Volume Title: Freight Transportation in the Soviet Union: A Comparison with the United States

Volume Author/Editor: Ernest W. Williams, Jr.

Volume Publisher: Princeton University Press

Volume ISBN: 0-87014-379-4

Volume URL: http://www.nber.org/books/will59-1

Publication Date: 1959

Chapter Title: Appendix A: Railroad Performance vs. Capital Investments during the Transportation Crisis in the USSR, 1931-35

Chapter Author: Ernest W. Williams, Jr.

Chapter URL: http://www.nber.org/chapters/c2519

Chapter pages in book: (p. 139 - 156)

Appendixes

NOTE: In these appendixes the sources are cited by an italicized numbering code followed by the page number. The sources are arranged by that code in the bibliography at the end of the book. In the case of articles, citations are given by an italicized number identifying the periodical or newspaper, followed by the year, issue, and page number.

APPENDIX A

Railroad Performance vs. Capital Investments During the Transportation Crisis in the USSR, 1931-35

BY GEORGE NOVAK

THE rapid growth of railroad freight traffic and the steady improvement of most operating indexes during the 1920's must have led Soviet planners to think that the railroads could continue increasing the volume of freight traffic they carried simply by raising the standards of their operating efficiency without making any substantial capital investment. The warnings of some conscientious railroad economists and engineers were discarded as typifying a "theory of limits" and, instead of providing an allocation of investments reasonably balanced between heavy industry and railroads, Soviet planners preferred to rely on constantly increasing pressure and minimum investment in the railroad plant.

This disproportionate allocation of investments in favor of heavy industry led, in the first two years of the Second Five Year Plan, to a general transportation crisis despite the high pressure on railroads to increase their operating efficiency. Transportation difficulties, which developed as early as 1930, were described by an official Soviet publication on transportation in the following terms:[1]

> Railroad transportation started off the year 1931 in poor condition. Its deterioration, which began in the middle of 1930, reached a low point in the first two months of 1931 when average daily carloadings declined to 38,800 in January and 36,000 in February. At this time transportation was the main cause for the underfulfillment of output plans in industry. Some enterprises accumulated masses of unshipped output (about one million tons of fuel in the Donbas alone); giant construction projects and factories remained without building raw materials, which caused a standstill in production. Instead of increasing, the level of industrial production dropped in January 1931 because of transportation difficulties, and in February 1931 it was back at the level of February 1930. As a result, industry fell below the level it had reached in December 1930, and suffered a setback which disorganized it quite considerably. . . .
>
> . . . Transportation really became a bottleneck in the economy. . . .

[1] 7, 1931, No. 11-12, 92.

. . . The appeal of January 15, 1931, was a turning point in the work of the railroads. . . .

. . . Average daily carloading increased to 49,300 in April, compared to 36,000 in February; the average number of bad-order locomotives declined from 158 per day in February to 61 in April; freight car-kilometers per active freight car increased from 65.4 in February to 92.3 in April. . . .

. . . However, in spite of the recovery of railroad transportation, the measures taken to sustain this recovery proved insufficient. Railroad transportation did not expand as rapidly as the building of socialism in our country.

In quantitative terms, however, the backlog of unshipped freight was quite small at this early stage compared to the backlog which developed in later years. Table A-1 presents a comparison between the average daily carloadings and the volume of unshipped freight in 1930-31.

TABLE A-1

AVERAGE DAILY CARLOADINGS AND BACKLOG OF UNSHIPPED FREIGHT, 1930-31
(thousand cars in 2-axle units)

	ADC		*Backlog*	
	1930	1931	1930	1931
January	42.8	38.8	3	50
February	42.3	36.0	3	83
March	45.9	43.9	15	112
April	48.1	49.3	14	92
May	48.4	51.5		52
June	51.0	54.6	1	7
July	47.5	52.4	2	13
August	45.0	51.1		14
September	46.7	53.7	3	37
October	48.3	55.0	8	45
November	47.2	55.4	14	49
December	42.6	49.6	21	52

SOURCE: ADC, *62*, 340; backlog, figures read off a diagram in 7, 1932, No. 9-10, 1.

The core of the transportation problem in 1933-34 becomes apparent when we compare the rate of growth of heavy industry with the performance of railroads (Tables A-2 and A-3). Average daily carloadings increased 11 per cent in the first quarter of 1934 compared to the first quarter of 1933, 8 per cent in the second, 9 per cent in the third, and 6 per cent in the fourth. The performance indexes also show some slight improvement in 1934 over 1933, but, compared to

TABLE A-2

PERFORMANCE OF RAILROADS, 1933-34

	First Quarter		*Second Quarter*		*Third Quarter*		*Fourth Quarter*	
	1933	1934	1933	1934	1933	1934	1933	1934
Average daily car-loadings	47,011	52,297	52,649	56,795	51,698	56,797	53,474	56,945
Average freight car turnaround time (days)	10.59	9.51	9.28	8.50	9.23	8.41	9.36	8.66
Freight car-kilometers per car-day	85.8	104.1	101.1	123.8	103.9	123.3	99.7	119.3
Locomotive-kilometers per locomotive-day in freight traffic	152.5	160.0	170.0	174.4	170.4	172.9	159.6	166.2
Technical speed of freight trains (kms per hr.)	21.5	21.8	23.0	22.8	22.9	22.9	21.8	22.3
Average section speed of freight trains (kms per hr.)	12.8	13.5	14.5	14.7	14.5	14.7	13.5	14.0

SOURCE: *6*, 1935, No. 11, 6.

APPENDIX A

TABLE A-3

AVERAGE DAILY OUTPUT OF MAJOR INDUSTRIAL COMMODITIES, 1933-34
(thousand metric tons)

	First Quarter		*Second Quarter*		*Third Quarter*		*Fourth Quarter*	
	1933	1934	1933	1934	1933	1934	1933	1934
Coal	190.1	245.9	201.0	248.9	206.6	274.5	231.6	272.1
Coke	23.6	34.7	27.7	38.8	29.9	40.5	30.9	41.6
Ores	33.2	46.8	37.6	58.9	43.7	65.3	46.3	69.6
Pig Iron	15.4	24.8	19.4	28.9	21.1	29.7	21.8	30.5
Steel	15.6	23.4	17.8	26.1	19.9	26.4	21.5	28.9

SOURCE: *6*, 1935, No. 11, 6.

the output of heavy industry (Table A-3), these increments appear negligible indeed. The first quarter showed a marked increase of 28 to 50 per cent, the second quarter of 23 to 60 per cent, the third quarter of 19 to 50 per cent, and the fourth quarter of 22 to 50 per cent. The quarterly increases in industrial output of major commodities were several times as great as the growth of railroad freight traffic in the corresponding period.

Moreover, the railroads had to carry more and more supplies of machinery and oil products for mechanized agriculture and a larger share of the marketed crops as the result of collectivization. At the same time, the transportation of lumber and oil was shifted from river to railroad. Under these circumstances, it is not surprising that a backlog of unshipped freight several times as great as the average daily carloadings could accumulate and last for long periods.

During this time, the railroads operated with great deficiencies, which, in the words of a Soviet writer,[2] resulted in "an increased number of catastrophes and accidents, long turnaround time of rolling stock, long detention of freight cars at all types of stations (classification, divisional, freight, and way stations), low technical and average section speeds, nonscheduled movement of trains, insufficient introduction of full trainload lots, and the absence of a real drive to speed up freight car and locomotive turnaround time."

The Soviet writer continues:[3]

> The overwhelming majority of railroad workers, including most of the Ministry and railroad agency officials, were convinced that the railroads were operating at the extreme limits of their technical resources and that the goal of 61,000 to 63,000 average daily carloadings was the upper limit of their performance.

[2] *6*, 1935, No. 11, 7.
[3] *6*, 1935, No. 11, 7.

The Scientific Research Institute for Railroad Operation and its "theorists" and "researchers" attempted to prove that the railroads were operating at the "limit" and that their performance could not be improved until industry provided new freight cars and the rolling stock was equipped with automatic brakes and automatic couplings.

These were the reasons for the poor performance of railroads. Neither the Ministry, nor the railroads, nor the research institutes tried to improve organization of operations; they did not even study the technical resources of railroads.

These often repeated official Soviet arguments and explanations of the 1933-34 transportation crisis are followed by an even more startling declaration of the magic power of L. M. Kaganovich, who apparently was responsible for the rapid recovery of transportation in 1935-36. The Soviet writer from the Ministry describes the immediate cause for the recovery in the following words:[4]

. . . and then came the history-making day for railroad transportation: February 28, 1935. The Party and the government ordered Stalin's close friend—Lazar Moiseevich Kaganovich—to take over railroad transportation.
. . . as soon as his Bolshevist hand, firm and organizing, touched the work, technical transportation resources began to be properly utilized and the management and mobilization of all the leading railroad workers started to be organized efficiently. As a result, the railroads overfulfilled their plan, for the first time, in April, by loading 61,977 cars a day.

There was indeed a marked increase in average daily carloadings in 1935-36 over 1933-34, but whether this was the result of the intra-transportation purges and the pressure applied by Kaganovich or other determining factors is another matter. Evidence indicates that the latter is at least as probable as the former. Table A-4 shows that there was an increase in the average daily carloadings *before* Kaganovich took over. This increase can be analyzed by breaking it down by causal factors. When the total increase in ADC from January to September of 1935 (24,003 freight cars per day) is distributed among the factors shown in Table A-5, it can be seen that it resulted primarily from a decrease in turnaround time of freight cars rather than from an increase in the active fleet.

[4] *6*, 1935, No. 11, 7.

TABLE A-4

AVERAGE DAILY CARLOADINGS, 1933-36, BY MONTH
(thousand cars in 2-axle units)

	1933	1934	1935	1936
January	46.3	51.8	50.7	77.6
February	46.4	53.1	56.1	76.4
March	48.3	52.0	59.2	86.7
April	52.2	55.4	62.0	89.0
May	53.8	57.2	69.3	92.4
June	51.9	57.8	72.7	89.9
July	50.0	56.7	73.0	90.4

SOURCE: *26,* 61.

TABLE A-5

BREAKDOWN OF INCREASE IN AVERAGE DAILY CARLOADINGS IN 1935 BY CAUSAL FACTORS
(cars in 2-axle units)

Increase in active freight car fleet	1,537
Increase in average section speed and decrease in time spent in motion	6,798
Decrease in demurrage of cars at loading and unloading stations	4,450
Decrease in demurrage of cars at divisional and classification stations	11,217
Total	24,002

SOURCE: Derived from data in *6,* 1935, No. 11, 10, and *26,* 61.

The reduction of the average full freight car turnaround trip by 60 kms[5] from February to September of 1935 did reduce the turnaround time in general and the demurrage at classification and divisional stations in particular (since the number of times the cars were worked at these stations was also lower). The equipping of all freight cars with hose (to connect the locomotive with automatic brake cars) also reduced the demurrage at classification stations. The extent to which the detention of freight cars at technical stations was reduced in 1935 is shown in Table A-6.

The improvement from 1934 to 1935 was not greater but rather less than from 1933 to 1934, as indicated by official Soviet statistics. It will be shown later that at least some of that reduction in turnaround time was obtained by deliberate understatement of the active fleet of freight cars.

The reduction in time spent in trains from January to September of 1935 was achieved by an in increase in train speeds and, to a very

[5] *6,* 1935, No. 11, 10.

TABLE A-6

DETENTION OF FREIGHT CARS AT DIVISIONAL AND CLASSIFICATION STATIONS, 1933-35

(hours)

	1933	1934	1935
January	13.2	11.7	10.8
February	13.2	10.4	8.3
March	13.1	9.6	8.2
April	11.5	8.7	8.0
May	10.8	8.1	7.1
June	11.0	8.9	7.0
July	10.9	8.2	7.1
August	10.7	8.1	7.5
September	10.2	8.1	7.3
October	10.1	7.8	
November	10.4	7.7	
December	12.3	9.3	

SOURCE: *6*, 1935, No. 11, 9.

minor extent (if we ignore seasonal improvement), by a decrease in time spent at way stations (compare Tables A-7 and A-11 below). Higher train speeds must have had an important part in increasing locomotive-kilometers per locomotive-day as well as in increasing

TABLE A-7

TRAIN AND ROLLING STOCK PERFORMANCE, 1935

	Average Technical Speed of Freight Trains (kms/hr)	Average Section Speed of Freight Trains (kms/hr)	Train Speed Coefficient	Loco-Kms per Loco-Day in Freight Service	Freight Car Kilometers per Active Freight Car Day
January	21.5	12.9	0.60	153.0	101.2
February	22.2	13.8	0.62	166.2	119.5
March	22.7	14.3	0.63	170.8	125.1
April	23.1	14.9	0.65	175.0	127.9
May	23.4	15.2	0.65	181.2	137.1
June	23.8	15.5	0.65	187.8	140.3
July	24.0	15.7	0.65	191.4	138.7
August	24.4	16.0	0.66	196.8	135.5
September	25.2	16.8	0.67	207.0	135.0

SOURCE: *65*, 429.

freight car-kilometers per active freight car. The latter index, however, might have been even more affected by the general Soviet practice of understating the active fleet of freight cars in daily statistical reporting. The performance of the rolling stock in 1935 is shown by month in Tables A-7 and A-8. It should be borne in mind, however, that the seasonal variations have not been eliminated from these series. It is not proper to follow the method used by Isaev[6] and

[6] *6*, 1935, No. 11.

TABLE A-8

UTILIZATION OF LOCOMOTIVE STOCK, 1934-35

	1934	*1935*			
	Annual Average	First Half	July	August	September
Gross ton-kms per locomotive in freight service	136.5	145.6	162.7		
Loco-kms per loco-day in freight service	168.6	178.1	191.4	196.5	207.0
Detention at the main engine house (hours)	8.81	7.9	7.12	5.41	5.39
Detention at the turning engine house (hours)	8.09	8.09	7.49	5.90	5.50

SOURCE: *6*, 1935, No. 11, 10.

compare the performance of railroads in September with that in January without making an allowance for the seasonal variations which tended to overemphasize the improvements achieved in September 1935.

Comparing and analyzing the annual data for 1934 and 1935, we find the improvements much less pronounced. The average daily carloadings increased by 12,376 from 1934 to 1935, compared to a 24,003 increase from January to September 1935. The distribution by causal factors of these increments was also quite different in the two cases. The increase in average daily carloadings attributable to the increase in the active fleet of freight cars was only 6.4 per cent (1,537 cars) of the total increase in ADC from January to September 1935, and 33.3 per cent (4,127 cars) from 1934 to 1935. The remaining increases of 94.6 per cent and 66.7 per cent were due to the reduction in turnaround time of freight cars in the respective periods. The breakdown of turnaround time of freight cars and the distribution of the increase of average daily carloadings from 1934 to 1935 are given in Tables A-9 and A-10.

TABLE A-9

AVERAGE DAILY CARLOADINGS AND BREAKDOWN OF TURNAROUND TIME OF FREIGHT CARS, 1934-35

	1934	1935	Difference
ADC (cars)	55,717	68,093	+12,376
Freight car turnaround (days)	8.75	7.69	−1.06
Active fleet of cars	487,524	523,635	+36,111
Total freight car turnaround (hrs.)	210.7	184.6	−26.1
Time in trains (hrs.)	72.5	63.3	−9.2
Time at technical stations (hrs.)	92.2	82.5	−9.7
Loading and unloading time (hrs.)	46.0	38.8	−7.2

SOURCE: *65*, 433.

TABLE A-10

BREAKDOWN OF INCREASE IN AVERAGE DAILY CARLOADINGS BY CAUSAL FACTORS, 1934-35

Total increase in ADC in 1935 (annual average)	12,376
Change in ADC produced by increase in the active fleet of freight cars	4,127
Change in ADC produced by decrease in turnaround time	8,249
Decrease of time in trains	2,907
Change in the detention time at technical stations	3,065
Change in the detention time in loading and unloading	2,275
Total increase in ADC (difference due to rounding)	12,374

SOURCE: Computed from Table A-9.

In considering the possible reasons for the above reduction in turnaround time of 1.06 days, we have to note first a decline of 42 kilometers in the average total freight car turnaround trip from 1934 to 1935, which explains in part the decrease in total turnaround time (by 26.1 hours), in part the reduction in detention time of freight cars at technical stations (by 9.7 hours), and in part the reduction in time spent in trains (by 9.2 hours) as explained above. Time spent in trains was decreased by the improvement in train speed coefficient (i.e., reduced demurrage of cars at way stations) and by some increase in the technical speed of trains. It was in 1936 and not in 1935 that the technical speed was increased by the upward revision of maximum boiler pressure norms for different locomotives. Table A-11 illustrates this point quite clearly.

TABLE A-11

TECHNICAL AND AVERAGE SECTION SPEEDS OF FREIGHT TRAINS, 1913, 1928-36

	Technical Speed	Average Section Speed	Train Speed Coefficient
1913	16.5	13.6	0.82
1928	21.1	14.1	0.67
1930	21.8	12.2	0.56
1932	23.0	14.3	0.62
1933	22.3	13.8	0.62
1934	23.5	14.2	0.60
1935	24.4	15.6	0.64
1936	29.8	18.3	0.61

SOURCE: Series C-18 and C-19 in Appendix C.

Analysis of railroad performance, supplemented by an analysis of capital investment in the form of new freight cars and locomotives, gives us a detailed picture of the events during the transportation crisis in 1933-34 and suggests some possible explanations for the improvements and the higher level of performance maintained in later years. Tables A-12 and A-13 show the extent to which the deliveries of new locomotives and new freight cars increased in this period. The cumulative effect of rolling stock deliveries before the peak in 1935 should also be taken into consideration in evaluating the full impact of these capital investments. The total carrying capacity of freight cars and the total tractive effort of locomotives increased more rapidly than the number of physical units because of the addition of more powerful locomotives and heavier freight cars to stocks. Comparing the production and deliveries of new freight cars to the increases in the active fleet, we can gain some insight into how much the latter had been understated (or possibly overstated) in the current statistical reporting of railroads. The active fleet is less inclusive than the fleet under railroad jurisdiction, which covers the following categories of freight cars: active fleet, bad-order cars, work train cars, storage and housing, special uses.

A direct comparison between the freight cars delivered and the annual increases in the fleet under railroad jurisdiction, presented in Table A-14, indicates that there is no pronounced tendency to understate either of the two fleets when an average rate of retirement of 2 per cent per year is assumed, except perhaps for 1935. On the contrary, in some years freight cars seem to come in from sources other than production and repair of bad-order cars, even if we take the annual rate of retirement as zero.

In order to take into account all the leakages and injections of freight cars, we should compare the production and retirements with the increases in the inventory fleet of cars, the most inclusive series. The inventory fleet covers, in addition to all the categories in the fleet under railroad jurisdiction, the freight cars in the ministry reserve leased to other ministries and organizations and the freight cars transferred to railroads under construction. However, in this case it might be more appropriate to take cars produced rather than cars delivered to railroads under the ministry jurisdiction. The comparison in Table A-15 shows less discrepancy between the increases in the inventory fleet and the annual output of freight cars than in the active fleet or the fleet under railroad jurisdiction.

TABLE A-12

NEW FREIGHT LOCOMOTIVES PRODUCED AND DELIVERED TO RAILROADS, 1927/28-40
(physical units)

	Total Number of Locomotives		*Freight Locomotives*		*Type E.*		*Type F.D.*		*Type S.O.*	
	Produced	Delivered	Produced	Delivered	Produced	Delivered	Produced	Delivered	Produced	Delivered
1927/28	479	458	308	308	308	308	—		—	
1928/29	575	548		408		408	—		—	
1929/30	625	587	564	587	564	587				
1931	810	812	810	812	809	811	1			
1932	827	829	679	681	678	680	1	1	—	
1933	930	907	748	725	727	704	21	21		
1934	1,210	1,066	942	844	758	659	226	181	3	
1935 (1st half)	n.a.	n.a.	n.a.	n.a.	359a		247	n.a.	n.a.	
1935	1,518	1,495	1,146	1,123	560		521	521	65	
1936	1,153	n.a.	784		55		664		318	
1937	1,171	n.a.					541		346	
1938	1,216	n.a.					485		406	
1940	917	n.a.								

a Type E.M. only.

SOURCE: *Produced:* 1927/28-35, *65*, 163; 1935 (1st half), *6*, 1935, No. 11, 11; 1936, *47*, 181; 1937, *3*, vol. 44, 239; 1938, *37*, 1/21/39; 1940, *35*, 46.

Delivered: 1927/28-31, *14*, 87; 1932-35, *65*, 46.

TABLE A-13

NEW FREIGHT CARS PRODUCED AND DELIVERED TO RAILROADS, 1927/28-38

	Produced, Industry Excl. Railroad Workshops	Delivered, Excl. Railroad Workshops	*Produced*			*Delivered*	
			Industry	Railroad Workshops	Total	Industry Only	Total
	(physical units)		(2-axle units)				
1927/28	7,871	9,550	10,612	1,537	12,149	12,268	13,805
1928/29	11,264	10,728	15,190	1,500	16,690	14,557	16,057
1929/30	13,884	11,858	19,427	1,500	20,927	17,329	18,829
1931 (special quarter)		3,275				4,724	
1931	14,439	12,889	21,175	2,146	23,321	17,698	19,844
1932	15,230	11,280	20,152	3,199	23,351	16,023	19,222
1933	12,989	11,647	18,126	814	18,940	16,413	17,227
1934	20,732	18,935	28,957	—	28,957	26,741	26,741
1935	69,638	69,270	85,875	—	85,675	85,294	85,294
1936	27,512	n.a.	67,200	n.a.	67,200		67,200
1937	29,900	n.a.	59,000	n.a.	59,000		59,000
1938	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.

Source: *Produced:* 1927/28-35, *65*, 163; 1936, *47*, 81; 1937, *72*, 207.
Produced in RR shops: 1928/29-30, estimates; 1931, *14*, 88.
Delivered: 1927/28-31, *14*, 88; 1932-35, *65*, 434.

TABLE A-14

COMPARISON OF ANNUAL CHANGES IN STOCKS OF FREIGHT CARS WITH ANNUAL DELIVERIES OF NEW FREIGHT CARS TO RAILROADS, 1928-37
(thousand 2-axle units)

	Annual Change in Average Active Fleet of Freight Cars	Annual Change in Average Fleet of Freight Cars Under Railroad Jurisdiction	Estimated Annual Retirement of Freight Cars from Fleet Under Railroad Jurisdiction	Total Number of Freight Cars Accounted for in Fleet Under Railroad Jurisdiction	Total Number of Freight Cars Delivered to Railroads	Total Number of Freight Cars Unaccounted for in Fleet Under Railroad Jurisdiction
1928	26.5	8.2	9.4	17.6	13.8	+3.8
1929	51.9	35.2	9.9	45.1	16.1	+29.0
1930	39.0	12.7	10.1	22.8	18.8	+4.0
1931	40.0	22.2	10.6	32.8	19.8	+13.0
1932	7.9	16.4	10.9	27.3	19.2	+8.1
1933	9.5	9.6	11.1	20.7	17.2	+3.5
1934	2.7	9.8	11.3	21.1	26.7	−5.6
1935	36.2	39.4	12.1	51.5	85.3	−33.8
1936	60.5	70.0	13.5	83.5	67.2	+16.3
1937	42.8	48.6	14.5	63.1	59.0	+4.1

SOURCE: Table A-13 and series C-26 and C-27 in Appendix C.

TABLE A-15

COMPARISON OF ANNUAL CHANGES IN INVENTORY FLEET OF FREIGHT CARS WITH ANNUAL PRODUCTION OF NEW FREIGHT CARS, 1928-37
(thousand 2-axle units)

	Annual Change in Freight Cars in Inventory Fleet (1)	Estimated Annual Retirement of Freight Cars from Inventory Fleet (2)	Total Number of Freight Cars Accounted for in Inventory Fleet (3)	Total Number of Freight Cars Produced (4)	Total Number of Freight Cars Unaccounted for in Inventory Fleet (5)
1928	30.1	10.0	40.1	12.1	+28.0
1929	17.4	10.4	27.8	16.7	+11.1
1930	12.0	10.6	22.6	20.9	+1.7
1931	18.6	11.0	29.6	23.3	+6.3
1932	13.2	11.3	24.5	23.4	+1.1
1933	15.0	11.6	26.6	18.9	+7.7
1934	15.4	11.9	27.3	29.0	−1.7
1935	48.0	19.9	67.9	85.7	−17.8
1936	33.9	14.2	48.1	67.2	−19.1
1937	31.1	14.9	46.0	59.0	−13.0

SOURCE: Col. 1: 1928-29, 1932, 1937—Based on inventory freight car fleet in physical units (*29*, 201; *84*, 469) and percentage of 4-axle units in total inventory fleet (series C-28 in Appendix C); 1930-31, 1933—Based on fleet under railroad jurisdiction (series C-27 in Appendix C) and interpolated percentage it was of total; 1934—*34*, *7*; 1935-36—*47*, 121.

Col. 2: Estimated.

Col. 3: Col. 1 plus col. 2.

Col. 4: Table A-13.

Col. 5: Col. 3 minus col. 4.

The positive discrepancy (Table A-15, column 5) probably reflects in part an overstatement (and the negative discrepancy an understatement) in the assumed 2 per cent per annum rate of retirements, and in part deficiencies in basic statistical data on stocks.

Bearing in mind the implications of these findings, we shall continue our analysis of the 1933-34 transportation crisis. The data in Table A-15 permit us to make allowances in the active fleet of freight cars for the probable understatement of the increase in the active fleet in 1935. Subtracting the annual increase of 36,200 cars and the 2 per cent retirement of 10,500 cars in the active fleet from the number of cars delivered to railroads during 1935 (all in 2-axle units), we get a rough approximation of the number of cars in the actual active fleet that the railroads failed to report in their current statistics, i.e., 38,600 cars.

A direct comparison of the increase in the active fleet and the cars delivered to railroads (after allowance for retirements) might be justified for 1935. The backlog of unshipped freight and the high pressure put on railroads to increase average daily carloadings in 1933-35 make transfers of large numbers of freight cars from the active fleet (or the inclusion of newly produced and delivered cars) to other categories of the fleet under railroad jurisdiction highly improbable. This proposition is supported by the relatively insignificant discrepancy between the increments in the active fleet and the increase of only 32,000 cars in the fleet under railroad jurisdiction in 1935.

Adding 38,600 cars to the reported active fleet of 523,700, we obtain an adjusted active fleet of 562,300, which makes it possible to compute adjusted turnaround time and to distribute the increment in the average daily carloadings by causal factors. The results of these adjustments are given in Table A-16.

TABLE A-16

BREAKDOWN OF INCREASE IN AVERAGE DAILY CARLOADINGS IN 1935 BY CAUSAL FACTORS, BASED ON REVISED ACTIVE FLEET

(2-axle units)

	1934	1935	Difference
ADC (cars)	55,717	68,093	12,376
Freight car turnaround (days)	8.75	[8.26]	.49
Active fleet of freight cars	487,524	562,300	74,776
Change in ADC produced by the increase in the active fleet of freight cars (cars)			8,546
Change in ADC produced by the decrease in the turnaround time (cars)			3,830

The causal factors for the ADC increment, as presented in Table A-16, shifted in favor of the increment in the inventory fleet of freight cars rather than in favor of the reduction in turnaround time as shown in Table A-10, according to official Soviet statistics. This finding suggests the final answer to the question posed at the beginning of this appendix, namely whether the increases in railroad investments or the better utilization of the available rolling stock were primarily responsible for the sharp and sustained increase in the average daily carloadings and in the volume of freight traffic in 1935.

These findings should be considered as suggestions rather than as final conclusions. Further research is needed, especially to compare different categories of freight car stock with the production data to determine how much railroad performance is exaggerated in Soviet statistics, a problem of great importance, but not of primary interest here.