Volume Title: Income in the United States, Its Amount and Distribut 1909-1919, Volume II: Detailed Report

Volume Author/Editor: Wesley Clair Mitchell, editor

Volume Publisher: NBER

Volume ISBN: 0-87014-001-9

Volume URL: http://www.nber.org/books/mitc22-1

Publication Date: 1922

Chapter Title: Transportation by Water

Chapter Author: Willford I. King

Chapter URL: http://www.nber.org/chapters/c9412

Chapter pages in book: (p. 191 - 201)

CHAPTER 16

TRANSPORTATION BY WATER

§ 16a. Sources of Information

The Census Bureau covered this field in the years 1906 and 1916, but the financial statistics presented are far from having the degree of completeness desired. The records of gross income, and of wages and salaries paid would, however, be of great assistance in solving our problems were it not that some of the totals presented are evidently very far from the truth. That serious errors really exist is clear if one compares the average wages paid to employees on land as shown by the Censuses of 1906 and 1916. The Census record indicates that this average wage declined, during the decade, from $665 to $450. All other sources agree, however, in showing that the period was characterized by sharply rising wages. An inquiry concerning this peculiarity of the data was sent to the Census Bureau and elicited the reply that the Census of 1916 was taken under difficulties due to the rapid shift in the personnel of the employees in water transportation. The Census Bureau officials, however, felt confident that the amounts stated as paid for wages and salaries are approximately correct, even though the number of employees may be materially in error. This belief, however, seems contrary to the facts for it involves the assumption that the number of employees diminished greatly during the decade. Overwhelming evidence including that in the Census report itself, proves that the number not only did not diminish but actually increased to a marked degree.

As a matter of fact, it appears that the Census data, as regards the number of employees, approximate the truth, but that the 1916 figures, because of the failure to include sufficient allowances for board and lodging, understate the total pay of employees on vessels.

For the reasons just stated, the assumption has been made that the Census figures for the average number of persons actually employed are, in each instance, reasonably accurate, and that the 1906 record is a correct picture of the average earnings of land workers at that date. It has also been assumed that the record of gross earnings is reasonably accurate for each of the Census years. These are the only Census figures which seem to be adapted to our particular needs.

It has been necessary to supplement the data thus obtained by material

derived from the reports of the Commissioner of Navigation and of the United States Shipping Board, and from the fragmentary information concerning steamship companies which appears in Poor's and Moody's *Manuals of Corporation Securities.*

§ 16b. Assumptions Made

The assumption has been made that the share of entrepreneurs and other property owners in the income arising from transportation by water comprises nothing but interest on bonds, dividends on stocks or distributed profits and business savings. There are doubtless other payments made directly to private parties, but of these we have no record, and they are probably not large enough materially to affect the totals. Similarly, the share of the employees is assumed to consist only of the money wages and salaries received plus an allowance for board and lodging furnished. Most of the figures are probably so inaccurate that further attempts at refinement in the assumptions made would be futile.

§ 16c. Mode of Estimating Gross Earnings

In estimating gross earnings for the intercensal years, recourse has been had to the use of a sequence of ratios. For each shipping company, the reports of which are shown in Poor's *Manual*, the ratio of the gross earnings for the given year to the earnings for the preceding year has been calculated and recorded. Earnings for the year 1909 have, however, been compared with those of 1906, (the Census year), the years 1907 and 1908 being skipped because, in this study, there is no attempt to derive estimates for years preceding 1909. Few shipping concerns have published reports for each year since 1906, hence the derivation of an accurate index of gross earnings is impossible. Under these circumstances, we have been forced to take the median of all the ratios for a given year as representing the proportionate change in gross earnings from the preceding period. These median ratios for the different years have been converted into an index on the base 1906 by a continued process of multiplication beginning with the ratio of 1909 to 1906, next applying thereto the ratio of 1910 to 1909, and so on. It can be demonstrated mathematically that an index computed in this manner tends, in the course of time, to rise above the true index. This tendency has been corrected by tying the indices thus derived to the Census estimates of total gross earnings; a process by which the upward slope is diminished materially and the error of the type just mentioned is presumably thus eliminated. The final estimate of gross earnings appears in Table 16A.

Having arrived at an approximate set of totals of gross earnings, the next step is to utilize these estimates as bases for computing the share of

TABLE 16A

THE ESTIMATED GROSS EARNINGS OF ALL PRIVATE CONCERNS IN THE CONTINENTAL UNITED STATES ENGAGED IN TRANSPORTATION BY WATER

A	B	C	D	E
Year	Gross income in thousands as reported by the Census [a]	Index of gross earnings estimated from reports of about twenty corporations [b]	Ratio of B to C	Estimated gross earnings of all concerns (Thousands) C × D
1906.....	$294,855	1.00	294,855 [c]	$294,855 [a]
1909.....		1.00	280,500 [d]	280,500
1910.....		1.10	275,700 [d]	303,300
1911.....		1.13	270,800 [d]	306,000
1912.....		1.27	266,100 [d]	338,000
1913.....		1.39	261,200 [d]	363,000
1914.....		1.29	256,600 [d]	331,000
1915.....		1.51	251,700 [d]	380,000
1916.....	563,736	2.28	247,300 [c]	563,736 [a]
1917.....		2.03	242,400 [d]	492,000
1918.....		1.79	237,400 [d]	425,000
1919.....		3.05	232,500 [d]	709,000

[a] *Census of Transportation by Water*, 1916, page 57.
[b] For derivation, see text.
[c] Computed by division.
[d] Interpolated along a straight line.

the entrepreneurs and property owners in the value product of each year. The mode of attack is as follows:

§ 16d. The Share of the Owners and Investors

For each shipping corporation dealt with in Poor's or Moody's *Manual*, the reports of which appear in such form as to make it possible, three ratios have been computed for each year; namely, the respective ratios of bond interest paid, dividends paid, and added surplus, to the gross earnings of the same year. In the case of bond interest, a weighted median of these ratios has been ascertained for each year, large companies like the International Mercantile Marine naturally having been given more weight than small concerns like the Montauk Steamship Company. The same procedure has been followed in obtaining the yearly medians of the ratios of surplus to gross earnings.[1] In the case of dividends, however, it was necessary to compute a weighted arithmetic average instead of a weighted

[1] The median was used because it eliminated the extreme variations in some of the samples. These extremes were not believed to be representative.

median of the ratios; for, in certain lean years, even though a few corporations paid very considerable dividends, the median ratio was zero.

The products obtained by multiplying the estimated gross earnings for the various years by the ratios obtained in the manner just described are believed to approximate the actual amounts falling into the respective categories. Table 16B shows the ratios and the estimated size of the various amounts which go to make up the share of the entrepreneurs and other property owners in the annual value product.

TABLE 16B

THE ESTIMATED SHARE OF ENTREPRENEURS AND OTHER PROPERTY OWNERS IN THE ANNUAL VALUE PRODUCT OF THE PRIVATE INDUSTRY OF TRANSPORTATION BY WATER

Calendar year	Estimated gross earnings in thousands [a]	Average ratio [b] to gross earnings of			Estimated share of entrepreneurs and other property owners [c] (Thousands)			
		Bond interest paid	Dividends paid	Amounts carried to surplus	Interest on funded debt	Profits disbursed	Business savings	Total
1909	$280,500	.0691	.0286	.0246	$19,380	$ 8,025	$ 6,900	$34,305
1910	303,300	.0623	.0550	.0835	18,900	16,680	25,320	60,900
1911	306,000	.0503	.0543	.0307	15,400	16,620	9,400	41,420
1912	338,000	.0521	.0424	.0725	17,620	14,320	24,510	56,450
1913	363,000	.0501	.0378	.0608	18,200	13,720	22,070	53,990
1914	331,000	.0502	.0543	—.0021	16,600	17,980	—695	33,885
1915	380,000	.0407	.0479	.0649	15,470	18,200	24,660	58,330
1916	563,736	.0374	.0418	.1189	15,000 [d]	23,550	67,030	105,580
1917	492,000	.0304	.1028	.0463	14,960	50,600	22,790	88,350
1918	425,000	.0293	.1013	.0699	12,460	43,050	29,720	85,230
1919	709,000	.0259	.1124	.0166	15,000 [d]	79,700	11,770	106,470

[a] See Table 16A.
[b] For mode of derivation, see text.
[c] Gross earnings multiplied by the appropriate ratios.
[d] Arbitrarily assumed, because original products seem too large, since it is unlikely that bond interest would change greatly from year to year.

While the share of the entrepreneurs and other property owners has increased greatly in terms of dollars, the change in their ability to secure commodities has been somewhat less striking. That such is the case is made clear by a study of Table 16C in which the current income of these classes has been converted into terms of purchasing power at the price level of 1913.

TABLE 16C

THE RELATIVE PURCHASING POWER IN TERMS OF CONSUMPTION GOODS OF THAT PART OF THE INCOME OF ENTREPRENEURS AND OTHER PROPERTY OWNERS DERIVED FROM TRANSPORTATION BY WATER

Calendar year	Disbursements to entrepreneurs and other property owners			Business savings		
	Profits and interest on funded debt [a] (Thousands)	Index of prices of goods consumed by wealthier families [b]	Purchasing power at prices of 1913 (Thousands)	Amount in thousands of dollars [c]	Index of construction costs [d]	Amount of construction purchasable at prices of 1913 (Thousands)
1909.....	$27,405	.964	$28,428	$ 6,900	.927	$ 7,443
1910.....	35,580	.982	36,232	25,320	.953	26,569
1911.....	32,020	.989	32,376	9,400	.945	5,947
1912.....	31,940	.999	31,972	24,510	.983	24,934
1913.....	31,920	1.000	31,920	22,070	1.000	22,070
1914.....	34,580	1.011	34,208	—695	.960	—724
1915.....	33,670	.999	33,704	24,660	.992	24,859
1916.....	38,550	1.081	35,667	67,030	1.194	56,139
1917.....	65,560	1.225	53,518	22,790	1.473	15,472
1918.....	55,510	1.406	39,481	29,720	1.499	19,827
1919.....	94,700	1.648	57,464	11,770	1.597	7,370

[a] Combination of the items in two columns of Table 16B.
[b] An average of the indices for families spending respectively $5,000 and $25,000 per annum for consumption goods.
[c] See Table 16B.
[d] An average of the U. S. Bureau of Labor Statistics indices for building labor, building materials, and metals, the weights used being, in the order named, 3, 1, and 2.

§ 16e. The Share of the Employees

The next step necessary is to ascertain the share of the product going to the employees in each year of the period. This end can apparently best be attained if the employees are first divided into the two classes used by the Census, namely those working on land and those employed on vessels.

It seems clear that the number of men required about the docks must vary in proportion to the amount of shipping to be handled. The criterion which has suggested itself as being the best adapted to measuring accurately shipping activity at our ports, is the tonnage of vessels entered and cleared. This tonnage is recorded for the foreign trade but not for the coastwise. In order to give some weight to the latter, the plan has been adopted of using a combination index constructed by adding to the sum of the tonnage in the foreign trade entered and cleared, one-fifth of the freight tonnage passing through the Sault Ste Marie Canal and five times

the tonnage of the vessels engaged in the coastwise trade. The "Soo" Canal traffic is weighted low because the handling of the grain and iron ore, which constitutes the bulk of the tonnage, requires relatively little labor. The weighting for coastwise vessels assumes that there are on the average five cargo handlings per year. However, the three indicators used vary so similarly that the relative size of the weights assigned is not a matter of great importance. The foreign trade figures for the period preceding 1918

TABLE 16D

THE ESTIMATED NUMBER AND EARNINGS OF LAND EMPLOYEES ENGAGED IN THE INDUSTRY OF TRANSPORTATION BY WATER

A	B	C	D	E	F	G
Calendar year	Number at work as reported by the Census	Index of tonnage loaded and unloaded [b]	Ratio of B to C	Estimated number at work C × D	Estimated average annual pay	Estimated total wages and salaries E × F
1906.....	47,419 [a]	109.8	432 [c]	47,419 [a]	$ 663 [a]	$31,456 [a]
1909.....		123.0	475 [d]	58,450	664 [e]	38,800
1910.....		128.5	488 [d]	62,750	665 [e]	41,720
1911.....		133.2	500 [d]	66,592	666 [e]	44,360
1912.....		145.6	512 [d]	74,480	698 [e]	52,000
1913.....		154.2	522 [d]	80,460	732 [e]	58,930
1914.....		144.4	530 [d]	76,540	732 [e]	56,050
1915.....		144.9	538 [d]	77,980	731 [e]	57,030
1916.....	83,581 [a]	153.2	545 [c]	83,581 [a]	808 [e]	67,560
1917.....		146.7	552 [d]	80,900	840 [e]	67,940
1918.....		144.6	556 [d]	80,400	1,012 [e]	81,400

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] For mode of derivation, see the text.
[c] Computed by division.
[d] Interpolated along a smooth curve.
[e] Assumed to vary from the 1906 wage in the same proportion as did the daily wages for longshoremen. See text for explanation.

are reported for years ending June 30, hence the pairs of fiscal years have been averaged in each case to give an estimate for the calendar year on which they overlap. These estimates for the calendar years have been combined with the other indicators in deriving the index used.

It has been assumed that the employees on land received, on the average in 1906, the $665, reported by the *Census of Transportation by Water*. This amount has been varied for the other years on the basis of the change in the daily rates of pay at New York City from 1906 to 1914 [1] and since

[1] Estimated from data given on page 80 of *The Longshoreman*, by Charles B. Barnes.

that date, in the daily rates for all sections of our coast.[1] The New York City rates have been weighted more heavily than the others because of the importance of this port.

The next necessary step in the procedure is to estimate the wages of the employees on vessels. Now it seems probable that the Census figures, as to the number of men employed, are approximately correct. The interpolation for the intercensal years has been on the basis of the reported tonnage of the American merchant marine, which seems to constitute a satisfactory criterion.

In computing the wage payments, it was, for reasons previously stated, found necessary to ignore the Census figures. Fortunately, the *Annual Reports* of the United States Commissioner of Navigation give detailed information each year concerning the wages paid to different classes of workers. From these reports, a median of monthly wages paid to able-bodied seamen on American steamships has been computed for each year. To this median wage has been added in each instance an allowance for board and lodging, this allowance having been made to vary in proportion to the food index computed by the United States Bureau of Labor Statistics.

On pages 188–9 and in Chapter IX of H. B. Drury's report on *Marine and Dock Labor*, statistics are given which enable one to compute, with a reasonable degree of accuracy, the ratio of the average pay of the entire ship's crew, including officers, to the average pay of able-bodied seamen. By applying this ratio, an estimate has been made of the average annual pay of workers on vessels. The final estimates appear in Table 16E.

[1] From the report dated December 31, 1918, of The National Adjustment Commission of the U. S. Shipping Board, p. 21, and from p. 150 of Bulletin 274 of the United States Bureau of Labor Statistics on *The Union Scales of Wages and Hours of Labor*, May 15, 1919.

TABLE 16E

THE ESTIMATED NUMBER AND EARNINGS OF THE EMPLOYEES ON THE VESSELS OF THE AMERICAN MERCHANT MARINE

A	B	C	D	E	F	G	H	I
Year	Number reported by U. S. Census	Tonnage of merchant marine of the U. S.[b] (Thousands)	Ratio of B to C	Estimated number of men actually at work C × D	Monthly wages of able seamen on American steam vessels: Median money wage[e]	Monthly wages of able seamen on American steam vessels: Estimated wage including board and lodging	Estimated average annual earnings of all employees[g]	Estimated total wages and salaries in thousands paid to employees on vessels E × H
1906	140,929[a]	6,675	.02111[c]	140,929	$25.84	$45.24	$ 788	$111,000
1909		7,389	.02019[d]	149,200	28.75	51.72	901	134,400
1910		7,508	.01990[d]	149,400	30.00	54.02	941	140,600
1911		7,639	.01958[d]	149,600	30.00	53.73	936	140,000
1912		7,714	.01930[d]	148,900	30.00	55.74	971	144,520
1913		7,887	.01900[d]	149,900	30.00	55.74	971	145,500
1914		7,929	.01870[d]	148,300	30.00	56.37	982	145,700
1915		8,389	.01839[d]	154,300	35.00	61.25	1,067	164,600
1916	153,301[a]	8,470	.01810[c]	153,301	47.60	77.15	1,341	205,100
1917		8,871	.01780[d]	157,900	58.85	96.73	1,685	265,900
1918		9,925	.01752[d]	173,900	68.75	112.17	1,954	339,800
1919		12,907	.01722[d]	222,200	75.00[f]	123.53[f]	2,152[f]	478,200[f]

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] *Statistical Abstract of U. S.* for 1919, p. 361.
[c] Computed by division.
[d] Interpolated along a straight line.
[e] Medians of wages for some 50 classes of able seamen. Data from *Annual Reports* of the U. S. Commissioner of Navigation. The items recorded are the averages of medians for the pairs of fiscal years overlapping on the calendar year.
[f] Preliminary figures.
[g] Items in column G multiplied by 17.42. For explanation, see text.

§ 16f. The Net Value Product and Its Division

We are now prepared to estimate the value product of the industry of Transportation by Water. The figures appear in Table 16F.

TABLE 16F

THE ESTIMATED TOTAL VALUE PRODUCT OF THE INDUSTRY OF TRANSPORTATION BY WATER AND THE PER CENT THEREOF GOING TO THE EMPLOYEES

Calendar year	Total value product [a] (Thousands)	Total share of entrepreneurs and investors [b] (Thousands)	Total wages and salaries paid [c] (Thousands)	Per cent of value product going to employees
1909	$207,505	$ 34,305	$173,200	83.5
1910	243,220	60,900	182,320	75.0
1911	225,780	41,420	184,360	81.7
1912	252,970	56,450	196,520	77.7
1913	258,390	53,990	204,400	79.1
1914	235,635	33,885	201,750	85.6
1915	279,960	58,330	221,630	79.2
1916	379,240	105,580	273,660	72.2
1917	422,290	88,350	333,940	79.1
1918	506,430	85,230	421,200	83.2

[a] Sum of the two following columns.
[b] See Table 16B.
[c] Sum of the last column in Table 16D and the last column in Table 16E.

It is clear that the employees in this line of work receive a high percentage of the value product as compared to those in many of the other fields. No tendency is apparent for their relative share either to increase or diminish as the years pass.

§ 16g. The Average Annual Earnings of Employees

The usual estimates of the numbers of men attached to the industry, the fluctuations in the average money earnings, and the purchasing power of these earnings on the basis of the prices of 1913 appear in Table 16G.

TABLE 16G

THE PURCHASING POWER OF THE AVERAGE ANNUAL EARNINGS OF THE EMPLOYEES IN THE PRIVATE INDUSTRY OF TRANSPORTATION BY WATER

A	B	C	D	E	F	G	H
Calendar year	Estimated average number of employees actually at work [c]	Estimated fraction of persons attached to industry actually at work [d]	Estimated number of employees normally attached to the industry B/C	Total wages and salaries paid [b] (Thousands)	Average annual earnings per employee attached to industry E/D	Index of prices of goods consumed by manual and clerical workers [e]	Purchasing power of earnings at prices of 1913 F/G
1906	188,348 [a]			$142,456			
1909	207,650	.927	224,002	173,200	$ 773	.955	$ 810
1910	212,150	.917	231,352	182,320	788	.978	806
1911	216.192	.906	238,623	184,360	773	.984	785
1912	223,380	.919	243,068	196,520	808	.994	813
1913	230,360	.930	247,699	204,400	825	1.000	825
1914	224,840	.899	250.100	201,750	807	1.01	799
1915	232,280	.922	251,931	221,630	880	1.03	854
1916	236,882 [a]	.936	253,079	273,660	1,081	1.10	983
1917	238,800	.934	255,675	333,940	1,306	1.29	1,012
1918	254,300	.925	275,000	421,200	1,532	1.58	969

[a] *U. S. Census of Transportation by Water*, 1916, p. 59.
[b] See Table 16F.
[c] The sum of the items in Column E, Table 16D, and in Column E, Table 16E.
[d] Estimated in § 2d.
[e] The Bureau of Labor Statistics index carried back by means of a special study made by this Bureau; see § 2b.

Table 16G records clearly a marked gain in the economic welfare of the employees in the years 1915, 1916, and 1917. The other years of the period show no changes of moment in this respect. On the whole, the employees were evidently very much better off in 1918 than in 1909.

§ 16h. The Tonnage of the American Merchant Marine

The final step is to note the changes in the supply of American merchant shipping which have occurred during the years under consideration. Table 16H sets forth the facts as indicated by the official reports.

TABLE 16H

THE TONNAGE OF THE AMERICAN MERCHANT MARINE AS COMPARED TO THE POPULATION OF THE CONTINENTAL UNITED STATES

Year	Tonnage afloat [a]	Population in thousands [b]	Tonnage per capita
1909	7,388,755	90,370	0.0818
1910	7,508,082	92,229	.0814
1911	7,638,790	93,811	.0814
1912	7,714,183	95,338	.0809
1913	7,886,551	97,278	.0811
1914	7,928,688	99,194	.0799
1915	8,389,429	100,428	.0835
1916	8,469,649	101,722	.0833
1917	8,871,037	103,059	.0861
1918	9,924,518	104,182	.0953
1919	12,907,300	104,847	.1231

[a] *Statistical Abstract of the U. S.*, 1919, p. 361.
[b] See Table 2A.

This table shows that the merchant marine just about kept pace with population until the beginning of the European War. A moderate relative increase in 1915 and 1917 was followed by a large growth in 1918 and a tremendous expansion in 1919. The reasons for this development are too well known to require comment.