

# WORKING PAPERS



## TRENDS IN AGGREGATE CONCENTRATION

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## TRENDS IN AGGREGATE CONCENTRATION

The position of the largest firms in the economy has been a subject of continuing interest. The issue of aggregate concentration is concerned with the share of the Nation's economic resources controlled by the largest firms, and measures of aggregate concentration are fundamentally measures of inequality of distribution.

The relevance of aggregate concentration is a subject of controversy in the economic literature. The debate centers on whether there is any meaning to concentration measures that are not related to specific markets. In a review of Kaplan's study of aggregate concentration [Kaplan 1954], Stigler declared, "The statistical universe of the hundred largest corporations is inappropriate to studies of monopoly and competition, and we may hope that this [Kaplan's study] will be the last study to fall prey to its dramatic irrelevance" [Stigler 1956]. Schwartzman has testified before the Senate Antitrust Subcommittee that the problem with the concept of aggregate concentration is that ". . . the economy is composed of markets, and economic power which does

not manifest itself in monopoly power in particular markets cannot manifest itself anywhere in the economy" [Schwartzman 1979].

Other economists, however, have expressed a different view. Mermelstein has written that he thinks Stigler is mistaken, and he argues that it is not self-evident that concentration among the 100 or 200 largest industrial corporations has "no relation whatsoever to economic power in the marketplace" [Mermelstein 1971]. Utton has pointed out that the concept of aggregate concentration involves "broad political and sociological questions raised by the control of a large absolute amount of economic resources by a small number of enterprises or individuals" [Utton 1974]. Scherer, in testimony before the Senate Antitrust Subcommittee, referred to ". . . the Jeffersonian-Madisonian vision of how the nation's business should be dispersed . . ." [Scherer 1979], and Comanor, in testimony before the same subcommittee, discussed the debates between Hamilton and Jefferson concerning the concentration of economic power in the economy [Comanor 1979].

It is not the intent of this paper to add to this debate, but rather to provide more recent data on the trends in aggregate concentration. These trends are related to past studies of aggregate concentration, and other sectors of the economy are introduced in order to provide broader measures of aggregate concentration than those obtained from the traditional focus on the manufacturing and the industrial sectors.

The first systematic study of aggregate concentration appeared in 1932, and since then about a dozen studies have been published on this subject. The seminal study, Berle and Means' The Modern Corporation and Private Property, received widespread attention, partly because it projected that if corporate growth patterns continued as they had from 1909 through 1929, the 200 largest nonfinancial corporations would account for 70 percent of all industrial assets by 1950 and would account for practically all industrial assets by 1972. All the following studies revealed, however, that the trend observed by Berle and Means failed to continue at the same rate after 1932.<sup>1</sup> Nevertheless, these reports showed that aggregate concentration continued to increase, particularly during the period following World War II. In 1969, a staff study of the Federal Trade Commission noted that the share of manufacturing assets held by the 100 largest corporations in 1968 was greater than the share of manufacturing assets held by the 200 largest corporations of 1950 [FTC 1969]. Much of the increase was attributed to merger activity.

Unlike the Berle and Means study, which focused upon all nonfinancial firms as the universe for measuring aggregate concentration, the later studies focused upon smaller sectors of the economy. Six studies focused upon the industrial sector, which

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<sup>1</sup> Collins and Preston 1961; Kaplan 1964; Adelman 1954; Friedland 1957; Mermelstein 1969; Stonebraker 1979; Means 1964; Adelman 1964; Boyle and McKenna 1970; Bond 1975; Farcas and Weinberger 1978; Bock, Farcas, and Weinberger 1979; and White 1981.

includes manufacturing, mining and distribution.<sup>1</sup> And six studies, as well as a statistical series compiled by the FTC, focused upon the manufacturing sector alone.<sup>2</sup> The broader nonfinancial universe chosen by Berle and Means includes utilities and transportation in addition to manufacturing, mining, and distribution. In this study, we measure aggregate concentration in all three of these sectors and also in the financial sector.

This inclusive approach seems preferable for two reasons: the concept of aggregate concentration is independent of the kind of business activity conducted by firms, and the increased diversification of several large firms has made it more difficult to classify them into an appropriate sector. For example, Union Pacific, historically identified as a railroad, recently became a holding company that operates a railroad, an integrated oil company, several coal mines, and joint ventures in uranium and in petrochemicals. Because more than half its assets in 1978 were committed to railroad operations (thus placing it primarily in the transportation sector), Union Pacific would not be classified in the manufacturing or industrial sectors. Nevertheless, some \$1.3 billion of Union Pacific's 1977 assets were engaged in mining and manufacturing activities, enough to rank 164th among firms in

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<sup>1</sup> The studies that used industrial firms are: Kaplan 1964; Adelman 1954; Friedland 1957; Mermelstein 1969; and Stonebraker 1979, in addition to Collins and Preston.

<sup>2</sup> The studies that used manufacturing firms are: Means 1964; Adelman 1964; Boyle and McKenna 1970; Bond 1975; Farcas and Weinberger 1978; and Bock, Farcas, and Weinberger 1979.

the industrial sector, ahead of such well-known companies as Pillsbury, Texas Instruments, Gillette, and Polaroid. In this study, Union Pacific was included in the nonfinancial sector.

As this example indicates, increased diversification can result in biases in measures of aggregate concentration based on narrow sectors of the economy. One form of bias is the inclusion of large amounts of nonmanufacturing assets held by firms that are primarily manufacturers, and another form of bias is the exclusion of large amounts of manufacturing assets held by firms that are primarily nonmanufacturers.<sup>1</sup>

These biases are reduced by using the broadest sector, and, consequently, the emphasis in this study will be upon the trends in the nonfinancial sector. However, for certain reasons, aggregate concentration is measured in two smaller sectors as well. One reason is to continue the series developed by Collins and Preston, who traced aggregate concentration from 1909 through 1958 [Collins and Preston 1961]; since they used the industrial sector, this sector is also included in this study. The manufacturing sector is also included in this study, because data for this sector are more current than data for the other sectors and also because in recent years the FTC series on concentration in the manufacturing

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<sup>1</sup> As a practical matter, the Internal Revenue Service data for the total assets in each sector tend to reduce these biases, because the data involve the same classification problems. This is discussed below.

sector has been relatively free of contamination caused by overseas investment by U.S. corporations.

The bias from overseas investment by U.S. corporations is a serious shortcoming in the data used for this study. Conceptually, it would be desirable to measure concentration trends in terms of domestic assets. The available data, however, do not permit such a measure over the time period under study, since the overseas assets of U.S. corporations are not reported separately. Furthermore, the Internal Revenue Service data used to measure the total assets in each of the sectors do not include all the overseas assets of U.S. corporations. (The IRS data include the assets of overseas branches but not of overseas subsidiaries.) Thus, the shares of assets held by the largest corporations are overstated, because the data used to measure the size of the largest corporations include their foreign assets, while the IRS data (which form the denominator in the ratio) include only some of their foreign assets. Some data suggest that the IRS data understate the extent of the assets in the nonfinancial sector by about 11 percent in 1966 and in 1973 and about 18 percent in 1977.<sup>1</sup>

The effect of this shortcoming is offset to some extent by differences in consolidation standards between the IRS data and the other sources used in this study. IRS reporting requirements

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<sup>1</sup> This problem is treated more fully in the Appendix on Data and Measurement.



make consolidation of subsidiaries optional and do not allow consolidation if the parent firm's ownership interest does not exceed 80 percent. In contrast, generally accepted accounting practice calls for consolidation of subsidiaries when ownership exceeds 50 percent. The significance of this for this study is that separate reporting of subsidiaries creates a double counting of the parent firm's net equity position, since it is reported both as part of the assets of the unconsolidated subsidiary and as part of the assets of the parent. It is not known how much this double counting contributes to overstatement of IRS asset totals for each sector of the economy. Another problem is that the IRS asset data are necessarily based on corporate accounts for Federal tax purposes, which are typically somewhat different from their accounts for other purposes. However, since the period under study is not marked by tax changes that would prompt firms to change their method of asset accounting for Federal tax purposes, this problem should not affect the trends in aggregate concentration reported here.

#### TRENDS IN AGGREGATE CONCENTRATION

The trends in aggregate concentration since 1958, measured in terms of assets, are shown in the tables that follow. These tables are arranged in order of the four sectors used to measure aggregate concentration: manufacturing, industrials, nonfinancial, and financial.

Table 1 uses data drawn from the FTC's Quarterly Financial Report series to provide measures of concentration among manufacturing corporations from 1974 through 1980. During this time period, the FTC series is relatively free of the bias from U.S. overseas investment, since the consolidation rules were changed to exclude overseas assets (other than net equity) as of the fourth quarter of 1973.<sup>1</sup> This change made the series before 1974 non-comparable with more recent years [Penn 1976]. This series indicates an increase in aggregate concentration in manufacturing from 44.4 percent for the 100 largest manufacturing corporations in 1974 to 46.8 percent in 1980, and an increase for the 200 largest manufacturing corporations from 56.7 percent in 1974 to 59.9 percent in 1980. Unfortunately, this series provides comparable data for only a short time period and for only the manufacturing sector.

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TABLE 1.--Concentration in Assets for Manufacturing Corporations  
Federal Trade Commission Series

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<u>Asset Size Group</u>							
Top 100	44.4%	45.0%	45.5%	45.9%	45.5%	46.1%	46.8%
Top 200	56.7	57.5	58.0	58.5	58.3	59.0	59.9

Source: FTC, Bureau of Economics, Quarterly Financial Report data published in Statistical Abstract.

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<sup>1</sup> This change and two other changes in the FTC series are described in the Appendix on Data and Measurement.

To compare concentration between manufacturing and more broadly defined sectors, it is necessary to use different sources for individual company data and for sector totals.<sup>1</sup> Consequently, we present estimates of aggregate concentration in the manufacturing sector, where individual company values were derived from Compustat<sup>2</sup> and Moody's Industrial Manual, and estimates of total manufacturing assets were taken from the Internal Revenue Service.<sup>3</sup>

The trend in table 2 for the entire period 1958-77 is essentially no increase in aggregate concentration for the 100 largest manufacturing corporations (0.1 percentage points) and a slight increase for the 200 largest manufacturing corporations (1.8 percentage points). More precisely, the trend during this period consists of an increase from 1958 to 1967 and a decline from 1967 to 1977. For the 100 largest manufacturers, concentration increased 1.5 percentage points from 1958 to 1967 and then

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<sup>1</sup> Although it would be desirable to use a single source for both numerator and denominator, in order to reduce biases in the data, this is not possible with publicly available data, except for the QFR series for the manufacturing sector. The use of Moody's (or a similar source) for firm data and IRS for sector data has been the standard method in other studies of aggregate concentration. Nevertheless, biases in the data cause this series to yield different results: the QFR series indicates a rising trend of aggregate concentration in manufacturing from 1974 through 1977, while the Moody's-Compustat-IRS series indicates a slight decline.

<sup>2</sup> Compustat is a data service of the Standard and Poor's Corporation that provides corporate data on computer tape.

<sup>3</sup> The IRS data are published annually in Statistics of Income, Corporation Income Tax Returns (Internal Revenue Service Publication 16).

TABLE 2.--Concentration in Assets for the Manufacturing Sector

	<u>1958</u>	<u>1963</u>	<u>1967</u>	<u>1972</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
<u>Asset Size Group</u>								
Top 50	35.5%	35.9%	36.2%	34.5%	35.6%	35.7%	36.1%	35.7%
Top 100	45.5	46.0	47.0	45.3	46.1	46.0	46.1	45.6
Top 150	50.9	52.0	53.6	52.0	52.9	52.7	52.7	52.2
Top 200	54.8	56.1	58.3	56.5	57.6	57.3	57.3	56.6

Sources: Bureau of Economics, based on data from Compustat, Moody's Industrial Manual, and Internal Revenue Service Statistics of Income.

declined 1.4 percentage points from 1967 to 1977. For the 200 largest manufacturers, concentration increased 3.5 percentage points from 1958 to 1967 and then declined 1.7 percentage points from 1967 to 1977.

Expanding the universe, and using the same Moody's-Compustat data sources, the trends for the industrial sector are much the same. The industrial sector consists of manufacturing plus mining, wholesale and retail trade, services, and construction. These trends are shown in table 3. The shares held by the largest industrial firms increased by 0.9 to 2.6 percentage points (depending on the size group) from 1958 to 1967, and then declined about 2 percentage points for each size group through 1977. Over the time period 1958-77, the share held by the largest 50 and 100 industrial firms decreased about 1 percentage point; the share of the 150 largest industrials declined 0.3 percentage points, and the share of the 200 largest industrials increased 0.3 percentage points.

The universe is expanded further to cover all nonfinancial corporations, a grouping which consists of the industrial sector plus transportation, public utilities, and agriculture, forestry and fishing--in other words, all firms except those in finance, insurance, or real estate. The trends, shown in table 4, indicate that the largest nonfinancial firms' share of their sector of the economy has declined slightly throughout the period 1958-77.

TABLE 3.--Concentration in Assets for the Industrial Sector

<u>Asset Size Group</u>	<u>1958</u>	<u>1963</u>	<u>1967</u>	<u>1972</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Top 50	23.6%	23.6%	24.5%	22.9%	23.2%	23.3%	23.4%	22.8%
Top 100	30.6	30.3	31.8	30.2	30.2	30.3	30.1	29.5
Top 150	34.3	34.2	36.3	35.0	35.1	35.0	34.7	34.0
Top 200	36.9	36.8	39.5	38.5	38.6	38.4	38.0	37.2

Sources: Bureau of Economics, based on data from Compustat, Moody's Industrial Manual, and Internal Revenue Service Service Statistics of Income.

TABLE 4.--Concentration in Assets for the Nonfinancial Sector

<u>Asset Size Group</u>	<u>1958</u>	<u>1963</u>	<u>1967</u>	<u>1972</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Top 50	23.9%	24.2%	24.5%	23.2%	23.2%	23.3%	23.3%	22.7%
Top 100	31.6	31.3	31.9	30.5	30.4	30.6	30.4	29.7
Top 150	36.5	36.3	37.1	35.7	35.5	35.6	35.3	34.5
Top 200	40.0	39.9	41.0	39.7	39.2	39.5	39.1	38.3

Sources: Bureau of Economics, based on data from Compustat, Moody's Industrial Manual, and Internal Revenue Service Service Statistics of Income.

Their share increased about 0.3 to 1.0 percentage points (depending on the size group) from 1958 through 1967 and declined about 1.8 to 2.7 percentage points between then and 1977.

Among financial firms, a different pattern of concentration trends emerges. As shown in table 5, the asset shares for all four size groups among financial firms declined 9 to 11 percentage points from 1958 through 1967 and then increased 5 to 6 percentage points. Over the entire period 1958-77, aggregate concentration among financial firms declined about 3 to 6 percentage points. The increase in financial firms' concentration since 1967 appears to be attributable in part to the evolution of the bank holding company during the 1970's and to anticipation of legalization of interstate banking.

Bank holding companies have become a means of geographic expansion that otherwise would not have been permitted by bank regulations, especially in States with laws that restrict branch banking. The number of multibank holding companies increased from 71 in 1968 to 306 in 1977, and the number of banks they controlled increased from 629 to 2,301. During this period, acquisitions by bank holding companies increased steadily, from 16.1 percent of all bank mergers and acquisitions in 1967 to a high of 74.0 percent in 1973, and remained over half of all bank mergers and acquisitions during 3 of the 4 subsequent years [Rhoades 1980].

Another factor affecting banks during this period was the anticipation of changes in the restriction against interstate



TABLE 5.—Concentration in Assets for the Financial Sector

<u>Asset Size Group</u>	<u>1958</u>	<u>1963</u>	<u>1967</u>	<u>1972</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Top 50	30.0%	26.3%	21.0%	23.8%	27.3%	26.6%	26.6%	27.0%
Top 100	36.3	31.9	26.7	29.4	33.0	32.0	32.0	32.5
Top 150	40.4	35.6	30.2	32.7	36.3	35.5	35.4	35.8
Top 200	43.4	38.3	32.7	34.7	38.3	37.5	37.4	37.8

Sources: Bureau of Economics, based on data from Compustat, Moody's Industrial Manual, and Internal Revenue Service Service Statistics of Income.

banking.<sup>1</sup> Consequently, many major banking organizations established a nationwide presence by expanding into authorized nonbank activities, such as consumer finance, insurance, data processing, and leasing [Rhoades 1980].

Thus, the use of three successively broader nonfinancial sectors of the economy yields similar trends of aggregate concentration when measured by the Moody's-Compustat-IRS series, even though the broader sectors reduce problems caused by increased firm diversification. Over the period 1958-77, concentration is stable and perhaps declining slightly. Within this period, concentration rises from 1958 through 1967 and falls from 1967 through 1977. The trend is different in the financial sector: a larger decline over the entire period than in the nonfinancial sectors but, more important, an increase from 1967 through 1977.

It should be noted that the trend for the manufacturing sector is different when measured by the FTC Quarterly Financial Report series. This shows a steady increase from 1974 through 1980. Not enough information is available to resolve this conflict. Presumably, the QFR data contain fewer biases, since a single source is used for both the firm data and the measure of assets in the manufacturing sector, and beginning in 1974, the

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<sup>1</sup> Although the McFadden Act of 1927 expressly prohibits interstate banking, bank holding companies have been able to expand across State lines through organizations that do not perform the basic banking function of accepting deposits. The ability to enter into such nonbanking activities is limited by the Board of Governors of the Federal Reserve System, which had approved 19 such activities by 1979.

QFR series does not contain the bias caused by overseas investment by U.S. firms.

#### LONG-TERM TRENDS IN CONCENTRATION

It is possible to trace the trends in aggregate concentration over a longer timespan by linking the trends for the manufacturing sector and the industrial sector to the trends found in two earlier studies. An FTC study [1969] reported the concentration trend in the manufacturing sector from 1925 to 1968, and the study by Collins and Preston [1961] calculated the trend in the industrial sector from 1909 to 1958.<sup>1</sup> As shown in table 6, the share of the manufacturing sector held by the 100 largest manufacturers increased during the latter half of the 1920's and during the Great Depression and then declined during the 1940's. Consequently, in 1950 the share held by the 100 largest manufacturers was 3.9 percentage points higher than in 1925. It increased substantially until 1958, declined slightly by 1963, and increased until 1967. Thereafter, it declined until 1972 and maintained essentially the same level through 1977. The net result was that the share of the manufacturing sector held by the 100 largest

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<sup>1</sup> Although the FTC series changed after 1947 from IRS data to Quarterly Financial Report data as its measure of assets in the manufacturing sector, this series is still comparable to the series developed for the present study. A comparison of the IRS and the QFR data in 1959, 1963, and 1967 indicated that these two sources differed by less than 2 percent in their measures of assets in the manufacturing sector, and the differences in asset shares ranged from .17 to .91 percentage points.

TABLE 6.--Long-Term Trends in Concentration in  
the Manufacturing Sector and the Industrial Sector

	<u>Manufacturing Sector</u>		<u>Industrial Sector</u>
	<u>100 largest</u>	<u>200 largest</u>	<u>100 largest</u>
1909	--	--	17.7%
1919	--	--	16.6
1925	34.5%	--	--
1929	38.2	45.8%	25.5
1935	40.8	47.7	28.1
1939	41.9	48.7	--
1948	38.6	46.3	26.7
1950	38.4	46.1	--
1958	46.0	55.2	29.8
1963	45.7	55.5	30.3
1967	47.6	58.7	31.8
1972	45.3	56.5	30.2
1974	46.1	57.6	30.2
1975	46.0	57.3	30.3
1976	46.1	57.3	30.1
1977	45.6	56.6	29.5

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Sources: For the manufacturing sector before 1972, FTC [1969, p. 173]; for the industrial sector before 1963, Collins and Preston [1961]; for the more recent years, Compustat and Moody's Industrial Manual.

manufacturers increased from 34.5 percent in 1925 to 45.6 percent in 1977. The pattern for the 200 largest manufacturers was similar, and the net result was that their share increased from 45.8 percent in 1925 to 56.6 percent in 1977. In the industrial sector, the share held by the 100 largest firms declined slightly from 1909 to 1919, then increased to 25.5 percent by 1929 and to 28.1 percent by 1935. This share declined to 26.7 percent in 1948 and then rose to 29.8 percent in 1958. Then it increased slightly by 1963 and increased more, to a high point in 1967. Thereafter, it declined through 1977. The upshot was that the share of the industrial sector held by the 100 largest firms increased from 17.7 percent in 1909 to 29.5 percent in 1977.

#### CHANGES IN THE SIZE STRUCTURE OF THE LARGEST FIRMS

Another aspect of aggregate concentration is whether large firms have become more or less equal in size since 1958. In order to examine this question, Lorenz curves are used to depict the asset distribution in each of the four sectors. The Lorenz curves show the proportion of the total assets of the 200 largest firms

accounted for by any given proportion of the firms.<sup>1</sup> Graph 1 indicates that the size structure of assets has become slightly more equal for nonfinancial firms since 1958 (as indicated by the curve for the more recent year lying nearer the diagonal line that represents an equal distribution of assets). The Lorenz curves for the less inclusive sectors, manufacturing and industrials, are so nearly identical to the picture for nonfinancials that they are not shown.<sup>2</sup> For the financial sector, however, the large-firm asset size distribution has become slightly less equal since 1958, as shown in graph 2.

#### CONCLUSIONS

Aggregate concentration, as measured using the Moody's-Compustat-IRS sources, increased from 1958 to 1967 and then

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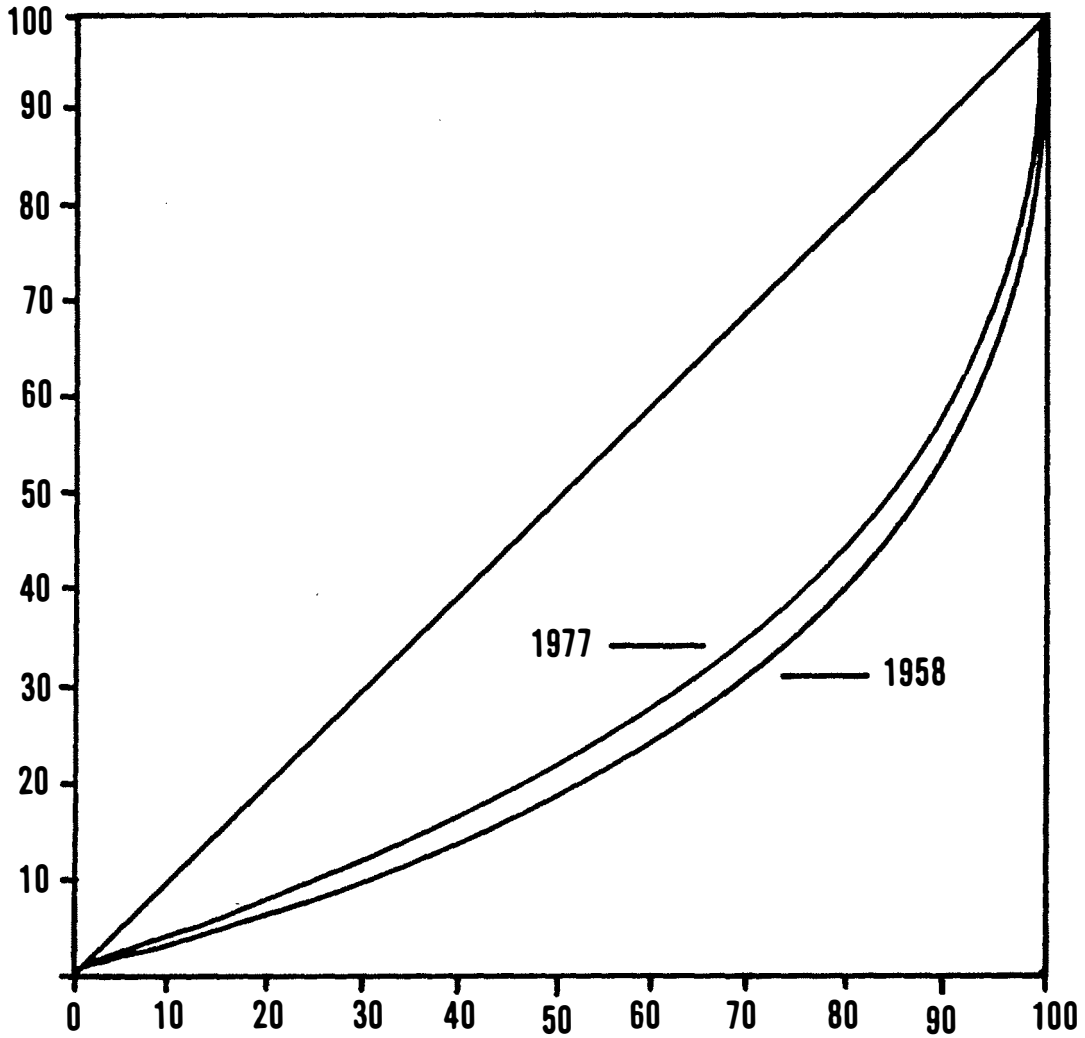
<sup>1</sup> The Lorenz distribution shown here measures the cumulative percentages of the assets of the 200 largest firms relative to a cumulative distribution of the 200 largest firms. Consequently, if all the 200 largest firms were of equal size, 10 percent of the firms would have 10 percent of the assets, 20 percent of the firms would have 20 percent of the assets, etc. Such a distribution would generate a straight line running diagonally across the graph from 0 to 100. To the extent that the largest firms differ in their asset sizes, the line depicting the actual size distribution deviates from this diagonal line. The greater the vertical distance between the diagonal line and the curve depicting the distribution of assets, the greater the relative inequality in firm asset size. When more than 1 year is shown on the graph, the direction of change in equality of firm size distribution is shown by whether the curves for the more recent years lie closer to the diagonal line or further from it.

<sup>2</sup> Collins and Preston found no change in the size distribution of the 100 largest industrial firms they measured from 1909 through 1958 [Collins and Preston 1961].

# GRAPH 1

## Distribution Of Assets Within The 200 Largest Nonfinancial Firms

Per Cent  
Assets of  
200 Firms

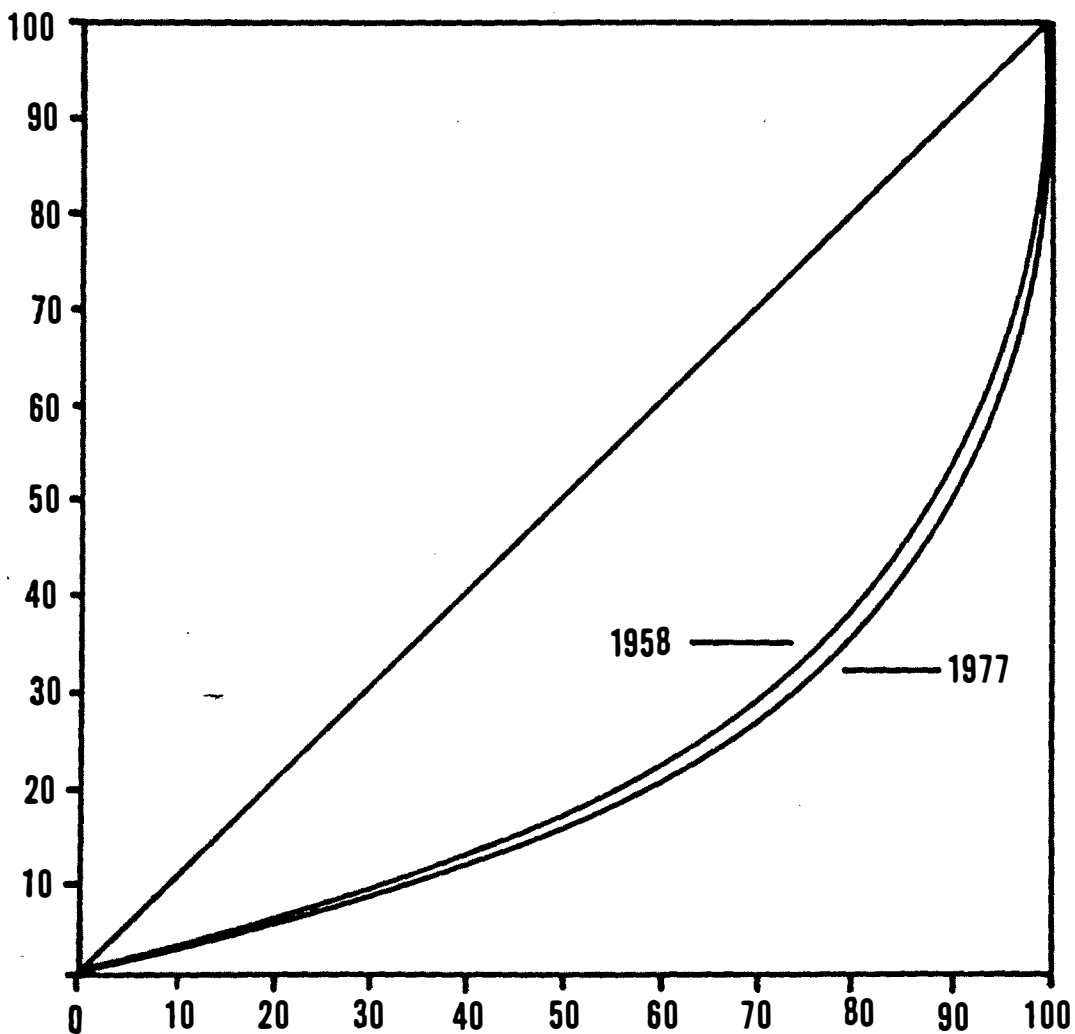


Per Cent of Firms

# GRAPH 2

## Distribution Of Assets Within The 200 Largest Financial Firms

Per Cent of  
Assets of  
200 Firms



Per Cent of Firms



essentially leveled off. These trends were observed for the manufacturing, industrial, and nonfinancial sectors. However, one data series, the FTC Quarterly Financial Report, shows aggregate concentration in manufacturing rising from 1974 to 1980. (No broader sector is covered by this series.) For concentration trends in the financial sector, the picture is different. Concentration declined through 1967 and then increased.

The Moody's-Compustat-IRS figures, combined with the findings of the 1969 FTC study and the Collins and Preston study, suggest that aggregate concentration is subject to a long-term ratchet effect: it increases during some periods and remains at the same level during other periods, but does not decline (except for some short-term fluctuations). Although this report does not examine merger activity, some of the major increases in aggregate concentration appear to be associated with the second merger wave and with the first decade of the third merger wave.

The data also suggest that among nonfinancial firms the distribution of firm asset size has become slightly more equal from 1958 to 1977. By contrast, the distribution of firm asset size among financial firms has become more unequal.

An unanticipated finding is the similarity of the trends in aggregate concentration for all three of the nonfinancial sectors, despite the disadvantages inherent in measuring aggregate concentration on a more narrow basis. Thus, at least during this period, the manufacturing sector was a proxy for the trends in

aggregate concentration in the industrial and the nonfinancial sectors. This raises the possibility that the more current and more carefully defined QFR series for manufacturing may also be indicative of trends in the industrial and nonfinancial sectors. Unfortunately, the data needed to test this hypothesis are not publicly available.

## APPENDIX ON DATA AND MEASUREMENT

Assets were used as the measure of corporate size in order to extend the work done by Collins and Preston and to allow comparison with other studies of aggregate concentration, all of which used assets. Assets also tend to exhibit greater stability than sales or employment--an advantageous feature in measuring trends in aggregate concentration.

Aggregate concentration can also be measured in terms of sales, value added, or employment. Each of these measures would produce somewhat different results. Employment is much less concentrated in the largest corporations than value added or sales, and they in turn are less concentrated than assets. Scherer has given three reasons for this: (1) The largest corporations tend to pay higher salaries and wages. (2) The leading producers in many industries tend to use more capital-intensive production methods than smaller firms in the same industries. (3) The 100 largest manufacturing corporations includes a disproportionately large number of petroleum refining firms, and they are much more capital intensive than the typical manufacturing firm [Scherer 1980].

Value added is generally regarded as the best measure of aggregate concentration, since it captures the net contribution of the firm and does not include inputs that the firm merely resells. Thus, it is a more meaningful measure of the output of a firm than

employment, sales, or assets. Unfortunately, value added data for individual firms are not publicly available, and an alternative measure must be used.

Sales data for specific firms are readily available, but they are distorted by differences in vertical integration [Adelman 1951]. Size is overstated for firms, such as retailers and supermarkets, that buy and resell a large portion of their output.

Asset data are also readily available for individual firms, and they have the advantage of reflecting the amount of productive activity in a manner analogous to value added. If firm size is regarded as the present result of past activity, assets are a better measure of size than value added [Adelman 1951]. However, the use of assets also involves problems. To the extent that different firms acquired their assets at different times and therefore at different price levels, the measurement among firms is not on a comparable basis. The longer the time period since the assets were purchased, the greater the uncertainty about their comparability. Another source of uncertainty is differences in accounting methods among firms. Despite these disadvantages, assets have become the measure most commonly used in studies of aggregate concentration.

Concentration was measured in years in which the Census of Manufactures was conducted during the period 1958 through 1977, and annually during the last 4 years of this period. The year 1958 provides continuation of Collins and Preston's work, which

ended in that year. The year 1977 is the most recent year for which asset data for various sectors of the economy were available from the Internal Revenue Service. The measure of concentration in the manufacturing sector, based on the FTC's Quarterly Financial Report, was available through 1980.

Except for the FTC series, which uses data from the Quarterly Financial Report, data for nonfinancial, industrial, and manufacturing firms were extracted from Moody's Industrial Manual and Compustat, a computerized data service of Standard and Poor's. The source of data for financial firms was Moody's Bank and Financial Manual. These sources obtain their information from 10-K reports, which publicly held corporations are required to file annually with the Securities and Exchange Commission.

The data have certain shortcomings, one of which involves the treatment of foreign assets of U.S. corporations. Conceptually, it would be desirable to measure U.S. corporations by their domestic assets only. The available data, however, do not permit such measures. Another data problem involving foreign assets of U.S. corporations arises because IRS data do not include all the overseas assets of U.S. corporations. (IRS data include the assets of overseas branches but not of overseas subsidiaries.) Thus, the shares of the assets held by the largest corporations are overstated, because the asset data reported by Moody's and by Compustat include their foreign assets but the IRS data (which

form the denominator in the ratio) include only a fraction of their foreign assets.

Some data suggest that the extent of this understatement in the IRS data may range from 11 percent in the mid-sixties to 18 percent in 1977. For example, a Commerce Department survey of majority-owned foreign affiliates of U.S. nonfinancial corporations amounted to \$89 billion, about 11 percent of IRS reported assets of \$837 billion for all nonfinancial corporations that year [U.S. Department of Commerce 1975]. Another Commerce Department survey found that in 1970, for a sample of 233 typically large U.S. manufacturing companies, the assets of majority-owned foreign subsidiaries amounted to 21 percent of the companies' total assets (domestic and foreign) [U.S. Department of Commerce 1970]. Moreover, in 1973, the change in reporting requirements for the FTC Quarterly Financial Report, which required that corporations report only their net equity interest in overseas subsidiaries, suggests that about 10 percent of the total assets were no longer reported. Also, a comparison of IRS data for manufacturing assets for the manufacturing sector with the FTC data indicates that the two series were essentially comparable from 1958 through 1972, but that thereafter the FTC series dropped about 11 percent relative to the IRS series. This difference increased slightly in 1976 and reached about 18 percent in 1977.

The other qualifications are that privately held firms are omitted because of lack of data, and that large U.S. subsidiaries of foreign firms (such as Shell Oil) are included on the grounds that they are major entities in the U.S. economy. This procedure is consistent with Collins and Preston's methodology.

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