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FORECASTS OF RAILWAY TRAFFIC

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Shippers' Advisory Boards and Their Forecasts

AT THE BEGINNING of the third quarter of 1927 the Car Service Division of the American Railroad Association issued a forecast of the number of freight cars shippers would require in that quarter. It has published similar forecasts ever since. These documents comprise by far the most extensive record we have of efforts to anticipate the movement of freight traffic. (Indeed, it would be hard to find another economic activity which has been the subject of continuous forecasts over so long a period.) Most of this paper will therefore be devoted to these forecasts.

In a sense the forecasts originated in the severe shortages of freight cars that frequently occurred in the early 1920's. It was felt that the situation called for organized interchange of information about needs for and the supply of cars between shippers and representatives of the railroads. Beginning in 1923, regional Shippers' Advisory Boards were formed in various parts of the country under the auspices of the Car Service Division. They met regularly and set up commodity committees to deal with particular species of traffic. By the middle of 1927 each committee was making a formal estimate of the number of cars that would be needed for the loading of its kind of traffic in its region, and the estimates were considered sufficiently standardized to justify the issuance of national totals. The committee estimates are assembled and published by the Division in a release called the *National Forecast.* Issued near the beginning of each quarter, it shows for each of thirty-two (originally twenty-seven) classes of commodities the actual carloadings in the corresponding quarter of the previous year, the estimated carloadings for the quarter, and the percentage increase or decrease of the latter over the former. The information is given for the country as a whole and for each of thirteen regions.

These estimates apply to shipments tendered to the railroads in carload quantities. They include only the more important kinds of carload traffic. In 1949, for example, the actual carloadings of the

William I. Greenwald and Johanna Stern assisted the author in preparing this paper.

commodities included in the forecast were 91 per cent of the number of carloads reported to the Interstate Commerce Commission as originated, and 87 per cent of all carloadings except merchandise given by the Car Service Division in its weekly release on carloadings reported to it by railroads. Merchandise is traffic tendered by shippers in less than carload quantities; railroads, not shippers, usually load it into cars. The actual carloadings reported by the Shippers' Advisory Boards were 76 per cent of all carloadings including merchandise.[1]

Estimated versus Actual Carloadings

Perhaps the simplest way to measure the accuracy of these forecasts is to compute the percentage ratio of the estimated loadings for each quarter to the actual loadings in the same quarter. This can be done, at the moment of writing, for ninety-nine forecasts, of which the earliest pertains to the third quarter of 1927, and the last to the first quarter of 1952.[2] The accuracy of the overall national estimate for all commodities forecast has varied a great deal (chart 1). The error has ranged from an overstatement of 40.5 per cent in the second quarter of 1932 to an understatement of 14.7 per cent in the third quarter of 1933.

What was the average error? There are two ways of answering this question. To a person who uses a forecast as a guide to action, an error in one direction may not compensate for a previous error in the opposite direction. Since one error does not atone for the other, from his point of view we should ignore signs when we com-

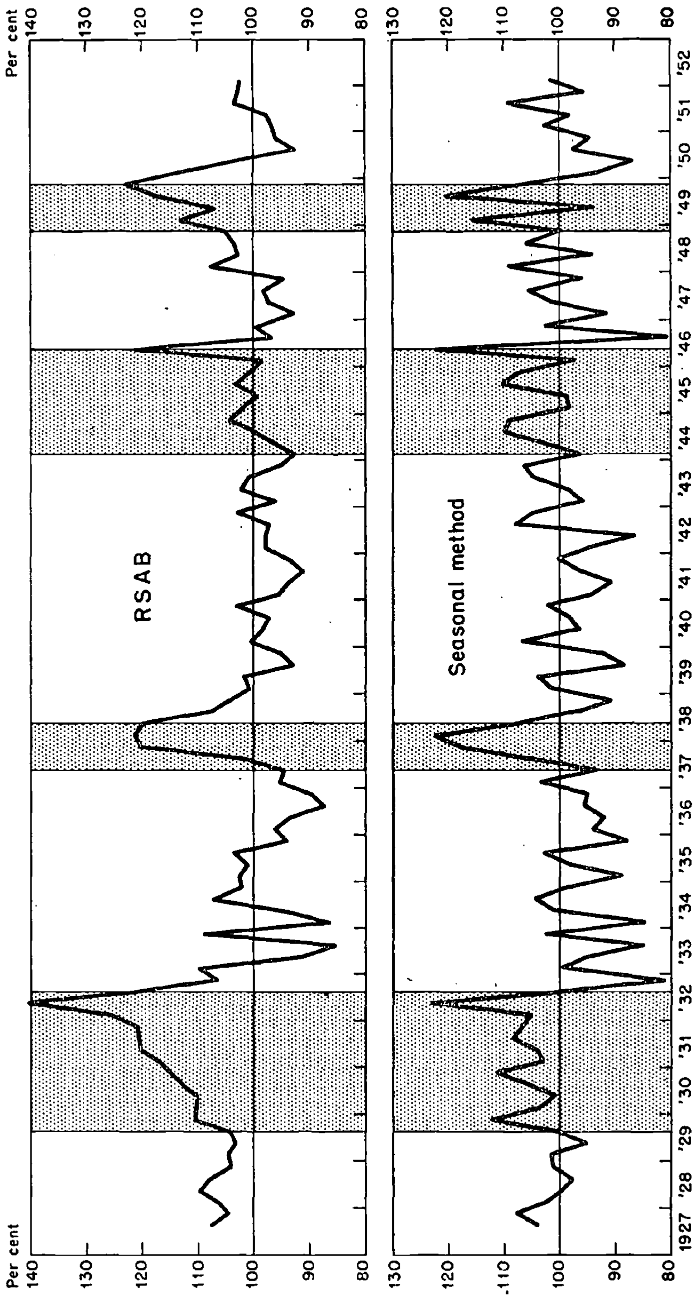
[1] We have computed these percentages from data in the four 1950 issues of the *National Forecast*, Interstate Commerce Commission *Statistics of Railways* for 1949, and the Car Service Division statement on *Revenue Freight Loaded* for the week ending December 31, 1949.

[2] Since the traffic covered by the estimates is less inclusive than that reported in other sources, it is difficult to obtain an actual figure, comparable with the forecast, except from the following year's forecast. Otherwise it would be possible at present to appraise four additional quarterly forecasts.

During the war some traffic was omitted and other traffic added to the forecasts, as follows:

Automobiles, trucks, and parts	Omitted	IQ 1942 to IVQ 1945
Chemicals and explosives	Omitted	IIIQ 1942 to IVQ 1945
Ore and concentrates	Omitted	IIIQ 1942 to IVQ 1942
Manufactures and miscellaneous	Added	IVQ 1942 to IVQ 1945

The "actual" figures for corresponding quarters a year earlier are similarly affected. To make the actual comparable with the estimated, or the figures for one year comparable with those for another, we have made appropriate deductions whenever necessary.



Shaded periods are contractions or quasi-contractions in actual carloadings.

Chart 1. Carloadings: Percentage Ratio of Estimated to Actual, All Commodities in Forecast, Regional Shippers' Advisory Board Estimates and Estimates by Seasonal Methods; Third Quarter 1927–First Quarter 1952 pute the average error. If the estimate is 140 per cent of the actual in one quarter and 70 per cent of the actual in another, the average error would be $(40 + 30) \div 2$ or 35 per cent. On the other hand, an error may be a matter of indifference to the user to the extent that it is matched later by an opposite error. If that is the situation, one should give regard to signs, and the average error in the example just cited would be $(40 - 30) \div 2$ or 5 per cent. In my judgment the first situation is the more important one. In the ninety-nine forecasts the national estimate for all commodities in the forecasts had an average error, ignoring signs, of 7.51 per cent.

The average error, ignoring signs, in the national estimates for every commodity that contributed over 5 per cent of the total actual loadings in 1949 is shown in table 1. Although flour and meal con-

TABLE 1

Carloadings, by Major Commodities: Relative Importance in 1949, and Average Error of Forecast, Neglecting Signs, Third Quarter 1927 to First Quarter 1952

	Actual Carloadings, 1949		
Commodity	*Amount (thousands)*	*Per Cent of total*	*Average Percentage Error*[a]
Grain	1,614	5.90	10.48
Flour, meal, and other mill products	1,224	4.47	6.36
Coal and coke	7,474	27.30	10.17
Ore and concentrates	2,228	8.14	25.80[b]
Gravel, sand, and stone	2,279	8.32	13.01
Lumber and forest products	2,120	7.74	12.45
Petroleum and petroleum products	1,510	5.52	7.37
Iron and steel	1,803	6.59	15.32
All other	7,125	26.02	. . .
All commodities in forecast	27,377	100.00	7.51

[a] To derive this figure we computed the difference, in each quarter, between the percentage ratio of estimated to actual carloadings for that quarter and 100; then we added the differences for all quarters, neglecting signs, and divided the total by 99, except in the case of ore.

[b] Average for 95 quarters; no data for 4.

Source: American Railroad Association, Car Service Division, *National Forecast.*

tributed somewhat less than 5 per cent, this category is also shown because it provides an instructive contrast with the others. The production of and traffic in some commodities—ore and concentrates; gravel, sand, and stone; iron and steel—fluctuate severely during the course of business cycles. The average errors in the estimates of these commodities were large. For lumber and forest products the average error is also rather large; if the group included only structural lumber, the average would probably be larger. On the other hand, petroleum and its products and flour and other mill products are not subject to severe cyclical fluctuations, and these commodities have the best forecasting records. Grain is not greatly affected in business cycle disturbances, but it is influenced by weather conditions, and production and traffic are more variable than they are in the case of flour and meal. Correspondingly, the forecasts for grain are less accurate than those for its products.

The greater difficulty in forecasting the more variable commodities affects the overall accuracy record of the several Advisory Boards (table 2). The Northwest board had the highest average

TABLE 2

Carloadings, by Districts: Relative Importance in 1949 and Average Error, Neglecting Signs, Third Quarter 1927 to First Quarter 1952

District Number and Name of Board	*Actual Carloadings, 1949* Amount (thousands)	Per Cent of Total	Average Percentage Error
9. Allegheny	3,275	11.96	12.33
8. Atlantic States	2,965	10.83	10.22
10. Central Western	1,050	3.84	8.13
2. Great Lakes	2,061	7.53	12.58
1. Midwest	3,244	11.85	6.66
12. New England	458	1.67	8.34
3. Northwest	2,064	7.54	13.78
4. Ohio Valley	3,155	11.52	10.37
11. Pacific Coast	1,332	4.87	10.14
14. Pacific Northwest	943	3.44	8.18
6. Southeast	3,367	12.30	9.63
7. Southwest	1,954	7.14	9.99
5. Trans-Missouri-Kansas	1,510	5.52	7.32
United States	27,377	100.00	7.51[a]

[a] The average error for the country is lower than the average error for almost every district because the district errors cancel each other to some extent in the national average.

Source: See source for table 1. For boundaries of districts see map in any issue of the *National Forecast.*

error, and the Great Lakes and Allegheny errors were only a little smaller. District 3 (Northwest) includes the Minnesota ranges of iron ore deposits, and loadings of ore and concentrates are a very large part of its loadings. District 2 (Great Lakes) includes the Lake

Erie ports at which ore going to interior furnaces is transferred from vessels to cars, and ore loadings are relatively important in this district also. District 9 (Allegheny) includes the Pittsburgh steel-making area, and iron and steel loadings are a relatively large part of its total.

The direction of the error appears to be related to business conditions. The unshaded periods on chart 1 correspond roughly to business expansions, and the shaded periods correspond to business contractions. A cursory glance at the chart suggests that the forecasts tend to fall short of the actual in expansions and to exceed the actual in contractions. The men on the committees that make these forecasts are representatives of business enterprises. It looks as though businessmen tended to underestimate the force both of expansions and of contractions. When business is improving they are underoptimistic; when it is falling off they are underpessimistic.

We may check this visual impression by computing average errors for business expansions and contractions separately. For this purpose we must consider the sign of the error. If businessmen tend to underestimate their prospects in expansion, underestimates should be more common than overestimates, and the average error, signs considered, should be negative in periods of expansion. If businessmen tend to overestimate their prospects in contractions, the average error, signs considered, should be positive in periods of contraction. Our computations support the general impression described in the preceding paragraph, although not as strongly as they might (table 3, part A). The error was negative in two of four expansions, positive in all contractions. The two expansions in which it was positive (1927-1929 and 1945-1948) were much milder than the other two (1933-1937 and 1938-1945). The positive error in 1927-1929 was much smaller than that in the immediately following contraction, and the same is true of the positive error in 1945-1948.

Instead of comparing the error during expansions in general business with the error in contractions of general business, we may compare the error during expansions of the traffic under consideration with the error during contractions of that traffic. To accomplish this we must first identify the cycles in traffic. Accordingly, we have adjusted the actual figures (all commodities in forecast) for seasonal variation, and marked off peaks and troughs as boundaries for the traffic expansions and contractions (chart 2). All the business fluctuations except 1926-1927 and 1927-1929 had their analogues in traffic, although the boundary dates for traffic differ somewhat from

TABLE 3

Percentage Error, Estimated Carloadings Compared with Actual in Same Quarter, during Periods of Expansion and Contraction in Business and Traffic, 1927-1949

Period[a]			
First Quarter	*Last Quarter*	*State of Business or Traffic*	*Average Error, Signs Considered*
	A. Business[b]		
IVQ 1927	IIQ 1929	Expansion	6.03
IIQ 1929	IQ 1933	Contraction	16.10
IQ 1933	IIQ 1937	Expansion	—3.35
IIQ 1937	IIQ 1938	Contraction	12.80
IIQ 1938	IQ 1945	Expansion	—1.03
IQ 1945	IVQ 1945	Contraction	1.27
IVQ 1945	IVQ 1948	Expansion	1.36
IVQ 1948	IVQ 1949	Contraction	12.85
	B. Traffic		
IIIQ 1927	IIIQ 1929	Slow contraction	5.80
IIIQ 1929	IIIQ 1932	Rapid contraction	18.01
IIIQ 1932	IIQ 1937	Expansion	—1.87
IIQ 1937	IIQ 1938	Contraction	12.80
IIQ 1938	IQ 1944	Expansion	—1.14
IQ 1944	IIQ 1946	Contraction	1.28
IIQ 1946	IQ 1947	Expansion	1.23
IQ 1947	IVQ 1948	Slow contraction	0.47
IVQ 1948	IVQ 1949	Rapid contraction	12.85

[a] Dates are inclusive. In computing averages for each period an overlapping quarter (e.g. IIQ 1929 on first and second lines) was considered half a quarter, and half of its error was included in the total for the period. The 1927 and 1949 turning quarters are so treated, except that, under "traffic cycles," IIIQ 1927 was included in full.

[b] Based on "reference" chronology of National Bureau of Economic Research.

Source: See source for table 1.

those for business. There is even a little evidence of a contraction in traffic corresponding to 1926-1927 in business and an expansion corresponding to 1927-1929, but it is so faint that we ignore it. The general trend of traffic was downward in 1926-1929, but the decline was much less abrupt than in 1929-1932. The third quarter of 1929 looks like a point of inflection; we shall subdivide 1926-1932 at that point. Although traffic reached a peak in the first quarter of 1947, the decline from that quarter to the quarter of the business peak was very mild. We shall subdivide 1947-1949 also.

This approach suggests a conclusion similar to that suggested by the business cycle approach, and troubled by fewer exceptions (table 3, part B). The average error was positive both in the mild

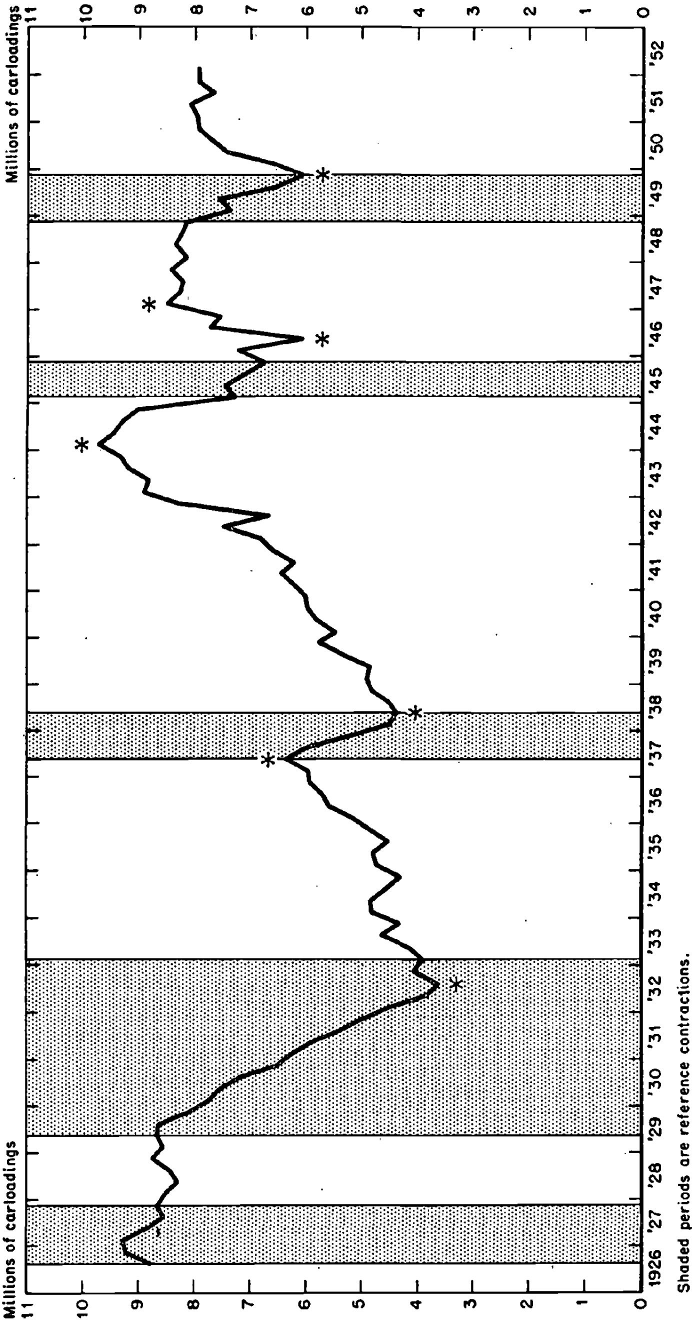


Chart 2. Actual Carloadings, All Commodities in Forecast, Seasonally Adjusted, Third Quarter 1926–First Quarter 1952

irregular decline of 1926-1929 (or at least in that part of it for which we have forecasts) and in the sharper decline that followed. It was smaller in the period of gradual than in the period of severe decline. Similar remarks apply to 1947-1949 and its component periods. All periods except 1946-1947 obey the rule that the average is negative in expansion and positive in contraction. Businessmen underestimate their prospective shipments when traffic in the aggregate is growing and overestimate them when it is falling off.[3]

Change from Preceding Year or Quarter

The form in which the *National Forecast* is published suggests that the commodity committees take as their point of departure the loadings in the quarter of the previous year corresponding to the quarter to be forecast, and ask themselves what the change from that point of departure is likely to be. We may vary our statistical procedure to take account of this possibility. Hitherto we have compared the forecast for each quarter with the actual for that same quarter. We shall now compare (a) the ratio of the forecast for each quarter to actual traffic in the corresponding quarter of the previous year with (b) the ratio of actual traffic in the forecast quarter to actual traffic in the corresponding quarter of the previous year.

First let us look at the direction of change (chart 3). In both the estimated and the actual change there are large runs of quarters in which the direction of change is positive, and others in which it is negative. In a broad way the runs correspond to business cycles. On the chart there is a white stretch corresponding roughly to the business expansion of 1927-1929, a shaded stretch corresponding to the business contraction of 1929-1933, and so forth. Usually the estimated direction of change is the same as the actual direction. The frequent agreement may seem impressive at first thought, but equally impressive success could have been attained in a much simpler way, without any investigation of the traffic situation in the various quarters. A "forecast" could have been made at the beginning of each quarter by assuming that the most recent direction

[3] The exceptional average for 1946-1947 is positive only because of the large overestimate in the second quarter of 1946; all the other quarters were underestimated. Figures for individual commodities indicate that the single overestimate is explained largely by failure of coal shippers to anticipate the effect of the miners' strike that began on April 2 and continued (with a partial interruption) through May 29, 1946.

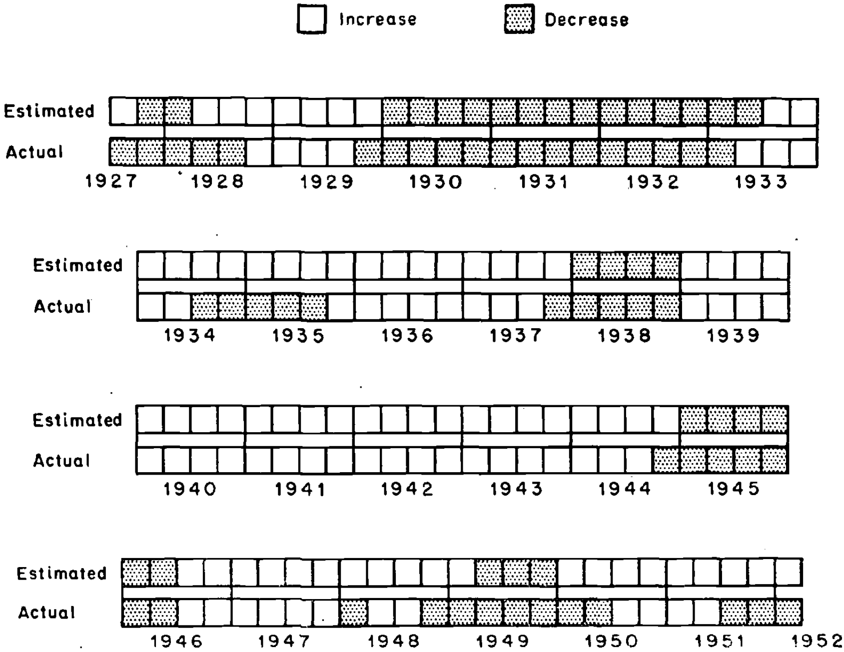


Chart 3. Carloadings: Direction of Change from Same Quarter in Preceding Year, Estimated and Actual, Third Quarter 1927–First Quarter 1952

of change would be repeated. A forecaster working on that assumption at the beginning of the second quarter of 1931, for example, would have noted that carloadings were smaller in the first quarter of 1931 than in the first quarter of 1930. He would then have "predicted" that carloadings would be lower in the second quarter of 1931 than in the second of 1930. Such forecasts would have been right most of the time. They would go wrong whenever the direction of traffic changes, and only then. The occasions on which they would have been in error are indicated by the transitions from shading to white in the "actual" bar of the chart. There are fourteen transitions.

On the other hand, the forecasts of the Advisory Boards were wrong as to direction in every quarter that has white in the upper and shading in the lower bar, or vice versa—i.e. in twenty quarters. These twenty errors include several failures to anticipate major cyclical downturns and upturns—the shifts from increase to decrease in the fourth quarter of 1929, from decrease to increase in the second quarter of 1933, from increase to decrease in the fourth quarter of 1937 and again in the fourth quarter of 1948.

Now let us compare the estimated and actual changes quantitatively. On chart 4 there is a dot for each of the ninety-nine quarters.

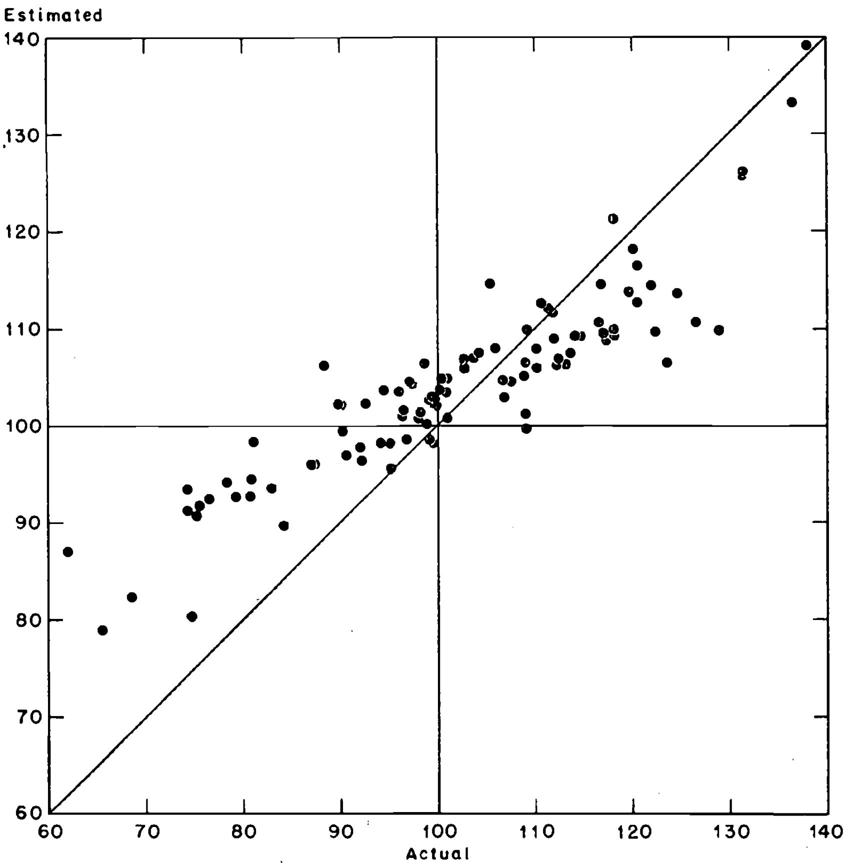


Chart 4. Percentage Ratios of Estimated and Actual Carloadings in Each Quarter to Actual Carloadings in Corresponding Quarter of Preceding Year, 1927-1952

The location of a point from left to right depends on the ratio of actual traffic in the quarter to actual traffic in the preceding year's base quarter. Its vertical position indicates the ratio of the forecast for the quarter to actual traffic in the base quarter. If all the forecasts were perfect, all dots would fall on the line drawn at an angle of 45 degrees through the intersection of the 100 per cent lines. In a broad way there is a correlation between forecast and actual change. The estimated change, however, usually understates the actual, especially when the latter is large. Most of the dots in the upper right quadrant of the chart are under the 45-degree line. Almost all of those in the lower left quadrant are above it.

Although perhaps not so intended, the estimate for each quarter could be taken as an indicator of the percentage change to be expected from the immediately preceding quarter. We can compute the error that would attend such expectations by a method similar to that just employed. For example, we can compare (a) the ratio of the forecast for the fourth quarter of 1949 to the actual traffic in the third quarter of 1949 with (b) the ratio of the actual traffic in the fourth quarter to the actual in the third quarter. In this kind of comparison the change is largely influenced by seasonal factors. The usual pattern is a rise from the first to the second and from the second to the third quarters, a fall from the third to the fourth and from the fourth to the first. In all 99 quarters the direction of change from actual to actual departed from this seasonal pattern in 11 instances. The forecast missed 7 of these exceptions. It erroneously indicated departures from the seasonal pattern in 11 instances, making 18 errors in all.

Quantitatively, the relation between estimated and actual change from the preceding quarter was much looser than the relation between estimated and actual change from the preceding year. Chart 5 suggests less correlation than chart 4.

Simple Seasonal Method Gives Better Forecasts

The preceding discussion suggests that much of the error in the estimates results from failure to gauge correctly the amount, or even the direction, of cyclical change, and that the accumulated cyclical change over a year, rather than the seasonal variation from quarter to quarter, dominates them. Estimates could be made, instead, on the simple assumption that the usual seasonal change from the most recent quarter will occur. Might such a procedure yield forecasts that are just as accurate?

If a forecast for a third quarter in a particular year is desired, for example, one might examine the actual carloadings in the second and third quarters of the preceding five years, compute the average ratio of the third to the second quarters, and multiply carloadings

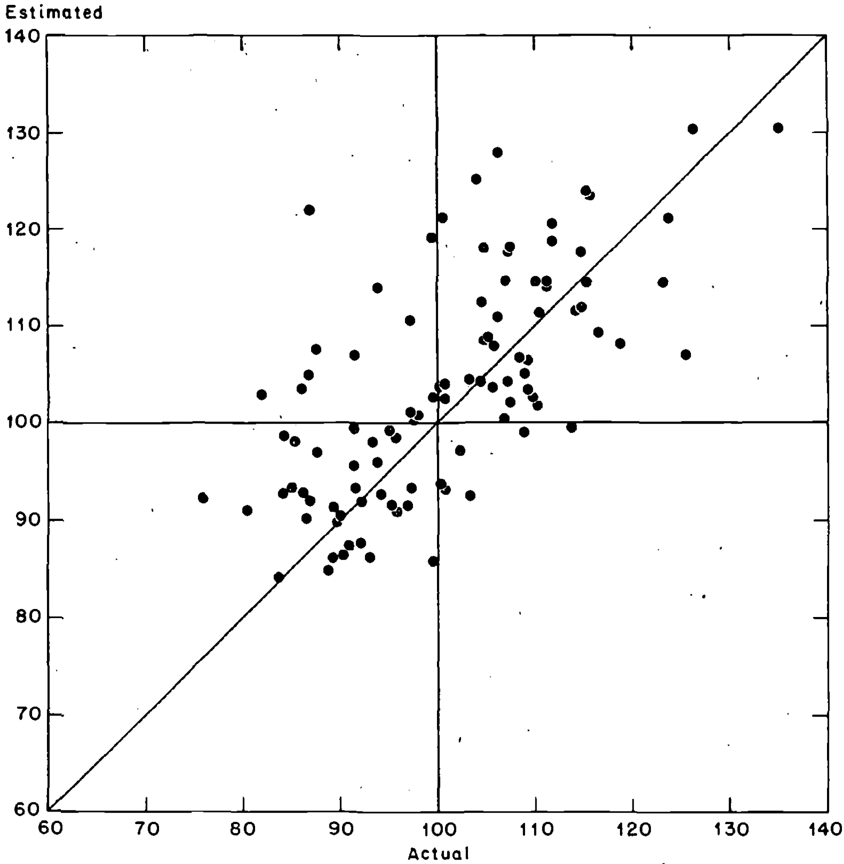


Chart 5. Percentage Ratios of Estimated and Actual Carloadings in Each Quarter to Actual Carloadings in Preceding Quarter, 1927-1952

in the second quarter of the current year by this ratio to obtain the desired estimate for the third quarter. Table 4 illustrates how such a forecast could have been made for the third quarter of 1937. From the second to the third quarter, carloadings increased 6.2 per cent in 1932, 25.5 per cent in 1933, and so forth. The average increase was 11.0 per cent. A forecaster using this purely seasonal method would have assumed that carloadings in the third quarter of 1937 would be 111.0 per cent of carloadings in the second quarter of that year.

We have made an estimate by the method of table 4 for each of the ninety-nine quarters, using in each case a seasonal ratio freshly computed from data for the appropriate five pairs of earlier quar-

TABLE 4

Estimate, by Seasonal Method, of Carloadings in Third Quarter of 1937 (*thousands of cars*)

A. Seasonal Experience of Preceding Years

	Actual Carloadings		
	Second Quarter	*Third Quarter*	*Ratio of Third Quarter to Second*
1932	3,618	3,842	1.062
1933	3,946	4,951	1.255
1934	4,603	4,812	1.045
1935	4,552	4,784	1.051
1936	5,331	6,058	1.136

B. Computation of Estimate and Error

Average of five ratios above	1.110
Actual carloadings, second quarter of 1937	6,060
Estimate for third quarter of 1937, 1.110 × 6,060	6,727
Cars actually loaded, third quarter of 1937	6,413
Ratio of estimate to actual, 6,727 ÷ 6,413	1.049
Percentage error of estimate	4.92

Source: See source for table 1.

ters. For all traffic in the aggregate, the seasonal method gives somewhat better results than those achieved by the Advisory Boards. The mean error, neglecting signs, of the ninety-nine estimates by the seasonal method is 6.47 per cent. It will be recalled that the mean error of the Advisory Board forecasts is 7.51 per cent.

If this method were to be used in making current forecasts rather than retrospective ones, data on actual carloadings in the quarter just closed would have to be available at the beginning of each quarter to be forecast. At the beginning of the first quarter of 1955 the forecasting agency would have to know the carloadings in the fourth quarter of 1954. This should be feasible. Carloadings for the nation are compiled daily and are among the most promptly available of all economic data.

Our "forecasts," therefore, although they were made long after the event to be "predicted" had occurred, make use only of information that could have been available in advance. All of the data underlying the estimate in table 4, for example, were or could have been available at the beginning of the third quarter of 1937.

An agency with resources not at our disposal could have followed a somewhat superior technical procedure. In "forecasting" the third quarter of 1927 and subsequent quarters in the earlier years of our period we needed seasonal ratios based on actual carloadings prior to July 1926. There are no data for traffic before that date comparable with the traffic data included in the forecasts. We therefore used the Interstate Commerce Commission data on cars of carload traffic originated. If the shippers and the Car Service Division had used the seasonal method in 1927, they presumably could have obtained strictly comparable historical data from the railroads. In spite of the discrepancy in character between the ICC figures and the figures to be estimated, however, the earlier "forecasts" by the seasonal method are not notably worse than the later ones (chart 1).

We have derived our seasonal ratios directly from the total carloadings of all commodities. A better forecast might be obtained, at the cost of much greater computational effort, by applying separate seasonal adjustment factors to each of the major commodities and adding the estimates for the various commodities. Such a method would take account of changes in the relative importance from year to year of commodities with different seasonal features.[4]

In spite of possible improvements, however, I do not contend that seasonal adjustment gives good forecasts. The point is merely that a simple, mechanical procedure yields estimates of total traffic that are somewhat less erroneous, on the average, than the estimates obtained by the elaborate Advisory Board procedure.

Forecasts based on nothing but seasonal fluctuation obviously make no allowance for other than seasonal influences on carloadings—no allowance for the business cycles or for occasional incidents like a major coal strike. The seasonal-method estimates, like the Advisory Board estimates, tend to be too low in expansions and too high in contractions (chart 1). But the seasonal forecasts are at least as good as the Advisory Board forecasts. The latter, too, do not successfully anticipate the effect of cyclical and other influences.

Forecasts in ICC Proceedings

In recent years rising wage rates and prices of materials and supplies have forced the railroads to seek higher rates and fares.

[4] We computed the seasonally adjusted data in chart 2 by the commonly used ratio-to-centered-moving-average method, using one set of seasonal indexes for 1927-1931, another for 1932-1940, and a third for 1941-1950. The method is more sophisticated than the one in table 4, but its application to continuously shifting base periods would involve much labor.

Their efforts led to Interstate Commerce Commission investigations in which it became more or less customary to introduce estimates of traffic, which are regarded as relevant because heavier traffic is usually expected to have a beneficial effect on net earnings and hence to minimize the need for higher rates. In these ICC proceedings it is to the interest of the railways that prospective traffic should appear to be small, and it is to the interest of their opponents that it should appear to be large.

Insofar as these estimates are cited in the Commission's decisions, they are summarized in table 5. The nonrailroad estimates, except the Commission's own on the last line, were introduced in opposition to rate increases. Many of the estimates pertain to the year in which they were submitted; when they were made late in that year, actual figures for the early months were available, and only the remainder had to be guessed. Similar estimates of passenger traffic, although of parenthetical interest here, are shown in the table.

In general but with some exceptions, the estimates that must include some actual data look best, and the estimates made more than a year ahead have errors that are large in comparison with actual cyclical fluctuation from year to year. The former would not look as good as they do if we could compare the implicit estimate for the remainder period with the actual traffic for that period.

General Remarks

Traffic depends on the production (and in some degree on the importation) of commodities and on the extent to which production is disposed of locally, temporarily by storage or permanently by consumption. The traffic of any one means of transport, such as railroads, depends also on the changing competitive attractiveness of the various means. Production, inventories at points of shipment, and railway participation in movement all vary cyclically and for seasonal and other reasons. Unless or until it becomes possible to forecast cycles in production, it might be better, in quarter to quarter forecasts, to disregard the cyclical aspect of the problem and concentrate on the seasonal influences, which are usually more powerful in the short run, at least in their effect on total traffic. Even with seasonal adjustment of the usual kind, the estimator will run into trouble unless he can anticipate such developments as strikes, unusually heavy or light crop yields, and early or late opening or closing of the Great Lakes to navigation (the rail movement of the

TABLE 5

Traffic Estimates Submitted to ICC in General Rate Increase Cases, 1943-1952

Year Esti-mated	Sponsor of Estimate	Date Case Submitted to ICC[a]	Revenue Ton-Miles Estimated (billions)	Revenue Ton-Miles Actual (billions)	Revenue Ton-Miles Percentage Error	Passenger-Miles Estimated (billions)	Passenger-Miles Actual (billions)	Passenger-Miles Percentage Error	Source[b]
1943	Price Adm.[c]	2-25-43	748[d]	727	2.9	80.6[d]	87.8	—8.2	255 ICC 357, 366
1944	Railroads	11-3-44	746[d]	737	1.2	96.1[d]	95.5	0.6	259 ICC 159, 170-171
1945	Railroads	11-3-44	. . .	681	. . .	80.0	91.7	—12.8	Same, 187
1945	Price Adm.[c]	11-3-44	663[de]	681	—2.6	86.0 to 90.7[d]	91.7	—6.2 to —1.1	Same, 184
1946	Railroads	5-13-46	550	592	—7.1	65.0	64.7	0.5	264 ICC 695, 705
1947	Railroads	10-25-46	593[d]	655	—9.5	47.7	45.9	3.9	266 ICC 537, 545
1947	Railroads	12-20-47	647	655	—1.2	44.8	45.9	—2.4	270 ICC 403, 418-419
1947	NARUC[f]	12-20-47	649	655	—0.9	46.7	45.9	1.7	Same
1948	Railroads	12-20-47	630	638	—1.3	39.1	41.2	—5.1	Same
1948	Sec. Agric.[g]	12-20-47	700; 770	638	9.7; 20.7	50.0; 55.0	41.2	21.4; 33.5	Same
1948	NARUC[f]	12-20-47	649; 682	638	1.7; 6.9	46.7; 49.1	41.2	13.3; 19.2	Same
1948	Railroads	12-10-48	637; 640	638	–0.2; 0.3	. . .	41.2	. . .	272 ICC 695, 708-709
1949	Railroads	12-10-48	619; 621	527	17.5: 17.8	. . .	35.1	. . .	Same
1949	Railroads	5-21-49	573	527	8.7	35.9	35.1	2.3	276 ICC 9, 19
1949	ICC	5-21-49	575	527	9.1	35.0	35.1	—0.3	Same
1951	Railroads	3-1-51	620	647	—4.2	33.0	34.6	—4.6	280 ICC 179, 185
1951	Railroads	7-13-51	632	647	—2.3	33.7	34.6	—2.6	281 ICC 557, 569-570
1951	Sec. Agric.[gh]	7-13-51	650 to 700	647	0.5 to 8.2	35.0	34.6	1.2	Same
1951	Sec. Agric.[gh]	7-13-51	675 to 720	647	4.3 to 11.3	37.5 to 40.0	34.6	8.4 to 15.6	Same
1951	Sec. Com.[i]	7-13-51	646 to 676	647	–0.2 to 4.5	34.2	34.6	—1.2	Same
1951	GSA[j]	7-13-51	660 to 790	647	2.0 to 22.1	38.0	34.6	9.8	Same
1952	Railroads	2-29-52	640	615	4.1	. . .	34.0	. . .	284 ICC 589, 601
1952	Dept. Com.[i]	2-29-52	657	615	6.8	. . .	34.0	. . .	Same

[a] Each estimate must have been made at some time before the date in this column.

[b] Actual from ICC, *Statistics of Railways*, 1949, p. 39, and *Revenue Traffic Statistics*, December 1952.

[c] Price Administrator, OPA.

[d] Estimate stated in source as a percentage or amount under or over an earlier year.

[e] Minimum.

[f] National Association of Railroad and Utilities Commissioners.

[g] Secretary of Agriculture.

[h] Two witnesses for the Secretary made separate estimates.

[i] Secretary or Department of Commerce.

[j] General Services Administration.

important iron ore traffic is closely geared to the water movement). The legalization of alcoholic liquors increased the percentage of certain grains moving by railroad; "institutional" factors should be watched. On the other hand, unexpected changes sometimes compensate each other at least in part. When crops of grain are large, farmers are likely to store a larger percentage in their barns or in local elevators, or to feed a larger percentage to livestock; unexpected fluctuations in yield are then partly compensated by unexpected fluctuations in local disposal. But even if all these miscellaneous influences can be dealt with or shown to be of small net importance in their effect on the grand aggregate of traffic, and even if the safest way to treat business cycles, in our ignorance, may be to disregard them, cyclical change will continue to confound anticipations of traffic. The problem of forecasting freight movements is bound up with that of forecasting the general course of the economy.