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# Appendix A

## Data, Methods and Limitations of Study

### CHARACTER OF THE SAMPLES

The historical records of business financial transactions available for a study of this type are far from complete, a fact that is particularly true in the case of the medium and small corporations. Neither time nor the available resources permitted any extensive compilation of whatever corporate financial statistics might be accessible from the records of individual business concerns. Consequently it was necessary to rely chiefly upon small samples of such data as were compiled by the Financial Research Program in connection with its Studies in Business Financing.[71] The characteristics of the individual samples — including their sources, industrial coverage and size, which must be known in order to interpret correctly the significance of the financial developments which they may reveal — are summarized briefly in the following paragraphs.

*Samples of Large Manufacturing and Trade Corporations*

Two samples, one covering the period 1914-22 and the other the period 1920-39, were chosen for the purpose of analyzing changes in the financial structure of large manufacturing and trade corporations. The war period sample (1914-22) was compiled especially for use in the present study, while the interbellum period sample (1920-39) had been developed previously by Albert R. Koch.[72] In so far as the available data permit, the two samples consist of the same companies.

World War I Samples. Our samples of large manufacturing and trade corporations (total assets of $5 million and over), covering the period 1914-22, include manufacturing concerns from 11 durable and non-durable goods industries, and trade concerns engaged in mass retailing of a chain, mail-order or department store variety. The manufacturing group included 84 companies for 1914, but as a result of corporate consolidation the number was reduced to 81 in 1922; the trade group consists of 8 companies for the entire period.

71 The data for all samples used in this and other studies of business financing tendencies under the National Bureau's Financial Research Program are collected in a source volume, *Data for Studies in Business Financing, 1900-42* (ms. 1943).

72 Albert R. Koch, *The Financing of Large Corporations, 1920-39,* National Bureau of Economic Research, Financial Research Program (1943).

In 1920, these two groups of corporations represented about 10 percent of the total number, and their sales amounted to approximately one-fifth of the total value of product, of all large manufacturing and trade concerns. Total assets of the manufacturing concerns amounted to about 25 percent of the total assets of all large manufacturing companies (practically all of which are incorporated); but the total assets of the 8 trade companies accounted for only 3 percent of the total assets of all large trade concerns, chiefly because most large trade concerns were not incorporated, or if they were, their stocks were closely held and hence their financial statements were not published.

Interbellum Samples. These samples include 84 large manufacturing and 10 large trade corporations, and cover the period 1920-39. Sales of the large manufacturing companies amounted to 26 percent of the value of product of all manufacturing companies in 1937, while the sales of the trade group were around 3 percent of the value of product of all trade concerns for that year. Total assets of the large manufacturing companies amounted to roughly 30 percent of the total assets of all *large* manufacturing companies; total assets of the trade group were about 15 percent of those of all *large* trade concerns.

### *Other Large Corporation Data*

In addition to these sample data pertaining to large manufacturing and trade corporations, use was made of certain figures on inventory holdings compiled by George Terborgh of the Federal Reserve Board, and by Willard Thorp and Helen Russell of Dun & Bradstreet, Inc.

Terborgh's figures pertain to inventory holdings of a varying number of manufacturing corporations, and were compiled from Moody's *Manuals*, 1916-23.[73] These corporate balance sheet figures were classified by major and minor industry groups, and by size (the criterion of size being amount of inventory rather than the amount of total assets or sales of the corporation), and were weighted by Kuznets' estimates of inventory values at the end of 1923.[74] Those differences which occur between our figures and Terborgh's with regard to the over-all growth in dollar volume of inventory holdings are attributable in part to Terborgh's inclusion of the smaller companies, and in part to the weighting he employed in combining the separate industry figures.

The inventory figures of Thorp and Russell are for an identical sam

73 See Terborgh, *op. cit.*, especially p. 617.

74 Simon Kuznets, *Commodity Flow and Capital Formation* (National Bureau of Economic Research, 1938) I, p. 412.

ple of 106 manufacturing corporations in 15 industry groups, and 5 mass distributors, and cover the period 1913-22.[75] The dollar figures for each industry group were combined into a total for manufacturing industry, the weights employed for this purpose being determined on the basis of the inventory holdings of different industry groups, as given in the 1937 *Census of Manufactures*, with allowance for varying rates of industry growth. The results of Thorp and Russell's calculations agree closely with ours, in spite of the fact that we did not weight our inventory figures in proportion to the relative importance of the various industry groups included in our samples.

### *Samples of Medium and Small Manufacturing and Trade Corporations*

Measured by the same criteria — number of companies, total assets, and sales — the three samples of financial statement data of medium and small manufacturing and trade corporations (total assets $50 thousand to $5 million) are very small indeed. Altogether, four separate samples of such corporations have been employed in the study.

Wisconsin Samples. Corporations domiciled in Wisconsin were selected from the files of the Wisconsin State Tax Commission, and data were transcribed from their income tax returns.

*Wisconsin Identical.* This sample includes 73 manufacturing corporations in 8 industries, and 30 identical trade corporations in 2 retail and 1 wholesale lines, and covers the period 1916-39 inclusive. The fact that all are companies which survived, for a period of at least 25 years, the numerous vicissitudes to which small business concerns are subject, imparts an element of bias to their behavior patterns. It is this sample of 103 companies that is referred to in the text and charts as "the Wisconsin sample."

*Wisconsin Non-Identical.* This is a supplementary sample of medium and small manufacturing and trade concerns, likewise drawn from the files of the Wisconsin State Tax Commission. The number of companies included varies with the particular year, but ranges from 72 to 94 corporations in 7 manufacturing industries, and from 29 to 45 companies in 3 trade lines — 2 retail and 1 wholesale. The years for which this supplementary sample provides data are 1916, 1918, 1920 and 1921.

Massachusetts Samples. Because of the fact that the breakdown of

75 See Thorp and Russell, *op. cit.*, especially p. 22.

certain asset and liability items as reported in the Wisconsin state income tax returns is not sufficiently detailed for the purposes of our analysis, and in order to have some check on the financial developments that characterized the Wisconsin companies, occasional use was made of data obtained from the certificates of condition which corporations are required to file with the Massachusetts Corporation Commission. Two samples were obtained from this source, each with a different composition, as follows:

> *Massachusetts Non-Identical,* consisting of approximately 390 medium, small and very small corporations (non-identical in all years), and covering the years 1916, 1918, 1920 and 1921; around 230 of these companies were from 10 manufacturing industries, and about 160 were from 2 trade lines — 44 to 107 in retail and 34 to 55 in wholesale trade.
>
> *Massachusetts Identical,* consisting of 56 identical companies, of which 39 were in manufacturing and 17 in trade, for the years 1914 through 1922.

In the country as a whole there were, in 1920, roughly 73,000 manu facturing and trade corporations with an asset size of $50 thousand t $5 million, their combined total assets amounting to some $24 billion Therefore our samples of medium and small concerns constitute a ver small part of the total number of such corporations, and in this sens are not representative of the whole group. When measured by th criterion of behavior, however, they do seem to typify their size clas for all of the evidence coming to our attention indicates that the war time financial behavior of medium and small corporations contraste strikingly with that of large corporations.

The use of samples of medium and small companies drawn from tw states as widely separated as Wisconsin and Massachusetts may be que tioned. But a number of tests of corporate financial data pertaining t different periods disclose that geographical differences are far less im portant in determining the pattern of corporate financial structure, a reflected by samples, than are the size of concern and its industria classification. Comparison of changes in specific items as between geo graphically different samples of comparable size composition reveal some inconsistencies in behavior; but these are primarily attributabl to differences in industrial composition, and only in a few instances doe the influence of regional economic variation seem to be significant.

## GENERAL LIMITATIONS OF THE DATA

Any analysis based on historical financial records is subject to certai general limitations, as well as to those arising from the particular san ples used. A financial statement represents an individual businessman's appraisal of the current financial condition of his company, and his estimates may or may not be realistic. Also, there are differences in accounting standards from one company to another, and from one period to another; it is known that these standards vary widely today, and the variation was probably even greater during the period of World War I, but there is no way of appraising the differences accurately from the available records. Moreover, individual concerns change their accounting practices from time to time, and such changes influence balance sheet amounts and categories indeterminately. Finally, data assembled from tax file sources (as were those for the Massachusetts and Wisconsin medium and small corporation samples) are necessarily influenced by the way in which the laws require reports to be submitted.

In order to give perspective to changes in business financial structure during the World War I period, 1914-21, we have compared the record of these years with that of expansion and contraction periods of the interbellum years 1922-39. As we had only annual data at our disposal we were obliged to define our expansion and contraction periods in terms of years; the years selected for inclusion in particular periods do not always agree with the reference cycle chronology of the National Bureau, as corporate financial data differ somewhat in behavior from the time series customarily used in business cycle analysis. Annual balance sheet data of individual corporations may show an expansion of financial structure in years when general business activity is undergoing mild contraction, and vice versa. Therefore expansion years were defined as those in which more than half of the companies in our samples reported an increase in the dollar volume of sales, in dollar volume of inventory, in total assets, and in net profits from operations. It was on this basis that 1915-18, 1919-20, 1922-29 (exclusive of 1924 and 1927) and 1933-37 were established as years of financial expansion, and 1921, 1930-32 and 1938 as periods of contraction.

To a certain extent the years 1915 through 1920 constituted one continuous period of inflationary finance. We divided this period into two parts, however, first because we were interested in the differences between the financial responses of enterprise in the years of the war itself and in the years immediately after; and second, because the period was actually interrupted by a contraction in industrial activity, beginning in the late fall of 1918 and extending to the late spring of 1919, although the recession was too mild to be visible in the annual financial statements of either year. The periods 1915-18 and 1919-20 are therefore considered in our tables as two World War I expansion periods, while 1922-29 and 1933-37 are regarded as peacetime expansion periods. Figures for the years 1924 and 1927 were excluded from the period 1922-29 because annual financial statements for these years do not reflect the general expansion tendencies of the period as a whole.

The wartime inflation period culminated in a financial crisis that began in 1920, but since it was not reflected in annual financial statements until 1921 the latter was designated as the year of wartime contraction; liquidations of 1930-32 and 1938 are called peacetime contractions.

## METHODOLOGY

### *Use of Aggregate Financial Statements*

Since we are primarily concerned with changes in business financial structure for the entire economy, rather than with individual company behavior, we analyzed our data in the form of aggregate financial statements of groups of companies.[76] The approach has limitations because it does not take account of differences in the financial structure of individual enterprises. Such differences reflect any one or more of a number of factors: the technical character of the industry in which an enterprise is engaged (conditions which greatly affect the type and composition of business assets); variations in business organization from one industry to another — for example, the presence of special agencies that help to provide materials, financing and distribution for the product; size of enterprise, which exerts a considerable influence on the composition of assets and of liabilities; policy factors, both financial and technological, of individual concerns; differences occurring between incorporated and unincorporated concerns; and, by no means least important, profitability of operations. Furthermore, many of these differences in financial structure are unstable; they change with temporary swings in business activity, and shift with structural changes in the economic system.

While there is still a great deal to be learned about differences among the financial structures of individual enterprises, it has not been possibl

[76] Our aggregates are unweighted, that is, no systematic weighting adjustment wa made for the relative importance of the industries represented in the samples. Coun of changes in selected financial statement items revealed that there was a substanti degree of conformity in financial behavior among the different industries represente and among the individual corporations constituting the size groups. Consequent little additional information concerning the general pattern of change in financi structure could be gained by systematic weighting. In addition, weighting would n have solved the problem of year-to-year changes in the relative importance of the i dustry groups covered, unless the weights were adjusted annually. One feature of t transition from a peace to a war economy and back is a change in the character industrial activity; war supply industries become more important than industri engaged primarily in civilian supply, and vice versa.

› deal intensively with them in this paper. We distinguish between the ggregate behavior of manufacturing corporations and of trade corpora- ons, and between the behavior of two size groups — large corporations over $5 million total assets) and medium and small corporations ($50 ıousand to $5 million total assets).

A finer industry or size grouping — for example, subdivision of manu- ıcturing corporations into those producing durable and those produc- ıg non-durable goods — would have made the study more useful. But ıch a subdivision was deemed feasible in only a few phases of the analy- s, partly because of the small size of our samples. Other studies of busi- ess financial structure for the years 1900-40, developed by the National ›ureau's Financial Research Program, support the view that the broad lassification herein employed yields significant results.

*'roblem of Comparability of Financial Statements*

'ublished corporate financial data of the period of World War I suffer :om lack of completeness, and this complicates the problem of obtain- ıg comparable balance sheets and income statements for the period 914-22 as a whole. To use only those companies whose statements were omplete in every respect throughout the period would have resulted ı samples substantially smaller than those employed; in some cases the epresentation of an industry would have been reduced to one or two oncerns. It was therefore necessary to estimate the breakdown of con- olidated items of a few companies in each year, and for missing years ɔ interpolate statements from those available. The number of missing tatements was greatest in 1914-15 for the large companies, and in 916-17 for the smaller companies.

A somewhat different problem was encountered in the analysis of hanges in balance sheet accounts occasioned by inflows and outflows f funds. As these changes are presented in the form of percentages of otal assets there is no need for an identical sample of companies hroughout the period: both the numerator and the denominator of the raction vary proportionately as the number of companies changes. Vhat is essential is that the aggregate balance sheets for any two con- ecutive years be strictly comparable, so that the first differences in the ccounts shall represent changes in actual amount rather than changes n the number of companies involved. In order to assure this desired ondition, forward- and backward-comparable balance sheets were em- ›loyed; thus for a given year, B, two balance sheets were prepared, one omparable with the preceding year, A, and the other with the follow- ng year, C. In computing flows of funds in relation to total assets as a ›ase, the source or use of funds for the year B was then divided by the total assets of the same companies at the end of year A; and so on fo each year of the series.

*Source and Use of Funds Relatives*

In discussing changes in balance sheet accounts brought about by actua inflows or outflows of funds, as distinguished from changes that ar merely the result of accounting transfers and revaluations, we hav followed the practice of presenting the figures as percentages rathe than as absolute amounts. These percentages, prepared for industry-siz sample groups, take the form of averages, and are computed by dividin the net flow of funds into or out of a particular account during a give period by the total of all assets on hand at the beginning of each yea included in the period. The reasons for adopting the relative in prefer ence to the absolute form are three. In the first place, there was a marke secular growth of manufacturing and trade assets over the period of th '20s, which made for larger absolute flows of funds during the latte years in comparison with those of the World War I period; therefor in order to judge correctly the importance of wartime changes in finan cial structure it was necessary to relate the different sources and uses o funds to the total resources of business concerns. In the second place, th absence of uniformity in the coverage of the large corporation samples 1915-21 and 1922-37, limits the comparability of absolute dolla amounts. In the third place, with such extreme differences in size of th companies represented in our large and in our medium and small cor poration samples, proper perspective on the relative behavior of th two groups can be obtained only by reducing the dollar magnitudes in volved to some common denominator, preferably one having a func tional relationship to the forces studied.