Volume Title: American Transportation in Prosperity and Depression

Volume Author/Editor: Thor Hultgren

Volume Publisher: NBER

Volume ISBN: 0-870-14086-8

Volume URL: http://www.nber.org/books/hult48-1

Publication Date: 1948

Chapter Title: Other Than Steam Railroad Transportation

Chapter Author: Thor Hultgren

Chapter URL: http://www.nber.org/chapters/c4620

Chapter pages in book: (p. 341 - 362)

CHAPTER 11

Other Than Steam Railroad Transportation

So far we have confined our discussion of cycles in transportation to the railroad industry. For years long past, and for most aspects of the subject even in recent times, this was not a matter of choice. Continuous records such as we need have not, with a few exceptions, been kept for domestic waterborne commerce, pipe lines, or highway traffic. Aviation is a newcomer; commercial planes operated on only a minute scale at the beginning of the last business cycle to close before this inquiry was undertaken. What figures we do have for transport other than by steam railroads pertain mainly to the movement of traffic; data on employment, fuel consumption, movement and stocks of equipment, revenues, costs, and profits are scarce indeed. What we have to report about the other means of movement can be told in one chapter.

TRANSIT

Nature of the industry

Perhaps the most familiar of the other commercial kinds of transport is the transit industry, whose facilities city people use in traveling to and from work, shopping, going to the big downtown movie houses, making short visits to relatives and friends, and to some extent in the course of transacting business, such as collecting bills and delivering packages.

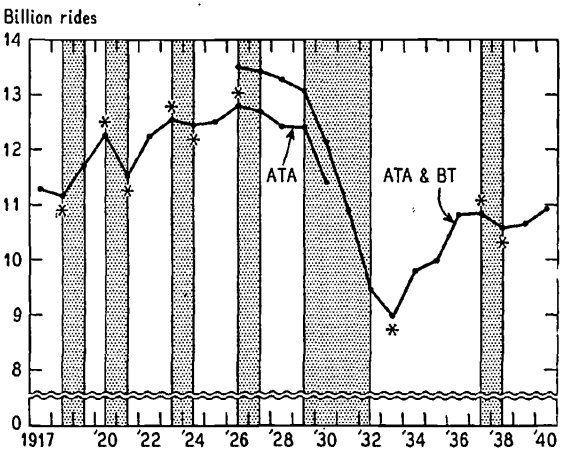
Before 1920 travel of this kind, after the early horse-car era, was provided for almost entirely by electrically operated cars running on tracks. But since then a progressively increasing portion has been accommodated in busses. The economic purposes the two means of transport serve are very similar. Often one company operates both kinds of vehicle, or operates trolley cars while a subsidiary operates busses. Bus companies and electric traction companies should be regarded for our purpose as comprising a single industry; the number of bus rides should be added to the number of car rides to measure its total performance.

The routes of many companies that operate transit facilities within cities extend beyond municipal limits. Some of these opera-

tions serve only to connect a city with its suburbs. Others connect two or more urban areas separated by open country. Some enterprises using busses, or rail cars, or perhaps a combination of the two, engage in interurban transport exclusively. Cyclical and other economic influences no doubt affect these three kinds of traffic differently. The occasions for interurban travel differ in nature from those for ordinary municipal travel. But unfortunately no consecutive nationwide statistics of passengers carried distinguish between intracity, suburban, and interurban riders. We are therefore obliged to study the three as a whole. Undoubtedly most of the business covered by the figures is intracity.

CHART 126

Transit Rides, United States, 1917–1940



Shaded periods are reference contractions.

Patronage and business conditions

In the four reference phases from 1920 to 1926 and in the two from 1932 to 1938, people curtailed their use of transit facilities when business was deteriorating and increased it when business was improving. Although patronage diminished in all three phases between 1926 and 1932, it fell off much more rapidly in 1929–32 than in 1927–29 (Chart 126). Although it rose in 1918–19, the advance was a trifle slower than in 1919–20 (Table 130). On the other hand, the decline in 1927–29 was, on the average, more rapid

than in 1926–27. With this exception, the number of rides conformed positively to the reference chronology from 1918 to 1938.

Table 130
Transit Rides, United States
Change per Year between Reference Peaks and Troughs, 1918–1929

Reference date	Level of business	Years from prec. date	Number of rides†	Change from preceding date		
				Total	Per year	
					To peak from trough	To trough from peak
			(millions)			
1918	Peak	..	11,175	...	...	...
1919	Trough	1	11,715	540	...	540
1920	Peak	1	12,277	562	562	...
1921	Trough	1	11,536	−741	...	−741
1923	Peak	2	12,556	1,020	510	...
1924	Trough	1	12,457	−99	...	−99
1926	Peak	2	12,799	342	171	...
1927	Trough	1	12,704	−95	...	−95
1926	Peak	..	13,513	...	...	...
1927	Trough	1	13,430	−83	...	−83
1929	Peak	2	13,073	−357	−178	...

† 1917–27, estimates for "revenue passengers carried by electric railways" plus "revenue passengers carried by motor buses", statement tentatively revised 1/8/41, transmitted with letter of July 21, 1941 from Edmund J. Murphy, Director of Information Service, American Transit Association. 1926–29 (1927–40 on Chart 126), electric railway estimates from same, plus estimates of "total revenue passengers" (bus) from *Bus Transportation*, Feb. 1929, p. 59; Feb. 1931, pp. 54–5; Feb. 1933, pp. 88–9; Feb. 1934, pp. 42–3; Feb. 1936, pp. 64–5; Jan. 1938, pp. 52–3; Jan. 1939, p. 49; Jan. 1940, pp. 46–7; Jan. 1941, pp. 48–9.

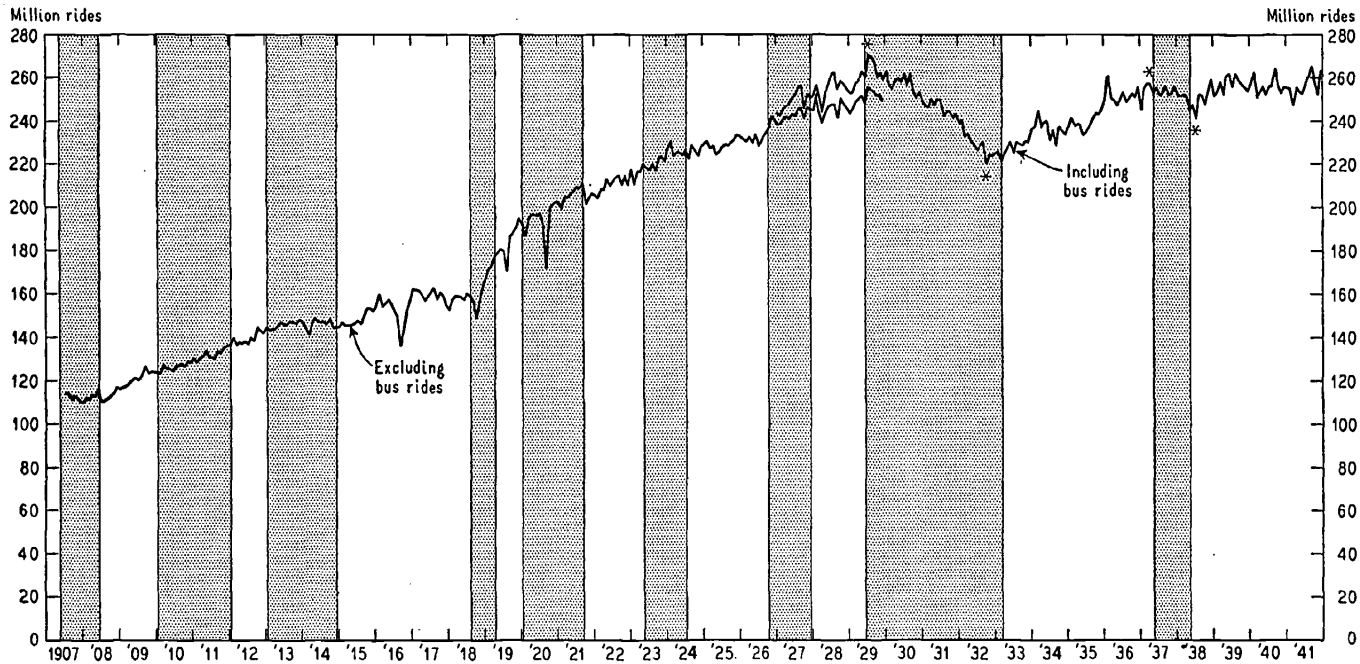
The ATA bus figures include only rides on busses of street railway and former street railway companies and their subsidiaries or affiliates. Neither the railway nor the bus data include rides authorized by pay or free transfers.

The BT estimates pertain to the entire motor bus industry. They include rides authorized by pay transfers but data in the *Census of Electrical Industries, 1937, Street railways and trolley-bus and motorbus operations*, pp. 32–33, suggest that these are less than 2 percent of all bus rides.

The preceding conclusion pertains to the country as a whole. In New York City, for which we have monthly data, the relation has been less consistent. The business contractions of 1929–33 and 1937–38, and the intervening expansion, it is true, have readily visible equivalents in the number of rides. Between 1908 and 1929, however, there are no clear-cut specific cycles (Chart

CHART 127

Transit Rides, New York City, July 1907—December 1941



Shaded periods are reference contractions.

Table 131

Transit Rides, New York City

Change per Month between Reference Peaks and Troughs, 1908–1929

Reference date	Level of business	Months from prec. date	Number of rides[a]	Change from preceding date			Conformity suggested[b]
				Total	Per month		
					To peak from trough	To trough from peak	
			(millions)				
June 1908	Trough	..	112.8	...	...	...	...
Jan. 1910	Peak	19	123.5	10.7	0.56	...	...
Jan. 1912	Trough	24	137.3	13.8	...	0.58	Inverse
Jan. 1913	Peak	12	142.8	5.5	0.46	...	Inverse
Dec. 1914	Trough	23	144.2	1.4	...	0.1	Positive
Aug. 1918	Peak	44	158.6	14.4	0.3	...	Positive
Apr. 1919	Trough	8	176.7	18.1	...	2.3	Inverse
Jan. 1920	Peak	9	191.2	14.5	1.6	...	Inverse
Sept. 1921	Trough	20	207.0	15.8	...	0.8	Positive
May 1923	Peak	20	218.3	11.3	0.6	...	Inverse
July 1924	Trough	14	224.1	5.8	...	0.4	Positive
Oct. 1926	Peak	27	236.8	12.7	0.5	...	Positive
Dec. 1927	Trough	14	245.7	8.9	...	0.6	Inverse
June 1929	Peak	18	251.8	6.1	0.3	...	Inverse

[a] Excluding bus rides. Three-month average; reference date is middle month.
[b] By comparison with preceding rate; e.g., 0.58 with 0.56.

Table 132

Street Car and Rapid Transit Rides, New York City

Change per Year between Reference Peaks and Troughs, 1900–1910

Reference date (year ended June 30)	1900	1901	1903	1904	1907	1908	1910
Level of business	Peak	Trough	Peak	Trough	Peak	Trough	Peak
Years from preceding date	...	1	2	1	3	1	2
Rides (millions)							
Number	847	881	1,001	1,066	1,315	1,354	1,488
Change from preceding date							
Total		34	120	65	249	39	134
Per year							
To peak from trough	...	...	60	...	83	...	67
To trough from peak	...	34	...	65	...	39	...

Table 133
Transit Rides, United States, and Railroad Revenue Ton-miles
Percentage Change between Specific Peak and Trough Years

Transit Rides								
Date of turn	1920	1921	1923	1924	1926	1933	1937	1938
Level	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
Number (millions)	12,277	11,536	12,536	12,457	12,799	8,962	10,842	10,573
% change from preceding date	...	−6	9	−1	3	...	21	−2
Ton-miles								
Date of turn	1920	1921	1923	1924	1926	1932	1937	1938
Level	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
% change from preceding date†	...	−25	35	−6	14	...	54	−20

† From Table 6.

127).[1] Indeed the number did not even conform well in this period. Five comparisons count toward positive, 7 toward inverse conformity, with little net result (Table 131). On the other hand, annual data from 1900 to 1910 suggest positive conformity in 4 of 5 instances (Table 132). This is surprising, for we usually expect monthly figures to register business disturbances more sensitively. Making all the comparisons of adjoining phases from 1900 to 1938 that we can, using annual data whenever monthly statistics are not available for both phases, we find that 12 suggest positive, 8 inverse conformity.

Table 134
Transit Rides, New York City, and Revenue Ton-miles
Percentage Change between Specific Peak and Trough Months, 1929–1938

Transit Rides				
Date of turn	July 1929	Oct. 1932	Apr. 1937	July 1938
Level	Peak	Trough	Peak	Trough
Number[a] (millions)	267.0	224.9	256.1	247.4
% change from preceding date	...	−16	14	−3
Revenue Ton-miles				
Date of turn	Aug. 1929	July 1932	Apr. 1937	May 1938
Level	Peak	Trough	Peak	Trough
% change from preceding date[b]	...	−55	93	−31

[a] Three-month average; date of turn is middle month.
[b] From Table 6.

Cyclical variation small

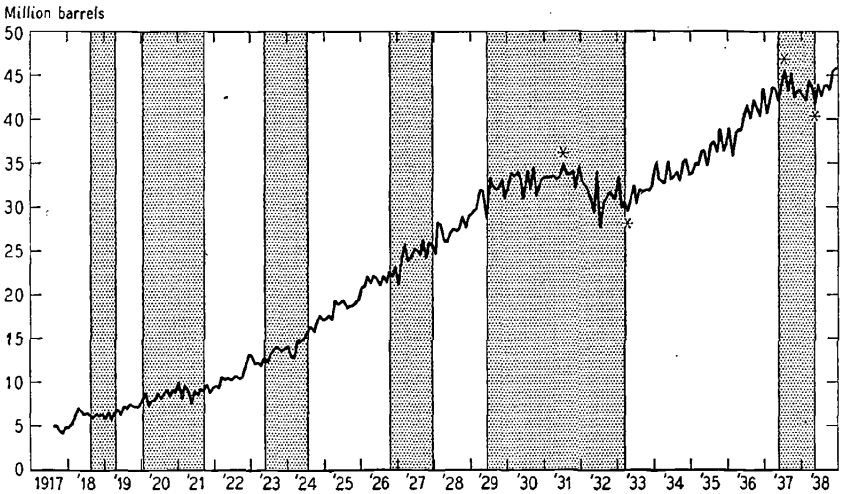
When specific fluctuations in the number of rides did occur, they were rather mild, much less severe, for example, than those in freight traffic (Tables 133, 134). Even in the great contraction

[1] Data from annual reports of N. Y. State Public Service Commission for the First District, 1907–19, and N. Y. State Transit Commission, 1920–41, except as indicated below. Subway, elevated, and street car passengers included throughout. Bus passengers excluded, 1907–29 segment; included, 1927–41. Data for busses compiled by the NBER from reports of individual companies in files of the Transit Commission, January 1927–June 1935; taken from worksheets of the Commission, July–December 1935.

1929–32, when ton-miles decreased 55 percent, riding in New York subways, street cars, and busses diminished only 16 percent.

CHART 128

Domestic Disappearance of Gasoline, August 1917—December 1928, and of Motor Fuel, January 1929—December 1938



Shaded periods are reference contractions.

HIGHWAY TRAFFIC

Reflection of business conditions recent

There are no sufficiently continuous statistics of any kind for the commercial motor freight industry: the enterprises that carry the goods of others for hire on streets and roads. We can, however, form some notion of cyclical variation in the collective highway operations of all classes of users—private motorists, firms hauling their own goods, commercial carriers of property and persons—from the data on domestic disappearance (approximately, consumption) of motor fuel. From 1917 to 1931 there is little evidence of such variation. No specific cycles are discernible (Chart 128).[2] From 1918 to 1929 disappearance of fuel did not even conform to cycles in the economy at large; three comparisons count one way, four, the other (Table 135). But the great contraction of 1929–33

[2] Sources are as indicated in Table 135.

made a clear impress: for a long time (two years) in the form of a mere flattening of the curve, but eventually in an actual decline. And the two subsequent reference phases have obvious analogues in fuel consumption.

Table 135
Domestic Disappearance of Gasoline or Motor Fuel
Change per Month between Reference Peaks and Troughs, 1918–1938

Reference date	Level of business	Months from prec. date	Disappearance[a]	Change from preceding date			Conformity suggested[b]
				Total	Per month		
					To peak from trough	To trough from peak	
			(millions of barrels)				
Aug. 1918	Peak	..	6.20	...	...	...	...
Apr. 1919	Trough	8	6.35	0.15	...	.02	...
Jan. 1920	Peak	9	8.01	1.66	.18	...	Positive
Sept. 1921	Trough	20	9.33	1.32	...	.07	Positive
May 1923	Peak	20	12.24	2.91	.15	...	Positive
July 1924	Trough	14	15.74	3.50	...	.25	Inverse
Oct. 1926	Peak	27	21.95	6.21	.23	...	Inverse
Dec. 1927	Trough	14	25.42	3.47	...	.25	Inverse
Oct. 1926	Peak	27	22.14	...	...	...	...
Dec. 1927	Trough	14	25.72	3.58	...	.26	...
June 1929	Peak	18	31.26	5.54	.14	...	Inverse
Mar. 1933	Trough	45	29.99	−1.27	...	−.03	Positive
May 1937	Peak	50	43.19	13.20	.26	...	Positive
May 1938	Trough	12	43.01	−0.18	...	−.02	Positive

[a] Three-month average; reference date is middle month. Original data from U. S. Bureau of Mines: *Petroleum Refining Statistics*, Bulletin 367, pp. 19, 222; *Mineral Resources* and *Minerals Yearbook Statistical Appendix*, various issues; *Economic Paper 20*, p. 10. Gasoline, 1918–27 section; motor fuel, 1926–38. Called 'domestic demand' in source.

[b] By comparison with preceding rate; e.g., .18 with .02.

Use of vehicles far more stable than their production

The aggregate number of miles all cars and trucks were driven presumably fluctuated in somewhat the same way as their consumption of gasoline. There must have been a striking contrast between the amount of use vehicles received and their production. Output of passenger cars had regular and violent cyclical fluctuations (Table 136); it declined even during the contractions in which use increased. This was true of the production of commercial vehicles also. When, after 1929, specific variations in

utilization did finally appear, they were much slighter than those in production. The figures for fuel consumption are −11, 46, and −3 percent (Table 137). The corresponding figures for the output of passenger cars are −78, 306, and −60; of motor trucks, −79, 403, and −57.

Table 136
Production of Passenger Cars and Motor Trucks
Percentage Change between Specific Peaks and Troughs, 1913–1938

Level of production	Passenger cars			Motor trucks		
	Date of level	Produced[a] (thousands)	% change from prec. date	Date of level	Produced[a] (thousands)	% change from prec. date
Trough	Sept. 1913	30	...	Sept. 1914	1.8	...
Peak	Nov. 1917	151	403	July 1918	21.2	1,078
Trough	Oct. 1918	35	−77	Nov. 1918	17.4	−18
Peak	Jan. 1920	190	443	Jan. 1920	35.2	102
Trough	Jan. 1921	86	−55	Jan. 1921	13.0	−63
Peak	Dec. 1923	363	322	June 1923	38.2	194
Trough	June 1924	216	−40	Sept. 1923[b]	31.4	−18
Peak	Dec. 1925	390	81	Sept. 1925	49.4	57
Trough	Nov. 1927	182	−53	Nov. 1927	34.6	−30
Peak	Jan. 1929	411	126	June 1929	77.6	124
Trough	Oct. 1932	89	−78	July 1932	16.6	−79
Peak	Aug. 1937	361	306	Aug. 1937	83.5	403
Trough	Aug. 1938	143	−60	Apr. 1938	35.5	−57

[a] From *Survey of Current Business*, June 1927, p. 22, and *Automobiles* (Bureau of Census, mimeographed) various issues. Three-month average; date of level is middle month.

[b] June 1924 was almost as low.

Table 137
Percentage Change in Domestic Disappearance of Motor Fuel between Its Own Peaks and Troughs, 1931–1938

Date of turn	July 1931	April 1933	July 1937	May 1938
Level	Peak	Trough	Peak	Trough
Amount† (million barrels)	34.02	30.33	44.26	43.01
% change from preceding date	...	−11	46	−3

† Three-month average; date of turn is middle month. For source see Table 135.

The sharp contractions in production had little effect on the stock of vehicles in use. The number of passenger cars registered at the end of the year increased without interruption from 1895

to 1929, as did the number of trucks from 1904 to 1930. Cyclical fluctuations in registration did occur later, but in amplitude they resembled the changes in the consumption of gasoline more nearly than those in the production of vehicles (Table 138).

Table 138
Motor Vehicle Registration
Percentage Change between Its Own Year-end Peaks and Troughs, 1929–1938

Date (Dec. 31)	Level of registration	Number registered† (000)	% change from preceding date
Passenger cars			
1929	Peak	23,122	...
1933	Trough	20,644	−11
1937	Peak	25,450	23
1938	Trough	25,262	−1
Trucks			
1930	Peak	3,486	...
1932	Trough	3,229	−7
1937	Peak	4,255	32
1938	Trough	4,224	−1

† Automobile Manufacturers Association, *Automobile Facts and Figures, 1944–45*, p. 50. Reported or estimated data in this source go back to 1895 (cars) and 1904 (trucks).

The unbroken growth of registrations during the reference phases before 1929–32 helps to explain the continuous rise of aggregate gasoline consumption in those phases. The latter rise does not necessarily mean that individual operators of motor vehicles typically increased their use of gasoline even when business conditions were becoming worse. Since the number of vehicles and presumably the number of owners grew, consumption by new owners and by multiple-vehicle owners who added to their fleets may have outweighed a decline in the quantity used by those who, at most, retained or replaced the cars and trucks they had at the beginning of business contraction. The majority of owners, it would seem, did curtail their use of gasoline in 1920–21 and 1923–24, when consumption per vehicle diminished (Table 139). However, the specific contractions in the quantity per vehicle, and the specific expansions too, were very mild during the entire period 1921–38.

Table 139
Percentage Change in Domestic Disappearance of Motor Fuel per Motor Vehicle Registered between Its Own Peaks and Troughs, 1919–1938

Date	1919	1920	1921	1923	1924	1931	1932	1937	1938
Disappearance per vehicle Level	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
Amount (barrels)	11.93	12.05	10.92	11.47	11.32	15.40	14.97	17.95	17.67
% change from preceding date	...	1	−9	5	−5	†	−3	20	−2

Domestic 'demand' for gasoline, 1919–24, and motor fuel, 1931–38 (Bureau of Mines, *Mineral Resources* and *Minerals Yearbook*, various issues), divided by average of motor vehicles registered at beginning and end of year (*Automobile Facts and Figures* data).
† No specific contraction corresponding to the reference phase 1926–27.

Table 140
Petroleum Production; Crude and Refined Oil Moved by Pipe Lines Reporting to the ICC; 1925–1940

	Production[a]	Originated[b]	Transported[c]
	Millions of barrels		
1925	764		831
1926	771		836
1927	901		989
1928	901		1,053
1929	1,007P		1,156
1930	898		1,172P
1931	851	505	987T
1932	785T	533	1,121
1933	906	567	1,189
1934	908	593	1,214
1935	997	767	
1936	1,100	807	
1937	1,279P	948P	
1938	1,214T	858T	
1939	1,265	873	
1940	1,353	958	
	Percentage change from specific peak to specific trough		
1929–32	−22		−16
1930–31			
1937–38	−5	−9	

P or T indicates specific peak or trough.
[a] Bureau of Mines, *Minerals Yearbook, 1937*, p. 1,009; *1940*, p. 941.
[b] Each barrel reported only by first line to handle it. ICC Bureau of Transport Economics and Statistics, *A Review of Statistics of Oil Pipe Lines, 1921–1941*, (Statement 4280, mimeographed, 1942), p. 40. Not available before 1931.
[c] A barrel transported consecutively by two lines would be counted twice. Data from *Statistics of Railways*. Not available before 1925; figures after 1934 apparently not comparable.

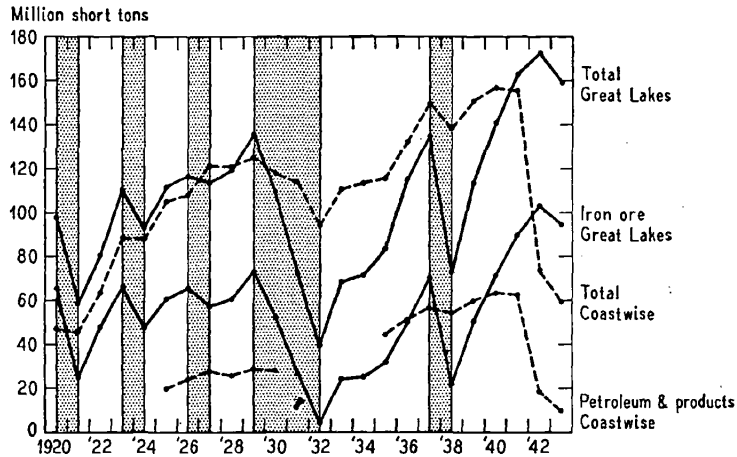
PIPE LINES

The cyclical history of pipe line traffic, in the brief period through which we can trace it, resembles that of petroleum production, which tended to increase its relative importance in the national economy during expansion and contraction alike (Table 140). Neither showed any diminution corresponding to the reference contraction of 1926–27, although output failed to rise from 1927 to 1928. In comparison with total rail and waterborne traffic, both declined only moderately in the initial phase of the great depression (cf. Table 141). In 1937 each attained a level far above its

previous peak.[3] The decreases in 1937–38 were again relatively small.

CHART 129

Tons Carried by Water, Selected Domestic Trades, 1920–1943



Shaded periods are reference contractions.

WATER TRANSPORT

The two major kinds of domestic waterborne traffic—movement on the Great Lakes and coastwise shipments—present something of a contrast (Chart 129, Table 141). Iron ore is usually a large part of Lake tonnage. As one might expect from the instability of steel production, ore shipments passed through violent cyclical fluctuations, conforming closely to the reference chronology. Although other commodities the output of which is more stable are carried in large quantities, percentage variations in Great Lakes tonnage as a whole exceeded those in the corresponding national totals, including coastwise traffic. Ton-miles of movement on the Lakes likewise fluctuated violently, and since they account for a very large part of ton-miles on all inland waterways, so did the latter (Chart 130).[4]

[3] We have no directly comparable figures for traffic. Barrels originated are roughly half of barrels transported. About 600,000,000 barrels must therefore have originated in 1930. For 1937 the figure is 948,000,000.

[4] Data from *Commercial Statistics*, 1925–43. None before 1925. Inland excludes coastwise, for which no ton-mile data are available.

Table 141

Tons Carried by Water, Selected Trades and Domestic Total; and Tons Originated by Railroads; Percentage Change between Specific Peak and Trough Years; 1920–1938

	Great Lakes		Coastwise[a]		Total domestic waterborne[c, e]	Railroads	Ratios	
	Iron ore[b] (1)	Total[c] (2)	Petroleum and products[d] (3)	Total[c] (4)	(5)	(6)	(1) to (2) (7)	(3) to (4) (8)
	Millions of tons						Percent	
1920	65.6*	98.4*		47.3*	286.2*	1363*	67	
1921	25.0*	58.6*		45.2*	239.3*	1018*	43	
1922	47.7	80.6		63.5	276.1	1112	59	
1923	66.1*	110.3*		88.7*	380.3*	1388*	60	
1924	47.7*	93.2*		88.6*	352.1*	1287*	51	
1925	60.6	111.6	19.7	105.1	374.9	1351	54	19
1926	65.6*	116.5*	23.8	108.0	409.2	1440*	56	22
1927	57.2*	113.9*	27.2*	121.0*	412.0(*)	1373	50	22
1928	60.5	119.3	25.6*	121.0*[f]	412.4(*)	1371*	51	21
1929	73.0*	135.8*	28.3*	125.0*	456.3*	1419*	54	23
1930	52.2	109.8	28.0	117.8	406.2	1220	48	24
1931	26.3	71.8		113.9	356.1	945	37	
1932	4.0*	39.5*		94.4*	272.1*	679*	10	
1933	24.2	68.6		110.3	324.6	733	35	
1934	24.9	71.6		113.2	336.4	802	35	
1935	31.8	83.5	44.5	115.4	371.7	832	38	39
1936	50.2	115.1	51.1	132.4	435.6	1012	44	39
1937	70.1*	134.8*	56.5*	149.4*	468.7*	1075*	52	38
1938	21.6*	72.8*	54.3*	138.5*	361.7*	820*	30	39
1939	50.5	113.3	60.0	150.9	456.7	955	45	40
	Percent change during specific phases							
1920–21	−62	−40		−4	−16	−25		
1921–23	164	88		96	59	36		
1923–24	−28	−16		−0[g]	−7	−7		
1924–26	38	25		37[h]	17[h,i]	12		
1926–27	−13	−2	−6[j]	−0[g,j]	0[g,i,j]	−5[k]		
1927–29	28	19	11[l]	3[l]	11[i,l]	4[l]		
1929–32	−95	−71		−24	−40	−52		
1932–37	1652	241		58	72	58		
1937–38	−69	−46	−4	−7	−23	−24		

* Indicates specific peak or trough, (*) end or resumption of rapid growth.

[a] Includes intercoastal.

[b] Lake Carriers Association, *Annual Report*, various issues.

[c] Chief of Engineers, War Department, *Annual Report, 1944*, Part 2, Commercial Statistics . . . for . . . 1943, p. 5.

[d] Original figures in barrels from Tariff Commission, *Report 30, Second Series*, 1932, pp. 98–101, and Bureau of Mines, *Monthly Petroleum Statement*, Feb. 1936, p. 1052, *Minerals Yearbook, 1932*, p. 835; *1939*, p. 1014; *1940*, p. 1089. Not available for years in which not shown. Converted to tons on basis of following factors for tons per barrel: Crude petroleum 0.149, gasoline 0.1295, kerosene 0.142, gas oil and distillate fuel oils 0.152, residual fuel or road oils 0.1655, lubricating oils 0.1575, asphalt and road oils 0.182, miscellaneous oils 0.150. Factors except that for miscellaneous oils, which is arbitrary, from American Petroleum Institute, *Petroleum Facts and Figures, 1941*, p. 28.

[e] 'Grand adjusted total' in source minus imports and exports at coast and Great Lakes ports.

[f] Slight decline in total coastwise concealed by rounding figures.

[g] Change of less than 0.5 percent.

[h] 1924–27.

[i] Percentage change during period of rapid or slow growth.

[j] 1927–28.

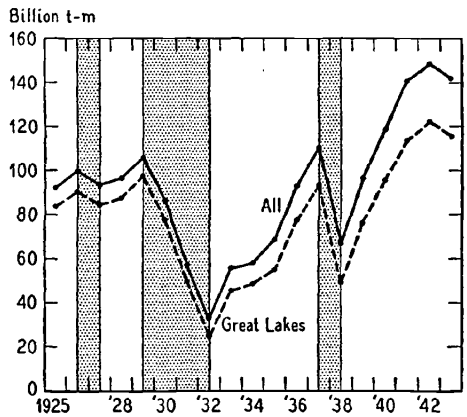
[k] 1926–28.

[l] 1928–29.

Petroleum and its derivatives are an important component of coastwise traffic, although not as important as ore on the Lakes. This oil tonnage, like the volume flowing through pipe lines, reflected the growing relative importance of petroleum in the economy. The analogue of the 1926–27 reference contraction was mild and belated. The contraction in 1937–38 was small. The 1937 peak greatly overtopped 1929 (ore and total Lake traffic failed to regain their 1929 levels). All these features were duplicated in total coastwise tonnage. The 1920–21, 1923–24, and 1929–32 contractions were also mild in comparison with those in the national waterborne total. Peaks before 1937 regularly surpassed their predecessors.

CHART 130

Ton-miles on Great Lakes and on All Inland Waterways, 1925–1943



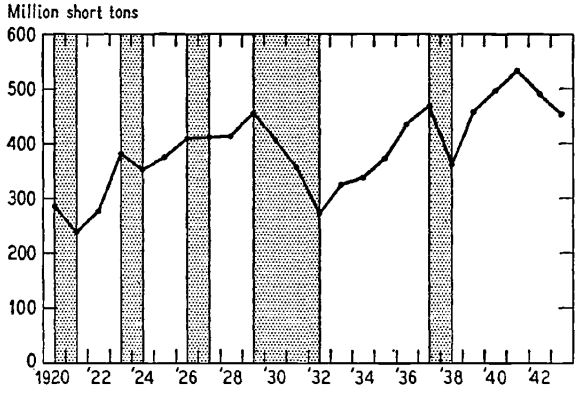
Shaded periods are reference contractions.

Fluctuations in total domestic waterborne commerce, which corresponded fairly closely to the reference cycles (Chart 131), were not extremely large or small. They did not differ greatly from those in railway freight traffic (Table 141). In general, water tonnage grew by a larger percentage than rail tonnage in expansion, diminished less in contraction. The comparisons suggest that noncyclical influences (improvement of waterways, rapid growth in the production of oil and perhaps of other commodities especially suited to water transport, etc.) tended to stimulate

water relatively to rail movement in both kinds of phase. They do not indicate a difference in sensitivity to cyclical business disturbances.[5]

CHART 131

Tons Carried by Water, All Domestic Commerce, 1920–1943



Shaded periods are reference contractions.

Estimates of water traffic and employment by Harold Barger and J. M. Gould suggest that the productivity of labor engaged in water transport, like that of railroad labor, tends to rise with expansion and fall with contraction of traffic.[6]

For the nation as a whole water traffic statistics begin only in 1920. We do have figures going much farther back for the canals of New York, including the Erie (now the Barge) Canal, once of great importance. Specific cycles in this tonnage do not match the reference cycles very well (Chart 132). But the data conform

[5] None of the data reviewed tell us anything about the fortunes of the commercial water transport industry. A large part of the traffic, especially of ore and petroleum, is carried in vessels belonging to the owners of the goods. Producers or users of the iron ore moving over the Great Lakes in the four months May to August 1944 shipped 11.9 percent of it in their own vessels and 37.0 percent in those of subsidiary and related companies. The oil industry poured 66.9 percent of its coastwise crude and refined into its own tankers during January, March, May, and July 1944, 6.5 percent into the tankers of subsidiaries, and 3.1 percent into those of affiliates. (C. S. Morgan, *Problems in the Regulation of Domestic Transportation by Water*, Report in Ex Parte No. 165, published by the ICC, 1946, pp. 48, 61.)

[6] Their indexes of output, employment, and employment per unit (the inverse of productivity) are published in Solomon Fabricant, Labor Savings in American Industry, 1899–1939, NBER *Occasional Paper 23*, (Nov. 1945), p. 51.

Table 142

Tons Carried on New York State Canals (thousands)

Change per Year between Reference Peaks and Troughs, 1838–1938

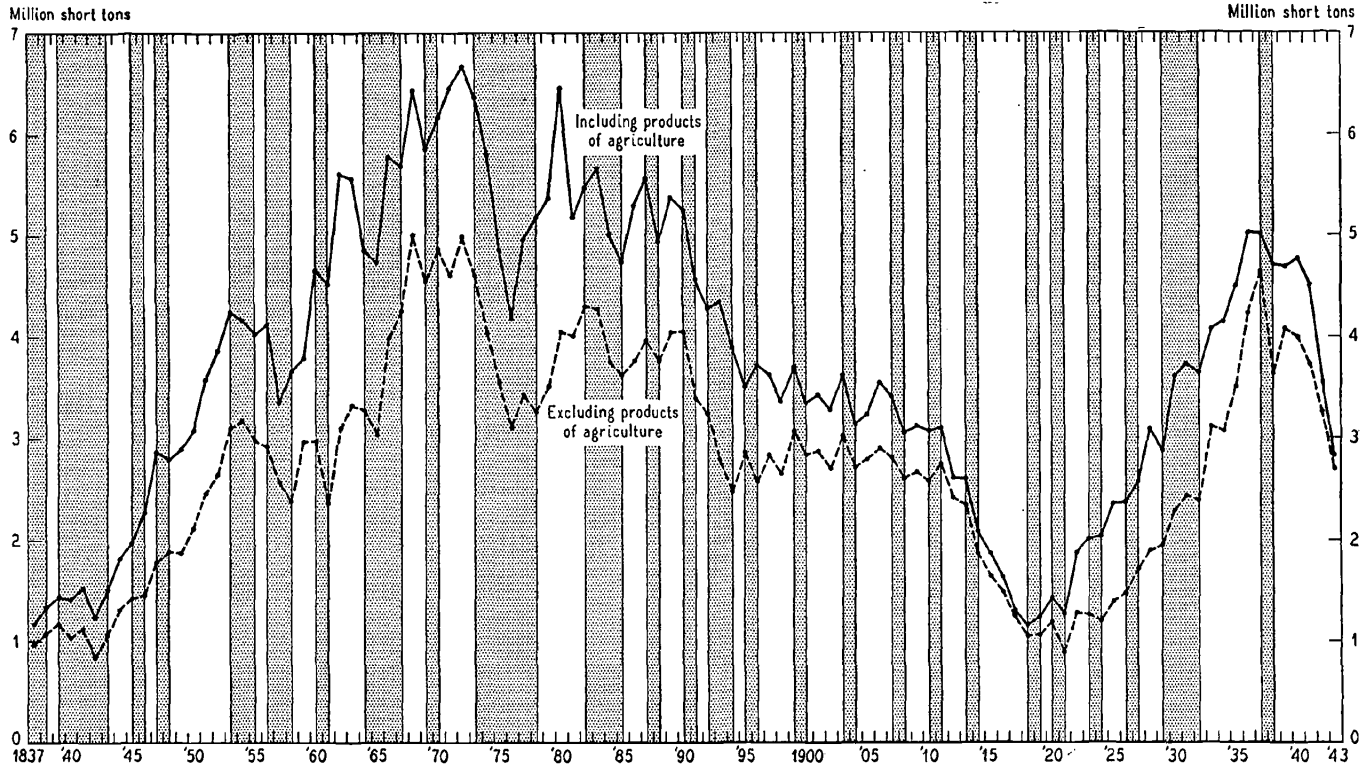
Reference date	Level of business	Years from prec. date	Excluding products of agriculture					Including products of agriculture				
			Tons carried[a]	Change from preceding date			Conformity suggested[b]	Tons carried[a]	Change from preceding date			Conformity suggested[b]
				Total	Per year				Total	Per year		
					To peak from trough	To trough from peak				To peak from trough	To trough from peak	
1838	Trough	...	1,078	...	...	...	...	1,333	...	...	...	...
1839	Peak	1	1,170	92	92	...	...	1,436	103	103	...	...
1843	Trough	4	1,058	−112	...	−28	Positive	1,513	77	...	19	Positive
1845	Peak	2	1,422	364	182	...	Positive	1,978	465	232	...	Positive
1846	Trough	1	1,454	32	...	32	Positive	2,269	291	...	291	Inverse
1847	Peak	1	1,777	323	323	...	Positive	2,870	601	601	...	Positive
1848	Trough	1	1,882	105	...	105	Positive	2,796	−74	...	−74	Positive
1853	Peak	5	3,097	1,215	243	...	Positive	4,248	1,452	290	...	Positive
1855	Trough	2	2,975	−122	...	−61	Positive	4,023	−225	...	−112	Positive
1856	Peak	1	2,923	−52	−52	...	Positive	4,116	93	93	...	Positive
1858	Trough	2	2,385	−538	...	−269	Positive	3,665	−451	...	−226	Positive
1860	Peak	2	2,967	582	291	...	Positive	4,650	985	492	...	Positive
1861	Trough	1	2,363	−604	...	−604	Positive	4,508	−142	...	−142	Positive
1864	Peak	3	3,280	917	306	...	Positive	4,853	345	115	...	Positive
1867	Trough	3	4,250	970	...	323	Inverse	5,688	835	...	278	Inverse
1869	Peak	2	4,545	295	148	...	Inverse	5,859	171	86	...	Inverse
1870	Trough	1	4,865	320	...	320	Inverse	6,174	315	...	315	Inverse
1873	Peak	3	4,614	−251	−84	...	Inverse	6,365	191	64	...	Inverse
1878	Trough	5	3,250	−1,364	...	−273	Positive	5,171	−1,194	...	−239	Positive
1882	Peak	4	4,294	1,044	261	...	Positive	5,467	296	74	...	Positive
1885	Trough	3	3,623	−671	...	−224	Positive	4,732	−735	...	−245	Positive

1887	Peak	2	3,963	340	170	...	Positive	5,554	822	411	...	Positive
1888	Trough	1	3,765	−198	...	−198	Positive	4,943	−611	...	−611	Positive
1890	Peak	2	4,044	279	140	...	Positive	5,246	303	152	...	Positive
1891	Trough	1	3,392	−652	...	−652	Positive	4,563	−683	...	−683	Positive
1892	Peak	1	3,243	−149	−149	...	Positive	4,282	−281	−281	...	Positive
1894	Trough	2	2,470	−773	...	−386	Positive	3,883	−399	...	−200	Inverse
1895	Peak	1	2,856	386	386	...	Positive	3,500	−383	−383	...	Inverse
1896	Trough	1	2,578	−278	...	−278	Positive	3,715	215	...	215	Inverse
1899	Peak	3	3,065	487	162	...	Positive	3,686	−29	−10	...	Inverse
1900	Trough	1	2,834	−231	...	−231	Positive	3,346	−340	...	−340	Positive
1903	Peak	3	3,018	184	61	...	Positive	3,615	269	90	...	Positive
1904	Trough	1	2,711	−307	...	−307	Positive	3,139	−476	...	−476	Positive
1907	Peak	3	2,802	91	30	...	Positive	3,408	269	90	...	Positive
1908	Trough	1	2,602	−200	...	−200	Positive	3,052	−356	...	−356	Positive
1910	Peak	2	2,581	−21	−10	...	Positive	3,073	21	10	...	Positive
1911	Trough	1	2,742	161	...	161	Inverse	3,097	24	...	24	Inverse
1913	Peak	2	2,345	−397	−198	...	Inverse	2,602	−495	−248	...	Inverse
1914	Trough	1	1,863	−482	...	−482	Positive	2,081	−521	...	−521	Positive
1918	Peak	4	1,049	−814	−204	...	Positive	1,159	−922	−230	...	Positive
1919	Trough	1	1,054	5	...	5	Inverse	1,239	80	...	80	Inverse
1920	Peak	2	1,195	141	141	...	Positive	1,421	182	182	...	Positive
1921	Trough	1	896	−299	...	−299	Positive	1,270	−151	...	−151	Positive
1923	Peak	2	1,261	365	182	...	Positive	2,006	736	368	...	Positive
1924	Trough	1	1,199	−62	...	−62	Positive	2,032	26	...	26	Positive
1926	Peak	2	1,470	271	136	...	Positive	2,369	337	168	...	Positive
1927	Trough	1	1,709	239	...	239	Inverse	2,582	213	...	213	Inverse
1929	Peak	2	1,944	235	118	...	Inverse	2,876	294	147	...	Inverse
1932	Trough	3	2,386	442	...	147	Inverse	3,643	767	...	256	Inverse
1937	Peak	5	4,631	2,245	449	...	Positive	5,010	1,367	273	...	Positive
1938	Trough	1	3,631	−1,000	...	−1,000	Positive	4,709	−301	...	−301	Positive

[a] From N. Y. State Public Works Department (or Division): *Annual Report of Superintendent*, 1930 and later years. Products of agriculture detected by NBER. A more detailed classification beginning in 1919 indicates that they are mostly grains.
[b] By comparison with preceding rate; e.g., −28 with 92, or 19 with 103.

CHART 132

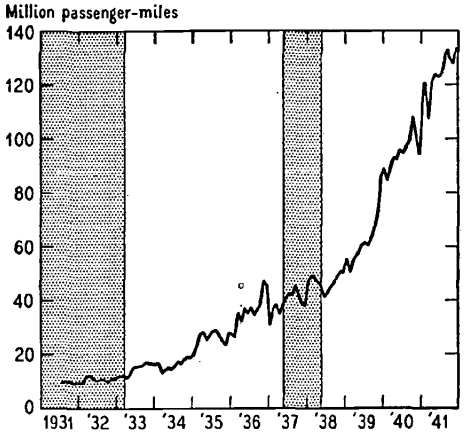
Tons Carried, New York State Canals, 1837–1943



Shaded periods are reference contractions.

CHART 133

Passenger-miles, Domestic Airlines, July 1931—December 1941



Shaded periods are reference contractions.

Table 143
Passenger-miles, Domestic Airlines
Change per Month between Reference Peaks and Troughs, 1933–1938

Reference date	Mar. 1933	May 1937	May 1938
Level of business	Trough	Peak	Trough
Months from preceding date	...	50	12
Passenger-miles flown† (millions)			
Number	11.64	38.27	44.39
Change from preceding date			
Total	...	26.63	6.12
Per month			
To peak from trough	...	0.53	...
To trough from peak	...	...	0.51

† Three-month average; reference date is middle month. Non-revenue passenger-miles included.

positively to the reference chronology (Table 142). The relation is not very close, however; 34 comparisons rate positive, 15 inverse. The unopposed cases (34 minus 15) are only 39 percent of the total (49). Business as a whole suffers, especially grain, has usually been large, and farm production is not associated as closely as industrial production with changes in business conditions. When we deduct products of agriculture from the total, the conformity

becomes closer. The number of unopposed cases (39 minus 10) becomes 59 percent of the total.[7]

AVIATION

Commercial air transport was in its infancy at the beginning of the 1933–38 business cycle. Between the initial and final trough the number of miles traveled by patrons of scheduled air services quadrupled; 1938 in turn looks small in comparison with later years (Chart 133).[8] Obviously, the technology and relative cost position of the airlines, and the attractiveness of their service to travelers, were improving in both expansion and contraction. Traffic continued to increase in 1937–38. The rate of growth, however, was not as rapid as in 1932–37, although the difference is small (Table 143).

[7] Most of the differences, with respect to the kind of conformity suggested, between tonnage including and tonnage excluding farm products were, however, confined to two short periods. One occurred in the 1840's, all four others in the 1890's.

[8] Data from Department of Commerce, *Air Commerce Bulletin*, and Civil Aeronautics Administration, *Civil Aeronautics Journal*.