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Volume Author/Editor: Ralph C. Epstein assisted by Florence M. Clark

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Chapter Author: Ralph C. Epstein, Florence M. Clark

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## APPENDICES



## APPENDIX A

### EXPLANATIONS OF METHODS USED IN PREPARING CERTAIN CHARTS AND TABLES

#### TABLES 1, 3, 5, 6, CHAPTER 2

##### *Estimate of Long-Time Interest*

INTEREST payments on long- and short-term debt are not segregated in the reports of the Bureau of Internal Revenue. In order to determine the rate of returns on total capital (capital stock equity plus funded debt) it was necessary to estimate the amount of interest paid on the funded debt. A rate of  $5\frac{1}{2}$  per cent was adopted as an average interest rate, and in each year interest, computed as  $5\frac{1}{2}$  per cent of the funded debt, was added to income to determine the profit earned on total capital. See note, *The Item of Interest on Funded Debt in the Several Samples*.

##### *'Stepping Up' Investment Data, Tables 1, 3, 5, 6*

Each year the number of corporations submitting income statements to the Bureau of Internal Revenue is somewhat larger than the number submitting balance sheets. To obtain a more accurate figure for the return on capital, both 'capitalization' and 'total capital' have been estimated for those corporations submitting only income statements and added to the investment amounts reported by the corporations submitting balance sheets. These estimated or 'stepped up' capital and capitalization figures have been computed as follows. In 1928, for example, 81,748 manufacturing corporations submitted balance sheets, showing a total capitalization of \$38,537,804,973, while 86,803 (106.2 per cent of this number) submitted income statements. This involves the assumption that the average capitalization per company of the companies that filed balance sheets is no

larger or smaller than of those that did not. We may *estimate* the capitalization of the 86,803 corporations to be \$40,927,148,881 (106.2 per cent of \$38,537,804,973). But since it is probably true that most of the 5,055 corporations that failed to file balance sheets are relatively small, the rate of return computed on the 'stepped up' capitalization figures to this extent understates the actual rate of return, just as that computed on the simple 'not stepped up' figures overstates the actual situation. For this reason, means between the ratios of income or profit to the 'stepped up' and 'not stepped up' capitalization or total capital figures are used as the most accurate available measurement of the aggregate return on capital for all corporations in the country, in the Manufacturing, Trading, Mining and Financial divisions.

#### TABLE 2, CHAPTER 2

The ten-year series of data for the 3,144 identical corporations were in their original form compiled by separate industrial divisions: i.e., Manufacturing, Trade, Finance, Mining. In obtaining composite figures comparable with the total amounts reported for all manufacturing, trade, finance and mining corporations in the United States, it is necessary that each of these four industrial groups be given the same relative importance in the sample of 3,144 corporations as in the actual data for the country as a whole, otherwise, the composite figures might be quite inaccurate because of the undue preponderance of one industrial division in the sample. For example, the Mining division shows a much lower mean return than the other divisions. It happens that Mining contains a tenth or less of the total capitalization of the four divisions (for all corporations in the country), but if the Mining division did constitute any very large proportion of the total capitalization of the sample, then the composite return for the sample could not well be compared, in its unweighted form, with the return for the United States as a whole. Upon theoretical grounds, weighting of the investment and income data is therefore indicated.

As a matter of technique, in making this adjustment—or in weighting the four divisions of our sample—it is more feasible to adjust the income figures than the investment data. (For purposes of further analysis and comparison it is desirable to keep the capitalization and total capital figures as actually reported for the 3,144 corporations.) To obtain the desired weighting in the final computed ratios through

adjustment of the income data, the following procedure is employed. The total capital (or capitalization) for the 3,144 corporations in each year is redistributed among the four industrial groups in the same proportion in which the data for the country as a whole are distributed among such industrial groups in that year.<sup>1</sup> The ratio of the *actual* amount of capitalization reported by each division of the sample to the amount it would have had if the distribution of capital in the sample had been 'correct' is then determined; and this ratio is applied to the income as actually reported for each industrial division of the sample. Thus the ratio of the sum of the computed amounts of income to the actual total capitalization is accurately comparable with the rate of return computed for all corporations in the four industrial groups in the country as a whole. The following example will show more clearly the several steps involved in computing this ratio.

In 1928 the total capitalization for manufacturing, trade, finance and mining corporations of the country reported in *Statistics of Income* was distributed among the industrial groups as follows: manufacturing corporations, 49.3 per cent of the total; trade, 13.4 per cent; finance, 29.6 per cent; mining, 7.7 per cent. If the total capitalization for the 3,144 corporations of our sample (\$32,031,200,000) had been distributed in those same proportions in that year, each industrial division in our sample would have reported the capitalization listed in column (b) below instead of the actual data for each division recorded in column (a).

	(a) <i>Actual capitalization</i>	(b) <i>Computed capitalization</i>	(c) <i>Ratio of com- puted to actual capitalization</i>
Manufacturing	\$24,925,000,000	\$15,791,381,600	0.63
Trade	2,502,500,000	4,292,180,800	1.72
Finance	2,931,700,000	9,481,235,200	3.23
Mining	1,672,000,000	2,466,402,400	1.48
Total	\$32,031,200,000	\$32,031,200,000	

<sup>1</sup> This is done in each of the years 1924-28. For the years 1919-23, however, data for the entire United States are not available. The relationships prevailing in 1926 are applied, in the manner set forth below, to the capitalization data of the sample in each of these years. The year 1926 is chosen because the data in *Statistics of Income* are probably somewhat more suited to the purpose at hand than those of 1924, as in 1924 the capital stock tax returns, instead of income tax returns, were utilized as the basis for the published balance sheet figures.

The ratio of the computed to the actual capitalization is given in column (c). Thus, if the total capitalization reported for the 3,144 corporations were distributed among the four industrial groups in the same proportion as the total capitalization for these same groups in the country as a whole is distributed in that year, the Manufacturing corporations of the sample would have reported only 63 per cent of their actual capitalization figure. Similarly, (assuming such a smaller sample to have been as representative as the larger one) they would have reported 63 per cent of the actual income amount. Applying this ratio of computed to actual capitalization to the actual income as given in column (d) below, the computed income figure listed in column (e) is obtained:

	(d) <i>Actual income</i>	(e) <i>Computed income</i>
Manufacture	\$2,736,450,000	\$1,723,963,500
Trade	306,900,000	527,868,000
Finance	303,600,000	980,628,000
Mining	132,400,000	195,952,000
Total	\$3,479,350,000	\$3,428,411,500

The properly weighted rate of return on the capitalization of the 3,144 corporations, which gives to each industrial group the same relative importance that it has in the data for the entire United States, is, then, the ratio between the total computed income (\$3,428,411,500) and the actual total capitalization (\$32,031,200,000), or 10.7 per cent. There are shorter methods of obtaining the same result, but the redistribution of the absolute figures effected above seems most clearly to illustrate the logic of the weighting process.

TABLE 7, CHAPTER 2

Data are not available in the annual reports of the Bureau of Internal Revenue for the computation of the rate of return on the capitalization of all manufacturing corporations with net incomes of over \$2,000 for the entire ten-year period 1919-28. Assuming, however, that our sample of 'small corporations' with incomes of \$2,000 to \$50,000, and our sample of 'large corporations' with incomes of \$50,000 or more are fairly representative, we may, by proper weighting, expand these data so as to give a picture of the entire universe.<sup>2</sup>

<sup>2</sup> For comment upon the character of these two samples, see Ch. 43.

In this process of weighting, three steps are involved. The first is to determine the ratio between the size of each of the samples and the number of corporations with the same sizes of net income<sup>3</sup> for the country as a whole. The second, to determine from this ratio the appropriate weighting. The third, to weight the actual data and combine them.

For example, in 1928 the Bureau of Internal Revenue reported 29,555 manufacturing corporations in the entire country with net incomes of \$2,000 to \$50,000, and 8,207 with net incomes of \$50,000 or more. In the same year in our small corporations sample there were 1,421 corporations, or 4.8 per cent of the total number in the country with net incomes of \$2,000–\$50,000; and in our large corporations sample there were 1,970 corporations, or 24.0 per cent of the total number in the country with net incomes of \$50,000 or over. Thus, in that year, there were actually in the United States, with incomes of \$2,000 to \$50,000, just about 20 times the number of corporations in the one sample and just about 4 times the number with incomes of \$50,000 or more as in the other sample. Applying these weights of 20 and 4 respectively to the data of the two samples and combining them, we obtain a total net income for manufacturing corporations with incomes of over \$2,000 in 1928 amounting to \$11,973,800,000 and a total capitalization of \$98,448,000,000. These estimates possess no validity as absolute figures; because the average size of the corporations in our large corporations sample is greater than that of most typical corporations with incomes in the 'over \$50,000' grouping, these weighted absolute figures are far larger than those which actually prevail. But although they are even absolutely higher than the actual data obtained from *Statistics of Income* for that year and presented in Table 6 (for all manufacturing corporations in the country with net incomes, including those under \$2,000), the rate of return computed for the estimated data of Table 7 is only slightly different from that for the actual data of Table 6: 12.2 per cent as against 12.0 per cent.

As in the case of Table 2, a shorter method to attain the same results could be employed by directly adjusting the ratios themselves and in this instance avoiding the use of the 'fictitious' absolute figures; but the logic of the adjustment is perhaps seen better by weighting the absolute data.

<sup>3</sup> For qualifications concerning definition, again see Ch. 43.

ESTIMATED EARNINGS RATES FOR ALL MANUFACTURING IN THE COUNTRY, 1921 AND 1931,  
GIVEN IN CHAPTER 1

The earnings rates for the 71 companies series described in Ch. 6 were compared with the figures for all manufacturing corporations in the country, for the five years 1924–28. It was found that the latter rates averaged 63.0 per cent of the former. This ratio was then applied to the earnings figures of the 71 companies for 1921 and 1931, and the resulting figures, 2.4 and 2.3 per cent respectively were called rough estimates for all manufacturing corporations in the country in those years. No decimal points are made use of in the text, as the margin of possible error is very large. The figures should be regarded as the broadest of estimates, since the assumption that underlies them is, of course, that the earnings rates of these 71 companies bore the same relation to those for all manufacturing corporations in the country in 1921 and 1931 as they did on an average in the years 1924–28.

The five annual ratios in 1924–28, for which the mean ratio is 63.0 per cent, are as follows: 62.6; 58.5; 56.4; 64.6; 73.1.

71 COMPANIES SERIES DATA FOR 1931, GIVEN IN  
CHAPTER 6

The Lumber figure for 1931 is preliminary, the earnings rate of one corporation in the group being estimated; but the possible error involved is very slight. Upon the total figures for all groups the trifling amount of possible error in the data for this company, which is a relatively small concern, can have no effect whatever. The total estimated capitalization of the Stone and Lumber groups (the two are combined, as explained earlier) in 1931 is 233 million dollars, while that for all 71 companies is just over six billion. The capitalization of the one corporation in question in 1930 was less than 20 million; so that even if an error of as much as 50 per cent were involved in estimating its 1931 figure, the difference in the 233 million figure could not be over 5 per cent either way, and in the 6 billion figure would be only one-third of 1 per cent.

## THE ITEM OF INTEREST ON FUNDED DEBT IN THE SEVERAL SAMPLES

The distinction between *net income* and *total profit* as drawn throughout this volume lies in the inclusion of interest charges upon funded debt in the latter. As elsewhere remarked, however, these interest amounts are estimated. The statement of the *Source-Book* (p. 3) is as follows: "*Estimated interest upon bonded debt* is, in the case of the corporations for which data are presented in Parts I and VI, the equivalent of five per centum of the amount of all funded or long-time obligations, while for the corporations in other parts of the book it is the equivalent of six per centum of such funded obligations." By the corporations in Parts I and VI are meant the several large identical corporations series discussed in the present volume. Upon the funded debts of the corporations of all other samples discussed in the present volume the rate of 6 per cent has been applied.

The basis on which 5 and 6 per cent were selected as the respective interest rates for 'large' and 'small' corporations in the original calculations of the data published in the *Source-Book* may be stated briefly. For large corporations there seemed to be little question that 5 per cent represented a very close approximation: the Standard Statistics Company's index of the average yield of fifteen high-grade industrial bonds between 1922 and 1928 (annual averages of monthly figures) ranged only between 4.8 and 5.3 per cent. (In 1920 and 1921 the figure was 6.0 per cent.)

For small corporations no general indexes are published by the Standard Statistics Company or other agencies for the period in question. The writer, however, investigated conditions in four banking centers: New York City, Buffalo, Cleveland and San Francisco. In New York City the consensus among the persons interviewed seemed to be that while the rate of interest paid by small industrials (corporations too small for public financing) varied greatly, it ran higher in most instances than for the larger companies; and 7 or 8 per cent was thought to be a more usual figure. In Buffalo, of ten small industrial enterprises with bond issues, nine paid 6 per cent and one paid 5.5 per cent. In Cleveland it was stated by a banker that "such financing . . . has been carried on . . . during the past ten years at rates that were almost never below six per cent, and which in almost every case carried in addition a bank charge that

would amount roughly to an additional one-half per cent. In other words this kind of financing has cost the smaller companies about  $6\frac{1}{2}$  per cent per year as a minimum, and more frequently 7 per cent or  $7\frac{1}{2}$  per cent. Nevertheless, while these are the general facts, it is also true that each business of financing has been an individual deal, both in our institution and in other banks, with various collateral considerations involved . . . [and] . . . the banks do not compile massed records or make index numbers of such transactions." In San Francisco no adequate information on which to generalize was obtained except for the savings bank rate applied to real estate mortgages which a banker there states "has been, during the period 1919-1928, uniformly 6 per cent. However, in the case of small industrials . . . in need of working capital . . . [where] the value of their property did not justify a savings bank loan at the above-mentioned rate and other assets had to be pledged to enable brokers to float a small bond issue, the rate would, of course, have been much higher because of the heavy costs that such bond issue would have inevitably to undergo."

There is not space here to discuss the sale of bonds at a discount and the collateral considerations affecting the real cost of financing these small industrials through long-term borrowed capital. But disregarding the undoubtedly great variations in individual instances, it is probably fair to conclude that most of these small companies *pay out* 6 per cent or more annually as interest upon their funded debt, and that this rate represents a sufficiently satisfactory figure for our purposes, namely, to ascertain the rate of net return upon total capital before the payment of fixed charges, as well as that upon capitalization after their deduction.

### EARNINGS RATES BEFORE AND AFTER TAXES

It was pointed out in Chapter 1 that for all years after 1921 the difference between earnings rates before and after payment of Federal income taxes is only slight. The statement related to arithmetic mean averages, but is also true of the frequency distributions for the earnings rates of individual corporations, as shown by experiments conducted for two industrial groups, Bakery Products and Radios and Parts. The individual corporations in each group were arrayed according to their rates of earnings before and after taxes, and the correlation is either perfect or almost perfect. Data from p. 201 of

the *Source-Book* are as follows. (Four cases are presented, large corporations and small corporations being treated separately in both groups.)

<i>Subgroup</i>	<i>No. of</i>	<i>taxes, range ap- proximately from:</i>	<i>Description of sample: corporations with total net incomes which, before corps. proximately from:</i>	<i>Coeffi- cients of rank correla- tion (all positive)</i>	<i>Data for percentage of net income to capitalization (before taxes)</i>			
					<i>Arith- metic mean</i>	<i>Me- dian</i>	<i>Upper quar- tile</i>	<i>Lower quar- tile</i>
Bakery Products	32	\$2,000-\$100,000		.9989	12.2	14.0	30.0	6.7
" "	18	All over \$100,000		1.0000	16.6	15.0	22.5	9.2
Radios and Parts	35	\$2,000-\$100,000		.9969	14.4	12.3	23.7	6.5
" " "	62	All over \$100,000		.9997	12.2	15.0	24.7	8.0

