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Volume Author/Editor: Walter A. Chudson

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Chapter Author: Walter A. Chudson

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Appendix A

CHARACTERISTICS OF THE DATA

THE MOST SUITABLE DATA for a cross-section analysis of financial structure consist of statements of individual concerns, which can be combined and classified in various appropriate ways for the testing of hypotheses. Such data, however, are available at present only on a sample basis with limited coverage. For a more extended coverage of industries and size classes it is necessary to forego some refinements in the quality of the data, to deal with aggregate figures for groups of corporations rather than with observations for individual concerns, and to be content with broad comparisons of the financial structure of different classes of business enterprise.

The balance-sheet data used in the present study are unadjusted; that is, they reflect the fact that the dollar value of certain assets on the one hand and of net worth on the other represent an appraisal by the management. To the extent that revaluations of assets have been made, the dollar values recorded in the balance sheet are not completely accurate summations of the past net flows of funds into and out of various accounts. For example, when we compare the ratio of fixed capital assets to total assets of various industrial groups, we must recognize that we are not necessarily comparing data representing actual dollars spent in every case. Nevertheless, we are concerned with comparative features of financial structure rather than with absolute measurements, and it is highly doubtful whether revaluations of the type mentioned would affect the broad comparisons in which we are interested.

For several reasons the year 1937 has been selected as the focus for the present study: for one thing, the statistics for 1937 provide a detailed breakdown of current liabilities, permitting a separate analysis of notes payable, accounts payable, and "other liabilities" (defined to include primarily accrued liabilities); also, our analysis is intended to serve, among other things, as a benchmark with which to compare data on the financial structure of years in previous decades which represent relatively high levels of business activity. But since conclusions based on 1937 data may be affected by short-run changes in financial structure, they have been compared, so far as possible, with the results for 1931.¹ Detailed examination of each year from 1931 to 1937 would have been too lengthy; therefore, the two terminal

¹ Limitations of space prevent publication of the tabulations in the present volume. The 1931 data are available in the files of the National Bureau of Economic Research, Financial Research Program. The 1937 data are included in the Data Book, described in Chapter I, p. 2, fn. 1.

years of this comparatively short period were selected for comparison. In so far as business cycles affect relationships among industry, size, and profitability classes, part of the differences between 1931 and 1937 may be attributable to the fact that they reflect different phases of the cyclical process. Study of a longer period than 1931-37 would be necessary, however, for an adequate cyclical analysis.²

SOURCES OF DATA

The chief sources of comprehensive data which we have used for our study are the compilations of the Bureau of Internal Revenue, which are made available annually in *Statistics of Income* and in the unpublished *Source Book of Statistics of Income*. *Statistics of Income for 1937*, Part 2 (1940), provides a fairly detailed balance-sheet and income statement for all corporations, classified by asset size into ten groups, by industry into a number of so-called major divisions, and by profitability into two broad groups, corporations "with net income" and "with no net income." A more detailed breakdown of balance-sheet items and a finer industrial classification are provided by the Bureau's *Source Book of Statistics of Income for 1937*, an unpublished manual tabulation of which one copy is available at the Bureau's Washington office. In *Statistics of Income for 1938*, Part 2 (1941), the major industrial classifications were considerably refined and somewhat altered, making possible a classification by size for a larger number of groups than in 1937, particularly in retail trade and in industries formerly classified under metals.

The statistics are tabulated in classifications suitable for a cross-section analysis of corporate capital and credit structure, but it must be emphasized that within each cross-classification or "cell" the data consist of composite or aggregate balance sheets and throw no light upon the dispersion or frequency distribution of individual corporations within cells. For information on this subject we have used a supplementary body of data, showing the dispersion of various balance-sheet ratios *within* classes of corporations. These data were published in *Statistics of American Listed Corporations*, Part 1, issued in 1940 by the Securities and Exchange Commission; and they have been supplemented by several unpublished tabulations prepared by the Securities and Exchange Commission at the request of the National Bureau of Economic Research. Although the SEC statistics are limited to "large" corporations, their value lies in the fact that they are in the form of frequency distributions, which permits us to test the statistical significance of differences between the mean values of ratios of different classes of corporations.

² Companion studies in the present series will throw light on the long-term changes in the comparative financial structure of corporations of different size groups and industrial composition. See National Bureau of Economic Research (Financial Research Program), *The Financing of Large Corporations, 1920-39*, by Albert R. Koch, (1943); *Changes in the Financial Structure of American Business Enterprise, 1900-1940*, by Sidney S. Alexander (ms. 1945).

THE INTERNAL REVENUE DATA

In a form suitable for cross-classification by industry, size, and profitability, the Internal Revenue data are available beginning with the year 1931.³ Since that year, the tabulations have undergone several important changes, particularly with respect to industrial classification and the segregation of particular balance-sheet accounts. In 1934 a shift from a consolidated to a non-consolidated basis for reporting financial statements also affected the balance-sheet structure.

In the present study each of the following asset and liability accounts, which are available in *Statistics of Income for 1937*, has been studied individually and, in certain cases, in combination:

ASSETS	LIABILITIES
Cash	Accounts payable
Investments, government obligations	Bonds, notes, mortgages payable:
Notes and accounts receivable (net)	Maturity less than 1 year
Inventory	Maturity 1 year or more
Investments, other than government obligations	Capital stock
Capital assets (net)	Surplus and undivided profits (less deficit)
Other assets	Other liabilities

Corresponding to the balance-sheet data is a full income account, of which the gross sales and net profit are basic to the analysis.

Industrial Classification

The *Source Book of Statistics of Income* of the Bureau of Internal Revenue classifies corporations into a large number of so-called minor industrial divisions, of which we have selected 61 for comparison.⁴ The corporations are grouped as follows:

- Manufacturing: 47 divisions
- Trade: 5 divisions
- Construction: 2 divisions
- Shipbuilding: 1 division
- Mining and Quarrying: 6 divisions

The detailed industrial comparisons that we have made omit several major branches of the economy. Agricultural corporations have been excluded because they do not represent the typical agricultural enterprise and

³ When the present study was started, the year 1937 was the most recent year for which data were available. The Internal Revenue data are published with a lag of approximately three and one-half years after date of filing.

⁴ The 61 minor industrial divisions, which include 15 divisions of retail trade, are listed in Appendix E. *Statistics of Income for 1938* provided the detailed breakdown of retail trade, which was formerly unavailable.

are unimportant quantitatively. Transportation and public utilities have not been included primarily because little interest attaches to an analysis of their current assets and liabilities, while their size range is too narrow to make for fruitful comparisons. Financial corporations (holding companies, banks, insurance companies, real estate companies, stockbrokers, etc.) have such characteristic financial structures that comparison with the cross-section financial structure of manufacturing and trade appears farfetched. Finally, service corporations have been omitted because they are too heterogeneous to treat as a whole, while a detailed treatment of their separate branches would have proved cumbersome.

Within the sphere chosen for industrial comparisons the only deficiency in coverage is in the field of retail trade, in which unincorporated concerns are important. Nevertheless, the Internal Revenue data for 1937 include approximately 70,000 retail trade corporations, which should provide a representative picture of that branch of enterprise, apart from any differences that may exist between incorporated and unincorporated companies in corresponding classes.

Size Classification

The aggregate dollar figures for each balance-sheet item are grouped by corporate size according to the following total assets classes:⁵

- Class 1—Under \$50,000
- Class 2—50,000-100,000
- Class 3—100,000-250,000
- Class 4—250,000-500,000
- Class 5—500,000-1,000,000
- Class 6—1,000,000-5,000,000
- Class 7—5,000,000-10,000,000
- Class 8—10,000,000-50,000,000
- Class 9—50,000,000-100,000,000
- Class 10—100,000,000 and over

The industrial cross-classification available for the analysis of size variations within industries is less detailed than that described in the preceding section. It consists of 19 "major" industrial groups of which the 61 "minor" industries are components.⁶ The major groups are divided into the ten asset classes listed above and also into corporations with and without net income as defined for tax purposes.

Profitability Classification

The basic profitability classification of the Internal Revenue data divides corporations into those with and without net income, which we have called

⁵ These classes are inclusive of the lower limit and exclusive of the upper. For convenience we have numbered each class interval, and we have referred to them as "Class 1," "Class 2," etc. When Classes 8, 9, and 10 include only a few concerns, these data are combined by the Bureau of Internal Revenue to conceal the identity of individual corporations. As a result, Classes 9 and 10 are rarely given separately, even where corporations of that size occur. Thus there are in effect eight size classes.

⁶ For a list of the 19 "major" industries that are cross-classified by size, see Appendix E.

"income" and "deficit" corporations, respectively. Net income is defined as net income for excess profits tax computation, that is, it is net of all taxes except income and excess profits taxes. The balance-sheet ratios of income and deficit corporations can be compared for each *minor* industrial division, and for each size group within the *major* industrial divisions.

A supplementary analysis of the relationship between profitability and various balance-sheet ratios is made possible by the fact that a profit ratio can be computed for each minor industrial division and for each size class within the major industrial divisions. This profit ratio indicates whether certain variations between industrial divisions or size classes may be related to profitability differences. For these purposes profitability is measured by the ratio of net income to net worth. Other indices of profitability can be thought of, but they probably would not yield different results in the present connection.⁷

Further Characteristics of the Data

For an analysis of the type here made, the data of the Bureau of Internal Revenue have certain limitations.⁸ The *Statistics of Income* computations do not provide a universal coverage of the balance sheets of all corporations. In 1937, 7 percent of all manufacturing corporations and 12 percent of all corporations filing income tax returns did not submit balance sheets. These are the smaller concerns, however, whose sales in preceding years had amounted to only 1 or 2 percent of the total. A minor statistical problem arises in using *Source Book* data, since the sales and income figures refer to a larger number of corporations than the balance-sheet data. In this case, also, the corporations with the missing balance sheets are the smaller ones.⁹

The Bureau of Internal Revenue assigns to corporations their industrial classification according to their predominant activity. A decline or increase in the volume of one line of activity may cause a shift in the corporation's classification from one year to the next. However, the fact that a concern which produces a diversified output must be classified in one industry or

⁷ It is true, however, that profitability comparisons between small and large concerns are rendered somewhat ambiguous by the complete exclusion from net income of officers' compensation. On this problem see W. L. Crum, *Corporate Size and Earning Power* (Cambridge, Mass., 1939), and Charles L. Merwin, Jr., *Financial Characteristics of American Manufacturing Corporations*, Temporary National Economic Committee, Monograph 15 (Washington, 1941) Chapter 2.

⁸ Consideration in any great detail of the quality of the Internal Revenue data for present purposes is not necessary here, since this ground has been covered thoroughly in earlier publications. See among others, R. C. Epstein, *Industrial Profits in the United States* (National Bureau of Economic Research, New York, 1934) pp. 455, 548-57; Solomon Fabricant, *Capital Consumption and Adjustment* (National Bureau of Economic Research, New York, 1938) p. 35; W. L. Crum, *op. cit.*, Chapter 2; Charles L. Merwin, Jr., *op. cit.*, pp. 2-5.

⁹ See page 119 for a description of the way in which the sales and income data have been deflated for purposes of comparison with the balance-sheet data.

another cannot be considered a defect of the data but is actually a problem in the definition of "industry."¹⁰

For the period 1931-37 the comparability of the results is affected not only by the institution of unconsolidated returns in 1934 but also by various redefinitions of industrial groupings. The majority of these changes of industrial definitions, however, were too minor to affect seriously the industrial comparisons made in this study. Minor redefinitions of income and deficit corporations have also produced some arbitrary shifts from one classification to the other.¹¹

The dating of the balance sheets submitted may determine to some extent the importance of the various component items. Returns may be submitted for fiscal or for calendar years, which introduces an element of noncomparability, particularly in periods of rapid change in the general level of economic activity. By the same token, the comparison of industries that file on the same date but have different patterns of seasonal operations is less accurate.

The importance of these characteristics of the data should not be exaggerated. With the exception of the feature of unconsolidated returns, there is no reason to believe that they can account for any of the systematic behavior with industry, size, and profitability which may be found in capital and credit structure or obscure such behavior where it exists.¹² Furthermore, several of the limitations of the data apply to intertemporal comparability rather than to a cross-section analysis, and are therefore of secondary interest here. Accepting the fact that balance-sheet data inevitably involve some estimated valuations, the Internal Revenue data appear tolerably suited to our purposes.

SEC DATA ON LARGE CORPORATIONS

The most important feature of the SEC data, from the point of view of the present analysis, is the fact that they are in the form of frequency distributions of balance-sheet ratios which are classified according to industry, size, and profitability. With such information, an objective appraisal can be made of the significance of differences between the mean ratios of the various classifications, something which cannot be done with the aggregate figures provided by the Bureau of Internal Revenue. Such tests of significance have been made, as explained in Appendix B, by the analysis of variance. A further useful feature of the SEC data is the information provided on the

¹⁰ The limitation on filing consolidated returns imposed by the Revenue Act of 1934 simplified the composition of the output of individual concerns somewhat, but it may have resulted in a separation of corporate entities which, with respect to their financial characteristics, really should be considered together.

¹¹ For example, in 1936 income was redefined to include income from dividends and interest received on certain government obligations.

¹² The effect of the elimination of consolidated returns in 1934 is discussed in Appendix C.

frequency with which the various balance-sheet accounts appear in each classification. This information sheds some light on the question of whether the frequency as well as the proportion of marketable securities, intercorporate investments, and notes payable varies among different classes of corporations.

The coverage of the SEC data is limited to 1,741 listed—and consequently large—corporations, of which 1,034 are in manufacturing. All data refer to December 31, 1937, or to the nearest fiscal year-end. In *Statistics of American Listed Corporations*, Part 1 (1940), frequency distributions of a number of ratios classified by industry, asset size, profitability, and several other factors are presented, but the threefold classification by size, industry, and profitability, which is the basis of our analysis of the Internal Revenue data, is not available. The Financial Research Program therefore suggested certain additional cross-classifications of the same frequency distributions, which were kindly provided by the SEC. Since these tabulations were derived from existent punch cards, no ratios in addition to those previously published were available. The tabulations were therefore confined to the following ratios:

Sales/inventory	Fixed capital assets/total assets
Inventory/total assets	Current liabilities/total liabilities
Cash, marketable securities, and receivables/total assets	Long-term debt/fixed capital assets
Quick assets/current liabilities	Net worth/total debt
Current assets/current liabilities	Sales/total assets

These ratios were cross-classified as follows:

1. By industry:	2. By asset size (in millions):	3. By profitability, according to the ratio of net income/net worth (in percent):
a. All manufacturing corporations	Under \$1	Under -5.0
b. Machinery	1- 3	-5.0- 0.0
c. Transportation equipment	3- 5	0.0- 5.0
d. Extractive industries	5- 10	5.0-10.0
e. Trade	10- 20	10.0-15.0
	20- 50	15.0-20.0
	50-100	20.0 and over
	100 and over	

The requisite measures were then computed from the data within each cell created by this cross-classification.

Further tests of the significance of industrial differences were based upon frequency distributions published in *Statistics of American Listed Corporations*, Part 1. In this case, the data were not classified simultaneously according to size and profitability. The industries tested were subdivisions of manufacturing, as follows:

Food	Petroleum refining
Tobacco	Rubber
Beverages	Leather
Textiles	Building materials
Lumber	Iron and steel
Paper	Nonferrous metals
Printing and publishing	Machinery and tools
Chemicals	Transportation equipment

The results of the tests of significance are summarized as follows:

I. Significance of Differences in Ratios among the Subdivisions of Manufacturing

<i>Ratio</i>	<i>Result</i> ¹³
Sales/inventory	Significant
Sales/receivables	Significant
Cash, marketable securities, and receivables/total assets	Significant
Quick assets/current liabilities	Significant
Current assets/current liabilities	Significant
Fixed assets/total assets	Significant
Long-term debt/total assets	Nonsignificant
Net worth/total debt	Significant
Sales/total assets	Significant

II. Significance of Variations of Ratios with Size and Profitability, Listed Manufacturing Corporations¹⁴

<i>Ratio</i>	<i>Variation with Size</i>	<i>Variation with Profitability</i>
Sales/inventory	Significant	Nonsignificant
Inventory/total assets	Nonsignificant	Nonsignificant
Cash, marketable securities, receivables/total assets	Nonsignificant	Significant
Sales/receivables	Nonsignificant	Nonsignificant
Quick assets/current liabilities	Significant	Significant
Current assets/current liabilities	Nonsignificant	Significant
Fixed capital assets/total assets	Nonsignificant	Significant
Current liabilities/total liabilities	Significant	Significant

¹³ R. A. Fisher's Z-coefficient was computed for this and the following tests. A 5 percent level of significance was employed throughout in appraising the results.

¹⁴ The significance of the size and profitability classifications was tested only for manufacturing corporations as a whole, and not for any subdivisions or other branches of industry and trade.

Long-term debt/fixed assets	Nonsignificant	Nonsignificant
Net worth/total debt	Nonsignificant	Significant
Sales/total assets	Significant	Nonsignificant

DEFLATION OF SALES FIGURES FROM THE SOURCE BOOK

Unlike *Statistics of Income* the *Source Book* provides sales data for a larger number of corporations than that for which it provides balance-sheet data. Therefore, in computing ratios based upon sales data from the *Source Book*, the sales figures must be deflated.

The corporations for which both sales and balance-sheet data are given in *Statistics of Income* are the same, in each major industrial group, as those for which balance-sheet data are reported in the *Source Book*. The deflation was accordingly made as follows: The difference between the sales figure in the *Source Book* and that in *Statistics of Income* was obtained for each major industrial group. This difference was then multiplied by the ratio of the sales of each minor group to the total sales of the major group to which it belonged. The result was then subtracted from the sales of the relevant minor group as given in the *Source Book*. This correction does not take account of the fact that the average sales of corporations not reporting balance sheets may vary among the minor industrial groups.

INTERNAL REVENUE DATA FOR YEARS OTHER THAN 1937

As stated above, when the present study was inaugurated the classification of the Internal Revenue data by size and by minor industries, which is the basis of our analysis, was available only from 1931 to 1937, inclusive. Even within this short period temporal comparisons are limited by changes in the definition of balance-sheet items, in industrial classifications, and in the practice with respect to consolidated returns. The effects of discontinuing consolidated returns in 1934 are dealt with in Appendix C. We may consider here, briefly, the other two aspects of the problem. The remarks apply to a comparison of the years 1931 and 1937, for which a systematic comparison of results has been made, so far as possible.

The changes in industrial classification primarily affect the comparisons of ratios by size classes. In 1931 several major industrial groups were combined, thus making a detailed comparison with 1937 data impossible. The groups affected are chemicals and petroleum; automobiles and metals; textiles and wearing apparel. Each pair was combined in 1931 and listed separately in 1937. These shifts are distinct from any shifts of individual corporations caused by slight changes in their predominant field of activity.

Two important changes in the character of balance-sheet items make for non-comparability of the 1931 and 1937 data. In 1931 notes payable were combined with accounts payable; not until 1937 were the two accounts separated. Therefore, a comparison between 1931 and 1937 of the analysis

of either account is impossible. The other important change was the separation in the year 1937 of surplus reserves and "other liabilities." "Other liabilities" in 1937 thus became almost entirely accrued items. This shift affects the comparability of surplus, net worth, other liabilities (i.e., accrued items), and finally the current ratio. (The current ratio was so defined in 1937 that other liabilities were included in current liabilities.)

Mention should also be made here of the use of the industrial breakdowns in *Statistics of Income for 1938*, Part 2 (1941), which became available during the course of this investigation. Of particular interest are the data for wholesale trade and the leading subdivisions of retail trade, in classifications by average asset size. In the *Data Book*,¹⁵ the breakdowns of the data for wholesale and retail trade are presented by size classes (Tables C-1 to C-26); and the complete percentage composition of the balance sheet and other selected ratios are given for the leading subdivisions of retail trade (Table C-30).

SEASONAL FLUCTUATIONS IN BALANCE-SHEET DATA

Seasonal fluctuations in balance-sheet data introduce an element of uncertainty into the industrial comparisons of capital and credit structure. The variations of ratios with size and profitability, however, are unlikely to be substantially affected, as there is little reason to assume that the incidence of seasonality will vary appreciably with respect to these two categories. Increasing awareness of the seasonal character of balance-sheet components is indicated by the discussions of the so-called "natural business year" which have appeared in the last decade, culminating in the formation of a Natural Business Year Council.¹⁶

Availability of balance-sheet data based on the natural business year, however, would not completely eliminate the effect of seasonality upon balance-sheet comparisons, although it would reduce it. So long as the amplitude of seasonal fluctuations varied among industries, an accurate comparison of their balance-sheet structure would require monthly or at least quarterly data. Unfortunately, such data are lacking in any comprehensive form.

¹⁵ See Chapter I, p. 2, fn. 2, for a complete description of the *Data Book*.

¹⁶ In 1937, out of a total of 477,838 corporations 80,798 took advantage of the privilege of filing returns on a fiscal-year basis. Although no comparable figures on sales are available, the importance of fiscal-year returns may be estimated by the fact that these returns included 12 percent of the net income of income-earning corporations and 14 percent of the net deficit of deficit corporations.