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CHAPTER IV

TRANSPORTATION

PART I.—RAILWAYS

BY WILLIAM J. CUNNINGHAM

The recent reorganization of American railways and the improvement in rail transportation service have been characterized by an eminent authority as "probably the most outstanding industrial accomplishment since the war."¹

In this review of economic changes in railways and their administration and public service since 1920, the significant developments in capital expenditures for betterments, financial organization, volume of traffic, motor vehicle competition, freight and passenger rates, labor conditions, operating efficiency, net income, valuation, consolidation, and quality of public service are discussed in turn.

I. CAPITAL EXPENDITURES

The large and continuing expenditure for additions and betterments to roadway, structures, terminal facilities, signaling, locomotives, and cars, is one outstanding feature in a review of railways since the war period. From 1920 to 1927, inclusive, the railways have made gross capital expenditures of almost six billion dollars. That sum has been divided about equally between (1) roadway and structures and (2) equipment—locomotives and cars. The additional investment has not created more route mileage, but has added to track mileage. The number of units of equipment has not been changed materially, but the capacity of the average unit and the aggregate capacity of all have been increased.

For nearly a decade prior to April, 1917, when the United States entered the World War, the diminishing net income of the railways had forced a curtailment in the former normal program of expenditures for enlargement and improvement of the railway plant and equipment. The common policy had been to keep facilities and their capacity reasonably ahead of the demands of steadily increasing traffic. That policy could not be maintained after 1910, except by relatively few companies. The financial condition of the carriers as a whole was serious, notably during the latter part of the five-year period between 1910 and 1915,

¹ Annual Report of Herbert Hoover, Secretary of Commerce, for the fiscal year 1926.

and many roads were forced into receivership. This alarming situation was attributable mainly to the growing burden of advancing costs of material and supplies, higher wage rates, and the disinclination of the Interstate Commerce Commission to authorize rate increases. Besides, there was a slowing up in the normal growth in traffic so that the lower unit costs, usually possible with greater volume of business, could not be realized. The first effects of the World War, in the latter part of 1914 and throughout 1915, were to hold back business activity in general and to react unfavorably upon railway earning power. The net railway operating income of \$805,000,000 for the fiscal year ended June 30, 1910, had shrunk to \$679,000,000 in 1915.

In 1916, the effects of orders for war materials from the Allies, and the feverish activity in the building and operation of plants engaged in the manufacture of such materials, were to stimulate business in general and to increase railway traffic. The net railway operating income jumped from \$679,000,000 in the year ended June 30, 1915, to \$1,058,000,000 in the calendar year 1916. From the point of view of net return upon railway investment, 1916, with a rate well over 6 per cent, was the best year the railways have had. The favorable results were possible because there was just enough unused capacity in facilities to take care of the heavier traffic without serious overload, so that the economic law of increasing returns had full play.

Had there been no further disturbance, it is possible that the better net income might have permitted the railways to resume the former normal program of betterments and enlargements, and their facilities and equipment might have been made equal to the needs of an even larger volume of traffic. But it was difficult to obtain capital funds. The opportunities in the industrial field were competitively much more attractive to investors. It was difficult also to obtain materials and labor when munition and other war supply plants could overbid the railways. Then when the United States entered the war, came mobilization and an extensive national program of construction of cantonments, ships, aircraft, and the enlargement of other war supply plants.

The railways made a commendable effort to meet the much heavier transportation demand by voluntarily unifying their operations and abandoning competition under the Railroads' War Board, but the obstacles were so great as to prevent continuation of early success. The further increase in traffic brought an overload on the carriers serving the Atlantic seaboard, and congestion ensued. The facilities and equipment were inadequate under the conditions of confusion in right of priority to preferred service; the carriers were unable to obtain funds on reasonable terms for vitally needed additional facilities or to refund obligations about to mature; the draft and demands of war-material production had left no labor supply; the railway employees, chafing under the growing

spread between their wages and those paid to workers in other industries, demanded advances on threat of strike; and, finally, there was serious doubt as to whether the railways in their voluntary unification were not violating the Sherman Act. This combination of conditions, notably the serious traffic congestion, led President Wilson, as a war emergency measure, to take over the railways, effective January 1, 1918, to be operated for the Government by a Director General of Railroads.

The results of Federal control and operation of railways from January 1, 1918, to March 1, 1920, need not here be reviewed except to say that under complete unification, with unprecedented power in the hands of the Director General, the railways were effectively operated as a branch of the Government. Traffic congestion was relieved within a few months. The funds imperatively needed for facilities and equipment were supplied by the Government. Wages were advanced. Freight and passenger rates were increased. Nonessential traffic was regulated by the issuance of permits. In brief, the railways in 1918 produced a greater volume of transportation than in any previous year, and rail service was effectively co-ordinated with the war-time activities of the Army, Navy, and allied branches of Government service.

This summary of events prior to and during the war is here given to furnish a background for the review of railway policy in capital expenditures since the war. It is necessary to bear in mind that normal development had been retarded by low earning power immediately preceding the war, and that railways were underequipped for the overload of war traffic. It should be borne in mind also that the capital expenditures made during the period of Federal control were determined primarily by the peculiar demands of war traffic under unified control, and were influenced but slightly by considerations which would have governed the carriers themselves in furthering their purely corporate and competitive individual interests. In other words, the capital expenditures during the war-control period (aggregating \$1,200,000,000) were determined mainly by the emergency needs of the hour rather than from the long-time point of view of the individual carrier and its requirements for traffic under normal competitive conditions. Most of this program was authorized and begun in 1918, but a large part was carried over into 1919. While, in greater part, the money was advanced by the Government from a revolving fund provided for that purpose by the Federal Control Act, the cost, with certain minor exceptions, was later assumed by the carriers. The details of capital expenditures, as reported by the Director General in 1920, are listed in Table 1.

The year 1920 was one of readjustment and rehabilitation of the carriers individually after the period of unified Federal control. It was a year also of heavy traffic, which, because of car shortages, was not moved without serious delays and inferior service. In an effort to

TABLE 1.—CAPITAL EXPENDITURES DURING FEDERAL CONTROL

Item	1918	1919	Two years
Roadway and track.....	\$294,000,000	\$247,000,000	\$ 541,000,000
Improvements to existing equipment.....	19,000,000	21,000,000	40,000,000
New equipment purchased by railroads.....	161,000,000	64,000,000	225,000,000
New equipment purchased by United States Railroad Administration.....	118,000,000	239,000,000	357,000,000
Total 1918 and 1919.....	\$592,000,000	\$571,000,000	\$1,163,000,000
Estimated expenditures in January and February, 1920.....	.....	.....	37,000,000
Grand total.....	.....	.....	\$1,200,000,000

improve facilities and equipment, substantial appropriations were made for additions and betterments. In that year, the gross capital expenditures amounted to \$653,267,000.

In 1921 there was a marked decline in railway traffic and earnings, but the program of betterments was continued. The gross capital expenditures in that year aggregated \$557,035,000, and in 1922 they were \$429,273,000.

These expenditures of the three years 1920 to 1922, inclusive, while substantial, were far exceeded by the expenditures beginning with 1923, when the carriers, acting together through the Association of Railway Executives, in an effort to gain public confidence and goodwill, pledged themselves to "a program to provide adequate transportation." With a larger volume of traffic in sight, and disturbed by the fear of recurrent interruptions by car shortage or other transportation difficulty, the carriers set out to improve their individual performances in technical efficiency. To make that possible, the appropriations for betterments were more liberal and comprehensive.

Through the American Railway Association, the railways from time to time since 1923 have published certain data, compiled by the Bureau of Railway Economics, showing the annual capital expenditures of Class I railways.² The figures for the years 1920 to 1927, inclusive, are given in Table 2. The amounts in all cases are greater than those reported in the annual reports of the Interstate Commerce Commission,

² The Interstate Commerce Commission classification places in Class I carriers whose operating revenues are above \$1,000,000 per year. Class II carriers are those whose annual operating revenues are \$100,000 to \$1,000,000. Class III embraces the remainder, with operating revenues less than \$100,000. The route mileage of the three classes in per cent of total in 1926 was: Class I, 90.63 per cent; Class II, 6 per cent; Class III, 2.32 per cent. The remaining 1.05 per cent was made up of a few small railways not reporting to the Interstate Commerce Commission. In operating revenues Class I roads earned 97.30 per cent of the total, with Classes II and III, 1.49 per cent and .07 per cent, respectively.

as the figures of the Bureau of Railway Economics are the gross amounts without deduction for property retired and other similar adjustments. In Table 2 are included also the net increases in the investment account of Class I roads and their operating subsidiaries, as adjusted by the Interstate Commerce Commission for retirements and other factors.

TABLE 2.—CAPITAL EXPENDITURES AND NET ADDITIONS TO INVESTMENT IN ROAD AND EQUIPMENT, CLASS I RAILWAYS AND THEIR OPERATING SUBSIDIARIES, 1920 TO 1927, INCLUSIVE

Year ended December 31	Gross capital expenditures (Bureau of Railway Economics)	Net additions to road and equipment (Interstate Commerce Commission)
1920.....	\$ 653,267,000	\$ 551,459,000
1921.....	557,035,000	442,043,000
1922.....	429,273,000	362,090,000
1923.....	1,059,149,000	808,208,000
1924.....	874,743,000	714,251,000
1925.....	748,191,000	579,975,000
1926.....	885,086,000	652,419,000
1927.....	771,552,000	698,069,000
Total 8 years.....	\$5,978,296,000	\$4,808,514,000
Average per year.....	747,287,000	601,064,000

The first column in Table 2 represents the amount of cash expended for extensions, additions, and betterments; the second column gives the net amounts added to the property investment account. The difference is mainly in charges to operating expenses or profit and loss, with corresponding credits to the investment account for property retired or abandoned in connection with such work. From the point of view of gross cash expenditures, the improvements made to plant and equipment in the eight years 1919 to 1927, inclusive, have averaged almost three-quarters of a billion per year. The net average yearly addition to the investment account was \$601,064,000, or an increase of nearly 3 per cent per year.

It is interesting to note that, while for the entire period the expenditures for roadway and track and those for equipment were almost equal in amount, the percentage devoted to equipment has been declining. In 1920 it was 60 per cent, but in 1925 and 1926 it was 37 per cent and 36 per cent, respectively.

In Table 3 are shown the details of net charges to investment in road and equipment and the percentages by the three general accounts.

As supplemental information, Table 4, based on information compiled by the Bureau of Railway Economics, is added. The table shows the gross capital expenditures, 1922 to 1927, inclusive, subdivided between classes of equipment and items in roadway and structures. Under

RECENT ECONOMIC CHANGES

TABLE 3.—NET CHARGES TO INVESTMENT IN ROAD AND EQUIPMENT, BY GENERAL ACCOUNTS, CLASS I RAILWAYS AND THEIR OPERATING SUBSIDIARIES, 1920 TO 1927, INCLUSIVE

Year	Road	Equipment	General	Total
1920:				
Total	\$ 213,793,000	\$ 333,422,000	\$ 4,244,000	\$ 551,459,000
Per cent.....	39	60	a	100
1921:				
Total	186,821,000	251,459,000	3,763,000	442,043,000
Per cent.....	42	57	a	100
1922:				
Total	219,597,000	139,444,000	3,049,000	362,090,000
Per cent.....	60	39	a	100
1923:				
Total	336,606,000	466,278,000	5,324,000	808,208,000
Per cent.....	42	58	a	100
1924:				
Total	346,330,000	361,022,000	6,899,000	714,251,000
Per cent.....	48	51	a	100
1925:				
Total	360,526,000	216,009,000	3,440,000	579,975,000
Per cent.....	62	37	a	100
1926:				
Total	416,371,000	232,694,000	3,354,000	652,419,000
Per cent.....	64	36	a	100
1927:				
Total	522,482,000	163,614,000	11,973,000	698,069,000
Per cent.....	75	23	2	100
Grand total.....	\$2,602,526,000	\$2,163,942,000	\$42,046,000	\$4,808,514,000
Per cent.....	54	45	1	100

*Less than 1 per cent.

TABLE 4.—GROSS CAPITAL EXPENDITURES, CLASS I RAILWAYS AND THEIR OPERATING SUBSIDIARIES, 1922 TO 1927, INCLUSIVE

Item	Amount	Per cent
Locomotives.....	\$597,810,000	12.3
Freight train cars.....	1,449,695,000	30.4
Passenger.....	264,375,000	5.6
Other equipment.....	107,698,000	2.3
Total equipment.....	2,419,578,000	50.6
Additional track and track material.....	727,487,000	15.2
Heavier rail.....	195,656,000	4.1
Shops and enginehouses.....	218,146,000	4.6
All other improvements.....	1,207,128,000	25.5
Total road and structures.....	2,348,417,000	49.4
Grand Total.....	\$4,767,995,000	100.0

equipment it may be noted that freight cars took 60 per cent of gross expenditures for equipment or 30 per cent of all gross capital expenditures.

Improvements in Roadway and Structures.—The effects of the capital expenditures since the war may now be viewed from the angle of changes in physical units, in so far as they may be quantitatively measured. In road and structures, suitable units are available in but few items, but in equipment fairly complete information may be had.

Little change in the total route mileage—that is, the miles of roadway without regard to the number of tracks—has occurred since 1913. The operated route miles of all railways in that year were 253,470. In 1916 they were 259,211. Since then, the additions have been almost offset by mileage abandoned. The total operated route miles in 1927 were 259,639.

When the total track miles are considered (instead of route miles or miles of first track), the changes are more significant. The total track miles in 1913 were 379,508. Since then, there has been a steady net increase, notwithstanding losses by abandonment. The total in 1927 was 424,737, an increase since 1913 of 11.9 per cent. The changes since the war are shown in Table 5.

TABLE 5.—MILES OF ROAD AND TRACK OPERATED, ALL RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	First track	Other main tracks	Yards and sidings	Total
1920.....	259,941	36,894	109,744	406,579
1921.....	258,362	37,614	111,555	407,531
1922.....	257,425	37,888	114,046	409,359
1923.....	258,084	38,697	116,212	412,993
1924.....	258,238	39,915	116,874	415,026
1925.....	258,631	40,962	118,361	417,954
1926.....	258,815	41,686	120,840	421,341
1927.....	259,639	42,071	123,027	424,737
Per cent increase 1927 over 1920.....	0.1	14.0	12.1	4.4

^a Decrease.

The miles of first track in 1927 were practically the same as in 1920. The greatest gain in trackage had been in second and other multiple running tracks, but a similar increase, larger in absolute amount but somewhat smaller relatively, is noted in miles of yard tracks and sidings. These figures indicate that the railway route miles are now fairly adequate for transportation needs, especially in view of highway competition, and that the network of rail lines is not likely to expand in the future as it has in the past. But it is likely that there will be continuous need for the enlargement of capacity of existing lines by the construction of additional running tracks and sidings, and the enlargement and

improvement of terminals. The limiting point in the traffic-carrying capacity of the typical railway has been, and still is, in its terminals. A large part of the recent expenditures for capital improvements has been devoted to terminal improvements.

The capacity of a railway may ordinarily be increased substantially by the installation of modern automatic signals. They permit trains to run under closer headway, reduce the number of train stops, and otherwise cut down road delays which have been from 25 per cent to 33 per cent of total time between terminals. The extent of such installations is indicated by the changes in the mileage equipped with automatic signals. At the close of 1906, the railway route miles so equipped were 6,535. In 1911, they were 19,737; in 1916, 31,167; in 1921, 37,196; and in 1927 they were 50,953, an increase of 37 per cent over 1921.³ This substantial increase in signaling, intended to "save seconds safely," has important bearing upon the gains in operating efficiency.

The data from which it is possible to compute definite units reflecting changes in such physical elements as weight of rail, number of ties, depth of ballast, and capacity of bridges are meager. With the greater strains upon track, roadway, and structures by heavier locomotives and cars, the tendency is to use heavier rail sections, to increase the number of ties per rail length, to use ties chemically treated to resist decay, to apply heavier tie plates, angle bars, and rail fastenings, to use better ballast and increase its depth, and to replace light bridges and culverts by new construction with greater strength and longer life.

The average weight of rail in all main tracks of Class I roads on December 31, 1921, was 82.89 pounds per yard. On December 31, 1927, it was 88.09 pounds. According to the American Iron and Steel Institute, the total production of steel rail of 100-pound section or heavier, in 1914, was but 27 per cent of the total; in 1921 it was 39 per cent, and in 1927 it was 69 per cent. Nearly one-quarter of the total tons rolled in 1927 were of 120-pound section or heavier. Current installations on several of the carriers are in sections of 135-pound.

The common use of treated ties, notably during the past six years, has had the effect, by prolonging the life of ties, of reducing the number required annually for renewals. Since 1922, the total number of new ties placed in previously constructed tracks of Class I roads has declined, notwithstanding the increase in trackage. The renewals in 1922 were 86,642,000; in 1923, 84,435,000; in 1924, 83,073,000; in 1925, 82,717,000; in 1926, 80,746,000; and in 1927, 78,340,000. While the total renewals have been less, the number of treated ties has been increasing—40,630,000 in 1922 and 57,083,000 in 1927. The treated ties in 1922 were 47 per cent of the total, and in 1927, 73 per cent.

³ Summarized from data submitted by 169 railways in answer to Interstate Commerce Commission questionnaire of July 22, 1927.

Locomotives and Cars.—When we turn to an examination of the equipment inventory in 1927 and the comparison with 1920, the striking fact is that there has been but a slight increase in the number of freight cars and an actual decrease in the number of locomotives, although the ton-mile product in 1927 was greater. With practically the same number of all passenger train cars, a decrease is shown in passenger carrying cars. The explanation is that the capacity of the average locomotive⁴ and freight car has increased, and, because of better facilities and improved operating technique, the equipment is being used more effectively. Hence, the railways, with practically the same number of freight cars in 1927 as in 1920, were able to handle substantially more tonnage and to provide service free from congestion or undue delay. The decline in passenger traffic accounts for the smaller number of passenger cars.

The number of steam locomotives in all classes of service on Class I roads in 1920 was 64,368. In 1927 it was but 60,868. The average tractive capacity, however, in 1920 was 36,365 pounds, while in 1927 it was 42,803 pounds. Thus the aggregate capacity of the smaller number of locomotives in 1927 was actually about 11 per cent greater than the aggregate capacity of the larger number in 1920. The improvement in locomotive design, moreover, has not been confined to the increase in tractive capacity. There is now a greater use of economizing devices, such as high-pressure boilers, superheaters, feed-water heaters, limited cut-off, boosters, and other improvements in design.

The number of freight cars owned by Class I railways in 1920 was 2,340,761, and the average capacity per car was 42.4 tons. In 1927, the total of railway-owned cars was 2,324,101 and the average capacity per car was 45.6 tons. Thus, while in number there has been little change, the aggregate capacity, because of retirement of old cars of low capacity, has been increased 8 per cent. Private line freight cars used in railroad service on a rental basis are not included in the totals. Of these, there were 203,372 in 1923 and 288,446 in 1927.

The number of passenger service cars of Class I roads in 1920 was 53,501. In 1927 it was 53,822. There was a slight increase in baggage, mail, and express cars, but the number of coaches and combination cars decreased from 36,814 in 1920 to 32,023 in 1927. Pullman cars, of which there were 7,764 in 1922 and 9,017 in 1927, are not included in the total. Elsewhere it is noted that the shrinkage in railway-borne passengers is mainly in local service. The cars released by taking off local trains are mainly of old type, and the retirements have not been offset entirely by acquisition of new equipment for through trains.⁵ The details of equipment changes are listed in Table 6.

⁴ See Improvement in Power Plant, Chap. II, Industry, Part 2, pp. 119 et seq.; Chap. IV, Transportation, Part 2, p. 312.

⁵ See Obsolescence, Chap. II, Industry, Part 2, pp. 129, 139; Chap. III, Construction, p. 226; Chap. V, Marketing, p. 330.

TABLE 6.—EQUIPMENT OF CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Steam locomotives ^a			Freight train cars ^b			Passenger train cars ^c	
	Number	Total tractive capacity (thousand pounds)	Average tractive capacity (pounds)	Number	Total capacity (thousand tons)	Average capacity (tons)	Passenger carrying cars	Total
1920.....	64,368	2,340,761	36,365	2,322,025	98,343	42.4	36,814	53,501
1921.....	64,585	2,385,470	36,935	2,315,595	98,504	42.5	34,079	54,331
1922.....	64,140	2,401,452	37,441	2,293,389	98,847	43.1	33,997	54,354
1923.....	64,939	2,544,115	39,177	2,315,609	101,318	43.8	33,990	54,718
1924.....	65,006	2,593,178	39,891	2,348,722	104,149	44.3	33,880	55,040
1925.....	63,612	2,586,868	40,666	2,357,221	105,570	44.8	33,131	54,622
1926.....	63,342	2,611,238	41,886	2,348,643	105,953	45.1	32,977	54,773
1927.....	60,868	2,605,347	42,803	2,324,101	105,819	45.6	32,023	53,804

^a In 1920 there were 153 electric locomotives; in 1927 there were 449.

^b Private line freight cars not included.

^c Pullman cars not included.

The greater use of steel in car construction is noteworthy. In 1920, the number of all-steel freight cars was 630,150. Of steel underframe with wood bodies there were 886,296. Of the total cars, 27 per cent were all-steel and 38 per cent had steel underframes, or 65 per cent in both classes. In 1927, there were 799,820 cars of all-steel and 1,086,982 with steel underframes—34 per cent of the total in all-steel, 47 per cent with steel underframes, or 81 per cent in all. In 1920, there were 15,111 passenger train cars of all-steel, or 28 per cent of the total, and with steel underframes there were 6,573, or 12 per cent of the total, making 40 per cent of steel construction. In 1927, this percentage had grown to 65 per cent—25,342, or 47 per cent, of all steel and 9,677, or 17 per cent, with steel underframes.

II. CHANGES IN FINANCIAL ORGANIZATION

Compared with the recent substantial additions to capital investment, the increase in railway capital obligations is relatively small. In Tables 7 and 8 are shown, by years beginning with 1920, the total investment of all railways in road and equipment and the total capitalization in stocks and bonds.

Subject to qualifications hereinafter noted, three significant points stand out in a comparison of the figures in the two tables and their relation to gross capital expenditures.⁶

⁶ The difference between the gross capital expenditures and the net additions to the investment account is explained by the credits to investment and corresponding charges to operating expenses or to surplus for property retired and replaced or abandoned. Operating expenses or surplus must be charged and the investment account credited with the original cost of property consumed in operation, and the

1. The aggregate gross expenditures for extensions, additions, and betterments during the years 1920 to 1927, inclusive, (Table 2) were \$5,978,296,000.

2. The net increase in the account "Investment in Road and Equipment" during the same period (Table 7) was \$4,604,551,000.

3. The net increase in railway capitalization (stocks and funded debt) during the same period (Table 8) was \$1,142,761,000.

From the fact that additional securities amounting to \$1,142,761,000 were issued against an additional investment of \$4,604,551,000, it is evident that the railways have been financing the greater part of improvement work out of current income or surplus.

Prior to July 1, 1907, there was no classification of expenditures for road and equipment, and the accounting methods of the carriers were not uniform. The policy of many prosperous carriers had been to charge substantial parts of improvement costs to operating expenses, thereby understating the investment account and creating hidden reserves. Many of the weak carriers, on the other hand, went to the opposite extreme in charging to capital amounts which should have been charged to current operation, thereby bringing about an overstatement of investment with a corresponding overstatement of current net income. In defense of the prosperous roads, it may be said that this "ploughing in" process was on the side of conservatism, even though disguised by an understatement of net profits, but, with respect to the opposite policy of the weak carriers, there is no defense except that of financial expediency when true accounting might have precipitated financial trouble by calling attention to inadequate earning power. In either case, the carrier was not bound by specific instructions from the Commission, as its earlier efforts to bring about uniformity had not been extended to the investment account. While the carriers were required to report annually the details of their balance sheet and surplus accounts, each was left free to follow its own accounting policy in the matter of capital expenditures. Hence the balance sheet account "Cost of Road and Equipment," prior to 1907, was not uniformly kept. It is probable that the undercharges to that account, by reason of capital expenditures absorbed in operating expenses, were greater than the overcharges improperly made to hold down operating expenses.

Since 1907, the carriers have been governed by definite instructions from the Commission, and the additions to the investment account in the 20 years of uniformity in accounting have been so large in the aggregate as to reduce the questionable base of 1907 to but one-half of the

investment account charged with the original cost of the replacements or additions. The net addition to the investment account may be capitalized in full either at the time the expenditures are made or later, but conservatism demands that securities should not be issued against the whole amount.

present total. On June 30, 1907, the book value of road and equipment, all carriers, was reported as \$13,030,344,328, and on December 31, 1927, it was \$24,453,870,938.

Inasmuch as we are concerned here only with recent changes, the figures in Table 7 are confined to the years since the war. The lack of uniformity in accounting prior to 1907 does not affect the present comparison, as the additions since 1907 have been accounted for under uniform practice.

TABLE 7.—INVESTMENT IN ROAD AND EQUIPMENT, ALL RAILWAYS, DECEMBER 31, 1920 TO 1927

Year	Amount	Year	Amount
1920.....	\$19,849,319,946	1924.....	\$22,182,267,385
1921.....	20,329,223,603	1925.....	23,230,915,985
1922.....	20,580,168,269	1926.....	23,880,740,146
1923.....	21,372,858,161	1927.....	24,453,870,938

TABLE 8.—CAPITALIZATION OF ALL RAILWAYS, DECEMBER 31, 1920 TO 1927
(In millions of dollars)

Year	Common stock outstanding	Preferred stock outstanding	Funded debt outstanding	Total capital outstanding	Stocks and bonds owned by railways	Net capitalization
1920.....	7,216	1,898	12,778	21,891	4,897	16,994
1921.....	7,275	1,800	13,216	22,292	5,209	17,083
1922.....	7,307	1,834	13,149	22,290	5,010	17,280
1923.....	7,398	1,852	13,589	22,839	5,028	17,810
1924.....	7,539	1,935	14,162	23,636	5,435	18,202
1925.....	7,602	1,937	14,105	23,644	5,454	18,191
1926.....	7,560	1,924	14,192	23,677	5,443	18,234
1927.....	7,683	1,980	13,952	23,614	5,477	18,137

Attention has been called to the relatively large part of additional net investment financed from income and surplus. That conservative policy of financing, however, was not altogether one of choice. As a matter of fact, the railways, because of unsatisfactory net earnings just before and immediately after the war, were unable, with a few notable exceptions, to sell stock, and their bonds in the early postwar period could be sold only at high rates of interest or at substantial discount.⁷

⁷ Throughout the period 1920 to 1927, inclusive, only eight companies—Illinois Central, New York Central, Chesapeake & Ohio, Southern, New York, Chicago & St. Louis, Baltimore & Ohio, Atlantic Coast Line, and St. Louis-San Francisco—sold any substantial amounts of stock to the public for cash. The only other sales for cash were in connection with reorganization or were for intercorporate purposes. In 1920, the Pennsylvania Railroad found it necessary to offer 7 per cent in order to sell a 10-year bond for refunding purposes. In refunding their joint issue of collateral trust bonds, based on Chicago, Burlington & Quincy stock, the Great Northern and

TABLE 9.—CONDENSED BALANCE SHEET, CLASS I RAILWAYS EXCLUSIVE OF THEIR NONOPERATING SUBSIDIARIES, DECEMBER 31, 1920 AND 1927

Item	1920	1927
ASSETS		
Investments:	<i>Thousands of dollars</i>	<i>Thousands of dollars</i>
Investment in road and equipment.....	15,665,749	18,522,613
Improvements on leased railway property.....	331,075	454,041
Miscellaneous physical property.....	232,584	159,094
Investments in affiliated companies.....	4,032,349	4,710,083
Other investments.....	708,686	905,782
Total investments.....	20,970,443	24,751,613
Current assets:		
Cash.....	369,422	495,846
Miscellaneous accounts receivable.....	793,472	213,184
Materials and supplies.....	755,563	523,651
Special deposits and other current assets.....	599,543	483,309
Total current assets.....	2,518,000	1,715,990
Deferred assets, total.....	1,898,417	194,998
Unadjusted debits, total.....	874,983	305,984
Grand total.....	26,261,843	26,968,585
LIABILITIES		
Stock:		
Capital stock.....	7,209,735	7,831,282
Stock liability for conversion.....	35,345	1,510
Premium on capital stock.....	42,124	48,094
Total stock.....	7,287,204	7,880,886
Grants in aid of construction.....	2,944	7,139
Long-term Debt:		
Funded debt unmaturred.....	9,690,092	10,511,573
Receivers' certificates.....	14,468	4,070
Non-negotiable debt to affiliated companies.....	310,682	425,937
Total long-term debt.....	10,015,242	10,941,580
Current liabilities:		
Loans and bills payable.....	291,952	64,499
Miscellaneous accounts payable.....	179,608	110,711
Other current liabilities.....	1,410,277	1,136,090
Total current liabilities.....	1,881,837	1,311,300
Deferred liabilities.....	2,305,308	123,447
Unadjusted credits:		
Accrued depreciation.....	995,938	1,753,903
Other unadjusted credits.....	832,535	689,288
Total unadjusted credits.....	1,828,473	2,443,191
Corporate surplus:		
Additions to property through income and surplus.....	818,245	859,192
Funded debt retired through income and surplus.....	84,580	82,612
Sinking fund reserves.....	51,941	40,030
Miscellaneous fund reserves.....	36,757	55,463
Appropriated surplus not specifically invested.....	101,876	60,104
Total appropriated surplus.....	1,093,399	1,097,401
Profit and loss surplus—balance.....	1,847,436	3,163,641
Total corporate surplus.....	2,940,835	4,261,042
Grand total.....	26,261,843	26,968,585

Northern Pacific in 1921 had to offer the new issue at 6½ per cent and to sell at a discount. The prevailing rate during that time and for a year or two later was from 6 to 5½ per cent for well-secured mortgage bonds. The average rate of interest (based upon par without taking into account discount) upon all new bonds issued in 1922 was 5.53 per cent. The average has since been lower—5.29 per cent in 1923, 5.05 per cent in 1924, 5.16 per cent in 1925, 4.88 per cent in 1926, and 4.84 per cent in 1927. These averages, reported by the Interstate Commerce Commission, would be more significant if the yield were based upon the amount actually paid rather than upon par, but they indicate the tendency toward a lower interest rate on railroad funded debt.

A general view of the financial structure of Class I railways in 1920 and 1927 is afforded by Table 9, in which are condensed the significant items of the balance sheets of Class I railways as of December 31, 1920 and 1927. These figures are for the owned properties of Class I railways and therefore do not include their nonoperating subsidiaries. The tabulation is not complete but is intended merely for the purpose of comparison between the two periods.

The impracticability, except in the few exceptional cases, of carriers financing the capital improvements of recent years by the sale of stock has led to an unhealthy tendency to increase the proportion which the funded debt bears to total capitalization. While no hard and fast rule can be applied without qualification, financial prudence dictates that the stake of the stockholders in the enterprise which they control should be little, if any, less than the amount which they borrow.*

During the decade of 1890-1900, the ratio of funded debt to total capitalization of all railways ranged between 50 and 53 per cent. In the following decade, it began at 49 per cent and ended at 56 per cent. Since 1910, it has steadily increased, and, since 1923, has stood between 59 and 60 per cent. The figures in Table 9, for Class I railways only, show that the ratio was 57.9 per cent in 1920 and 58.1 per cent in 1927. Including roads of Classes II and III, the ratio in 1927 was 59 per cent.

III. CHANGES IN VOLUME OF TRAFFIC

The two principal measures of railway traffic volume are revenue ton-miles and revenue passenger-miles. These units take account not only of the number of tons and passengers, but also of the distance carried in each case.

Transportation by rail in 1920 was one of record-breaking proportions. In tons, ton-miles, passengers, and passenger-miles, the volume was substantially greater than in 1916, the previous year of high record. Business in general was unusually active, in contrast to the inactivity of 1919, and the civilian passenger traffic was augmented by the processes of demobilization of military forces.

From the point of view of freight service, there have been three relatively poor years since 1920. The revenue ton-miles of 1921, 1922, and 1924 were less than those of 1920, but with a larger volume of business in the other postwar years the trend of freight traffic has been upward. The year 1926 now holds the record—443.7 billion revenue ton-miles for

* This is clearly an expression of opinion. It may be argued that investments in public utilities should be mainly nonspeculative and should have a limited return, that bonds with their fixed and relatively low return are less speculative than stocks, and that, if the Transportation Act is successfully administered, the railway net income will, on the whole, be adequate to permit regularity of interest payment on a large percentage of fixed obligations in the cases of those roads which might in any case market stock.—Note by George Soule, Director of the National Bureau.

Class I railways. The comparable figure in 1927 was 428.6 billions; in 1925 it was 413.8 billions; and in 1920 it was 410.3 billions.

In contrast to the growth in freight tonnage, the passenger-miles have fallen off seriously. The total of 1920—46.8 billion passenger-miles on Class I railways—is likely to stand for a long time as the high record. Since then, with one exception, every successive year has shown a substantial decline both in passengers carried and in passenger-miles. The passenger-miles on Class I railways in 1927 were 33.6 billions, a decrease from 1920 of 13.2 billions, or 28 per cent. This decline will be discussed in the next section of this chapter.

The details of both freight and passenger transportation for Class I railways, 1920 to 1927, are shown in Table 10.

TABLE 10.—FREIGHT AND PASSENGER SERVICE, CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Freight service			Passenger service		
	Revenue tons carried	Revenue ton-miles	Average haul	Passengers carried	Passenger-miles	Average journey
	<i>Millions</i>	<i>Millions</i>	<i>Miles</i>	<i>Millions</i>	<i>Millions</i>	<i>Miles</i>
1920.....	2,260	410,306	181.5	1,235	46,849	37.9
1921.....	1,691	306,840	181.5	1,035	37,313	36.0
1922.....	1,841	339,285	184.3	967	35,470	36.7
1923.....	2,334	412,727	176.9	987	37,957	38.5
1924.....	2,172	388,415	178.8	933	36,091	38.7
1925.....	2,304	413,814	179.6	888	35,950	40.5
1926.....	2,465	443,746	180.0	862	35,478	41.1
1927.....	2,362	428,621	181.5	830	33,648	40.6

An examination of commodity statistics in Table 11 reveals, with one exception, no notable changes in tonnage by groups or in the percentage which each group bore to the grand total, 1920 to 1927. The exception is noted in products of mines which, because of labor troubles at the coal mines in 1921 and 1922, moved in smaller volume. The coal tonnage is such a large part of the total that fluctuations in that single item may distort the percentage relationships of other commodity groups to total. For example, in 1921, the tonnage of products of agriculture was but 1 per cent more than in 1920, yet its proportion of total tons jumped from 9.76 per cent to 13.17 per cent, because the tonnage of mine products fell off so sharply with losses in all other groups. The volume of tonnage of agricultural products has been remarkably uniform throughout the entire period, the upper and lower extremes being 230.9 million tons in 1924 and 215.1 million tons in 1925. The same comment may be applied to animal products and forest products, although the fluctua-

tions are greater than those in agricultural products. A much greater range is apparent in manufactured products. These moved upward or downward in harmony with fluctuations in the tonnage of mine products. The volume of less-than-carload tonnage shows a downward tendency, reflecting the effect of motor truck competition.

TABLE 11.—REVENUE FREIGHT CARRIED, BY CLASSES OF COMMODITIES, CLASS I RAILWAYS, 1920 TO 1927

Year	Total tons carried (in millions)						
	Products of agriculture	Animals and products	Products of mines	Products of forests	Manufactures and miscellaneous	Less than carload	Total
1920.....	220.0	44.9	1,209.1	195.6	494.6	89.9	2,260.0
1921.....	222.7	41.8	878.2	148.0	333.0	67.0	1,690.8
1922.....	220.7	44.8	912.4	171.2	421.8	69.9	1,840.9
1923.....	220.5	48.9	1,250.2	222.6	517.8	73.6	2,333.6
1924.....	230.9	48.5	1,114.6	209.4	500.3	68.1	2,171.7
1925.....	215.1	46.3	1,212.0	210.1	552.5	68.2	2,304.3
1926.....	223.9	47.0	1,341.6	204.8	579.8	68.2	2,465.4
1927.....	221.0	46.7	1,271.7	192.7	564.1	65.8	2,361.9
Year	Per cent of total tons						
	Products of agriculture	Animals and products	Products of mines	Products of forests	Manufactures and miscellaneous	Less than carload	Total
1920.....	9.76	1.99	53.64	8.68	21.94	3.99	100
1921.....	13.17	2.47	51.94	8.76	19.69	3.97	100
1922.....	11.99	2.44	49.56	9.30	22.91	3.80	100
1923.....	9.45	2.09	53.58	9.54	22.19	3.15	100
1924.....	10.63	2.23	51.33	9.64	23.04	3.13	100
1925.....	9.33	2.01	52.60	9.12	23.98	2.96	100
1926.....	9.08	1.91	54.42	8.30	23.52	2.77	100
1927.....	9.36	1.98	53.84	8.16	23.88	2.78	100

Another measure of railway freight traffic is available in the statistics of loaded cars, but the unit "cars loaded" is not as comprehensive as ton-miles since the former is not weighted for differences in carload weights or lengths of haul. The carloadings per week by years, since 1920, were as shown in the following statement:

1920.....	868,000
1921.....	756,000
1922.....	831,000
1923.....	958,000
1924.....	933,000
1925.....	985,000
1926.....	1,021,000
1927.....	995,000
First 11 months of 1927.....	1,006,000
First 11 months of 1928.....	1,001,000

A comparison of the carloadings and the ton-miles indicates that the fluctuations do not correspond in degree. In 1927, the excess of ton-miles over 1920 was 4.5 per cent, while the excess of cars loaded was 14.6 per cent. The difference is attributable in large measure to a lighter carload in 1927, but it is possible also that the carload statistics are not as carefully compiled as are the ton-miles. The discrepancy is not as great in later years. The per cent of decrease in ton-miles, 1927 under 1926, was 3.4 per cent, and the decrease in loaded cars was 2.5 per cent.

The average length of the haul (per railway) shows little change in freight service, but the average journey per passenger (per railway) shows an increase. This is owing to the loss of local passengers to the highway and to a slight increase in the number of long-distance passengers. These averages are partially deceptive in that interline tons and passengers (those which in a given movement are handled by more than one railroad) are counted once by each railroad and are thus duplicated in the totals. A better index of the freight haul is found by dividing the total ton-miles by the tons *originated*, thus giving the average haul per ton on the railways of the United States considered as one system. In 1920, the average haul per ton on that basis for all railways was 303.5 miles; in 1921 it was 304.11 miles; and in 1927 it was 314.75 miles. For the passenger service no such basis is available, as no distinction is made in the statistics between originated and total passengers carried.

In view of the steady decline in the total passengers carried by rail, it is of interest to note that the number carried in Pullman cars (included in the railway total) has had an upward tendency. The number of Pullman car passengers in 1921 was 31,225,324, or 3 per cent of the total passengers carried by rail. By 1926, the number had grown to 36,073,211, or 4.2 per cent of total. In 1927, it had dropped to 35,197,178, but, because the loss in total passengers had been relatively greater, the Pullman percentage of the total remained at 4.2 per cent.

The changes in relative proportions of Pullman, commutation, and day-coach passengers (other than commutation) are more striking when stated in terms of revenue. In 1921, the Pullman passengers contributed 31.1 per cent of the total passenger revenue; in 1927, their contribution was 45.3 per cent, with a corresponding decline in total day-coach revenues from 68.9 per cent to 54.7 per cent. If, however, the commutation passenger revenue is segregated, the loss in day-coach passenger revenue other than commutation is much more impressive. Commutation passenger statistics are not available prior to 1922. In that year, the commutation revenue was 6.3 per cent of the total, and in 1927 it was 7.6 per cent. In the meantime, the day-coach passenger revenue (exclusive of commutation) declined from 59.9 per cent to 47.1 per cent.⁸

⁸ These percentages are taken from a study made by Samuel O. Dunn, editor, *Railway Age*, and used by him editorially in the issue of March 19, 1927.

IV. EFFECT OF MOTOR VEHICLE COMPETITION

The passenger automobile as a modern agency of transportation is about twenty-five years old. The motor truck and the motor coach are even younger. Yet in many respects the automotive industry, in its quarter-century of development, has outstripped the railways, now a century old. The public investment in motor vehicles and hard-surfaced highways now exceeds the public investments in railways and their equipment. The number of employees in the automotive industry and highway transportation is more than those engaged in railway service. Motor vehicles now rank first in value of annual products and third in value of exported goods.

The effects of the private automobile and the motor coach on railway passenger traffic, and of the motor truck on railway freight traffic, are difficult to measure accurately. It is impossible to determine how many passenger-miles made by private motor vehicles are due solely to the desire to ride for pleasure, and how many passenger-miles are substitutes for railway transportation. To a large extent the passenger traffic by highway is not competitive with railways. It is created by the automobile itself, and would not be produced by railways if the automobile were not available. Passenger traffic by motor coach, however, is highly competitive with the electric and steam railways. The motor truck, almost entirely displacing the horse-drawn vehicles in urban communities, has widened the zone of local trucking and is taking from railways a substantial part of short-haul traffic in small shipments. In practically every city there are organizations of common carriers by motor truck. Then there are the contract truckers who serve only one or a limited number of customers under contract, and finally there are the trucks owned and operated by the individual industries for their own service exclusively.

The steady decline in railway passenger traffic since 1920 (Table 11) is evidence that the competition of motor vehicles is severe. The automobile is being used more and more on relatively short trips, both for business and pleasure, that formerly were made by rail. The public has recently shown a decided preference for the motor coach over the steam railway coach and the trolley car.

The railway loss has not been in the long-distance passengers. The Pullman car statistics support the statement that railway long-distance passenger traffic continues to grow slowly. It is probable, however, that the growth would have been much greater if the automobile and motor coach had not been developed.

Nor is the railway loss in suburban traffic. The number of commutation passengers has been increasing steadily—about 3 per cent per year since 1921. The railway loss is confined almost entirely to the traffic

on local trains between adjacent cities or on secondary or branch lines. Such losses are serious, as the local passenger trains ordinarily have been poor earners, if not unremunerative, and the lighter loads have increased the number of trains with gross earnings less than the actual "out of pocket" expenses. This has brought about curtailment of train service or abandonment of branch lines, when such action is permitted by the regulatory authorities, and the effect of poorer railway service has been to stimulate the transfer of passengers to the highway.

The railway managers are concerned about the heavy losses in passenger traffic and the further competitive possibilities. To meet the new form of competition, many railways, besides improving their through train service, have organized motor coach companies as subsidiaries, and are recapturing a part of the lost traffic by catering to the public preference for rubber tires over steel. Motor coach lines are being operated by railways as substitutes for branch line steam trains, as auxiliaries to rail service, and even in the duplication of rail service. The railways, either directly or through subsidiaries, early in 1928 operated about 1,046 motor coaches over 10,519 route miles, and the service is expanding. The importance of this new railway activity is shown by the fact that the American Railway Association has recently created a new organization known as the Motor Transport Division of that association.

The competition of motor trucks in freight service is not so alarming from the railway point of view. The potentialities are not as great as in passenger service. A reasonable estimate of the transportation production of all motor trucks on the highways outside of cities is that they produce a total ton-mileage equivalent to less than 3 per cent of the actual ton-miles produced by railways. In mass movements over long distances the railway is supreme. To haul as much revenue freight as is carried by the average freight train with a crew of five or six men would require at least 140 fully loaded 5-ton trucks, with at least that number of operators, and with a total fuel cost of over \$5 per mile in contrast to the railroad fuel cost of about 50 cents per mile. The trucks cannot compete successfully, except in the narrowly limited field of small short-haul shipments of relatively high value, or when the combination of pick-up, road haul, and final delivery service by truck saves time and minimizes damage or loss by theft. The zone, within which motor trucks can economically compete with railways for the transportation of selected commodities, varies with local conditions, but in a typical case the limit is from 30 to 50 miles, with a wider range under conditions favorable to the truck and for a small number of commodities.

The railway commodity statistics (Table 11) show that the volume of less-than-carload freight is declining. A part of the loss may be attributed to motor truck competition. Studies made by the highway authorities of several states indicate that the volume of truck-borne

tonnage which might move by rail is substantial and is increasing. Relatively, however, the freight which the motor truck is taking from the rails is small and, what is more important, it is the kind of traffic which the railways can give up with little, if any, net loss. The small, short-haul shipments, while yielding a high gross revenue per ton-mile, are carried at exceedingly high ton-mile cost, and the net revenue is relatively low. This kind of traffic is burdensome in its demands upon terminals and freight cars, and usually is moved in way-freights, the poorest paying of freight trains. Confronted with the continuing necessity for enlarging terminals and increasing the productivity of equipment, the railways may regard with equanimity the loss of a part of the tonnage which is least attractive from the viewpoint of net revenue, and they can devote the released capacity in facilities and equipment to the long-haul and better-paying tonnage.

As in the case of competition of motor coaches in passenger service, the railways are entering the field of motor trucking by establishing highway freight service where it is more economical or gives better public service than by rail. In this field, however, railway activity is not as great as in meeting motor coach competition. Thus far the railway-controlled highway freight service is confined to substitution of trucks for way-freights or branch-line trains, or to serve as collecting or distributing media within metropolitan zones. To a small extent, a few railways have gone into the so-called "store door delivery" plan, under which the freight is called for or delivered by railway-controlled motor trucks. This practice is likely to be extended when the disputed points of carrier liability and extra charges for the service are satisfactorily settled.

The possibility of further inroads on railway revenues by highway competition depends in part upon Congressional action. To a large extent, motor vehicles, notably motor trucks, are unregulated except in minor particulars. In some states the authorities exercise certain police powers, especially with respect to motor coaches, but, broadly speaking, the trucks have a free hand in the matter of rates and assume no continuing obligation to serve. Under such circumstances, the railways have justification for complaint against unfair competition. Efforts have been made to enact a law which would place definite obligations upon common carriers by highway, and there was promise that action bearing upon motor coaches would be taken by Congress early in 1928. The bill, however, was not enacted. While it is probable that a similar bill affecting motor coaches may be passed in 1929, the likelihood of Federal regulation of trucks is more remote.

V. CHANGES IN FREIGHT AND PASSENGER RATES

The Federal Control Act, approved March 21, 1918, gave legislative sanction to the terms under which President Wilson, as an emergency

war measure, took control of railways, effective January 1, 1918, and clothed the President with wide powers over the rates to be charged to the public for transportation service. During the period of Federal control of railways, the Interstate Commerce Commission, temporarily shorn of power to suspend rates initiated by the Director General of Railroads acting for the President, left the determination of rates and classifications in greater part with the Director General. To meet the extra burden of war-time prices of materials and the substantial increases in wages of railway employees, the Director General, on May 25, 1918, ordered a horizontal increase of approximately 25 per cent in freight rates and advanced the passenger rates to three cents per mile. Where the existing rate was higher than three cents per mile, no increase was ordered. Suburban fares were advanced 10 per cent. For the passenger service as a whole, the increase was approximately 18 per cent, to which was added a surcharge of one-half cent per mile on tickets used in Pullman cars.⁹ Although strongly urged by the representatives of the railway corporations, during the second year of Federal control, to authorize further rate increases in recognition of further heavy increases in expenses, no further general advances in rates were authorized by the Director General. While numerous adjustments in individual rates were made, the majority were reductions rather than increases.

The fact that the rate basis in effect in 1919 was inadequate to insure a reasonable return to the railways was recognized by Congress in the Transportation Act of 1920. Into that law was written affirmatively a mandate to the Interstate Commerce Commission to establish rate scales which, under honest and economical management, would "as nearly as may be" yield to the railways as a whole, in territorial groups, a fair return on the value of property used in transportation service. The value was to be determined by the Commission. For the first two years the fair return was defined as 6 per cent, but the Commission was empowered to change that rate from time to time thereafter.¹⁰

Basing their estimates in part upon the book investment figures submitted by the railways, and in part upon the tentative physical valuation of approximately one-quarter of railway mileage, and taking into account the wage increases ordered on July 20, 1920, by the United States Railroad Labor Board, the Commission, effective August 28, 1920, authorized increases in freight rates of 40 per cent in the East, 25 per cent

⁹ The additional charge on tickets used in Pullman cars was discontinued late in 1918.

¹⁰ "During the two years beginning March 1, 1920, the Commission shall take as such fair return a sum equal to $5\frac{1}{2}$ per cent of such aggregate value, but may, in its discretion, add thereto a sum not exceeding one-half of 1 per cent of such aggregate value to make provision in whole or in part for improvements, betterments, or equipment which . . . are chargeable to capital account." (Sec. 15a). In 1922 the Commission set $5\frac{3}{4}$ per cent as the fair return, omitting any reference to an additional sum for capital improvements.

in the South, 35 per cent in the West, and 25 per cent in Mountain-Pacific territory. The weighted average was between 30 and 35 per cent. In passenger service, the ticket rates were advanced uniformly (about 20 per cent) throughout the country, bringing the standard rate to 3.6 cents per mile, and charges for Pullman car seats and berths were increased 50 per cent (the added charge to be retained by the railways rather than the Pullman Co.). These increases¹¹ were intended, under the estimated volume of traffic, operating expenses, and taxes for the following year, to yield 6 per cent on estimated property value, but, while the Commission apparently accepted without question the railway estimates of revenues and expenses, it was unwilling to accept the book value as the basis for computing the return. The railways' book cost at the time was given as slightly in excess of \$20,000,000,000. The Commission, principally upon the basis of certain tentative valuation returns, arbitrarily wrote down the book value to \$18,900,000,000. This reduction in the base was equivalent to cutting down the estimated return from 6 to 5.7 per cent on the book value of the railway investment.

The carriers, however, were able to earn but a small part of the estimated net income in the first year under the new rates, because the volume of traffic in 1921 was very much smaller than the estimate. The earned return on book value was but 2.9 per cent.

The extent of the rate increases of 1920 was surprising to the shipping public, but, in that era of inflation and while business was booming, the higher transportation charges were accepted with little protest. Complaints began when the depression set in early in 1921, and throughout that entire year the railways and the Interstate Commerce Commission were besieged by requests for rate reductions. Many such reductions were made by the railways voluntarily, as previous relationships in absolute differentials in cents per 100 pounds between rates on certain commodities and between certain points were unduly disturbed by the horizontal percentage increases of 1918 and 1920. In the aggregate, the rate reductions were substantial, but they were not general enough to meet the widespread demand. The pressure of the agricultural bloc in Congress was focused upon the railways and the Commission. After hearings, the Commission ordered reductions in the rates on livestock, hay, and grain, and subsequently the railways voluntarily offered to reduce by 10 per cent the rates on all products of the farm, orchard, and ranch. The offer was approved by the Commission and the reduction became effective in October, 1921, but in the meantime the Commission instituted a prolonged inquiry into railway management and its relation to the rate scale as a whole.

Notwithstanding the meager net earnings of the carriers, the shippers' view, that the railway financial problem was but temporary and that

¹¹ The general average increase for all classes of service was about 32 per cent.

lower rates would probably stimulate business, prevailed with the Commission. In May, 1922, a general reduction in freight rates was ordered, but passenger rates were not changed.

Since then, there have been no general increases or decreases, but many changes, practically all downward, have been made either voluntarily or by Commission order. The efforts of the western carriers, beginning in 1924 and still continuing, to prove that their impaired financial situation justified a general advance in rates, have been unsuccessful. The Commission in 1926 definitely denied the application for a general 5 per cent rate increase, and has since ordered still further reductions in the rates on livestock and fruit.

The standard rate in passenger service has been 3.6 cents per passenger-mile since the advances of 1920. While that rate has been attacked from time to time, the demand has not been insistent or general. Such is not the case with respect to the Pullman ticket surcharge of 50 per cent. Complaint on that score has been bitter and continuous. The drive against the surcharge was carried into Congress, with a view to having it abolished by direct legislation. Such efforts, however, have fallen short of success, and, in the meantime, after investigation and hearings, the Commission declined in February, 1924, to order a change. Considering the passenger and freight services separately, the revenue and cost figures indicate that the net revenue from the transportation of passengers is relatively less than that from freight, and inasmuch as the carriers have not been earning and are not earning the promised fair return on value, it is obvious that the abolition of the surcharge would result in an even lower return for the service as a whole, or would require an advance in freight rates sufficient in degree to overcome the loss.¹² As has already been noted, the number of passengers in Pullman cars has been increasing steadily, notwithstanding the surcharge, while the number of passengers in coaches, under uniform rates since 1920, has been declining.

The average revenue per passenger-mile and per ton-mile are often used as indexes of average rates.¹³ The two averages are significant, and

¹² In 1927, the passenger service operating expenses of Class I railways took 89.69 per cent of passenger service revenues; in freight service the ratio was 70.29 per cent. For all classes of service the operating ratio was 74.54 per cent.

¹³ For comparative purposes the two averages are subject to qualifications and may not always reflect a true indication of rate levels. The general scale of passenger rates has not been changed materially since 1920, yet, because of the varying proportions borne to the total by through passengers carried under competitive rates, local passengers carried under the standard distance tariff of 3.6 cents per mile, and commutation passengers carried under very low passenger-mile rates, the average revenue per passenger-mile for all classes of service fluctuates from month to month and from year to year. In freight service the average revenue per ton-mile is influenced by the proportions of tonnage carried under very low rates and very high rates, as well as by the proportions of long-haul and short-haul tonnage. The general average is often affected as much by changes in volume of different commodities as by changes in rates.

they are given in Table 12. With the revenue units are shown the average hauls in each case, as well as the tonnage proportions of products of agriculture, mines and forests, as these commodities move under relatively low rates. For the passenger service the proportions of Pullman car passengers and commutation passenger-miles are given.

TABLE 12.—AVERAGE REVENUE PER TON-MILE AND PER PASSENGER-MILE WITH OTHER RELATED STATISTICS, CLASS I RAILWAYS, 1920 TO 1927

Year	Freight service			Passenger service				
	Average revenue per ton-mile	Average haul per ton	Per cent of total tons of products of agriculture, mines, and forests	Average revenue per passenger-mile	Average journey per passenger	Per cent Pullman passengers of all passengers ^a	Per cent commutation of total	
							Passengers	Passenger-miles
	<i>Cents</i>	<i>Miles</i>		<i>Cents</i>	<i>Miles</i>			
1920.....	1.052	181.55	72.08	2.745	37.94			
1921.....	1.275	181.48	73.87	3.086	36.03	3.0		
1922.....	1.177	184.30	70.85	3.027	36.66	3.3	44	17
1923.....	1.116	176.86	72.57	3.018	38.46	3.5	45	17
1924.....	1.116	178.85	71.60	2.978	38.70	3.7	47	18
1925.....	1.097	179.59	71.05	2.938	40.47	4.0	49	18
1926.....	1.081	179.99	71.80	2.936	41.14	4.2	52	19
1927.....	1.080	181.47	71.36	2.896	40.55	4.2	54	20

^a Pullman passenger-miles not available.

The fluctuations in percentage volume of low-grade commodities, except in 1921 when the tonnage of agricultural products was heavier than usual, are not substantial, nor are there any noticeable variations in the average haul. These two factors, showing no noticeable change in the average revenues per ton-mile, may be taken as fairly indicative of the effect of rate reductions in 1921 and subsequent years. The full effect of the 1920 increases bore upon the traffic of 1921, and subsequent decreases held down the averages of later years. Since 1921, the average receipts per ton-mile have declined steadily from 1.275 cents in that year to 1.080 cents in 1927.¹⁴

¹⁴ If the total ton-miles of 1927 had moved under the average ton-mile revenue of 1921, the public would have paid to the railways in freight revenue \$835,810,950 more. By the same process of computation, the savings to the public in other years, and the grand total 1922 to 1927, inclusive, for freight service only, were as shown in the following statement:

1922.....	\$332,499,300
1923.....	656,235,930
1924.....	617,579,850
1925.....	736,588,920
1926.....	860,867,240
1927.....	835,810,950
Total.....	\$4,039,582,190

In passenger service, the decline in the average receipts per passenger-mile, as already noted, is attributable in but small part to reductions in rates, although the practice of offering reduced rates for excursions and for other special purposes has been extended. The lower average revenue is attributable rather to the heavy losses in local passengers paying the standard rate of 3.6 cents per mile, and slight increases in both the long-distance passengers (carried at rates in many cases somewhat less than standard) and in commutation passengers who enjoy subnormal rates. The substantial and consistently continuous increase in the proportion of Pullman car passengers to total passengers carried is noticeable.

Inasmuch as the drop in average receipts per passenger-mile is due principally to causes other than changes in rates, it would not be proper, as in the case of freight service, to assume that the lower average actually saved any money to the public. As a matter of fact, the commutation rates in several cases have been increased.

VI. CHANGES IN RELATIONS BETWEEN RAILWAY MANAGEMENT AND EMPLOYEES¹⁵

The railways emerged from the period of Federal control with lowered employee morale.¹⁶ The centralization of power in the Director General, and in the bipartisan boards organized by him, had appreciably weakened the authority of the managers of the individual carriers.* The strength of railway labor unions and the prestige of their leaders had been substantially enhanced by the large wage increases and many concessions made during the war period. The first general increase affecting all employees was announced in May, 1918, retroactive to January 1, 1918, and several supplementary increases to separate classes, such as shopmen, were granted in 1919. Altogether the wage increases, or their equivalent in shortening of the working day, payment of punitive overtime rates, and other changes which affected the pay roll favorably from the point of view of the employee, added about \$1,000,000,000 per year to total wages, or about \$500 per employee per year.

In the closing months of the period of Federal control, the railway labor unions attempted to obtain further increases, but the Director General refused, urging the employees to be patient and hold their

¹⁵ See Labor Relations, Chap. II, Industry, Part 1, pp. 87, 90; Chap. III, Construction, p. 251; Chap. IV, Transportation, Part 2, p. 315; Chap. VI, Labor, p. 479; Chap. VII, Management, pp. 514-531.

¹⁶ The lower employee morale was not peculiar to railways but was common to industry in 1920.

* Any inference that a lowered morale of employees was associated with the strengthening of the unions under bipartisan boards of adjustment is, in my opinion, unfortunate. The lowered morale was due largely to the fact that in 1919 the cost of living had risen much more than wages.—Note by George Soule, Director.

petitions for determination by the Railroad Labor Board to be created by the Transportation Act, then under consideration by Congress.

The Railroad Labor Board, created by the Transportation Act of 1920, consisted of nine members: three representing each group, employees, management, and the public. Its first decision was made under great pressure for quick action, on July 20, 1920. It granted increases which averaged about 22 per cent to practically all employees, or at the rate of over \$600,000,000 per year. During the remainder of 1920 and until 1926 (when it was abolished), the Board was kept busy with disputes which should have been dealt with by adjustment boards. The law intended that the Railroad Labor Board should deal primarily with wage rates and broad working conditions, as provision was made also for the organization of bipartisan adjustment boards, subordinate to the Labor Board, to deal with disputes concerning rules and working conditions. But the creation of such adjustment boards was made optional rather than mandatory, and the law left for joint determination by labor and management whether such boards should be on a national, regional, or system basis. The unions affiliated with the American Federation of Labor,¹⁷ viewing with satisfaction the substantial accomplishment in standardization during Federal control, insisted upon national boards. To this the railways would not agree. By majority action they stood out for system boards. A minority of railway executives were willing to compromise on regional boards, but were outvoted. Thus the two parties were deadlocked, and as a matter of fact no affirmative action was ever taken in organizing the adjustment boards contemplated by law, although many system boards were formed by mutual consent subsequent to 1922.

The record of the Railroad Labor Board was one of trouble with both labor and management, and of internal strife after the first year of its existence. Shortly subsequent to its award of an increase of 22 per cent in wages in July, 1920, the depression of 1921 and the serious impairment of railway net income were apparent, and the carriers petitioned the board to cut wages to the level of 1920. Hearings were begun in January, 1921, but no decision was announced until June, when the Board authorized a 12 per cent reduction. This left the wage scale about 8 per cent above the 1920 base. The result was disappointing both to labor and to management. The latter had hoped for a much deeper cut, and announced their intention to move for further decreases. Smarting under the 12 per cent reduction, the possibility of further losses was met by the train service employees by a threat to strike, and in June, 1921, a serious dispute was narrowly averted by the acceptance of the wage reduction, with an implied assurance on the part of the managers that requests for further decreases would be withheld. The train

¹⁷ Practically all except the four train service brotherhoods.

service brotherhoods were not subsequently asked to accept wage cuts, but in 1922 the Labor Board, acting upon petition from the railways, authorized a second cut in wages or abridgment of favorable rules, adversely affecting the interests of other classes of employees, notably the shop crafts and trackmen.

That order, which brought down the wages of the shop crafts approximately to the scale of March, 1920, and took away the increases of June in that year, precipitated one of the most extensive, serious, and protracted strikes in railway history. Acting against the findings of the Labor Board, the shopmen refused to accept the cut and walked out on July 1, 1922, the date on which the lower rates were to become effective. The strike was directed not only against the wage reduction but also against the growing practice of some companies to give their equipment repair work to outside shops not subject to Labor Board rulings, and against the negative attitude of railway managers toward national adjustment boards.

The shopmen's strike was a failure and it cost them much in impaired prestige. A minority of the roads entered into a compromise agreement, influenced in part by the desire of the managers to get back their experienced employees to take the place of the inefficient strikebreakers, and in part by the desire of the labor leaders to prevent further damage to union prestige. On those roads, the strikers, when taken back without sacrifice of seniority rights, accepted the Labor Board rates, but, on the majority of the railroads, new shopmen were recruited and retained, and the number of strikers taken back eventually as new employees was but a small proportion of those who walked out. One indirect benefit to the shopmen was the abandonment of the policy of contract repairs in outside shops, but, in the matter of adjustment boards, the effect was to foster the organization of such boards on a system basis and to bring into being many "company unions" of shopmen unaffiliated with the national unions.

The policies of the Railroad Labor Board in connection with the shopmen's strike, its apparent inability to cope with the problem of adjustment boards (in the meantime having itself to pass upon a large volume of small disputes which should have been handled by adjustment boards), its failure to command full respect from either party, and a general belief on the part of the public that the Board was not functioning effectively, led to an agitation for its abolishment. Friction within the Board itself (between the representatives of labor and of the public) had no small part in the final outcome, but action was precipitated by the refusal of enginemen and firemen in western territory to obey a summons to appear before the Board and to take part in the hearings on a wage issue properly before the Board for determination. Subsequently, the employees refused to abide by the Board's decision amending certain

rules, and by strike threat coerced the railways into agreeing to a wage increase without amendment of rules. Refusal to abide by findings of the Board was not confined to employees, as one important carrier in eastern territory insisted upon carrying out a policy of employee representation contrary to Board ruling, and carried the issue into the courts. The decision was that the Board had no legal power to enforce its orders. In a few other cases the rulings of the Board were not observed by the carriers, notably in the prolonged continuance of the subterfuge of "farming out" maintenance work by contract to outside companies, virtually subsidiaries of the carriers, so as to place the employees affected outside the jurisdiction of the Board. That unethical procedure was eventually abandoned, but it was continued long enough to justify labor in asserting that defiance of the Board was practiced by the carriers as well as by the labor organizations, and that the blame for thus impairing the usefulness of the Board must be assumed in part by railroad management.

On the part of railway managers, the attitude of the majority was that the Board should be continued and strengthened by an amendment to the law giving it further powers, but as there appeared to be no likelihood that Congress would enact strengthening legislation, in view of labor opposition to the Board, no definite concerted stand was taken.

On the part of employees, the principal objection to the Board was against the public members who held the balance of power and who were regarded, unfairly perhaps, as antagonistic to labor.

Efforts were made by labor in 1925 to enact the Howell-Barkley Bill with its "closed shop" principle, and the bill was almost enacted.* Alarmed at the prospect of passage of such a law, and realizing that under the existing political conditions the Railroad Labor Board would not be continued, the railway executives sought a compromise which would give to labor the principal objectives it sought and yet would avoid the drastic proposals of the Howell-Barkley Bill. The results of joint conferences were embodied in the Watson-Parker Bill, introduced in January, 1926, and enacted in May, 1926.

An unusual feature of that legislation, dealing as it does with highly controversial matters, was the unanimity of support. The bill was advocated not only by the railway labor unions but also by a large majority of railway executives, and its passage was recommended by the President. The opposition, never formidable, was confined to

* It should be understood that the railway unions do not practise the "closed shop" in the sense in which that term is used by most well-informed students of labor relations—in other words, they do not ask the employer to agree to employ no nonunion men. The Howell Barkley bill merely embodied a plan to conduct labor relations through the standard national labor organizations, as opposed to the "company unions" established by employers.—Note by George Soule, Director.

a few representatives of manufacturers and shippers, who feared collusion between management and labor to increase wages and then to advance rates, and to a small minority of railway executives who insisted that the bill was wrong in principle and a compromise which would react unfavorably upon the public.

The essential difference between the 1926 and the 1920 laws lies in the elimination of public representation in the determination of wages, and in the elimination of compulsory arbitration. The 1920 law compelled arbitration but did not compel acceptance, while the 1926 law made arbitration voluntary but provided that the arbitral awards must be accepted. Instead of a continuing tribunal of nine men, three of whom represented the public, with a formal procedure of public hearings, complete records, and reported decisions, the new law has created a Board of Mediation of five members, appointed by the President, who may intervene in wage disputes and solely by process of mediation move to avert trouble. The new Board has no powers in summoning witnesses or holding public hearings, but acts solely as a peace-making body in harmonizing differences in point of view. If unable to bring about an amicable adjustment, the Board is required to make an effort to induce the disputants to agree to arbitration under procedure set forth in the law, the decision to be binding upon all parties. In the event of failure of mediation, or unwillingness of either or both parties to arbitrate, the Board of Mediation, if it believes that the dispute may substantially interrupt traffic, is required to notify the President who, in his discretion, is authorized to create a "fact-finding" emergency board to investigate and report to him within 30 days. The law provides further for a "cooling off" period. After the creation of the "fact-finding" board, and for 30 days subsequent to the date of its report, no change, except by agreement, shall be made by the parties to the controversy in the conditions out of which the dispute arose.

Since the creation of the Board of Mediation, there have been no labor disputes which the Board could not adjust. The years 1926, 1927, and 1928 have been free from interruptions to traffic by strikes. For such freedom, credit belongs in part to the Board. Yet the efficacy of mediation, arbitration, and emergency "fact-finding" has not thus far been thoroughly tested. Since 1926, there has been a general upward revision in wage rates without any serious dispute. The Board of Mediation has been of service in the adjustment of differences, but in the main the concessions have been made by the carriers. No attempt has been made to reduce wages.¹⁸

¹⁸ In but two cases (in May and October, 1928) has the appointment of a "fact-finding" emergency board been necessary. The first case involved the continuation of substandard wage rates on a weak road which, because of peculiar conditions of light traffic, could hardly meet its operating expenses. A strike was ordered to enforce

Some critics have contended that the railway executives have been too willing to concede to organized pressure for higher wages and more favorable rules affecting employment, and that, by concerted and firm resistance, they might have made better bargains with their employees and thereby held down operating expenses which the public must pay in transportation charges. Such criticism, however, overlooks the prime obligation of management to provide continuous service to the public. Ill feeling engendered by strife would react quickly on transportation service, and strikes would be highly demoralizing. Public opinion in crises of that kind is not likely to side with the corporations. Except in isolated and unimportant cases, the wages of railway workers cannot be said to be too generous. The high grade of transportation service since 1923 has increased the public goodwill toward railways, an asset not lightly to be jeopardized. The morale of the service in 1928, in contrast with that of 1920, has been high, and the employees and management have co-operated in increasing operating efficiency.

TABLE 13.—EMPLOYEES AND THEIR COMPENSATION, CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE*

Year	Average number of employees	Total hours worked	Hours per employee	Total compensation	Average compensation	
					Per hour	Per year
		<i>Thousands</i>		<i>Thousands of dollars</i>		
1920.....	2,022,832	5,446,741	2,693	3,681,801	\$.676	\$1,820
1921.....	1,659,513	4,147,319	2,499	2,765,218	.667	1,666
1922.....	1,626,834	4,311,897	2,650	2,640,817	.613	1,623
1923.....	1,857,674	4,928,651	2,653	3,004,072	.610	1,617
1924.....	1,751,362	4,534,879	2,589	2,825,775	.623	1,613
1925.....	1,744,311	4,531,361	2,598	2,860,600	.631	1,640
1926.....	1,779,275	4,671,736	2,626	2,946,114	.631	1,656
1927.....	1,734,470	4,517,694	2,605	2,909,217	.644	1,677

* The total compensation includes overtime and other pay roll allowances. The number of employees is the average of quarterly counts. The statistics include general officers as well as all others on railroad pay rolls. The average yearly compensation is subject to qualification as to the count of employees, but as the same basis was used in each year the comparison is at least indicative.

The average number of employees, their aggregate annual compensation, and the average yearly compensation per employee are shown in Table 13. The tendency in average hourly and yearly compensation

the demand for standard wages but the order was suspended when the emergency board was appointed, and its report in favor of a continuation of substandard wages (previously approved by the abolished Labor Board) assisted in effecting a compromise between the management and its employees. The second case was a dispute between the western railways and their conductors and trainmen, over the extent of a wage increase and its relation to certain restrictive rules. The differences were settled after the publication of a report by the fact-finding board.

was downward from 1920 to 1923, and since then the tendency has been upward. It is interesting to note that, although the volume of freight traffic in 1926 was nearly 8 per cent greater than in 1923, the number of employees was 7 per cent less and the number of man-hours was 8 per cent less. The year 1920 was abnormal, as it was affected by influences carried over from the period of Federal control.

It may be of interest here to utilize a summary, prepared by the Bureau of Railway Economics, showing the distribution of railway operating revenues. The item of labor (salaries and wages) is, of course, the largest in the group. In 1920, labor was paid 55.4 cents out of each dollar of operating revenues. In 1921, the proportion had dropped to 46.9 cents, and since then the tendency has been downward: 44.4 cents in 1922, 44.3 cents in 1923 and 1924, 43.2 cents in 1925, 42.6 cents in 1926, and 43.9 cents in 1927. The smaller part of revenues taken by wages was influenced by the improved operating efficiency, elsewhere discussed.

The improvement in efficiency may be shown by comparing the total employee hours with the total traffic units. Although the practice of computing such units, by adding to the ton-miles a multiple of the passenger-miles, is open to some objection, it is not improper to use it here. The commission in rate cases has occasionally employed the basis of considering one passenger-mile as equivalent to three ton-miles (roughly proportional with revenue). On that basis, the number of traffic units per man-hour in 1920 and 1921 was 101. In 1922, it was 103; in 1923, 107; in 1924, 109; in 1925, 115; in 1926 (the high record); 118; and in 1927, with somewhat less traffic, 117. These figures indicate that the output per man-hour in 1926 was 17 per cent more than in 1920 and 10 per cent more than in 1923. The larger part of the increased productivity per man-hour is attributable to better equipment and more adequate facilities, but the record would not have been as favorable without the improvement in morale and degree of employee co-operation.¹⁹

VII. CHANGES IN INDEXES OF OPERATING EFFICIENCY

A comparison of the operating statistics of 1927 and 1928 with those of the first years of the postwar period reveals striking gains in railway operating efficiency. In nearly every index of equipment utilization, train and terminal operation, and output per man-hour, the improvements are notable. These improvements, and the related public benefits in a higher quality of transportation service, are attributable in part to the large expenditures for additions and betterments to facilities and equipment, in part to changes in operating methods and better managerial

¹⁹ See *Productivity per Worker*, Chap. II, Industry, Part 1, p. 81; Part 2, pp. 98, 103, 142, 164; Chap. III, Construction, p. 248; Chap. VI, Labor, p. 447; Chap. VII, Management, pp. 512-513.

control, in part to higher employee morale, and in part to a better understanding and more cordial co-operation on the part of the shipping public.

Freight Car Performance.—The fact has already been touched upon that there have been few net additions to the number of freight cars, and an actual decrease in the number of locomotives since the war period. In 1920, the equipment was inadequate to take care of traffic demands, as there were car shortages, congestions, embargoes, and other serious interruptions. In 1926, however, when the total revenue ton-miles were 8 per cent more than in 1920, there was complete freedom from car shortage and congestion, and the quality of public service was never higher.

The best index of freight car utilization is net ton-miles per car-day. In it are combined the carload, the miles per car-day, and the per cent loaded of total car-miles. Since the total number of cars—serviceable in use, serviceable stored, and unserviceable—is taken as the divisor, the net ton-miles per car-day should be greatest in periods of heavy traffic, unless the volume is so heavy as to cause congestion, or other factors (such as delays in loading and unloading, light carloads, or a high percentage of empty car-miles) interfere with the usual efficiency in car utilization.

TABLE 14.—FREIGHT CAR PERFORMANCE, CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Total net ton-miles	Average cars on line daily	Car-miles per car-day	Tons per loaded car	Per cent loaded	Ton-miles per car-day
	<i>Millions</i>	<i>Thousands</i>				
1920.....	440,125	2,464	25.1	29.3	67.9	498
1921.....	344,343	2,425	22.4	27.6	63.0	389
1922.....	375,617	2,429	23.5	26.9	67.2	424
1923.....	457,590	2,461	27.8	27.9	65.7	509
1924.....	429,453	2,486	26.9	27.0	65.1	472
1925.....	456,265	2,527	28.3	27.0	64.5	493
1926.....	488,578	2,518	30.4	27.4	63.7	532
1927.....	474,683	2,509	30.3	27.2	62.9	518
1928*.....	397,369	2,481	32.0	26.6	63.3	525

NOTE.—Total net ton-miles include nonrevenue as well as revenue freight; cars on line daily include private line cars.

* First 10 months.

The figures in Table 14 show the relation between traffic volume and net ton-miles per car-day. The high record of 1926 (532 net ton-miles per car-day) was made in the year of greatest traffic. The two factors, however, are interdependent. The record volume of traffic could not have been moved if cars had not been efficiently utilized, nor could the high record in ton-mile production per car have been attained with less traffic, since the divisor—the number of cars—is fairly constant. This interrelation must be considered in passing judgment on car performance.

It will be noted that the principal improvement has been in car-miles per car-day. The better movement is the result of less delay in yards and terminals, less time taken by shippers and consignees for loading and unloading, better distribution through control by the American Railway Association, and an increase in train speed. In the factor last named, the gain has not been so much in the actual speed while in motion as in the reduction of road delays. The running speed is probably little, if any, faster than in the previous years, but the increase in multiple running tracks, the better design of locomotives, the installation of additional automatic signals, and the enlargement of yards and terminals have materially cut down stand-by losses on the roads and have favorably affected the over-all train speed between terminals.

When the railway executives in 1923 set for themselves certain objectives to be attained, they named 30 miles per car-day and 30 tons per loaded car. The miles per car-day in 1923 were 27.8, but previously the average had been considerably lower. The 30 miles per day objective was reached in 1926, and has since continued, even with less traffic. The carload objective has not been attained, and the tendency is toward a smaller average load. It was 27.9 tons in 1923, when the 30-ton objective was set, but in no subsequent year has the 1923 load been maintained. It was 27.4 tons in 1926, 27.2 tons in 1927, and 26.6 tons during the first ten months of 1928. The smaller carload is the result of the changing purchasing habits under conditions which call for smaller but more rapidly moving inventories. It is also the result of the tendency in freight classification changes to establish lower weights minimum for which car-load rates apply.

The per cent borne by loaded car-miles to total car-miles has an important bearing upon car performance. Table 14 shows a steady decline in that unit since 1922. It was low in 1921, because of the abnormal movement of empties to the owning road, in the process of "unscrambling" cars used with virtual disregard of ownership during Federal control. Since then, the decline has been steady and consistent—from 67.2 per cent in 1922 to 62.9 per cent in 1927, with a slight increase to 63.3 per cent in the first ten months of 1928. This loss in efficiency is one item of expense in improving public service, as the growing per cent of empty mileage is brought about in part by orders from the American Railway Association's Division of Car Service, which has power to require the distribution of cars in advance of territorial and seasonal needs, and in part by a slightly higher proportion of freight in cars of special design, which invariably move empty on the return trip. The cross-hauling of empties from one section to another section of the country is now being done to a greater extent than formerly. While it reduces the per cent loaded of total, that disadvantage is more than offset by having the cars where they are needed when they are needed and thereby

avoiding the delay which ensues when shippers are obliged to wait for suitable cars.

An analysis of comparative car performance in 1923 and 1927 is interesting. The net ton-miles of 1927 were about 4 per cent greater than in 1923, and the freight cars on line daily were about 2 per cent greater. The 1927 average daily movement per freight car increased about 9 per cent, but the average load declined 2.5 per cent, and there was a loss of 4.3 per cent in loaded car-miles. The net result of these changes was an increase of about 2 per cent in net ton-miles per car-day, as the gain in car-miles per car-day was greater than the losses in the carload and per cent of loaded miles.²⁰ In this factor in car performance, railway management has made a distinctly creditable gain. The loss in the average carload is largely beyond railway control, and the decline in the per cent loaded of total car-miles is one element in the price of improved public service.

Locomotive Performance.—In locomotive utilization, the only available statistical information is the average miles per locomotive-day. As in the case of freight cars, the divisor is the total number of locomotives—serviceable in use, serviceable stored, and unserviceable. The average miles per locomotive-day, therefore, other factors remaining unchanged, would be greatest when traffic is heavy and all serviceable locomotives are utilized, and least when traffic is light and part of the serviceable locomotives are stored. In 1921, a year of low traffic volume, the average per freight locomotive-day was 49.9 miles. In 1922, it was 52 miles, and in 1923 it was 60.3 miles. Since then, there has been little change, but the tendency is upward—61.8 miles in 1926 and 60.9 miles in 1927. The improvement may be attributed in part to the factors which affect train operation (next to be discussed), in part to the general practice of increasing the length of the locomotive run, and in part to expenditures devoted to the improvement of engine terminals and shops. In passenger service, the increase in miles per locomotive-day is slightly greater than in freight service—108.7 miles in 1923 and 114.4 miles in 1927.

Freight Train Performance.—In freight train service, the significant units are (a) the gross train load, (b) the net train load, (c) the average train speed between terminals, and (d) the gross ton-miles per train-hour. The data for the years 1920 to 1927, inclusive, are given in Table 15.

In every year since 1921, the train load, both gross and net, has shown an increase. In every year, except 1923, the train speed has

²⁰ If the carload and the per cent of loaded miles had been the same in 1927 as in 1923, the higher car-miles per car day of 1927 could have released 267,000 cars. had additional traffic called for them. Under traffic conditions at present an increase of one mile in the average car-miles per car day is equivalent to releasing approximately 100,000 cars, or conversely, a loss of one mile per car day is equivalent to taking 100,000 cars out of service.

TABLE 15.—FREIGHT TRAIN PERFORMANCE, CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Train load		Speed in miles per hour	Gross ton-miles per train-hour
	Gross tons	Net tons		
1920.....	1,443	708	10.3	14,876
1921.....	1,435	651	11.5	16,555
1922.....	1,466	677	11.1	16,211
1923.....	1,539	713	10.9	16,768
1924.....	1,588	715	11.5	18,261
1925.....	1,670	744	11.8	19,679
1926.....	1,737	772	11.9	20,705
1927.....	1,780	778	12.3	21,945
1928 ^a	1,839	793	12.8	23,623

NOTE.—Gross and net tons include nonrevenue freight. Gross tons include the weight of both cars and contents. Net tons include the weight of contents only.

^a First 10 months of 1928.

gained. The most notable improvement is in gross ton-miles per train-hour, an increase from 16,555 in 1921 to 21,945 in 1927, a gain of nearly 33 per cent in six years. The performance during the first 10 months of 1928 was substantially better than in the same period of 1927.

Gross ton-miles per train-hour, as a unit of freight train performance, combines the factors of load and speed. While the trainload in itself is significant, it must be considered together with train speed, as gains in loading may be offset by losses in speed when overloading causes delay. Train expenses vary more with train-hours than with train-miles. In the past few years greater attention has been paid to the time element, and by reductions in road delays the train speed has been steadily gaining with the heavier trainload. Train-miles or train-hours should be regarded as expense; ton-miles as product. The pronounced gain in product per unit of work (gross ton-miles per train-hour) is another distinctly creditable achievement.

Fuel Consumption.—Because of improved locomotive design, reductions in grades and curvature, better train loading, less road delay, and improved technique in firing, the railroads are producing more ton-miles per ton of coal (or its equivalent in oil).²¹ In 1921, the coal consumption per 1,000 gross ton-miles²² was 162 pounds. In 1922, there was a slight loss, as 163 pounds were burned. In 1923, the consumption was the same as in 1921, but since then a steady improvement is shown—149 pounds in 1924, 140 pounds in 1925, 137 pounds in 1926, and 130 pounds in 1927. During the first 10 months of 1928 it was 125 pounds. If the 1927 gross ton-miles had been produced under 1921 fuel efficiency, the

²¹ See Improvement in Power Plant, Chap. II, Industry, Part 2, pp. 119 et seq.; Chap. IV, Transportation, Part 2, p. 312.

²² Including weight of locomotive and tender.

fuel consumption in 1927 would have been 19,000,000 tons more than were actually burned. The savings were over 19 per cent.

In passenger service, the fuel consumption record is similar, but both the degree and the absolute savings are smaller. In 1921, the fuel burned per passenger train car-mile was 17.7 pounds; in 1927, it was 15.4 pounds. The actual consumption in 1927 in passenger service would have been about 4,335,000 tons greater if burned under 1921 efficiency. The savings in that service were 13 per cent. The data for switch service are not available, but it is probable that corresponding reductions were made in that class of service. For train service alone, the 1927 fuel costs (at \$2.66 per ton, the average price f.o.b. line) would have been about \$62,071,000 more if fuel had been burned with the same efficiency as in 1921.

Unserviceable Equipment.—The greater productivity of equipment during the past five years is due in part to higher standards of maintenance. The 1923 program, to which the railway executives pledged themselves, set among other objectives a goal of but 5 per cent unserviceable freight cars and but 15 per cent unserviceable locomotives. At the close of 1922, the number of freight cars out of service for repairs was 9.1 per cent of total cars, and 26.4 per cent of freight locomotives were unserviceable. The averages by years since 1920 are shown in Table 16.

TABLE 16.—UNSERVICEABLE EQUIPMENT, CLASS I RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Unserviceable freight cars	Per cent of total	Unserviceable freight locomotives	Per cent of total
1920.....	252,000	7.0	7,378	24.5
1921.....	320,000	13.2	7,317	23.4
1922.....	311,000	12.8	8,394	25.5
1923.....	197,000	8.0	7,118	21.6
1924.....	216,000	7.8	6,256	18.8
1925.....	195,000	7.7	5,791	17.8
1926.....	164,000	6.5	5,197	16.4
1927.....	148,000	5.9	4,988	16.1
1928 ^a	155,000	6.2	4,919	16.2

^a First 10 months.

While the objectives have not been fully attained, the reductions in "bad order" equipment have been substantial. Compared with 1921, the year before the shopmen's strike, the 1927 maintenance policies have made available for service 172,000 additional freight cars and 2,329 additional freight locomotives. The gain in passenger locomotives was similar in degree. In 1921, the per cent of unserviceable passenger locomotives was 22.4 per cent; in 1927 it was 16.4 per cent.

Composite Index of Operating Efficiency.—In a review of railway operations in 1927,²³ Dr. J. H. Parmelee, Director of the Bureau of Railway Economics, suggests a method of combining the several indexes of operating efficiency in one composite unit. His method is to take each efficiency factor separately, to compute an index number for that factor by relating it on a percentage basis to some previous level, and then to combine all the indexes computed for the different factors into a common or average index. He took the following 13 factors:

1. Car-miles per car-day.
2. Net ton-miles per car-day.
3. Gross tons per train.
4. Net tons per train.
5. Gross ton-miles per train-hour.
6. Net ton-miles per train-hour.
7. Locomotive-miles per locomotive-day, freight.
8. Locomotive-miles per locomotive-day, passenger.
9. Percentage serviceable locomotives, freight.
10. Percentage serviceable locomotives, passenger.
11. Percentage serviceable freight cars.
12. Fuel consumption per unit, freight.
13. Fuel consumption per unit, passenger.

Using the composite averages of the years 1920–1924 as the base of 100, he found that the composite averages of subsequent years were as follows: 1924, 104.8; 1925, 109.4; 1926, 113.5; and 1927, 115.2.

While his method may be questioned because it gives equal weight to each single factor and because some of the factors are elements in other factors (such as 1 and 2), nevertheless the comparison in a general way is sound and indicates that the year 1927, even with less traffic than that of 1926, reflected a further gain in operating efficiency—a gain of 15.2 per cent over the average of 1920 to 1924, inclusive.

Purchasing and Stores Administration.—While railways, unlike manufacturers and merchants, do not carry large inventories in raw materials and merchandise, they do have substantial sums of capital tied up continuously in fuel and other material and supplies for maintenance, train operation, and construction. In 1920, the balance sheet for all railways considered as one system carried an item of \$767,266,510, representing material and supplies held for use. In each succeeding year, except 1923, there was a decrease. In 1927, the item was \$532,063,111, a reduction of \$235,203,399. Part of the decrease was due to lower prices, but the major savings were attributable to improvements in purchasing policies and storekeeping. The railways themselves are taking advantage of better transportation service and have found, like manufacturers and merchants, that rail service has so improved in regularity and dependability that smaller stocks of supplies may be carried without fear of

²³ *Railway Age*, January 7, 1928.

interruption to maintenance work. The carrying charges on a dollar of surplus material are around 16 cents (6 per cent for interest and 10 per cent for depreciation, obsolescence, taxes, and insurance). That percentage, applied to a saving of \$235,203,399 in surplus material, indicates that operating expenses and other costs for material held for use were \$37,632,000 less in 1927 than in 1920. While a part of the saving is the result of lower prices, the estimated savings are indicative also of the success of efforts to improve the administration of purchases and stores.²⁴

Operating Revenues and Expenses.—In order that attention may be drawn to certain features of the income account, the revenues, expenses, taxes, and net operating income of Class I railways are given in condensed form in Table 17.²⁵

TABLE 17.—REVENUES, EXPENSES, and NET OPERATING INCOME, CLASS I RAILWAYS, 1921 TO 1927

(In millions of dollars)

Item	1921	1922	1923	1924	1925	1926	1927
OPERATING REVENUES							
Freight.....	3,911	3,992	4,607	4,334	4,542	4,798	4,631
Passenger.....	1,152	1,074	1,146	1,075	1,056	1,042	975
Other.....	454	493	537	512	525	543	528
Total.....	5,517	5,559	6,290	5,921	6,123	5,383	6,134
OPERATING EXPENSES							
Maintenance of way and structures.....	756	729	814	793	816	867	868
Maintenance of equipment.....	1,251	1,253	1,465	1,260	1,259	1,283	1,219
Transportation.....	2,252	2,140	2,310	2,141	2,128	2,172	2,127
Other.....	304	293	306	314	334	347	359
Total.....	4,563	4,415	4,895	4,508	4,537	4,669	4,573
Taxes.....	276	301	332	340	359	389	376
Joint facility and equipment rents, net debit ^a	70	83	101	99	106	112	117
Net railway operating income.....	608	760	962	974	1,121	1,213	1,068

^a Including uncollectible operating revenues and miscellaneous operations.

Since 1921, there have been two peaks in the curve of railway operating revenues, the first in 1923 and the second in 1926. The latter now stands as the high record. Neither peak was notably pronounced—from

²⁴ See Size of Inventory, Chap. III, Construction, pp. 235, 242; Chap. V, Marketing, pp. 332, 344, 350; Chap. VII, Management, pp. 508 et seq.; 537.

²⁵ The tabulation begins with the year 1921 because the year 1920 was affected so much by abnormal conditions (the closing two months of Federal control, six months of guarantee period, and four months of complete corporate control) that it is not suitable as a base for comparison. The year 1921 also is not entirely satisfactory as a starting point, as it was adversely affected by business depression and subnormal traffic.

\$5,517,000,000 in 1921 to \$6,290,000,000 in 1923, an increase of 14 per cent and to \$6,383,000,000 in 1926, a further increase of 2 per cent over 1923, or an extreme range of but 16 per cent between the lowest and highest earnings of the seven-year period.

The degree of fluctuation in operating expenses was even less. The expenses of 1923 were but 7 per cent greater than in 1921, although revenues were 14 per cent better. The expenses of 1926, with additional revenues of 2 per cent, were 5 per cent less than in 1923. Since 1924, operating expenses have been fairly constant, the extreme range being from \$4,508,000,000 in 1924 to \$4,669,000,000 in 1926. In 1927, they were but 0.2 per cent more than in 1921, although the revenues were 11 per cent greater and the ton-miles (Table 10) were 38 per cent greater. The loss in passenger business and the reduction in freight rates explain the difference between the relative changes in revenues and ton-miles.

The growth in the burden of taxation is noticeable. In the seven-year period, the increase in taxes was from \$276,000,000 to \$376,000,000, or 36 per cent.

The changes in net railway operating income, and their relation to property investment, will be discussed later.

TABLE 18.—DISTRIBUTION OF THE DOLLAR OF OPERATING REVENUE, CLASS I RAILWAYS, 1921 TO 1927, INCLUSIVE

Item	1921	1922	1923	1924	1925	1926	1927
OPERATING REVENUES							
Freight.....	70.9	71.9	73.2	73.2	74.2	75.2	75.5
Passenger.....	20.9	19.3	18.3	18.2	17.3	16.3	15.9
Other.....	8.2	8.8	8.6	8.6	8.5	8.5	8.6
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
OPERATING EXPENSES							
Maintenance of way and structures.....	13.7	13.2	12.9	13.4	13.3	13.6	14.1
Maintenance of equipment.....	22.7	22.5	23.3	21.3	20.5	20.1	19.9
Transportation.....	40.8	38.5	36.7	36.2	34.8	34.0	34.6
Other.....	5.5	5.2	4.9	5.3	5.5	5.4	5.9
Total.....	82.7	79.4	77.8	76.1	74.1	73.1	74.6
Taxes.....	5.0	5.4	5.3	5.7	5.9	6.1	6.1
Joint facility and equipment rents, net debit ^a	1.3	1.5	1.6	1.7	1.7	1.8	1.9
Net railway operating income.....	11.0	13.7	15.3	16.4	18.3	19.0	17.4

^a Including uncollectible operating revenues and miscellaneous operations.

The changing relationships between the principal classes of traffic and total revenues, and between the principal groups of operating expenses and total, as well as the relationships between expenses, taxes, and net operating income and gross revenues are depicted in Table 18.

Under operating revenues, the notable change is in the relative proportions of freight revenue and revenue from the sale of passenger

tickets. In 1921, freight revenue was 70.9 per cent and passenger revenue 20.9 per cent of the total. The freight proportion has steadily increased and the passenger proportion has steadily decreased in each year, so that in 1927 the percentages of total were 75.5 and 15.9, respectively. All other revenues combined show practically no relative change—8.2 per cent in 1921 and 8.6 per cent in 1927.

The proportion of revenues taken by expenses has shown a distinctly downward tendency—from 82.7 per cent in 1921 to 74.6 per cent in 1927. The lowest point was in 1926, when the operating ratio was 73.1 per cent.²⁶ Among the general accounts, the principal reduction in the ratio is found in transportation expenses—40.8 per cent of revenues in 1921 and 34.6 per cent in 1927—although a smaller reduction is noted also in equipment maintenance. A comparison with earlier periods would show that the two maintenance accounts have been constituting a larger part of the whole during the past two decades, especially the equipment maintenance group. The explanation is that the capital expenditures yield their greatest return in reduction in transportation expenses, but tend to increase the burden upon maintenance. The transportation savings are greater than the added maintenance costs, and the net result is a decrease in the total operating ratio.

In view of rate reductions in 1922 and subsequently, and the advances in wage rates in the past three or four years, the reduction in the operating ratio, especially in transportation expenses, reflects credit upon operating management.

VIII. CHANGES IN RAILWAY NET INCOME

The Transportation Act of 1920 placed upon the Interstate Commerce Commission the duty of establishing rates so that the railways as a whole, or as a whole in territorial groups, under honest and efficient operation, may earn, "as nearly as may be," a fair return on the value of property held for and used in the service of transportation. Valuation was to be determined by the Commission according to procedure under way since 1914, and for the first two years the fair return was defined as 5½ per cent plus an additional one-half of 1 per cent, in the discretion of the commission, "to make provision in whole or in part for improvements, betterments, or equipment . . . chargeable to capital account."

The rate advances of 1920 were intended by the Commission to yield net railway operating income equal to 6 per cent on an aggregate value of \$18,900,000,000. The Commission estimated that sum by applying to the railway total book costs the percentage which the Commission's tentative valuation of approximately one-quarter of the

²⁶ In the first 10 months of 1928, the operating ratio was 72.64 per cent or 1.32 points of percentage less than in the corresponding period of 1927.

railways bore to the book costs of those properties. In effect, that method wrote down the railway book costs about 5 per cent.

While the Commission's rate increase order was made with the intention of yielding 6 per cent on the estimated value, the actual return was less than one-half of 6 per cent, as the traffic and gross earnings of 1921 fell off sharply. It was hoped that with a revival of business the 1920 rates would yield the desired return in later years, but they have not done so. Since 1920, as has already been noted, freight rates as a whole have been reduced. In 1922, after the expiration of the two-year period in which the 6 per cent maximum return was contemplated, the Commission, acting under a provision of the law requiring it periodically to set the fair return to conform to changing conditions, found that the fair return from that time should be $5\frac{3}{4}$ per cent without any additional allowance for capital expenditures from income. No change has since been made. The law imposed upon the Commission the obligation in determining the rate of return to "give due consideration, among other things, to the transportation needs of the country and the necessity (under honest, efficient, and economical management of existing transportation facilities) of enlarging such facilities in order to provide the people of the United States with adequate transportation."

In the opinion of the Commission, a return of $5\frac{3}{4}$ per cent on value is adequate to serve the purpose which Congress had in mind, that is, to permit railways to earn, under honest and efficient management, sufficient net income to sustain their credit, and to obtain capital as needed on reasonable terms to enlarge facilities so as to furnish the public with adequate service. Yet in no year since the Transportation Act was passed have the railways as a whole earned as much as $5\frac{3}{4}$ per cent on value. The public, during the past four years, has been furnished with adequate rail service, largely as a result of capital expenditures devoted to enlargement of facilities and betterment of equipment, but these capital expenditures have been made in a hope, thus far unrealized, that the spirit of the law which promises a fair return would be carried out by the Commission. This is not to say that the low earning power of railways may be remedied entirely by rate increases, as higher rates might stifle business activity and further diminish railway net income, but the fact remains that the net return on the value of railway property has been plainly inadequate since 1920, and unless that return is bettered the carriers may be unable to continue to enlarge their facilities to keep pace with traffic demands. If that time comes, the people of the United States will not then be furnished with adequate transportation.

The Commission does not publish the annual return on valuation, and may not do so until their valuation work is complete. In the absence of the total official valuation figures from the Commission, the railway book costs may be taken, subject to the qualification that in 1920 they

were roughly 5 per cent in excess of the tentative base then used by the Commission in the rate advance case. The rate of return annually from 1920 to 1927 is given in Table 19. The railway value includes working capital in cash and material and supplies, as well as the investment in road and equipment for Class I roads and their nonoperating subsidiaries. Net railway operating income is what is left out of operating revenues after payment of operating expenses, taxes, and net debit balances for joint facility rents and hire of equipment. It is the amount left to pay interest charges on funded and other debt, rentals for leased lines, other charges, and dividends—in other words, the net amount which may be considered as a reward to the total capital invested, and the basis which should be used in computing the rate of return on investment as a whole.

TABLE 19.—NET RAILWAY OPERATING INCOME AND RETURN ON INVESTMENT, CLASS I RAILWAYS AND THEIR NONOPERATING SUBSIDIARIES, 1921 TO 1927
(In millions of dollars)

Year	Operating revenues	Operating expenses	Taxes	Net railway operating income	Railway property investment	Annual return on investment
1921.....	5,517	4,563	276	608	20,673	<i>Per cent</i> 2.9
1922.....	5,559	4,415	301	760	20,911	3.6
1923.....	6,290	4,895	332	962	21,764	4.4
1924.....	5,921	4,508	340	974	22,564	4.3
1925.....	6,123	4,537	359	1,121	23,146	4.8
1926.....	6,383	4,669	389	1,213	23,455	5.2
1927.....	6,134	4,573	376	1,068	*23,716	4.5
First 10 months:						
1927.....	5,239	3,875	324	944	.....	^b 4.6
1928.....	5,152	3,742	325	986	.....	^b 4.7

* Partially estimated.

^b Report of Bureau of Railway Economics.

Even with a liberal allowance for the difference between the railway book cost and the valuation that the Interstate Commerce Commission may finally fix for rate-making purposes, the return in the seven years since the enactment of the new rule of rate making is markedly inadequate. For the seven years, the average return on the investment was but 4.3 per cent. The aggregate net railway operating income of the seven years was \$2,277,000,000 less than $5\frac{3}{4}$ per cent on the investment, a deficiency of \$325,000,000 per year.

The question may be asked: "Why have the railways continued, during the past three or four years, to invest such large additional sums when the return on the investment as a whole has been so meager?" An adequate answer requires consideration of the background of the present situation. When the extensive program of improvements was undertaken in 1922 and 1923, as a deliberate policy of the Association of Railway Executives, they had the more or less definite promise in the

Transportation Act that the railways, as a whole or regionally, would be permitted to earn a fair return. At that time the policy of the Interstate Commerce Commission in interpreting the new rule of rate making had not been developed, except initially in 1920, and there was abundant reason to hope, if not confidently to expect, that the mandate of Congress would be observed. In other words, the inadequate returns of 1922 and 1923 might have been regarded as merely transitional and one form of the pains of economic readjustment. Since then, the net income as a whole has been substantially below a fair return and the prospects of improving it are not encouraging, notably since the passage of the Hoch-Smith resolution which in effect directs the Commission to reduce rates on the commodities affected when there is evidence of a depression in an industry. While that resolution was intended specifically to afford preferential treatment to agricultural products, the Commission apparently is giving it broader interpretation, as in the Lake Cargo Case, when, because of a depression in the coal industry in the northern field, lower rates to lake ports were approved and the southern fields were not similarly favored. Reductions in rates under the Hoch-Smith resolution are to be made only when not inconsistent with existing law. The railroad net return as a whole is not consistent with the policy of the 1920 act, yet further rate reductions have been ordered and proposals to increase other rates have been held up.

One partial answer to the question may be that some of the fundamental issues of valuation and rate making are yet to be determined by the Supreme Court, and there is faith that a satisfactory solution will be found when that body speaks. Another partial answer is that the railways have faith in the ultimate fairness of the public and the Government, and hope for an eventual change in policy more favorable to the carriers. Such a change would not come about without public goodwill toward railways, and public goodwill could not be held without good service. To give good service, the additional facilities and better equipment are essential.

The most complete answer to the question lies, probably, in the fact that the additional capital expenditures were intended not only to provide adequate transportation but also to produce it more economically. The new capital, taken by itself, is probably earning more than a fair return in operating economies, even though the net income as a whole is less than a fair return on the entire investment. The return on the total investment might be even lower if the new capital were withheld. It is a case of investing additional money to protect the larger sums previously invested.

One effect of inadequate income has been to spur railway management to do its utmost in increasing efficiency and economy. The Commission is required to take these factors into account, and has broad

powers to inquire into all phases of management. Except in a few singular cases, no criticism on that score has been voiced by the Commission. On the contrary, it has, by implication at least, given the railways as a whole a clean bill on economical management. The facts concerning recent improvements in operation indicate clearly that the Commission's present policy of holding down the rate scales cannot be born of belief that there is any general inefficiency or dishonesty in management.

As now organized financially, the railways as a whole have about 59 per cent of their capital structure in funded debt on which the average interest rate is now about 4.7 per cent. A return of $5\frac{3}{4}$ per cent on the property value would give enough income to pay the 4.7 per cent interest on the 59 per cent of capitalization in bonds and leave divisible income equivalent to 7.3 per cent dividend upon the 41 per cent of capitalization in stock, provided, of course, that the total capitalization were not greater than property value. As a matter of fact, the railway net capitalization is less than the book investment value. The total investment in road and equipment (all roads) in 1927 (not including working capital in cash and materials held for use) was \$24,453,870,938. The gross capitalization was \$23,614,325,858, but that capitalization included \$5,477,634,413 in securities owned by the railways themselves, leaving a net capitalization of \$18,136,691,445 in the hands of the public, a sum six billions less than the total investment in road and equipment.

Consideration must be given also to the fact that the net income from which dividends are declared comes not only from railroad operations but also from outside investments. In many cases these are substantial. Such investments are not included in the railway value (investment in road and equipment) upon which the fair return is computed, nor are the returns included in net railway operating income. Yet the income from outside investments is an addition to the railway income available for dividends on railway stock.

To these factors, which explain why the dividends recently paid upon railway stocks are higher than the rate of return on railway investment, may be added one additional factor. A substantial part of the total railway stocks have received no dividends for years. In 1927 the non-dividend stock was 30 per cent of the total. The proportion of such stock is decreasing. In 1921 it was 43 per cent.

Table 20 gives the dividend rates and the interest rates on funded debt, 1920 to 1927, inclusive. The average rate of interest is not reported by the Interstate Commerce Commission, but has been approximated here by taking the par value of outstanding funded debt and relating it to the actual interest payments on funded debt.

While the figures in Table 20 reflect fairly satisfactory dividend rates on dividend-paying stock, the rate on all stock (including the 30 per cent on which dividends were not paid) is not sufficient to justify investors

TABLE 20.—DIVIDENDS ON CAPITAL STOCK AND INTEREST RATE ON FUNDED DEBT, ALL RAILWAYS, 1920 TO 1927, INCLUSIVE

Year	Per cent of stock yielding dividends	Amount of stock yielding dividends	Amount of dividends declared	Average rate on dividend-yielding stock	Ratio of dividends declared to all stock	Average interest rate on funded debt
		<i>Millions of dollars</i>	<i>Millions of dollars</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
1920	57.30	5,075	331	6.52	3.74	4.43
1921	56.92	5,060	456	9.02	5.13	4.68
1922	59.38	5,321	339	6.37	3.78	4.68
1923	62.09	5,646	412	7.30	4.53	4.61
1924	64.97	6,042	385	6.37	4.14	4.75
1925	66.70	6,279	410	6.52	4.35	4.74
1926	69.12	6,473	474	7.32	5.06	4.69
1927	70.25	6,701	587	8.47	5.95	4.74

^a Class I railways only.

^b Increase over 1920 caused almost entirely by stock dividends.

in risking additional capital in railway stocks except those of the strong companies.

The per cent of dividend-paying stocks has been increasing steadily since 1921. The 1927 per cent, 70.25, is the highest on record. The degree of insolvency (indicated by railway mileage in the hands of receivers) also has shown an improvement. In 1921, the mileage was 13,512, owned by 68 companies. In 1927, the mileage was 16,752, owned by 40 companies, but since then the Chicago, Milwaukee & St. Paul Railway (the only large system in the list) has been reorganized, and the receivers have been discharged. Deducting the mileage of that road from the 1927 total, leaves 6,569 miles, or about one-half of the 1921 total.

IX. CONSOLIDATION AND UNIFICATION

The Transportation Act of 1920 requires the Interstate Commerce Commission to prepare a plan for the consolidation of all railways into a limited number of systems, and the intent of the law is that such consolidations shall be brought about, so that, instead of many railroads of varying degrees of earning power and financial strength, there shall be but a few of fairly equal strength. It is provided that in such groupings competition shall be preserved as fully as practicable, and that the existing routes and channels of traffic shall not be unduly disturbed.

The Commission has followed the instructions of Congress up to the point of publishing its final plan. It has drafted and published its tentative plan, has held extended hearings, considered numerous proposals, and built up a voluminous record, but the final plan has not yet been formulated. In fact, its chairman in 1927 admitted, in hearings before Congressional committees on proposed amendments to the law, that the task is too difficult and that the Commission would like to be

relieved of preparing a final plan. As an alternative, the Commission supports the proposal that consolidations, on correct principles and subject to its approval, should be allowed to take place naturally and voluntarily, as in the past, instead of an advance grand-scale determination of a comprehensive scheme to which all proposals must conform. The Parker Bill to permit such voluntary consolidations, subject to commission approval, came near to enactment in the spring of 1928, and is likely to be reintroduced in 1929.

As the matter now stands, no consolidation of railway properties may be made without Commission approval, and no proposal may be approved unless it is in harmony with the final plan which the Commission has not yet prepared. As a consequence, no consolidation has taken place since the 1920 law was passed, and none can take place until the final plan is published or the law is changed. There have been, however, a few so-called unifications by lease or stock control. The Commission is empowered to approve combinations short of actual consolidation, when in the public interest. Several proposals of that kind have been acted upon, and a few are now before the Commission. Until the present law is changed to permit piecemeal and voluntary consolidations, with adequate protection to the weak lines and the general public, little progress toward systematic consolidation can be made.

The principal object of consolidation is to simplify the problems of regional rate-making. As has already been mentioned, the law provides that rates shall be set for the railways as a whole in a territorial region, so that the railways in that region may earn a fair return on their aggregate value. The treatment is by groups, not by individual roads. Competitive freight rates in a region are necessarily the same on each competing road. Where distance class-rates apply in freight service, the mileage rate is uniform. Passenger mileage rates are, with few exceptions, the same on all roads in a region. If these uniform rates are determined by the income needs of all of the roads in a region considered as one system, it necessarily follows that the rates so determined will yield more than a fair return to the strong and less than a fair return to the weak. The real problem is the protection of the weak road. The strong roads are partially held in check by the recapture clause of the 1920 law, under which one-half of net income in excess of 6 per cent on value is taken by the Government, but no provision is made for compensating the poor roads which earn less than the fair return. If the number of roads in each region were reduced, the weak lines parceled out to the strong, and a new alignment perfected which would give approximately equal strength to each of the few large systems to be organized, then the uniform rate scales would yield approximately the same rate of return to each and the problem of the weak road would disappear.

While simplification of rate control may be regarded as the prime objective of consolidation, there are likely to be other advantages in unification of terminals, more efficient use of equipment and facilities, and economies of other kinds through elimination of duplication of effort. But these economies are likely to be overestimated, and in any specific case there will always be the possibility of diminution in competition and disturbance in transportation relationships between the many communities served. This explains why, as a general rule, the representatives of cities and the organizations of shippers are lukewarm toward, if not actually opposed to, the principle of consolidation.

We are here concerned only with economic changes since the war period. So far as consolidation of railway properties is concerned, a fundamental change was intended by the 1920 law, but, instead of accomplishing its purpose, the law has actually retarded consolidation on a large scale by acting as a brake on the natural process of system development by voluntary action, the process under which in earlier periods the existing large systems have grown.

X. CHANGES IN QUALITY OF RAILWAY SERVICE

The recent improvement in the quality of railway service cannot be quantitatively measured. It cannot, like gains in operating efficiency, be expressed in definite units or percentages of change. The universal testimony of shippers and others interested in rail transportation is that, in the past three years and at present, the service is of a higher standard than ever before, and the recent railway record has been favorably commented upon by the Interstate Commerce Commission, the Secretary of Commerce, and others in high governmental positions. Secretary Hoover, in his 1927 annual report, estimated that the rapidity of freight transportation was then from 30 per cent to 40 per cent greater than at the close of the war, and expressed the view that the expedition of railway service has reacted favorably upon the entire economic structure.

Concretely, the improvement in service is seen in the relief from car shortages, in freedom from traffic congestion, in quicker movement of freight, and in closer adherence to scheduled transit times, thereby insuring dependability in delivery.

The credit for better service may be given to several factors already discussed. First in importance are the capital expenditures devoted to enlarging and improving facilities and equipment. These, with more effective managerial control and better employee morale, have increased the productivity of the plant. The improvement in service, however, would undoubtedly have been very much less had it not been for the cordial co-operation of shippers through their Regional Advisory Boards. These boards, the first organized early in 1923, consist entirely of purchasers of transportation and are now organized on a regional basis,

14 in all, with an aggregate membership of approximately 15,000, representing something like 25 million shippers and receivers of freight by rail. They meet regularly, with railway representatives as guests, and their committees dealing with specific commodities are constantly in touch with railway officers. This organized co-operative effort has resulted in a closer and more cordial and understanding relationship between the users and the producers of transportation. Car demands have been anticipated and provided for in advance; seasonal or unusual movements are planned for and transportation difficulties avoided; and the frequent contact in co-operative effort has given each side a more complete and sympathetic understanding of common and individual problems. It is probable that a large part of the credit for the better utilization of freight cars should go to the shippers' advisory boards, as well as to the better management of the railways.

In the effort to improve service, the railways have recently increased the number of scheduled fast freight trains, and have speeded up their movement so as to make earlier deliveries at destination. This has been accomplished in part by the greater use of the principle of making up trains to run through without dropping or picking up cars en route, by establishing longer locomotive runs, by reducing delays at inter-divisional terminals, and by cutting down the time required at initial and final terminals in the making up of the train and the placing of the cars at destination. Distinct progress has been made in the operation of classification yards, and throughout the entire train yard and terminal service there is a new conception of the value of a minute.

The shipper of small lots of less-than-carload freight finds that a revision of transfer points has reduced the number of handlings, as well as the time in transit. Improvements in freight house facilities and operating methods have reduced the stand-by losses of trucks and drays. Amplification of car records and passing times are giving quicker and more complete information concerning shipments in transit. Greater pains are taken by the traffic and operating officers of the railways to merchandise railway service.

Besides the satisfaction of having prompt and reliable rail service, the typical manufacturer or merchant has discovered that because of transportation dependability he can realize real and substantial savings by carrying smaller stocks of raw materials, finished products, or merchandise. The reduction in credit demands, partial release of "frozen assets," saving in interest charges, and loss or deterioration in inventories, cannot be estimated with accuracy, but in the aggregate they run into large sums. For such savings the higher grade of railway service may be credited in substantial part. The improvement in transportation called attention to the possibilities, and gave impetus to the recent general improvement in inventory control.

One instance was cited by Secretary of Commerce Hoover, in an address on April 5, 1927, before the Atlantic States Shippers' Advisory Board, when he referred to the fact that principally because of better rail service the retail lumber dealers found that they could carry on their business with approximately four billion less board-feet in stocks than six years before, thereby releasing about \$600,000,000 of capital in that one industry. He mentioned, further, that one of the reasons for the abundant capital in this country at the present time is the enormous decrease in inventories, not alone in lumber but in dry goods and in every commodity in the country. One of the reasons for stability in price levels is the fact that goods move quickly, and there is not the stimulus to rising prices and the pyramiding of orders that come about in the face of any suspension of ample transportation.

One further quotation from Mr. Hoover succinctly summarizes the topic. The following is taken from his 1926 annual report as Secretary of Commerce:

Probably the most outstanding single industrial accomplishment since the war has been the reorganization of our American railways. Our transportation service was not only demoralized by Government operation during the war but had suffered chronic car shortages and insufficient service, not only after the war but for many years before. The annual loss from this periodic strangulation in transportation was estimated in the department's annual report of 1925 to amount to hundreds of millions a year. The insufficiency of transportation interfered with steady industrial operations, created intermittent employment, increased the cost of production, and, through periodic strangulation, caused high prices to the consumer. Manufacturers and distributors were compelled to carry excessive inventories as a protective measure, thus not only increasing the amount of capital required in the business but multiplying the danger of loss by price fluctuation.

The railways, during the past five years, not only have built up adequate service and given complete correction to those ills, but they have, by great ability of their managers, greatly reduced transportation costs and thus made rate reductions possible which would not have been otherwise the case . . . The result of this great reorganization upon the whole economic fabric of the country has been far-reaching.

XI. SUMMARY

From 1920 (when railway property investment was slightly in excess of \$20,000,000,000) to 1927, inclusive, the railways have made gross expenditures of nearly \$6,000,000,000 for additions to and betterments of facilities and equipment, an average annual expenditure of three-quarters of a billion. Of the total sum, approximately one-half has been devoted to roadway and structures, principally in additional running tracks, sidings, and yards; improved terminals and structures; additional automatic and other signaling; heavier rail; more and better ties; and more and better ballast. The other one-half has been devoted to betterments of equipment. The number of equipment units shows little change—a slight increase in freight cars but actual decreases in locomo-

tives and passenger cars—but the average and the aggregate capacity of the units have increased and, particularly in locomotives, there have been notable improvements in design and economic effectiveness. In the first few years of the postwar period, the expenditures for equipment were greater than those for roadway and structures, but during the latter part of the period the proportions have been reversed. Because of the more effective use of equipment, the additional traffic has been handled with the same or even less units, and orders for new locomotives and cars have been mainly for replacement of units retired.

A little less than one-quarter of the six billions devoted to additions and betterments has been charged to operating expenses or to the profit and loss surplus. Such charges, in the main, represent the original cost of property or equipment replaced or retired. Something more than two-thirds of the six billions was added to the investment account—the excess cost of the new over the original cost of the old. Less than one-fifth of the six billions has been capitalized by the issue of stocks or bonds. For the years 1920 to 1927, inclusive, the gross expenditures for additions and betterments were \$5,978,296,000; the net increase in the investment account was \$4,604,551,000; and the net increase in railway capitalization in stocks and bonds was \$1,142,761,000. These figures indicate that the greater part of the gross expenditures for betterments and of the net increase in investment was financed from income or surplus and has not been capitalized. That conservative policy on the part of the railways was not altogether one of choice, but was made necessary by the practical inability of the typical railway to sell stock, and the high rates of interest or heavy discounts required to make the bonds marketable. An unhealthy tendency is apparent in the growing proportion of funded debt of total capitalization. The funded debt proportion grew from about 50 per cent in 1910 to 58 per cent in 1920, and to 59 per cent since 1923.

Railway freight traffic since 1920 has had a general (but slight) upward tendency. The ton-miles of 1923 and 1926 were of record-breaking volume. The former peak-loads were in 1918 and 1920. Taking 1918, a war year, as 100, the successive peaks were 101 in 1920, 102 in 1923 and 1925, 109 in 1926, and 106 in 1927. The number of loaded cars shows relatively greater increases than ton-miles, but the loaded car unit does not take into account the tendency toward a smaller carload. Railway passenger traffic, in contrast to the slight increase in freight, is steadily and seriously diminishing in volume. Since 1920, each year, with the exception of 1923, has had a smaller total passenger-miles than the preceding year. The passenger-miles in 1927 were 28 per cent less than in 1920. The loss is almost entirely in local passengers, and is owing mainly to motor vehicle competition. Long distance passengers and commuters have been increasing slightly.

The effect of motor truck competition on railways, while it has diminished the volume of less-than-carload freight and has taken away some tonnage in carload lots in a few other commodities, is not serious. Relatively, the freight lost to trucks is a small part of the total, and it is the least remunerative of railway freight. The small-shipment, short-haul freight traffic is burdensome in its demands upon equipment and facilities, and the railways are better off when the equipment and facility capacity, released by the loss of freight to trucks, is employed for the long-distance bulk-freight which is more attractive from the point of view of net revenue. In railway passenger service, however, the loss in local passengers to automobiles and motor coaches is substantial and serious, and is narrowing the already small spread between railway passenger revenues and passenger expenses. To meet the new form of competition, the railways are improving the schedules and equipment of the through trains, and are entering the motor coach field themselves by substituting motor transportation for branch-line trains or paralleling their rail lines by motor coach service. The greatest loss to the railways, however, is not in the passengers taken by motor coaches, but in the greater use of the private automobile as a substitute for railway transportation.

Shortly after the Transportation Act was passed in 1920, the Interstate Commerce Commission, acting under the new rule of rate-making, authorized rate increases which were intended to yield a 6 per cent return on railway property value. The average advance in freight rates was between 30 per cent and 35 per cent; in passenger service, the mileage rates were increased about 18 per cent and Pullman fares were advanced 50 per cent. These heavy increases did not, however, yield 6 per cent on property value, as the 1921 traffic fell off sharply. After the initial attempt to adjust rates so as to yield a specified rate of return, as required by law, the Commission apparently has given less attention to the relation between rates as a whole and fair return than to the downward adjustment of specific rates, notably on agricultural products. The average revenue per ton-mile in 1921 was 1.275 cents; in 1927, it was 1.080 cents. The ton-mile revenue is not always an accurate index of relative rates, but in this case it is indicative of reductions since 1921. These reductions, on the basis of the differences between the ton-mile revenue of 1921 and of subsequent years up to and including 1927, have saved the shipping public over \$4,000,000,000, or at the rate of \$670,000,000 per year. In passenger service, the rates have remained substantially the same since the advances of 1920, although, on the one hand, the tendency has been to offer to the public more opportunities in the form of reduced excursion or tourist rates, and, on the other hand, there have been advances in suburban fares in some localities. The revenue per passenger-mile has declined from 3.086 cents in 1921 to 2.896 cents in 1927, but the

decrease has been the result not only of the greater use of excursion tickets, but also of higher proportions of through passengers and suburbanites, and of lower proportions of local passengers who travel on the highest passenger-mile rates.

When the railways were restored to private operation after the war, the employee morale, in common with employee morale in nearly all industries, was seriously impaired. Relations were further strained when the Railroad Labor Board reduced wages in 1921 and 1922, and took away certain favorable rules, and the service was adversely affected by a nation-wide strike of shopmen in 1922-23. The Railroad Labor Board, created by the 1920 law, did not function satisfactorily, and it was replaced in 1926 by a Board of Mediation. Since then, there have been no serious labor troubles, but friction has been avoided partly by wage advances by mutual agreement between management and employees, or as a result of mediation. The process of mediation as a substitute for the offices of the Railroad Labor Board (on which the public members held the deciding vote) has not yet been subjected to a severe test. The Labor Board was not successful in avoiding disputes, and mediation since 1926 has maintained peace. The average wages per hour and per year, while less than those of the war period, have been gradually increasing since 1923, and the employee morale has shown an improvement. Employees are co-operating effectively with management in increasing the efficiency of operation. The traffic units per man-hour were 17 per cent greater in 1926 than in 1920, and 10 per cent greater than in 1923, but the major part of the gain is attributable to improved facilities and equipment.

The most notable achievement in railroad administration since the war has been the marked increase in the efficiency with which equipment has been utilized and trains operated. The car-miles per car-day have been increased from 25.1 in 1920 to 30.3 in 1927, and the ton-miles per car-day from 498 to 518. The 11 per cent more ton-miles of 1926 (the high record), compared with 1920, were produced with but 2 per cent more freight cars, notwithstanding a smaller average carload (over which the railways have little control) and a larger percentage of empty car-miles resulting from centralized distribution in shifting surplus cars from one region to another as needed for prospective loading. Unserviceable freight cars and locomotives have been reduced materially in number. In train service, there has been a steady and consistent gain in the train load from year to year since 1920, with a similar consistent gain in train speed through a reduction in road delays. In 1920, the gross load per train (cars and contents) was 1,443 tons; in 1927 it was 1,780 tons, a gain of 24 per cent. In 1920, the average train speed between terminals was 10.3 miles per hour; in 1927, it was 12.3 miles per hour, an increase of 19 per cent. In the inclusive unit combining load and speed—

gross ton-miles per train-hour—the gain was from 14,876 to 21,945, an increase in efficiency of 48 per cent. This impressive gain in production per train-hour was not purchased at the expense of higher ton-mile cost, as the operating ratio for the service as a whole has been brought down from 82.7 per cent in 1920 to 74.6 per cent in 1927, notwithstanding rate reductions and losses in passenger traffic. The greater efficiency in fuel consumption stands out as a single item. The savings in coal in 1927, in comparison with 1920, were 19 per cent in freight service and 13 per cent in passenger service (on the basis of consumption per ton-mile and per car-mile, respectively), and were equivalent in train service alone to economies of \$62,000,000 per year. Through better administration of material and supplies held for use in maintenance, operation, and construction, the savings in carrying charges in 1926, in comparison with 1920, were about \$32,000,000.³⁰

From the railway point of view, the only important unfavorable element in the present situation is the low net return on value. The 1920 law was intended by Congress to give the railways a reasonable assurance of a fair return, but the rate-making policy of the Interstate Commerce Commission has not been consistent with that intention. The Commission, effective in 1922, defined a fair return as $5\frac{3}{4}$ per cent on value, but in no year since the law was enacted in 1920 have the railways earned that return. The work of valuation of railroad property is not complete, and in its present stage is surrounded by many uncertainties which are yet to be cleared up by the Supreme Court, but it seems not at all unlikely that the final value, when determined, will be little different from the investment cost carried on the railway books. On that value, plus working capital in cash and materials held for use, the net return in operating income was 2.9 per cent in 1921, with a gradually increasing rate up to 4.8 per cent in 1925 and 5.2 per cent in 1926, the year of greatest freight traffic volume and greatest gross revenues. In 1927, with slightly less traffic, the return was but 4.5 per cent, and, for the first 10 months of 1928, it was at the rate of 4.7 per cent. The average for the seven years ended with 1927 was 4.3 per cent, a rate inadequate as a reward for taking the risks of investment, and plainly below the reward that Congress intended as an incentive to adequate transportation service to the public when the Transportation Act was passed. The additional investments of the past eight years have been made with faith in the assurance of a fair return. Although the fair return has not been earned upon the total investment, it is likely that it would have been even less without the additional investments, as they not only made it possible to produce the greater volume of transportation since 1923 but also to produce it at lower cost. There is a limit, however, to the extent to which new dollars can be devoted to saving old dollars already

³⁰ Lower prices in 1926 contributed substantially to this result.

invested, and the present policy of betterments cannot long be continued on an average return of 4.3 per cent on the whole.

Little progress has been made in carrying out the provisions of the Transportation Act pertaining to the consolidation of all railways into a limited number of systems of fairly equal financial strength. The purpose of that part of the Act was to simplify the problems of rate-making, and to insure reasonably uniform returns under uniform rates to all of the railways in any region. The Interstate Commerce Commission was directed to prepare a final plan to which all proposals should conform, but the Commission has reached the conclusion that the task is too difficult, and no final plan has been published. In the meantime, no consolidations can take place because, according to law, none can be approved unless it is in harmony with the Commission's final plan not yet prepared. All that can be done is to approve unifications by lease or stock control, but short of actual consolidation. A few such proposals have been approved and others are before the Commission, but the law instead of bringing about the intended large-scale consolidations has, because of the inability of the Commission to prepare a final plan, acted as a brake upon the long-time natural process under which the existing systems have grown. An amendment to the law, proposing a period in which consolidations, when believed by the Commission to be in the public interest, may be effected voluntarily without regard to a comprehensive plan, was favorably considered by Congress early in 1928, but was crowded off the calendar in the closing days of the session.

From the public point of view, the outstanding railway development since the war has been the marked improvement in transportation service. The adequacy, speed, and dependability in freight movement have never been better. The improvement is seen in freedom from car shortages, embargoes, and other restrictions, and in close adherence to scheduled transit times. The number of scheduled fast freight trains has been increased and the speed bettered so as to give earlier deliveries at destination. Incidental services have been extended, and throughout the whole service there is greater effort to apply modern merchandising principles in the development and sale of transportation. The regularity of movement and dependability in rail service have given impetus to the general practice among manufacturers and merchants of carrying smaller inventories of raw materials and merchandise. Better rail service cannot be credited wholly with this economic development, but it called attention to the possibilities and led to the general movement. Certain it is that the smaller stocks would not afford adequate protection, were rail service less prompt and reliable. The general reductions in inventories have released sums of capital which in the aggregate are enormous, and in buying habits have brought about profound changes which are far-reaching in their economic effects.