Book IV

PROBLEMS OF ESTIMATION
AND INTERPRETATION

CHAPTER 43

PROBLEMS OF SAMPLING AND WEIGHTING

1. NECESSITY OF RESORTING TO SAMPLES

THERE are in the United States about half a million corporations—the exact number reporting to the Bureau of Internal Revenue in 1928 was 495,892.[1] Of these, some 95,000 engage in Manufacture, 130,000 in Trade, 19,000 in Mining, 120,000 in Finance. The remainder are classified in industrial divisions not treated in this volume, such as Railroads and Public Utilities, Agriculture, Construction, and Service (for example, laundries, hotels and moving picture theatres).

Of the 365,000 engaged in Manufacture, Trade, Finance and Mining in 1928, about 25,000 were 'inactive', that is, they reported no income data. For the remaining 340,000 active corporations in these four fields, no complete tabulations, involving the types of data presented in this volume, have ever been made. Whether based upon Government data or materials collected by other agencies, every statistical study of profits that has essayed to divide such a field as Manufacture into numerous minor industrial groups, to cover more than a one- or two-year period, and to present frequency distributions for the earnings rates of individual

[1] This figure really is for the number of corporate income tax returns, which varies from about 320,000 to 495,000 in the different years between 1919 and 1928. The number of corporations is somewhat larger, since some of these tax returns are for consolidated companies. See Ch. 46.

[455]

corporations, has had to rely upon samples of one sort or another. We have done likewise throughout the greater part of this volume. Accordingly, even though our data constitute a more comprehensive set of detailed materials than those heretofore available, we still have to ask, how large, both absolutely and relatively, how representative, how typical, are our several samples?

In doing so, it will be necessary not only to discuss the samples already presented, but also to introduce others which because of their smaller size, or for technical reasons, have not been discussed in the parts of the volume intended for general readers. In some instances, these new sets of samples either correspond with or overlap upon some portions of those previously presented, and may thus serve as a check upon their validity. Also, the methods by which some of the earlier samples already presented have in several instances been combined, in order to yield certain estimates and results contained in other parts of the volume, need here to be explained.

2. DIVISION OF TOTAL FIELD OR UNIVERSE: MANUFACTURING AS AN ILLUSTRATION

The 90,000 active corporations in the country engaged in manufacture, of course, include enterprises that are large or small, that in a given year have net incomes or deficits, that have been engaged in business for many years or for only a few years, that are consistently successful or unsuccessful, or that have enjoyed neither conspicuously good nor conspicuously bad fortune.

Of this hybrid and complex universe or total, the corporations of our samples constitute but a small percentage by number. But the manner in which each sample has been drawn, or the relation it bears to the general aggregate of

the original materials, affects greatly its representativeness and significance. For no one of the samples is so heterogeneous as is the whole of which each is a part. Each typifies rather, to a degree more or less accurate, a particular portion or segment of the entire universe of manufacturing corporations, meaning by 'entire universe' the approximately 70,000 to 90,000 manufacturing corporations of the country in each year between 1919 and 1928. It will be desirable first to comment more specifically upon the character of this 'general universe', then to relate our samples quantitatively, as best we can, to its several segments.

For this purpose, we first divide the entire universe of manufacturing corporations into two broad portions: corporations with net incomes and those without net incomes. The 'with net' group amounts to roughly 60 per cent of the total number. Thus in all years from 1919 to 1928 the number of manufacturing corporations with net incomes runs from about 50,000 to 55,000 a year, except in 1921 when the figure was slightly less than 40,000.

We may further divide the 'with net' group into various segments according to the amount of income received by each of the corporations comprising it. Absolute amount of net income is not by any means the best index of size—amount of sales, capital or even total assets would be a better basis—but it is the only one available in the data for all of the country's corporations.[2] However, while not the best index of *size*, it affords one important criterion by which the representativeness of our samples may be judged; and for this purpose the corporations earning net incomes

[2] In the analysis in this chapter the data for all corporations in the country, or broad segments thereof, are taken from the annual reports of the Bureau of Internal Revenue, *Statistics of Income*. The 1931 volume happily has begun the practice of classifying income and balance sheet data by size of assets; that volume, however, became available only at the end of 1933.

may be further divided into three broad groups: those with incomes of less than $2,000; those with incomes between $2,000 and $50,000; and those with incomes of over $50,000.[3]

These net incomes, as classified in the data for all corporations in the country, are *taxable net incomes*.[4] They thus exclude both interest receipts upon tax-exempt securities and intercorporate dividends, that is, dividends received by one corporation upon the capital stocks that it owns in other corporations. The net income items in our several samples, however, are so computed as to include these tax-exempt items: interest on Government, state and municipal securities and dividends received from other corporations (exempted from taxation under the income tax law because the tax on such dividends is already paid by the corporation earning the income originally). Thus our income comparisons in later sections will be of somewhat different items. But the discrepancy here, while great in the case of certain individual corporations having substantial intercorporate

[3] Strictly speaking, incomes of from $2,000 to $49,999, and of $50,000 or over. The reports of the Bureau of Internal Revenue, however, in some years show class intervals in which the upper limit of one class appears as the lower limit of the next class; with respect to this point there is here no need to be meticulous.

[4] This statement is subject to two qualifications, neither of which is important for our purposes here. One is that the incomes contained in the frequency distributions of *Statistics of Income* for any year are actual or current year net earnings, and in the case of corporations which had *net losses* in the year previous, the whole of the current year income is not taxable, but only the amount of the income after deduction of the 'prior year loss'. In some years, the losses of more than one year back have been deductible. Another qualification is that domestic corporations with net incomes of $25,000 or less may deduct $2,000 as a special credit or exemption, before determining the income on which a tax liability is incurred. But except for these two types of case, the net incomes shown in the *Statistics of Income* distributions discussed in this chapter are taxable incomes, i.e., unlike the net incomes shown for corporations of our various samples, they exclude non-taxable items, chiefly those of dividends received and interest on tax-exempt securities.

holdings, is probably not serious by and large. It is certainly not serious, at least, so far as our general arithmetic mean calculations of the return upon investment are concerned. For the entire universe of manufacturing corporations of the country with net incomes, the sum of tax-exempt interest and dividends received amounted (in 1928) to 11.3 per cent of the net income reckoned without those two items. Thus, related to an investment base of 46 billion dollars, the return without the inclusion of the two items is 10.4 per cent as compared with 11.6 per cent when they are included.

As said, in considering the return earned by any particular corporation, the inclusion or exclusion of tax-exempt income may make a large difference. But it probably makes slight difference with respect to the frequency distributions of the rates of earnings upon investment received by individual corporations; for the proportion of individual corporations receiving tax-exempt incomes that are at all substantial relative to their taxable incomes is quite small. That this is so follows from the generally low ratio of aggregate tax-exempt income to the aggregate taxable income of all corporations combined. The proportion is so small that for any list of even a few dozen companies the relative standing in terms of earnings rates is probably about the same taking either set of figures.[5] Evidence supporting this *a priori* reasoning is available in data for two manufacturing groups, chosen quite at random and in which an experiment was undertaken to check upon this point. For the group, Bakery Products,[6] containing 18 corporations each possessing some tax-exempt income, but each having a

[5] This could, of course, also be so, theoretically, if all corporations received tax-exempt incomes in exactly the same proportion to the taxable incomes— but we know this is not the case.

[6] Sub-code No. 0290 in the *Source-Book,* corresponding in classification with Minor group No. 1, the experimental data for which are given on p. 201 of that volume.

total net income of over $100,000, there were computed
for each corporation the percentages of earnings upon capi-
talization both with and without the inclusion of the tax-
exempt items. The rank correlation between the two series
was perfect: +1.0. For 32 other corporations of the same
group but with total net incomes of from $2,000 to $100,-
000 each, the rank correlation coefficient was again perfect.
The second group similarly analyzed, Radio manufacturing,
yielded almost exactly the same results.[7] That the same
thing is true of most other individual industrial groups is
not, of course, established by these experiments, but they
afford presumptive evidence that probably no serious error
is made upon this score in comparing distributions of the
two types of net income for large groups of corporations.
In other words, we are justified in saying in this, as in many
other connections, that the presence of individually inade-
quate items of data, taken *en masse,* often may not interfere
with fairly accurate final results—not because the errors
happily cancel one another, but because the individual
anomalies constitute too small a part of the aggregate to
cause any great general distortion.

   With these preliminary observations in mind, we may
now examine our several samples, *seriatim.*[8]

3. SAMPLES FOR THE MANUFACTURING DIVISION

a. Large Manufacturing Corporation Series

   i. Fragmentary descriptions of this sample have been
given in previous chapters, but we have now to describe it

   [7] For 62 corporations with incomes of over $100,000 the coefficient was
+.9907, while for 35 corporations with incomes of from $2,000 to $100,000
it was +.9995.
   [8] All that has been said in this section concerning the definition of net
income applies to the Trade, Finance and Mining samples discussed in later
sections quite as much as to Manufacturing.

more precisely and to evaluate it in detailed terms. The sample consists of identical corporations numbering 2,046 in every year of the period 1919–28. Consequently all the corporations included are at least ten years old, and many, of course, have been engaged in business much longer. Containing identical corporations throughout the period, the sample in every year consists of some corporations with negative and some with positive incomes, although, as will appear shortly, the number of deficits in any one year other than 1921 is slight.

Similarly, the effect of industrial mergers is in no way eliminated. Any growth in the size of a given corporation because of combination with other corporations during the period is reflected in the absolute data for sales, investment and net income, either for the sample as a whole (that is, All Manufacturing) or for the major or minor group in which the corporation is classified. Although impairing somewhat the significance of the absolute figures *per se,* this factor does not at all invalidate either comparisons between the growth rates of the absolute data or the time comparison of the percentages of earnings upon investment, as the effect of a merger is to increase the sales and income as well as the capital investment of a company.

As regards industrial classification, each corporation has been kept in exactly the same minor group throughout the period; the reason for this, and the bearing of mergers upon it, are discussed in Ch. 46.

The large corporations series contains only a small proportion of the entire universe of 70,000 to 90,000 manufacturing corporations—from 2.1 to 3.0 per cent in different years. But the total net income of the sample runs from 57 to 66 per cent of that for all manufacturing corpo-

rations of the country between 1922 and 1928.[9] In terms
of volume of business, sales for the large corporations
sample amount to from 42 to 46 per cent in different years
of the same period. In terms of investment, the sample
contains from 43 to 47 per cent of that for all manufactur-
ing corporations in the country during the years 1926–28.[10]
All in all, our large corporations series therefore constitutes
a very large proportion of the activities of all manufactur-
ing corporations in the country.

But so far as profitableness is concerned, the sample is
somewhat biased in an upward direction. The fact that it
is composed exclusively of corporations that have been in
business for ten years or more exercises a kind of commer-
cial or financial natural selection—the great numbers of
corporations that constantly go in and out of business, each
lasting but a few years, are not even touched. This qualifica-
tion is not so important in manufacturing as in trading,
where the length of business life, particularly for the smaller
enterprises, is proverbially short; nevertheless it must be
said that both are better samples of successful large corpo-
rations than of unsuccessful.

This is not to say that 'large corporations earn more than
small ones', for whether this is so depends upon one's defi-
nition of 'large' and 'small'. The analysis of earnings rates
by size of corporation *within* the large corporations sample,
as presented in Chapter 5, showed that corporations with
capitals of over $500,000 earn profits at lower rates than

[9] Comparable data between sample and universe prior to 1922 are not
available.

[10] The investment figures for all manufacturing corporations in the
country are estimates, subject, however, to rather small margins of error,
as explained in Appendix A. Closely comparable data for other years on
investment for all manufacturing corporations in the country are not avail-
able, but the ratios in question are doubtless not very different; we are
justified in inferring this because of the figures for sales just cited for a
longer period.

do those of smaller size. That analysis was not in terms of minor groups, but probably in nearly every specific industry there is an optimum beyond which it does not pay most enterprises to expand—at least, so far as the *rates* at which their capitals earn profits are concerned. But the entire group of all manufacturing corporations in the country (including those which fail to earn net incomes as well as those which do so) undoubtedly contains numerous enterprises of such small size that they enjoy the economies of large-scale production, relatively speaking, hardly at all, while our large corporations sample may include many companies operating at or near the peak of efficiency as well as those which have passed it. Then, too, many of the very small corporations [11] —often they are 'close corporations' owned and operated by members of a family—deduct charges for officers' salaries which are much larger relative to the income before such deductions than is the case with the generally larger concerns. Frequently these deductions, combined with other factors, may cause nominal deficits to be shown by such very small corporations. The proportion of deficits among all manufacturing corporations in the country is, of course, far higher than in our large corporations sample. For all manufacturing corporations of the country no data are available that divide the universe into any groups according to size of capital, or into any size groups in relation to the profitableness of operations upon any basis of assets or net worth; but we can obtain some general inkling as to the size of the corporations which showed net incomes as compared with those which reported deficits by computing the average sales per enterprise for each class of corporation. In 1928 this figure for all manufacturing corporations in the

[11] The expression 'very small corporations' is used here so as to avoid any identification with our 'small corporations' sample (which includes corporations with net incomes only) discussed in the following section.

country with net incomes was almost exactly one million dollars, whereas for all corporations reporting deficits it was only $258,000.

Indeed, in our large corporations series the proportion of enterprises with deficits is in most years very low. It runs less than 4 per cent of the companies in all years except 1920 and 1921, when it is 6 and 21 per cent respectively. As a result, our large corporations series as a whole (the corporations with deficits combined with those with net incomes) between 1924 and 1928 earns the following rates of net income to capitalization:

1924	1925	1926	1927	1928
10%	12%	12%	10%	11%

whereas *all* of the manufacturing corporations in the country for which we have estimated data for those same years show:

1924	1925	1926	1927	1928
8%	9%	9%	7%	9%

As a sample of *all* manufacturing corporations in the country, therefore, the large corporations series must be accepted with this clear qualification: the arithmetic mean rate of return is too high. There is, however, no evidence to indicate that *fluctuations* in the data of the large corporations series over the period 1919–28 do not satisfactorily reflect the relative *changes* that take place in the data for all manufacturing corporations in the country, in the aggregate. Whether fluctuations in the data of the large corporations series sample *when subdivided into minor groups* are representative of changes for other than such large corporations is, however, a matter which we shall not discuss until later in this chapter when other samples are compared with the one in question.

ii. But as representative of all of the manufacturing

corporations in the country *with net incomes,* the large
corporations series, so far as we can tell, seems indeed to
be an excellent sample, at least in terms of the calculation
of arithmetic mean ratios for manufacture as a whole. If
we exclude the corporations with deficits from both sets of
figures, our large corporations sample, in respect of num-
ber, again constitutes a small proportion of all the manu-
facturing corporations in the country; the representation in
the various years of the period is only 3.6 to 4.4 per cent,
although in terms of the amount of net income received,
the large corporations sample accounts for from 49 to 56
per cent of that received by all the 'with net' manufactur-
ing corporations in the country between 1922 and 1928.
Although containing only a 4 per cent representation by
number the generally representative character of the sam-
ple's 'with net' corporations is evidenced by the closeness
with which the earnings rates shown by it correspond with
those for all such corporations in the country, in the three
years of the period for which the latter data are available.
The percentages of net income to capitalization shown by
the sample in 1926, 1927 and 1928 are:

13.0	10.9	12.2

while those for all manufacturing corporations in the coun-
try are:

12.3	10.9	12.0

   iii. All that has been said thus far, however, relates to
the degree of validity attaching to the large corporations
sample for purposes of arithmetic mean results. We may
now go somewhat beyond this and inquire into its repre-
sentativeness with respect to certain frequency distributions.
The two inquiries are in a mathematical sense, of course,

related, but it is quite conceivable that a sample might yield fairly good arithmetic mean data and yet not be typical in terms of the distribution of its component items. Accordingly we may compare the composition of our sample as best we can with that of the particular segment of all manufacturing corporations from which it is drawn and which it most nearly typifies.

It will be recalled that earlier in this chapter it was stated that a frequency distribution by size of net income is available for all of the country's corporations. This net income figure does not, however, include the tax-exempt items contained in the income of our samples. It will further be recalled that, for purposes of comparison with our samples, the manufacturing corporations of the country earning net incomes can be broadly classed into three groups: less than $2,000; $2,000 to $50,000; and over $50,000. Our large corporations sample is predominantly of incomes of $50,000 or over; in all years except 1921 approximately 90 per cent of the corporations of the sample have incomes of over this amount; and even in 1921 about 80 per cent have such incomes. We may thus regard it as belonging to the 'over $50,000' category. Both by number and by income received, the 'with net' corporations of the sample constitute a substantial proportion of this 'over $50,000 universe'. In no year does the number of corporations constitute less than a 23 per cent representation, while in several years it runs over 25 per cent. In terms of the amount of income the sample contains from 55 to 68 per cent of the total income received by all of the country's manufacturing corporations with over $50,000 incomes.

But 'the incomes above $50,000' includes a broad range; and we may now ask exactly how their relative distributions in our sample correspond with that for all manufacturing

corporations in the country with such incomes, in the years 1920–28.[12]

For this purpose we set up six class intervals for size of income (it is to be noted that they are uneven) : $50,000–$100,000; $100,000–$250,000; $250,000–$500,000; $500,000 to $1,000,000; $1,000,000 to $5,000,000; and $5,000,000 and over. In all of these classes combined there are in most years approximately 8,000 corporations in the 'all manufacturing corporations of the country' distribution and approximately 1,800 corporations in each year in the distribution for the large corporations sample.[13]

The two distributions, for 1928, are given in Tables 90 and 91. But in all years the general results are much the

TABLE 90

FREQUENCY DISTRIBUTIONS OF NET INCOMES FOR ALL MANU-
FACTURING CORPORATIONS IN THE UNITED STATES WITH
INCOMES OF OVER $50,000 IN 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	3,284	40.0
100,000– 250,000	2,647	32.3
250,000– 500,000	1,049	12.8
500,000–1,000,000	627	7.6
1,000,000–5,000,000	499	6.1
5,000,000 and over	101	1.2
Total	8,207	100.0

same. In the case of all manufacturing corporations of the country approximately 40 per cent of the total frequencies

[12] Data are not available to make comparisons for 1919.

[13] The number of corporations is not exactly the same in each year for the sample, first, because deficits in successive years are not, of course, necessarily repeated by the identical corporations; second, because the few incomes of under $50,000 are in each year omitted from the calculations. (They belong, of course, to no one of the brackets above $50,000. The extent to which their exclusion affects the results may be seen by examining Table 100.)

TABLE 91

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR
COMPANIES WITH INCOMES OF OVER $50,000, IN THE LARGE
MANUFACTURING CORPORATIONS SAMPLE, 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	290	17.0
100,000– 250,000	500	29.3
250,000– 500,000	354	20.8
500,000–1,000,000	256	15.0
1,000,000–5,000,000	222	13.0
5,000,000 and over	84	4.9
Total	1,706	100.0

are found in the $50,000–$100,000 class interval; but in
the case of the large corporations sample, in most years
only about 16 or 17 per cent of the frequencies are found
in this class.

The next class, the $100,000–$250,000 interval, contains
approximately 32 per cent of the total frequencies in both
cases.

The third class, the $250,000–$500,000 interval, con-
tains about 13 per cent of the frequencies in the case of all
manufacturing corporations in the country, but about 20
per cent of them in the case of the sample.

The next bracket, the $500,000–$1,000,000 class, con-
tains about 7 per cent of the frequencies for all corpora-
tions in the country, but about 15 per cent for the sample;
and the next class, the $1,000,000–$5,000,000 group, con-
tains about 5 per cent of the frequencies for all corporations
of the country, but about 12 per cent for the sample. The
highest class, the $5,000,000 and over bracket, contains
about 1 per cent of the frequencies for all corporations of
the country, but about 4 per cent for the sample.

The correspondence between the two distributions is
therefore far from close. Each set of distributions in itself

shows a high degree of consistency from year to year. In nearly all years, however, the proportion of frequencies in the $50,000 to $100,000 interval is more than twice as great for all corporations of the country as for the large corporations series; while the proportion of frequencies in all of the brackets above $250,000 is substantially less for all manufacturing corporations in the country than for the sample. This may be partly explained by the difference in the definition of 'net income'. The inclusion of tax-exempt income in the sample figures undoubtedly results in some 'pushing-up' effect: it may take frequencies that would otherwise be in the lowest class and place them in the next higher one, and so on successively up through the brackets. The highest class interval, the open-end category of $5 million and over, includes relatively four or five times as many in the sample as in all manufacturing corporations. It is quite probable that the very largest corporations receive relatively the highest amounts of tax-exempt income, particularly in the form of intercorporate dividends. But with all due respect to this factor it still remains true that our large corporations sample possesses a substantial measure of bias in the direction of 'bigness'. As of 1928 the arithmetic mean capital per corporation for the sample (companies with net incomes) is $12 million, whereas that for all manufacturing corporations with net incomes (no figure is available for just those with incomes of over $50,000) is only $800,000.

In Tables 92 and 93 are given the quartiles for both the size of capital per corporation and the amount of income per corporation, for the 2,046 companies of the sample, in all years.

iv. We may now, with somewhat less elaboration, indicate the character of the large corporations sample when it is divided into major manufacturing groups.

TABLE 92

QUARTILES FOR SIZE OF CAPITAL[1] PER CORPORATION IN LARGE
MANUFACTURING CORPORATIONS SAMPLE, 1919–28

	1919	1920	1921	1922	1923
Q1	$435,585	$555,000	$632,699	$617,411	$756,799
Q2	951,389	1,196,121	1,313,953	1,299,257	1,487,762
Q3	2,672,297	3,286,232	3,457,692	3,488,095	3,995,536
	1924	1925	1926	1927	1928
Q1	$799,665	$846,201	$871,114	$902,624	$925,578
Q2	1,600,575	1,714,660	1,793,814	1,880,435	1,972,222
Q3	4,335,366	4,618,750	4,695,946	4,914,474	5,322,967

[1] For 1924–28, this item includes bonded debt.

TABLE 93

QUARTILES FOR SIZE OF NET INCOME[1] PER CORPORATION IN
LARGE MANUFACTURING CORPORATIONS SAMPLE, 1919–28

	1919	1920	1921	1922	1923
Q1	$138,753	$104,985	$14,250	$93,101	$116,406
Q2	245,613	218,316	87,833	219,847	242,599
Q3	660,088	495,013	240,245	495,937	625,000
	1924	1925	1926	1927	1928
Q1	$89,134	$101,696	$91,508	$83,422	$76,855
Q2	210,513	235,130	226,444	215,470	217,900
Q3	495,474	588,102	591,236	538,174	572,977

[1] In all years, this item includes non-taxable income.

It has been stated that by number the large corporations
sample constitutes only a 2.1 to 3.0 per cent representation
of all manufacturing corporations in the country. Divided
into its 11 major groups and each of these then related to
the figures for all manufacturing corporations in the coun-
try in each group, the ratios prevailing in the several groups
in different years range from about 1 to about 7 per cent.
In the Food group the range is from 1.4 to 1.7 per cent; in
Metals from 3.0 to 4.9 per cent; in Paper from 5.5 to 7.3
per cent.

The sales of the corporations of the sample, however,

in 1928 amounted to from 18 to 69 per cent of the total business done by all the country's corporations in each major group; and the net income received in the same year constituted from 34 to 88 per cent. The data are given in Tables 94 and 95.

If only companies with net incomes in both the sample and for all manufacturing corporations of the country be

TABLE 94

SALES OF THE LARGE MANUFACTURING CORPORATIONS SAMPLE COMPARED WITH THE SALES OF ALL CORPORATIONS IN THE UNITED STATES, BY MAJOR GROUPS, 1928

(in millions of dollars)

	ALL UNITED STATES	SAMPLE	PERCENTAGE OF SAMPLE TO ALL UNITED STATES
Major group			
1 Foods	$13,955	$7,026	50
2 Textiles	7,675	1,389	18
3 Leather	1,686	380	23
4 Rubber	1,350	935	69
5 Lumber	2,731	541	20
6 Paper	1,665	501	30
7 Printing and publishing	2,455	623	25
8 Chemicals	8,634	4,469	52
9 Clay, stone and glass	1,605	550	34
10 Metals	20,266	11,266	56
11 Special manufacturing industries	2,340	539	23
Total, all manufacture	$64,361	$28,219	44

taken, the representation by number for the several major groups in the various years of the period ranges from somewhat over 1 per cent to about 10 per cent. In Foods the range is from 2.2 to 2.6 per cent; in Metals from 5.0 to 7.9 per cent; in Paper from 7.9 to 10.3 per cent. Although data are not available with which to segregate the figures for the corporations of the sample with net incomes only,

TABLE 95

NET INCOME OF THE LARGE MANUFACTURING CORPORATIONS
SAMPLE COMPARED WITH THE NET INCOME OF ALL CORPORA-
TIONS IN THE UNITED STATES, BY MAJOR GROUPS, 1928

(in millions of dollars)

	ALL UNITED STATES	SAMPLE	PERCENTAGE OF SAMPLE TO ALL UNITED STATES
Major group			
1 Foods	$598	$307	51`
2 Textiles	216	80	37
3 Leather	53	29	55
4 Rubber	8	7	88
5 Lumber	82	44	54
6 Paper	121	41	34
7 Printing and publishing	242	98	40
8 Chemicals	1,081	780	72
9 Clay, stone and glass	147	89	61
10 Metals	1,768	1,175	66
11 Special manufacturing industries	164	85	52
Total, all manufacture	$4,480	$2,735	61

by major groups, the representation in such terms of course
runs much larger.

v. It has been noted, however, that the large manufac-
turing corporations series is predominently a sample of
corporations with net incomes of over $50,000, in most
years, the corporations included in it constituting by num-
ber approximately 25 per cent of all manufacturing corpo-
rations in the country with such incomes. Among major
groups the range of such representation in different years is
from 12 to 38 per cent.[14] In the Food group it is from 20

[14] Except for the Special Manufacturing Industries group, which shows
10 per cent in one year. The ranges given above are for the several groups
in the various years from 1920 to 1928, but exclude the figures for 1921,
which are in most groups by far the highest percentages of all years,
running to about 50 per cent in several groups. They are, of course, so
high because in 1921 the number of corporations in the country with net
incomes of over $50,000 showed a more substantial decline than did the

to 27 per cent; in Metals from 25 to 40 per cent; in Paper
from 23 to 40 per cent.

vi. Just as we compared the frequency distributions of
the sample and of all corporations in the country for All
Manufacturing, so may we also compare (Tables 96 and
97) similar distributions (again for companies with net
incomes of over $50,000) by major groups for 1928. The
group numbers correspond, of course, with those used in
Book II.

The ratios are much the same as in the distribution for
All Manufacturing. In every group the relative number of
frequencies in the $50,000–$100,000 class is far lower for
the sample than for all corporations in the country, in some
instances only one-half or one-third as great. In the next
interval, the $100,000–$250,000 class, the relative num-
bers are about the same; while in the upper brackets the
proportions of frequencies in the samples in the various
groups are considerably higher than those for all manufac-
turing corporations in the country.

In part these discrepancies are explicable upon the
grounds already set forth in connection with those noted
above for All Manufacturing; but again the samples in
nearly all of our major groups are somewhat biased in the
direction of 'bigness'.[15]

number in the sample, thus making the sample relatively a much larger
one; and it seems fairer to omit this exceptional year in characterizing the
samples' representativeness for the period 1920–28 in general. As stated
previously, data for 1919 are not available.

[15] The reasoning of this and preceding passages does not imply the ex-
istence of any exact correlation between the amount of a corporation's
income and the size of its capital. Probably no close correlation exists—
and to assume one would beg the whole question of differences in earnings
rates between corporations and industries. But this is not to say that very
broad differences in the size of incomes, by and large, cannot serve to
point differences in the size of capital which take the same direction. It is
not necessarily true that a corporation with an income of $500,000 will have
any larger capital than one with an income of $400,000; but it *is* generally

TABLE 96

NET INCOMES FOR ALL MANUFACTURING CORPORATIONS WITH INCOMES OF OVER $50,000 IN THE UNITED STATES, 1928

SIZE OF INCOME	MAJOR GROUP 1 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 2 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 3 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 4 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	432	41.1	452	42.5	77	40.2	22	28.2
100,000– 250,000	350	33.4	351	33.0	66	34.2	23	29.5
250,000– 500,000	110	10.5	145	13.6	26	13.5	14	17.9
500,000–1,000,000	71	6.8	79	7.4	18	9.4	12	15.4
1,000,000–5,000,000	67	6.4	35	3.3	5	2.6	6	7.7
5,000,000 and over	19	1.8	2	0.2	1	0.1	1	1.3
Total	1,049	100.0	1,064	100.0	193	100.0	78	100.0

SIZE OF INCOME	MAJOR GROUP 5 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 6 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 7 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 8 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	278	48.5	119	36.8	290	45.2	306	36.3
100,000– 250,000	205	35.8	101	31.2	209	32.6	235	27.9
250,000– 500,000	51	8.9	52	16.0	70	10.9	128	15.2
500,000–1,000,000	27	4.7	31	9.5	41	6.4	75	8.9
1,000,000–5,000,000	12	2.1	21	6.5	31	4.8	76	9.0
5,000,000 and over	0	0.0	0	0.0	3	0.1	23	2.7
Total	573	100.0	324	100.0	644	100.0	843	100.0

SIZE OF INCOME	MAJOR GROUP 9 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 10 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	MAJOR GROUP 11 NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	174	43.5	908	36.0	226	44.0
100,000– 250,000	126	31.5	817	32.3	164	31.9
250,000– 500,000	39	9.8	350	13.9	64	12.5
500,000–1,000,000	25	6.3	218	8.6	30	5.8
1,000,000–5,000,000	31	7.8	187	7.4	28	5.4
5,000,000 and over	4	1.0	46	1.8	2	0.4
Total	399	100.0	2,526	100.0	514	100.0

TABLE 97

TOTAL NET INCOMES FOR COMPANIES WITH INCOMES OF OVER $50,000 IN THE LARGE MANUFACTURING CORPORATIONS SAMPLE, 1928

SIZE OF INCOME	MAJOR GROUP 1		MAJOR GROUP 2		MAJOR GROUP 3		MAJOR GROUP 4	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	25	13.4	46	21.7	6	15.0	2	11.1
100,000– 250,000	61	32.8	65	30.6	15	37.5	4	22.3
250,000– 500,000	28	15.1	47	22.2	12	30.0	8	44.5
500,000–1,000,000	30	16.1	39	18.4	5	12.5	1	5.5
1,000,000–5,000,000	28	15.1	15	7.1	1	2.5	2	11.1
5,000,000 and over	14	7.5	0	0.0	1	2.5	1	5.5
Total	186	100.0	212	100.0	40	100.0	18	100.0

SIZE OF INCOME	MAJOR GROUP 5		MAJOR GROUP 6		MAJOR GROUP 7		MAJOR GROUP 8	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	50	33.5	18	19.6	18	20.3	18	9.8
100,000– 250,000	54	36.3	31	33.7	33	37.1	43	23.5
250,000– 500,000	28	18.8	21	22.8	15	16.8	44	24.0
500,000–1,000,000	11	7.4	14	15.2	10	11.2	27	14.8
1,000,000–5,000,000	6	4.0	8	8.7	10	11.2	31	17.0
5,000,000 and over	0	0.0	0	0.0	3	3.4	20	10.9
Total	149	100.0	92	100.0	89	100.0	183	100.0

SIZE OF INCOME	MAJOR GROUP 9		MAJOR GROUP 10		MAJOR GROUP 11	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	24	25.0	71	12.7	12	15.0
100,000– 250,000	20	20.8	153	27.3	21	26.2
250,000– 500,000	14	14.6	117	20.8	20	25.0
500,000–1,000,000	15	15.6	89	15.9	15	18.8
1,000,000–5,000,000	19	19.8	92	16.4	10	12.5
5,000,000 and over	4	4.2	39	6.9	2	2.5
Total	96	100.0	561	100.0	80	100.0

b. Small Manufacturing Corporations Series

i. This is a sample which contributed data for manufacturing as a whole, for all of the major groups, and for some of the minor groups discussed in Book III. It consists of non-identical corporations for the ten-year period, from 1,421 to 1,665 in each year. All have positive incomes, the majority between $2,000 and $50,000 per corporation. Just as in the large corporations sample it was stated that only about 10 per cent of the companies had incomes below $50,-000, so here it may be said that of the small corporations in the present sample only 11 or 12 per cent in any year (other than 1921) have incomes that exceed $50,000; and none have incomes below $2,000. The small manufacturing corporations sample is therefore predominently representative of that segment of the universe containing corporations with incomes ranging from $2,000 to $50,000, and may be so regarded for purposes of comparison and appraisal.

By number the sample contains from 5 to 6 per cent of the manufacturing corporations in the country with such net incomes. In terms of income received, however, the proportion in various years runs from 8 to 10 per cent. As representative of all of the country's manufacturing corporations with net income, in terms of arithmetic mean earnings rates, the small manufacturing corporations sample comes almost as close to perfect correspondence as did the large corporations series. Again data are available to make this comparison in three years. The percentages of income to capitalization shown by the small corporations sample in 1926, 1927 and 1928 are:

true that companies which in most years have incomes of $5,000,000 will have larger capitals than those with incomes of $500,000. Upon this basis, therefore, it must be said that the data which have been reviewed at least suggest that our large corporations sample is biased in an upward direction with respect to the size of the corporations that compose it. The exact extent of this bias, is not, of course, susceptible of measurement.

11.7	11.6	11.5

while those for all manufacturing corporations in the country are:

12.3	10.9	12.0

ii. We may next compare the small corporations sample with its 'specific universe' (that is, with that segment of the universe containing corporations with net incomes of from $2,000 to $50,000) by examining the frequency distributions for the size of net incomes. These incomes can be classed for both the sample and the corporations of the country. For this purpose it is possible to obtain comparable distributions containing only three class intervals: incomes of $2,000–$5,000; those of $5,000–$10,000; and those of $10,000–$50,000.

Here, in nearly all years, a very close correspondence indeed is apparent between the two distributions for the sample and the universe. In nearly all years, both for the sample and for all manufacturing corporations in the country, between about 30 and 35 per cent of the total frequencies are found in the lowest class interval. In all years approximately 23 per cent of the frequencies, in both, are found in the middle interval. And in all years, between about 40 and 45 per cent of the frequencies, for both the sample and all manufacturing corporations in the country, appear in the highest class interval.[16] The distributions appear in Tables 98 and 99.

iii. The small corporations sample may now be divided into major groups for characterization with respect to representativeness.

[16] As in the similar analyses undertaken for the large corporations sample, the distribution of incomes for the sample excludes the relatively few corporations with incomes not falling within any of the class limits designated.

TABLE 98

FREQUENCY DISTRIBUTIONS OF NET INCOMES FOR ALL MANU-
FACTURING CORPORATIONS IN THE UNITED STATES WITH
INCOMES FROM $2,000 TO $50,000 IN 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	11,781	39.9
5,000–10,000	6,282	21.2
10,000–50,000	11,492	38.9
Total	29,555	100.0

TABLE 99

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR COM-
PANIES WITH INCOMES FROM $2,000 TO $50,000 IN THE SMALL
MANUFACTURING CORPORATIONS SAMPLE, 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	440	34.8
5,000–10,000	291	23.0
10,000–50,000	533	42.2
Total	1,264	100.0

For the Manufacturing division it has been said that the
corporations of the sample afford a 5 to 6 per cent repre-
sentation by number in nearly all years. For the several
major groups this representation ranges from about 4 to
11 per cent.[17] The sample in the Food group contains from
4.5 per cent to 8.5 per cent of all manufacturing corpora-
tions in the country with net incomes of from $2,000–
$50,000; in the Metals group from 5.3 to 9.5 per cent; in
the Paper group from 5.2 to 9.3 per cent. In terms of
amount of net income received, the samples of the major
groups show representations ranging in 1928 from 5.2 to
9.9 per cent.

[17] Excluding figures of 2 and 3 per cent in several years for the Special
Manufacturing Industries group.

The frequency distributions of net incomes for the several major groups of the sample in 1928 correspond rather closely with those for all manufacturing corporations in the country with incomes of from $2,000–$50,000. Where discrepancies are to be found, they are seldom excessive, and in large measure may probably be explained on grounds of the sort discussed in previous sections. A fairly typical group is Metals, in which the lowest interval of the sample shows 32 per cent of the frequencies as against 36 per cent in the universe; the middle bracket 22 per cent in both cases; and the highest interval, 46 per cent as against 42 per cent. The distributions for all groups, in 1928, are given in Tables 100 and 101.

c. Small Manufacturing Corporations Sample with Net Incomes under $2,000

This is a sample of non-identical corporations with positive net incomes, most of which are less than $2,000. Data are available in this sample for the five years 1924–28 only. The proportion of companies with incomes of $2,000 or over amounts to no more than 5 per cent of the companies in the sample, in any year except 1928, when about one-fifth have higher incomes. Virtually all of these larger incomes are, however, less than $5,000. The number of corporations in the series varies in the five years as follows: 1924, 570; 1925, 406; 1926, 1,008, 1927, 703; 1928, 1,-118. Most of the corporations included are small, the arithmetic mean capitalization ranging from $56,000 to $89,000 in different years. In no year do more than 2 per cent of the corporations included have capitals of over $500,000; and in all years at least 89 per cent have capitals under $250,000.

By number the corporations of this sample constitute a 2.3 to 6.5 per cent representation of all manufacturing cor-

TABLE 100

FREQUENCY DISTRIBUTIONS OF NET INCOMES FOR ALL MANUFACTURING CORPORATIONS IN THE UNITED STATES WITH INCOMES FROM $2,000 TO $50,000, BY MAJOR GROUPS, 1928

SIZE OF INCOME	MAJOR GROUP 1		MAJOR GROUP 2		MAJOR GROUP 3		MAJOR GROUP 4	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	2,024	41.5	1,797	43.1	292	38.0	63	39.9
5,000–10,000	1,032	21.1	843	20.3	153	19.9	37	23.4
10,000–50,000	1,833	37.4	1,528	36.6	324	42.1	58	36.7
Total	4,889	100.0	4,168	100.0	769	100.0	158	100.0

SIZE OF INCOME	MAJOR GROUP 5		MAJOR GROUP 6		MAJOR GROUP 7		MAJOR GROUP 8	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	937	36.3	233	31.1	1,698	45.5	714	34.9
5,000–10,000	570	22.1	151	20.2	838	22.4	439	21.4
10,000–50,000	1,074	41.6	365	48.7	1,194	32.1	895	43.7
Total	2,581	100.0	749	100.0	3,730	100.0	2,048	100.0

SIZE OF INCOME	MAJOR GROUP 9		MAJOR GROUP 10		MAJOR GROUP 11	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	597	41.0	2,445	36.1	981	43.6
5,000–10,000	307	21.1	1,460	21.6	452	20.1
10,000–50,000	552	37.9	2,853	42.3	816	36.3
Total	1,456	100.0	6,758	100.0	2,249	100.0

TABLE 101

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR
COMPANIES IN THE SMALL MANUFACTURING CORPORATIONS
SAMPLE WITH INCOMES FROM $2,000 TO $50,000, BY MAJOR
GROUPS, 1928

SIZE OF INCOME	MAJOR GROUP 1		MAJOR GROUP 2		MAJOR GROUP 3		MAJOR GROUP 4	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	71	35.7	63	37.1	12	32.4	4	40.0
5,000–10,000	47	23.6	39	22.9	10	27.0	2	20.0
10,000–50,000	81	40.7	68	40.0	15	40.6	4	40.0
Total	199	100.0	170	100.0	37	100.0	10	100.0

SIZE OF INCOME	MAJOR GROUP 5		MAJOR GROUP 6		MAJOR GROUP 7		MAJOR GROUP 8	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	45	34.6	11	28.9	56	39.1	29	30.5
5,000–10,000	29	22.3	9	23.7	36	25.2	21	22.1
10,000–50,000	56	43.1	18	47.4	51	35.7	45	47.4
Total	130	100.0	38	100.0	143	100.0	95	100.0

SIZE OF INCOME	MAJOR GROUP 9		MAJOR GROUP 10		MAJOR GROUP 11	
	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$2,000– 5,000	24	40.7	104	32.4	21	33.8
5,000–10,000	12	20.3	71	22.1	15	24.2
10,000–50,000	23	39.0	146	45.5	26	42.0
Total	59	100.0	321	100.0	62	100.0

porations in the country with net incomes under $2,000. They account, however, for between 4.0 to 11.3 per cent of the total net income.

They are corporations not only of small absolute incomes, but also of low average earnings rates. In no year does any of the ten major groups into which the sample may be divided[18] earn more than 4 per cent upon its capitalization, while most of the figures run about 2 per cent. A few of the 20 minor groups into which the sample may be divided[19] show earnings rates of over 5 per cent in one year or another, but most earn only 2 or 3 per cent.

The percentages of net income to capitalization shown by the entire sample (all major groups combined) are as follows: 1924, 1.5; 1925, 2.0; 1926, 1.9; 1927, 1.4; 1928, 2.6. To be sure, these are but arithmetic mean figures, and the frequency distribution of the earnings rates of individual corporations indicates that many companies of the sample earned far higher rates of return. The distribution for 1928, for example, is given in Chart 66. The corporation standing at the upper quartile earns 10.2 per cent, and the median corporation earns 5.0 per cent. These returns on investment are, however, much lower than the corresponding data for the two other manufacturing corporations series already discussed.

It is not possible to undertake many of the tests of representativeness in connection with this sample which have been essayed in previous sections for other samples. We know, of course, that the profitableness of the corporations

[18] The Leather and Rubber groups are combined, but the classification of the nine other major groups is the same as in previous samples.

[19] The minor groups do not 'add up' to make major groups because many corporations belonging to various minor groups which were shown separately in other samples could not be so shown here. There is nevertheless included in the major groups some representation of all or most of the 73 minor groups found in other samples, but it is not possible to show each separately.

CHART 66

FREQUENCY DISTRIBUTION OF EARNINGS RATES
OF INDIVIDUAL CORPORATIONS FOR 1928

SMALL MANUFACTURING CORPORATIONS WITH NET INCOMES UNDER $2000

EARNINGS RATES CLASSES
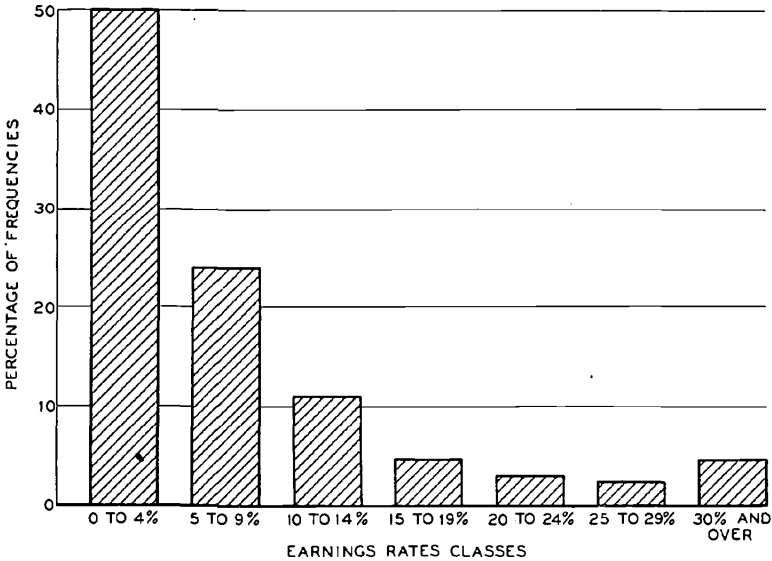
of this sample is much lower than that for all manufactur-
ing corporations in the country taken *en masse,* but we are
not able to compare this average figure with that for all of
the manufacturing corporations of the country with incomes
between $1 and $2,000. Nor is there available any distribu-
tion of incomes for all manufacturing corporations in the
country with absolute incomes of this amount, with which to
compare the income distributions of the corporations in this
sample. Because of the absence of any assurance in these
matters we have made but slight use of this sample through-
out the volume, the only instance of its employment being
the preparation of the frequency distributions of the earn-
ings of individual corporations with positive net incomes

as presented in Chapter 2. This utilization of the sample is discussed in the following section.

Although we have no information on the comparative distribution of incomes, in most years the sample contains much the same proportion of its 'specific universe' as does the small corporations sample (from about 4 to 6 per cent in 1926–28) and a somewhat larger proportion than the large corporations sample. Primarily upon the basis of this representation in each year, the combination of its frequencies for individual corporations' earnings rates with those of other samples, now about to be described, has been essayed.

d. Combination of Samples—
Frequency Distributions of Earnings Rates

According to the annual reports of the Bureau of Internal Revenue, roughly 50,000 manufacturing corporations have net incomes in any one of the years 1925, 1926, 1927 and 1928. The publications of the Bureau of Internal Revenue give no information on the distribution of earnings rates or of capitals among these individual corporations, but, as has already been noted, they do give frequency distributions for the absolute size of the incomes alone. By first using these distributions in conjunction with our several samples and then expanding the latter, we are able to approximate a complete distribution of earnings rates for all of the country's corporations.

For this purpose, we employ three sets of data: (1) our 'large corporations' series already described both in this chapter and in Book II; (2) the 'small corporations' series described in this chapter and in Book III; (3) the 'small corporations with positive incomes of less than $2,000' series mentioned in the immediately preceding section of this chapter. Our problem is now to define as carefully as

possible—without being so meticulous as to give a specious impression of the accuracy of our results—the ratios existing between the sizes of these three samples and their respective universes; then by appropriate weighting, to combine and expand the three samples so as to obtain a fairly good picture of the entire universe of manufacturing corporations with net incomes. The procedure will assume a certain degree of 'representativeness' within each sample; and the extent to which this assumption is justified is something concerning which the reader who has considered the preceding sections of this chapter may himself judge.

The data for 1928 will afford an illustration. In 1928 the tabulations of the Bureau of Internal Revenue indicate that of the 55,007 manufacturing corporations in the country with net incomes:

> 17,245 earned under $2,000;
> 29,555 earned from $2,000 to $49,999;
> 8,207 earned $50,000 or more.

Taking first the sample for 'small corporations with positive incomes under $2,000', the 1,118 corporations of our sample are seen to amount to 6.5 per cent of the total number in the country having such incomes. There are thus actually about 16 times as many manufacturing corporations in the country with net incomes of from $1 to $1,999 as in our sample. Upon the assumption that the sample is fairly representative (an assumption probably not so well founded in the case of this sample as in that of the two others), we may therefore say that the proper frequency for any class interval of the distribution of earnings rates for *all* corporations in the country (with incomes of from $1 to $1,999 in 1928) is 16 times the number shown by the corresponding class interval in our sample (that is, 100 per cent, divided by 6.5 per cent, equals roughly 16). The

561 corporations which, in the sample, were found to have earned under 5 per cent upon their capitals are thus multiplied by 16 and appear as 8,976 corporations, in the 'Under five per cent' class interval, in the work-sheets which we now use to build up the new estimated distribution for the entire country.

Similarly, our 'small corporations' sample consists mainly of corporations with incomes between $2,000 and $49,999. It contains 1,421 corporations, or 4.8 per cent of the total number reported by the Bureau of Internal Revenue for those income classes. The frequencies for each class interval of the sample here are each multiplied by 20.

In the same manner our large corporations series, with 1,970 corporations in 1928, the incomes of which are mainly over $50,000, are seen to constitute a 24 per cent representation of all manufacturing enterprises in the country with incomes of over that amount in 1928. Frequencies in all class intervals of the sample distribution here are thus multiplied by four, in order to give an approximately correct picture of the actual numbers of large corporations in each class, in the entire universe—again upon the assumption that the sample is fairly representative.

Finally, the three new sets of (expanded) frequencies for each class interval are added together to give the completed estimated distribution for all sizes of corporations combined. The resulting totals are thus weighted by the relative numbers of small and large corporations belonging to each earnings rates class, and the bias that would attach to any simple combination of the original frequencies for the three samples—were the distributions of earnings rates different as between the three samples—is thus eliminated.

In other years different weights are used, but the method is the same. Table 102 gives the basic data for all years,

TABLE 102

BASIC DATA UNDERLYING THE DETERMINATION OF WEIGHTS EMPLOYED IN PREPARATION OF ESTIMATED FREQUENCY DISTRIBUTIONS OF EARNINGS OF INDIVIDUAL MANUFACTURING CORPORATIONS IN THE UNITED STATES, 1925-1928 [1]

Three Samples

SIZE OF NET INCOME	NUMBER OF MANUFACTURING CORPORATIONS IN THE COUNTRY	SMALL CORPORATIONS WITH INCOMES OF LESS THAN $2,000 SERIES			SMALL CORPORATIONS SERIES			LARGE CORPORATIONS SERIES		
		NO. OF CORPORATIONS	PERCENT OF ALL CORPORATIONS IN THE COUNTRY	WEIGHT	NO. OF CORPORATIONS	PERCENT OF ALL CORPORATIONS IN THE COUNTRY	WEIGHT	NO. OF CORPORATIONS	PERCENT OF ALL CORPORATIONS IN THE COUNTRY	WEIGHT
1925										
Under $2,000	17,756	406	2.3	43						
2,000 to 49,999	27,986				1,461	5.2	19	2,016	24.0	4
50,000 and over	8,395									
Total	54,137									
1926										
Under $2,000	19,460	1,008	5.2	18						
2,000 to 49,999	27,548				1,468	5.3	19	1,996	24.7	4
50,000 and over	8,086									
Total	55,094									
1927										
Under $2,000	19,435	703	3.6	25						
2,000 to 49,999	26,470				1,665	6.3	16	1,984	25.7	4
50,000 and over	7,715									
Total	53,620									

TABLE 102 (continued)

BASIC DATA UNDERLYING EARNINGS OF CORPORATIONS

Three Samples

SIZE OF NET INCOME	NUMBER OF MANUFACTURING CORPORATIONS IN THE COUNTRY	SMALL CORPORATIONS WITH INCOMES OF LESS THAN $2,000 SERIES			SMALL CORPORATIONS SERIES			LARGE CORPORATIONS SERIES		
		NO. OF CORPORATIONS IN THE COUNTRY	PERCENT OF ALL CORPORATIONS IN THE COUNTRY	WEIGHT	NO. OF CORPORATIONS IN THE COUNTRY	PERCENT OF ALL CORPORATIONS IN THE COUNTRY	WEIGHT	NO. OF CORPORATIONS IN THE COUNTRY	PERCENT OF ALL CORPORATIONS .... IN THE COUNTRY	WEIGHT
1928										
Under $2,000	17,245	1,118	6.5	16						
2,000 to 49,999	29,555				1,421	4.8	20			
50,000 and over	8,207							1,970	24.0	4
Total	55,007									

[1] See text for explanation. The final estimated frequency distributions themselves are given in Chapter 2.

together with the multiples or weights employed. The final distributions themselves appeared in·Chapter 2.

4. SAMPLES FOR THE TRADING DIVISION

a. Large Trading Corporations Series

The number of corporations engaged in Trading in different years of the period 1919–28 range from 70,000 to 130,000. By number, our large corporations sample for Trade, which consists of 664 corporations in every year of the period, comprises in all years less than a 1 per cent representation, the figure varying from 0.5 per cent to 0.9 per cent. In terms of income, however, the 664 corporations of the sample in most years account for about 30 per cent of the total net income received by all trading corporations in the country.

As in the Manufacturing sample, however, the large corporations series for Trade contains relatively few companies with deficits, 2 per cent or less in most years.[20] In the entire country the number of Trading corporations with net incomes in 1928 was about 80,000 as compared with the total of 130,000. The number with net incomes in the sample in the various years comprises 0.8 per cent to 1.3 per cent of the universe of Trading corporations with net incomes. In terms of incomes received, the 'with net' corporations of the sample, however, in 1928 account for about 25 per cent of that for all Trading corporations in the country with such incomes.

Although not nearly so markedly as in Manufacturing, the large corporations series for Trading is principally a sample of enterprises with net incomes of over $50,000.[21]

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[20] In 1920 and 1921, however, the figures were 7 and 17 per cent respectively.

[21] In most years the number of companies with incomes of under $50,000 is 20 per cent or less; but in 1928 the figure is 28 per cent, and in 1921,

In 1928 it contained 14 per cent of all such Trading corpo-
rations in the country. ,

As was done previously, we may compare the distribu-
tion of size of incomes for the sample and for all corpora-
tions in the country in the 'over $50,000' class. Tables 103
and 104 give results for 1928. The figures for that year,
which are typical, exhibit essentially the same characteris-
tics as did those for the large corporations series in Manu-
facturing: a much smaller preponderance of incomes in the

TABLE 103

FREQUENCY DISTRIBUTIONS OF NET INCOMES FOR ALL TRAD-
ING CORPORATIONS IN THE UNITED STATES WITH INCOMES
OVER $50,000 IN 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	1,857	53.5
100,000– 250,000	1,071	30.9
250,000– 500,000	312	9.0
500,000–1,000,000	132	3.8
1,000,000–5,000,000	85	2.4
5,000,000 and over	14	0.4
Total	3,471	100.0

TABLE 104

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR
COMPANIES WITH INCOMES OF OVER $50,000 IN THE LARGE
TRADING CORPORATIONS SAMPLE, 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	130	27.1
100,000– 250,000	192	40.1
250,000– 500,000	78	16.3
500,000–1,000,000	36	7.5
1,000,000–5,000,000	34	7.1
5,000,000 and over	9	1.9
Total	479	100.0

43 per cent. The latter figure, however, includes the corporations with
deficits.

lowest bracket in the sample than for all the corporations of the country, and relatively larger frequencies in the higher brackets. The reason is in part undoubtedly the same as in the case of Manufacturing—the inclusion of tax-exempt income in the sample figures—and in part because the sample is biased in an upward direction with respect to the size of corporations.

b. Small Trading Corporations Series

This sample, like the small corporations series for Manufacturing, consists of non-identical corporations with positive net incomes most of which are between $2,000 and $50,000. It may be compared, therefore, with that segment of the universe of Trading corporations for the two years 1924 and 1928.

Of the 35,000 Trading corporations in the country with such net incomes ($2,000–$50,000) in 1924, the 1,350 corporations of the sample constituted only a 4 per cent representation. In 1928 the 1,337 corporations of the sample comprised a 3 per cent representation. In terms of net income received, however, the sample accounted for 5.5 per cent of the total in 1924 and 4.4 per cent in 1928.

Frequency distributions of the absolute net income amounts for the sample in these two years are not available.

5. SAMPLES FOR THE MINING DIVISION

a. Large Mining Corporations Series

Between 13,000 and 19,000 corporations were engaged in Mining in various years of the period 1919–28. The 88 corporations of our large corporations series constitute only about one-half of one per cent of these in every year. In terms of net income, however, they account for a widely

varying proportion of the total.[22] In terms of all Mining corporations of the country with net incomes, the sample constitutes about a one to one and one-half per cent repre-sentation by number in most years. In terms of net income the corresponding ratio is not available.[23]

As in the cases of the two preceding industrial divisions, however, the large corporations sample for Mining is pri-marily one of corporations with net incomes of over $50,-000. The corporations of the sample having such incomes constitute about 85 per cent of the total number in the sample in most years. We may accordingly compare the distributions of incomes for the sample and for all such corporations in the country.

The 1928 distributions are presented in Tables 105 and

TABLE 105

FREQUENCY DISTRIBUTIONS OF NET INCOMES FOR ALL MINING CORPORATIONS IN THE UNITED STATES WITH INCOMES OF OVER $50,000 IN 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	252	40.1
100,000– 250,000	206	32.8
250,000– 500,000	79	12.6
500,000–1,000,000	40	6.4
1,000,000–5,000,000	43	6.8
5,000,000 and over	8	1.3
Total	628	100.0

106. As in the other industrial divisions, the lower brackets show a smaller relative frequency in the sample than for all corporations in the country, while the four upper brackets all show the reverse. The reasons are doubtless the same

[22] For example, 19 per cent in 1923, and 85 per cent in 1927. In 1924 the figure exceeds 100 per cent.

[23] The *Source-Book* does not show separately the aggregate deficit for the Mining corporations with losses.

TABLE 106

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR
COMPANIES WITH INCOMES OF OVER $50,000 IN THE LARGE
MINING CORPORATIONS SAMPLE, 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	11	14.9
100,000– 250,000	17	23.0
250,000– 500,000	14	18.9
500,000–1,000,000	12	16.2
1,000,000–5,000,000	15	20.3
5,000,000 and over	5	6.7
Total	74	100.0

as in the cases of the large corporations series for Manu-
facturing and Trading.

6. SAMPLES FOR THE FINANCE DIVISION

a. Large Corporations Series

The total number of financial corporations in the coun-
try ranges from about 70,000 in 1919 to 130,000 in 1928.
By number, our 346 identical large corporations constitute
less than a 1 per cent representation of those totals in all
years. In terms of net income the sample accounts for 12
to 21 per cent of the total during different years of the
period 1922–28.[24]

The number of financial corporations with net incomes
ranges from about 50,000 to 80,000. Of this segment of
the universe our sample constitutes again less than a 1 per
cent representation by number, but in terms of net income it
accounts for a much larger proportion, the 1928 figure be-
ing 11.1 per cent of the total.

Like the large corporations sample in the other indus-

[24] As remarked elsewhere, our Finance sample excludes all life insurance
companies.

trial divisions, however, that in Finance constitutes prin-
cipally corporations with net incomes of over $50,000.[25]
The distributions of net incomes for the sample and for all
financial enterprises in the country with incomes in the
'over $50,000' group in 1928 are given in Tables 107 and
108. They disclose the tendency that has been previously
remarked in the large corporations series: a smaller rela-
tive number of frequencies in the $50,000–$100,000 in-

TABLE 107

FREQUENCY DISTRIBUTIONS OF NET INCOME FOR ALL FINAN-
CIAL CORPORATIONS IN THE UNITED STATES WITH INCOMES
OF OVER $50,000 IN 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	2,110	45.7
100,000– 250,000	1,458	31.6
250,000– 500,000	512	11.1
500,000–1,000,000	274	6.0
1,000,000–5,000,000	222	4.8
5,000,000 and over	37	0.8
Total	4,613	100.0

TABLE 108

FREQUENCY DISTRIBUTIONS OF TOTAL NET INCOMES FOR
COMPANIES WITH INCOMES OF OVER $50,000 IN THE LARGE
FINANCIAL CORPORATIONS SAMPLE,[1] 1928

SIZE OF INCOME	NUMBER OF CORPORATIONS	PERCENTAGE OF TOTAL
$50,000– 100,000	32	9.6
100,000– 250,000	115	34.5
250,000– 500,000	79	23.7
500,000–1,000,000	45	13.4
1,000,000–5,000,000	49	14.6
5,000,000 and over	14	4.2
Total	334	100.0

[1] The finance sample excludes life insurance companies.

[25] In all years, the corporations with net incomes of over $50,000 comprise
94 per cent or more of the large corporations Finance sample.

come bracket than for all corporations in the country. The $100,000–$250,000 bracket again shows for the sample a much smaller relative frequency; while in all of the higher brackets the proportion of frequencies is far higher for the sample than for all corporations in the country. The explanation in terms of the inclusion of tax-exempt interest in the incomes of the sample is perhaps even more cogent in this group than in the other industrial divisions. To what extent the discrepancy is due mainly to this and to what extent to upward bias of the sample itself in respect of the size of corporations, we cannot say.