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A STATISTICAL STUDY OF FACTORS AFFECTING THE RATE OF

CORPORATE MERGER IN AMERICAN MANUFACTURING, 1951-1966

by

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CHAPTER I. INTRODUCTION

Setting and Purpose

The role of the industrial organization economist is to assess changes in the organization and working of the economy in relation to the achievement of society's goals (7, p. 1). As a result of one factor that has effected changes in the organization and working of the American economy in the post-World War II period, American students of an industrial organization have become increasingly attentive to the effects of merger[1] on competition (2,5,14,15,21,43,78).

An overview of corporate merger activity in American manufacturing and mining since 1950[2] reveals several dynamic changes which have prompted this increased attention: 1) the average number of firms acquired annually has risen from about 220 in the 1948-1953 period to over 1,000 for 1965-1966 (57, Appendix, Table 2); 2) acquiring companies with assets greater than $100 million accounted for less than 5 percent of all acquisitions in the 1951-1954 period, while the

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[1]A merger is the combination into a single economic enterprise of two or more previously independent enterprises and may be accomplished by acquisition or consolidation (61, p. 3). Technically, acquisition represents the taking over of one firm by another either as an isolated event or as one of an extended series in which the acquired firms may retain their identities (61, p. 59). A consolidation is the simultaneous multiple-union of two or more firms in which the dissolving companies ordinarily lose their identities (61, p. 59). These differences are recognized herein, but inasmuch as the emphasis of this study is on one firm gaining control of another, the distinctions are of less importance.

[2]The year 1950 is chosen as a base point for describing changes in merger activity primarily because the passage of the Celler-Kefauver amendment (73) to Section 7 of the Clayton Act (74) signified the adoption of a more stringent public policy with regard to merger.

comparable figure in 1966 was 28 percent (57, Appendix, Tables 3 and 8);
and 3) horizontal, vertical and conglomerate acquisitions[1] comprised
31, 10 and 59 percent, respectively, of all acquisitions in the 1948-
1953 period, but the comparable figures for the years 1960-1966 were
13, 15 and 72 percent (57, p. 11).

As stated before, previous studies have assessed these changes
in corporate merger activity primarily with respect to impact on the
competitive behavior of firms and performance levels of American
industry. The present study emphasizes one additional aspect of the
current merger movement, the economic forces responsible for, or
correlated with, the accelerated merger pace since 1950.

Specifically, this study attempts to relate movements in certain
economic variables to the rate of corporate merger in aggregate manu-
facturing for the period 1951-1966. In addition there is an endeavor
to ascertain the relative importance of movements in the respective
economic variables in explaining the rate of corporate merger within
individual manufacturing industries. These two purposes are in
accordance with the study's central hypothesis that changes in var-
iables associated with conditions of business, the capital market and

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[1]The Federal Trade Commission defines horizontal mergers as
those in which the merging companies produce one or more closely
related products in the same geographic market, vertical mergers
as those in which the merging companies have a buyer-seller relation-
ship prior to merger and conglomerate mergers as the residual of
mergers not classified as either horizontal or vertical (55, p. 43).

growth are correlated with the rate of corporate merger in American
manufacturing during the period 1951-1966.

The following discussion relates to the implications of merger
activity for public goals and public policy. Chapter II reviews
studies examining the causes of earlier merger movements and considers
the current state of merger theory. Hypotheses about the factors
prompting the current wave of mergers comprise Chapter III. Chapter
IV cites the data and describes the statistical technique employed
to test the hypotheses. Chapter V presents the findings of the
statistical tests and the conclusions drawn therefrom.

Public Policy and Merger Activity

Presumably, the pursuit of research supported by public resources
is guided by public goals. Moreover, it is assumed that the antitrust
framework and other manifestations of policy are shaped by public
goals. An identification of public goals relevant to the organization
of the American economy is, therefore, essential for the understanding
of the implications of merger activity for public goals and public
policy.

According to the President's Commission on National Goals, an
important, if not primary, economic goal is the maintenance of a
democratic form of economic organization through the prevention of
great concentrations of economic power (66, p. 9). The preservation
of a democratic economy is deemed to be compatible with the advancement
of the other economic goals of efficiency, full employment, progress
and equity (66, pp. 149-206).

In accordance with the goal of maintaining a democratic economy, Congress enacted the antitrust laws, of which the original Section 7 of the Clayton Act (73) and its 1950 amendment (74) are specifically applicable to the effects of merger on competition. The dual economic grounds for public restraint of merger are that 1) mergers ostensibly increase the level of economic concentration[1] and 2) mergers, by increasing concentration, lower the level of efficiency in the economy (7, p. 164; 20, pp. 94-111).

Almost by definition, at a specific point in time any merger, whether horizontal, vertical or conglomerate, raises the level of aggregate concentration, and a horizontal merger, of course, increases the level of industry or market concentration. Yet the quantitative importance of merger in raising concentration levels needs to be established over time and the influence of other variables affecting concentration deserves consideration before a judgment on the serious-ness of merger as a concentration-increasing force is reached.

The statistical evidence on the effect of mergers on concentra-tion from the period of the 1895-1904 merger movement[2] through the

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[1] Concentration, as used in the economic sense, is a state of ownership or control. The degree of concentration refers to the number and size distribution of firms which own or control a given economic aggregate (such as sales or assets). The size of each firm is measured by the proportion of the economic aggregate it controls or owns. Con-centration is usually measured at the industry level, referring to the concentration of control of the economic aggregate within a specific industry, or at an aggregate level, denoting concentration of the aggregate for the economy as a whole, or for some broad sector of the economy (7, pp. 77-81).

[2] The identification of various merger movements in the history of the American economy is found in Chapter II on pages 14-22.

1940's, though not available for all years and for all industries, does permit some generalizations. During the first merger movement, 1895-1904, the 92 largest consolidations produced control of more than 50 percent of the output of their respective industries (55, p. 487) and as a result of 318 consolidations in the same period control was obtained over 40 percent of the nation's assets (93, p. 57). While the merger movement of the 1920's was primarily non-horizontal in character (49, p. 170) and thus did not affect industry concentration perceptibly, the movement was primarily responsible for the over 50 percent increase during the 1905-1935 period in the percentage of all non-financial corporations (7, p. 108). Studies by Butters and Lintner (19) and the Federal Trade Commission (85) suggest that mergers in the 1940-1947 period accounted for less than 1 percent of the increase in the level of aggregate concentration and that the relatively small sizes of the acquired firms and the predominantly vertical and conglomerate nature of the acquisitions could not be responsible for any marked increases in industry concentration.

Thus, the effectiveness of mergers in raising concentration levels in the period subsequent to the first major merger movement appears to have declined, both at the aggregate and the industry levels. A number of factors may explain this phenomenon, which is seemingly inconsistent with the fact that a merger, at a single instant in time,

does increase the level of concentration. First, whether a firm
chooses to grow by merger or by internal means, the firm's market
share may be growing at a smaller rate than the capacity of the
market. Therefore, concentration is declining in the sense that the
firm's market share is falling relative to the total market. Second,
the competition of new and existing firms may erode away the market
share gained by one firm through merger. Third, internal expansion
of the firm could have accounted for, and apparently did in the 1940's,
a much larger increase in concentration than merger.

Hence, recognition must be taken of factors which either tend
to offset increases in concentration resulting from merger or are
relatively more important than merger as a cause of increases in
concentration before the merger-concentration relationship is cited
as an economic ground for public control of mergers.

The other economic ground for public restraint of mergers, that
mergers, by raising concentration, lower the level of efficiency in
the economy, must be evaluated according to the concept of efficiency[1]
in order to determine if only a unidirectional, inverse relationship
prevails between mergers and efficiency.

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[1]"Allocative" efficiency, as used here, refers to the allocation
of resources among industries in a fashion that yields the maximum
output to society (7, p. 374; 20, pp. 103-105). "Technical" efficiency
refers to the allocation of resources within firms in a fashion that
allows output to be produced at the minimum attainable unit cost
(7, p. 374; 20, pp. 105-106). While it is recognized that mergers
may also have implications for the other public, economic goals, only
the more direct relationship between mergers and efficiency is explored
here.

The theoretical construct underlying the relationship between mergers and efficiency, or more strictly, concentration and efficiency, has been expressed as a relational structure-conduct-performance continuum (7, pp. 430-468). Industry structure, typically depicted by the level of seller concentration (7, pp. 112-163), ostensibly influences industry conduct, primarily characterized by the pricing and output behavior of firms in the industry (7, pp. 302-371). Industry performance, mainly portrayed by both technical and allocative aspects of efficiency, refers to the composite of economic results of an industry's market behavior and is an appraisal of an industry's contribution to the general material welfare of society (7, pp. 372-429).

Price theory provides one link between structure and performance in terms of the relation of concentration to allocative efficiency. Given the traditional assumptions of price theory that markets operate freely in the absence of external forces and that entrepreneurs attempt to maximize profits (35, pp. 189-191), firms in atomistic industries,[1] characterized by low levels of seller concentration, charge lower prices and produce larger outputs than do firms in monopolistic industries, identified by high levels of seller concentration (7, pp. 28-29). Moreover, with an ability to restrict output and raise

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[1]The main features of atomistic industries are many sellers, small size of each seller relative to the total market and inability of each seller to influence market price (7, p. 28). In direct contrast, monopolistic industries, used here in a broad sense, include industries composed of one seller (monopolist) or a few sellers (oligopolists), each seller having an ability to influence market price (7, pp. 28-29).

prices, monopolists or oligopolists earn profits in excess of the normal level required to insure continued production under atomistic conditions of competition (7, pp. 28-29). In general, this divergence in profits between atomistic industries and monopolistic industries signifies a misallocation of resources between the two types of industries, or allocative inefficiency (20, p. 13).

Given the assumptions that entrepreneurs have perfect knowledge of profit opportunities and that perfect mobility of resources exists to capture those potential profits (35, pp. 194-195), allocative inefficiency may be corrected either by transferring resources from atomistic industries to monopolistic industries or by spreading existing resources in monopolistic industries over a greater number of firms (20, p. 13). Either method would satisfy the conventionally assumed preferences of society for larger output and lower prices.

Therefore, the relationship seems clear between concentration and allocative efficiency. Allocative inefficiency exists because the less heavily concentrated, atomistic industries contribute more to the production of socially desirable output than do the more heavily concentrated, monopolistic industries. The correction of allocative inefficiency involves a process of "deconcentrating" the monopolistic industries so as to reduce the ability of each seller to restrict output, charge higher prices and earn excess profits.

It follows that any merger which results in an increase in the level of industry concentration may serve also to lower the level of allocative efficiency if the merging firms tend to act in a

monopolistic manner. Thus, price theory provides the grounds for hypothesizing an inverse relation between merger and allocative efficiency.

A second link may exist between structure and performance in terms of the relation of concentration to technical efficiency. Given the assumption that business firms attempt to maximize profits, an individual firm seeks to minimize its unit costs of production (7, p. 180). Cost theory (35, pp. 162-184) suggests that the firm may be able to reduce its unit cost of production by increasing the size of plant up to a point (35, pp. 180-181), that is, by capturing plant scale economies (7, pp. 166-167). In addition, the firm may be able to lower costs further by operating several optimal-size plants in order to gain economies of the multi-plant firm (7, pp. 170-172). In short, to realize fully certain economies of large-scale plants and certain additional economies of the large-scale, multi-plant firm, the firm needs to grow to some critical minimum size or scale, at which the firm's unit cost of production is the lowest attainable. This critical minimum size is designated the minimum optimal scale of the firm (7, p. 172), the technically efficient size of the firm.

The relation of concentration to technical efficiency becomes evident by relating the minimum optimal scale of firms within an industry to the total industry size. If the optimal size of the firm is large relative to total industry size, the growth of firms to this technically efficient size will have as its consequence high industry

concentration. That is, for technical efficiency of firms within an industry to be high, each firm may be forced to produce a sizable portion of industry output, thereby resulting in high levels of concentration (7, pp. 180-189).

The actual relation of merger to technical efficiency stems from the fact that merger is one method of firm growth the firm may use to obtain its optimal size. By merger a firm can directly realize multi-plant economies, to the extent that such economies exist, and can obtain, in general, other economies of large firms. A horizontal merger, of course, raises industry concentration, but the increase in concentration may be consistent with greater technical efficiency. The hypothesis may be set forth, therefore, that mergers are related directly to the level of technical efficiency.

The seriousness of the need for public policy regarding merger activity may be indicated by statistical tests of the hypotheses that mergers vary inversely with the level of allocative efficiency, but directly with the level of technical efficiency. If it is assumed that horizontal mergers do increase industry concentration, appropriate, if somewhat indirect, tests of the hypotheses would be possible by relating concentration to the various measures of technical efficiency and allocative efficiency.

Several studies correlating industry concentration to measures of allocative efficiency tend to confirm that a negative relationship exists between the two (21,22,31,36,44,54,91). In direct contrast the scant statistical evidence on firm size, relative to total industry

size, required for technical efficiency does not support a positive
relation between concentration and technical efficiency (7, pp. 197-
199). Thus, the hypothesis that merger activity varies inversely
with the level of allocative efficiency seems more acceptable than
the hypothesis that mergers are directly related to the level of
technical efficiency.

Since merger activity appears more likely to stifle allocative
efficiency than to promote technical efficiency, there is justifica-
tion for some public policy approach to merger activity and its effect
on competition and performance in the American economy. Essentially,
the approach taken may be one of restraining merger activity itself
or of attacking the causes of mergers. Historically, society has
adopted the former route.

In determining the legality of specific mergers, public decision-
makers, or the courts, have relied principally on the market power
of the merging firms. The market power of the merging firms in a
horizontal merger is directly expressed in the share of the market
controlled by each of the firms, and, generally, the courts have
acted to prohibit mergers involving substantial shares of the market
(88). Vertical mergers are scrutinized for the possibility of extend-
ing the market power of the merging firms from one level of production
to another (16,87). Finally, the legal status of conglomerate mergers
has been resolved largely on the opportunity of the merging firms to
use their market power in their respective industries as a means to
withstand losses incurred in the undercutting of the prices of

competitors (33) or to increase sales at the expense of competitors through favoritism in buying and selling (32).

Though economists are in general agreement that market power is directly related to anti-competitive behavior, certain economists feel that the market power doctrine has been applied too stringently in some cases (1,2,15,48) and that in other cases, the market power of the merging firms, not the merger, should be restricted (23,30, 53,78). In particular, the courts have ignored possible economies resulting from small, horizontal mergers and have seemed to be unduly concerned with the market power of mergers involving minimal shares of the market (16,89). In addition several theoreticians have pointed out that vertical mergers, in themselves, are neutral with respect to competition (23,30,53) and that it is the monopoly power of the merging firms, not the merger, that should be curbed. Further, Turner doubts that price-cutting and reciprocal buying and selling even rarely result from conglomerate mergers, which ostensibly increase the likelihood of the two practices (78, pp. 1348-1352). Such practices also depend on the market power of the merging firms, and it is this market power, not the merger, that should be assailed (78, p. 1387).

The afore-mentioned criticisms of antimerger policy have direct relevance primarily in the short run. Judicial decisions generally reflect a long-run view. The courts evidently feel that a mild attitude toward mergers now, even in cases where competition is only minutely affected (small horizontal mergers) or where the effect on competition is not attributable to the merger (vertical and conglomerate

mergers) will in the long run result in concentrated industry structures. To the extent barriers-to-entry prevent new firms from entering an industry to restrain existing firms from acting as monopolists, the close scrutiny currently accorded mergers is warranted.

CHAPTER II. EXPLANATIONS OF EARLIER MERGER MOVEMENTS
AND THE STATE OF MERGER THEORY

Earlier Merger Movements

An investigation of previous periods of high or rising merger
activity is a logical departure point in the analysis of factors
affecting the rate of corporate merger in the period 1951-1966. Such
an investigation may detect factors that were present in all periods
of accelerated merger activity and, thus, indicate the appropriate-
ness of testing the influence of those common factors on corporate
merger activity in 1951-1966. Alternatively, the investigation may
determine that few, if any, factors were common to all or even a
majority of the merger movements, suggesting that a merger movement
may be explainable only by the unique economic environment present
at the time of the movement.

As in any classification process the criteria for selecting a
specific period as one encompassing a "merger movement" as opposed
to a "normal" level of merger activity are necessarily arbitrary.
A basic problem exists in determining the initial and the terminal
dates of each movement. For example, a merger movement may be
depicted as extending from one trough of merger activity to the
following trough, or from peak to peak, or from a trough to the
following peak, or during a period in which merger activity remained
above some "normal" level. While this study recognizes the arbitrari-
ness of designating initial and terminal dates of merger movements,

for the purpose of surveying causes of merger movements the identification of earlier merger movements rests primarily on the determinations made in previous merger studies. A review of merger activity prior to 1950 indicates that, to a great extent, the years of abnormally high, or sharply rising, merger activity are included in the periods which have been termed "merger movements."

An additional difficulty in determining whether merger activity of a certain period constitutes a merger movement lies in the choice of an index of merger activity. The magnitude of merger activity may be described in terms of either the number of firms disappearing by merger or the sizes of firms disappearing by merger (61, p. 36). Conceivably, the two indices could move in different directions from one time period to the next, as was the case between 1905 and 1906 (61, p. 37, Table 14) and between 1907 and 1908 (61, p. 37, Table 14). To indicate the degree to which the two indices moved together, a simple, rank correlation coefficient[1] was computed on the ordering of merger capitalizations, as a measure of firm sizes, and the number of acquired firms in manufacturing and mining for the period 1895-1920. The resulting value of .88 was significant at the 1 percent level, suggesting that either index is a suitable measure of the magnitude of merger activity. Firm disappearances by merger is the measure

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[1]The rank correlation coefficient indicates the degree to which two or more rankings of the same variable correspond to each other (72, pp. 233-234). In this example, merger capitalizations and number of acquired firms represent alternative rankings of the magnitude of merger activity.

chosen in this study, though where the data exist, merger capitaliza-
tions or the asset sizes of the acquiring and the acquired firms are
presented as a supplemental measure.

Data on the number of acquired firms in manufacturing and mining
are presented annually for the years 1887-1966 on page 17 and merger
activity in the period 1895-1966 is graphed on pages 18-20. The first
year for which data on aggregate merger activity have been compiled is
1887, while the terminal year of this study is 1966. The graphical
depiction of merger activity in the period 1895-1966 reveals accelerated
merger activity during the turn of the twentieth century, the 1920's,
the 1940's and the decades of the 1950's and 1960's. The exact initial
and terminal dates of each merger movement, with the exception of the
current movement, have varied from study to study (49,61,93), but no
great exactness is required for ascertaining the factors responsible
for earlier merger movements.

According to Markham, Nelson and Weston, the first merger move-
ment occurred during the periods 1887-1904, 1895-1904 and 1898-1903,
respectively (49, pp. 154-166; 61, pp. 33-70; 93, pp. 31-32). It
would seem appropriate to delete the period 1887-1894, as the annual
number of mergers reported was never larger than 13 according to
Table 2.1. With the exception of the comparatively small decrease
in mergers from 1895 to 1896, the period 1895-1904 includes the years
in which merger activity rose sharply or was high relative to merger
activity in the 1905-1918 period preceding the second merger wave.
The average number of firms acquired annually in the 1895-1904 period

Table 2.1. Number of acquired firms in manufacturing and mining, 1887-1966[a]

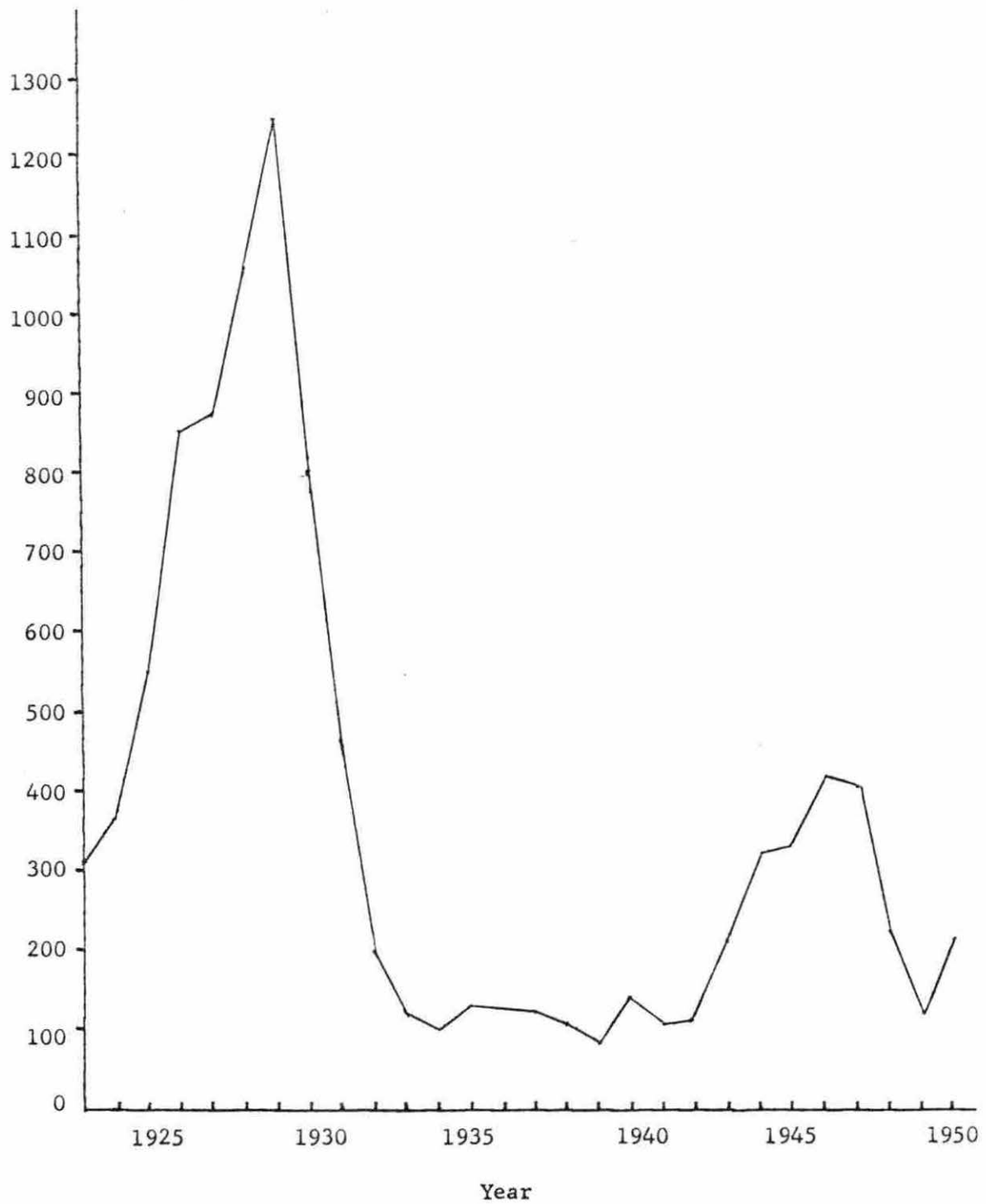| Year	Number of acquired firms	Year	Number of acquired firms
1887	8	1927	870
1888	3	1928	1,058
1889	12	1929	1,245
1890	13	1930	799
1891	17	1931	464
1892	10	1932	203
1893	6	1933	120
1894	4	1934	101
1895	43	1935	130
1896	26	1936	126
1897	69	1937	124
1898	303	1938	110
1899	1,208	1939	87
1900	340	1940	140
1901	423	1941	111
1902	379	1942	118
1903	142	1943	213
1904	79	1944	324
1905	226	1945	333
1906	128	1946	419
1907	87	1947	404
1908	50	1948	223
1909	49	1949	126
1910	142	1950	219
1911	103	1951	235
1912	82	1952	288
1913	85	1953	295
1914	39	1954	387
1915	71	1955	683
1916	117	1956	673
1917	195	1957	585
1918	71	1958	589
1919	438	1959	835
1920	760	1960	844
1921	487	1961	954
1922	309	1962	853
1923	311	1963	861
1924	368	1964	854
1925	554	1965	1,008
1926	856	1966	995

[a] Sources: 1887-1894 (25); 1895-1918 (61, p. 37, Table 14); 1919-1939 (77, pp. 231-234); 1940-1966 (83,57,55).

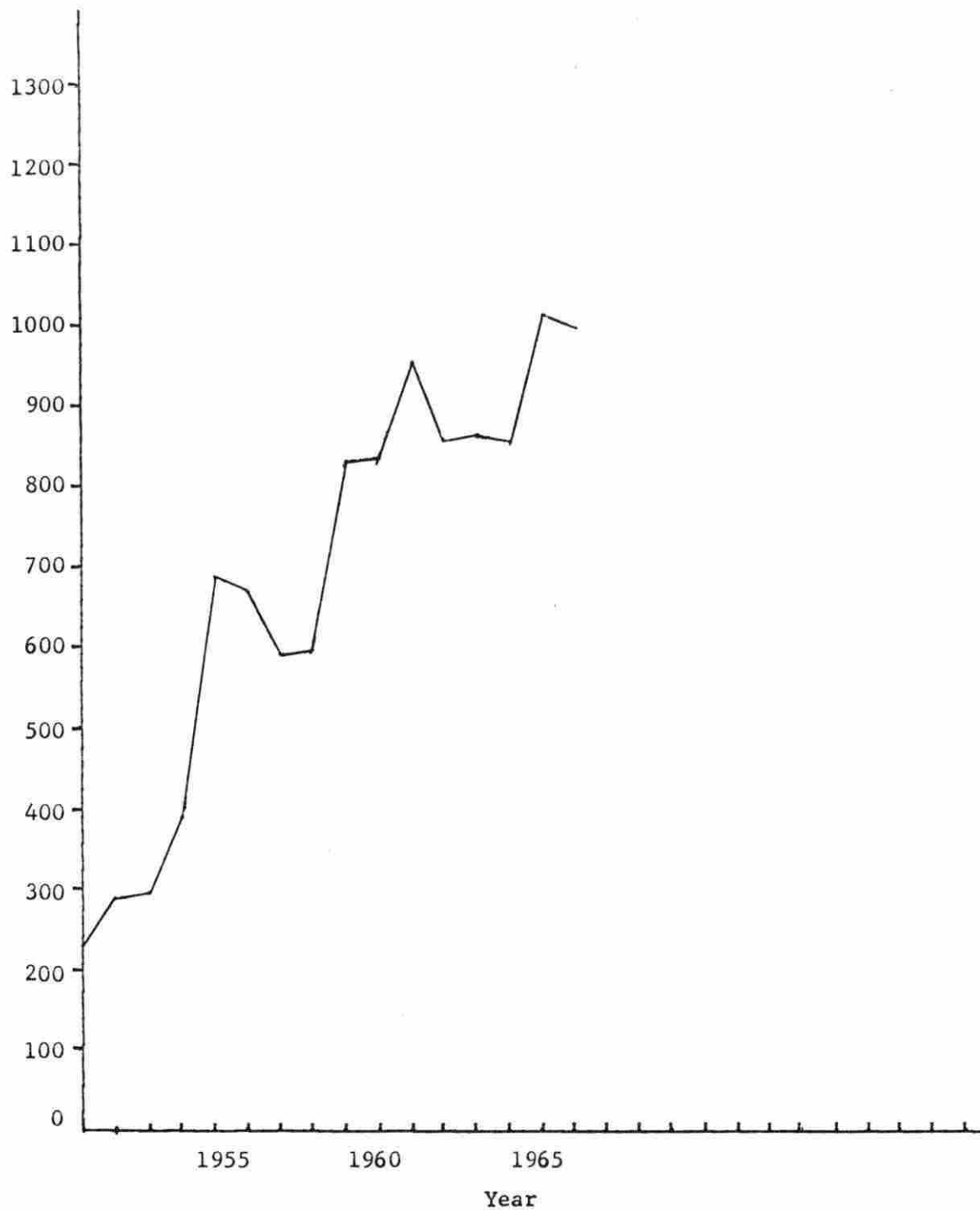Number of acquired firms

Year
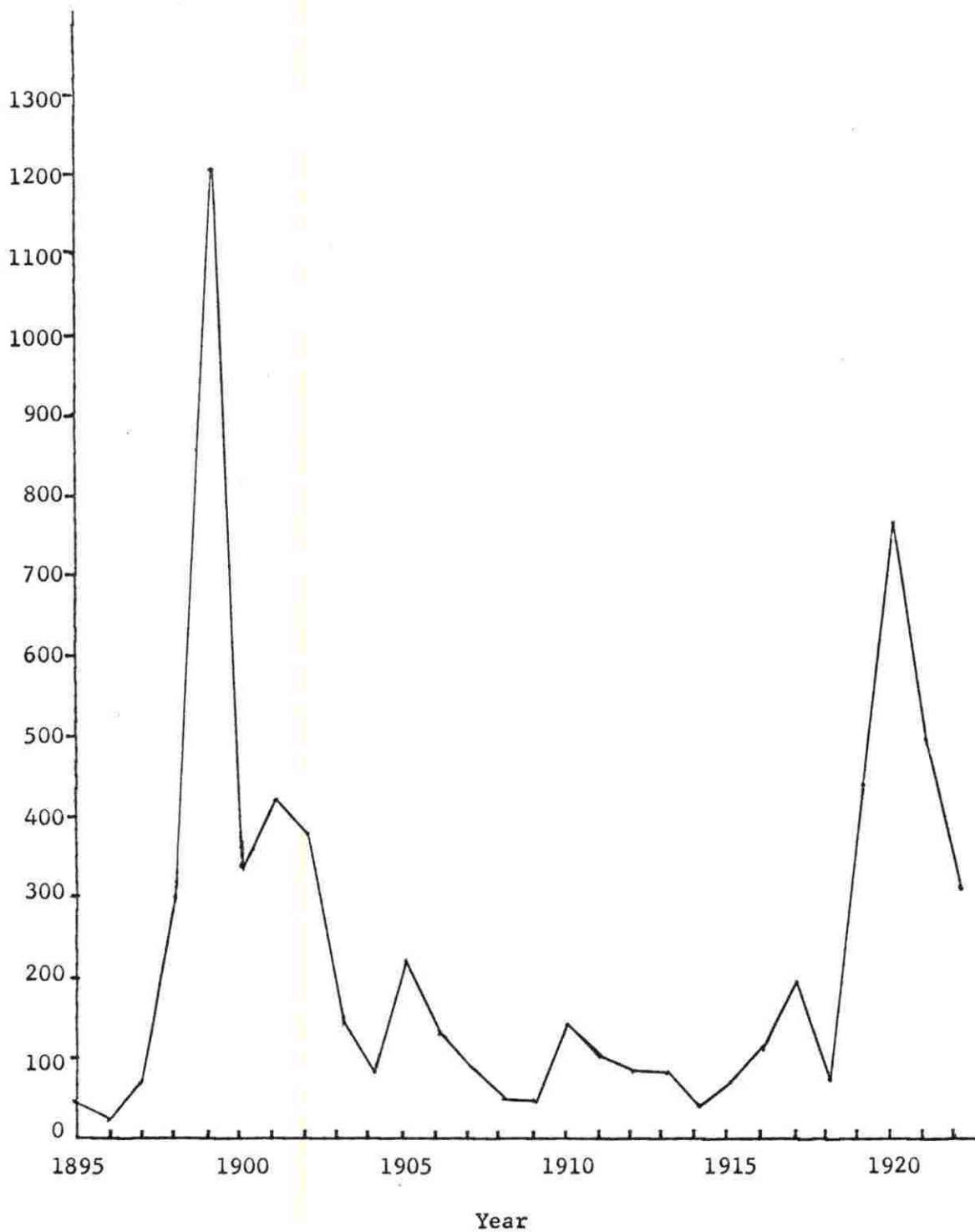
Graph 2.1.   Annual number of acquired firms in manufacturing and
mining, 1895-1966

Number of acquired firms

Year

Graph 2.1.   (Continued)

Number of acquired firms

Graph 2.1. (Continued)

was 301, compared to 100 in 1905-1914 and 113 in 1915-1918; merger

capitalizations were $6,912.7 million in 1895-1904, compared to

$2,207.4 million in 1905-1914 and $1,561.3 million in 1915-1918

(61, p. 37, Table 14). These figures would seem to justify the

designation of 1895-1904 as the period of the first American merger

movement.

As Graph 2.1 shows, merger activity commenced to rise in 1919

and remained above World War I levels until 1932. From Table 2.1

it may be shown that average annual merger activity was 908 in the

period 1919-1930, compared with 153 in the following eleven year

period of 1932-1942. Thus, in comparison with periods both before

and after, merger activity during 1919-1930, according to Markham

(49, pp. 167-173), or 1919-1931, according to Nelson (61, p. 121),

appears to be of sufficient magnitude to be considered a merger

movement.

As demonstrated by Graph 2.1, following the extremely low levels

of merger activity in the 1932-1942 period, merger activity began to

revive during the wartime years. According to Table 2.1, from 213

in 1943, the number of acquired firms rose to a peak of 419 in 1946

and declined to 223 in 1948. The annual average for the entire period

was 319, or nearly double the yearly average in 1932-1942. These

figures suggest the adoption of 1943-1948 as a period constituting

a merger movement, though a graphical comparison of the three defined

merger movements reveals that merger activity in the 1940's did not

achieve the size proportions of the two earlier merger movements.

It may be noted from Graph 2.1 that merger activity in the period 1951-1966 has risen every year with the exception of four years. In terms of the number of firms acquired annually, the magnitude of current merger activity has not yet become as large as the magnitude of the first two merger movements, but present merger activity displays a strong upward trend. Given also changes in the type of mergers and in the sizes of the acquiring firms,[1] it would seem appropriate to term merger activity during 1951-1966 as a merger movement.

Where at all possible, the analysis of causes of accelerated merger activity will be confined to periods which have been designated merger movements in this study. At times, however, it will be necessary to depart from the established periods, primarily because information on the factors associated with various merger movements has been assembled for different time periods.

The early merger movement, 1895-1904

The imprint of the 1895-1904 merger movement on the structure of American industry has yet to be erased. The present-day industrial giants of American Tobacco Company, General Electric Company, United States Rubber Company, United States Steel Corporation, Pittsburgh Plate Glass Company, National Biscuit Company, Eastman Kodak and E. I. du Pont de Nemours Company represent only a few of the

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[1] See pp. 1-2.

multi-million dollar consolidations of the early merger period (85, pp. 23-24). By 1904, 318 trusts controlled over 40 percent of total manufacturing assets in the United States (85, p. 24, footnote 34) and mergers had transformed 71 oligopolistic[1] or atomistic industries into industries in which a single seller dominated (near, or partial, monopolies) (49, p. 168). Thus, the 1895-1904 merger movement laid the foundation for the concentrated industrial structure so widely prevalent in American industry during the twentieth century (61, p. 5).

Though substantial agreement exists about the influence of the early merger movement on industry structure, a variety of explanations, in contrast, has been offered for its occurrence (6,25,51,76,85,90). The explanations considered here consist primarily of those on which data permit some quantitative judgment.

As the formation of many industries dominated by a single seller was attributable to merger, it is tempting to ascribe the motive of market control to mergers of the 1895-1904 period. Stigler, in fact, does describe this period as one of "merger for monopoly" (76, pp. 27-31). The market control motive is difficult, if not impossible, to measure directly, in the sense of determining the precise proportion of merger activity expressly undertaken to gain monopoly control. Yet, in an ex post sense a judgment on the importance of the market

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[1]Oligopolistic industries, sometimes termed "partial monopolies," are industries in which the sellers are so few that each is able to materially affect market price, and in which each is forced to take account of the effect of his pricing and production policies upon similar policies by his competitors (71, p. 232).

control motive may be rendered by determining the share of merger activity that did achieve market control.

Nelson, relying heavily on data from Moody's study (55) found that 48.6 percent, in terms of firm disappearances, and 70.4 percent, in terms of merger capitalizations, of total merger activity in the 1895-1904 period achieved market control (61, pp. 101-102, Table 54). Market control was defined as one firm possessing more than 50 percent of the market (61, p. 101). While it is improbable that all of the mergers that achieved market control were formed solely for that purpose, the findings infer the presence of a fairly strong desire to avoid competition and the promise of monopoly profits as an effective inducement for consolidation (61, p. 103).

In describing the early merger movement as one of "merger for monopoly" (76, p. 27), Stigler paid only secondary attention to the possible effects of other conditions. In contrast, Bain and Weston suggest that these other conditions make up a highly diverse set of circumstances contributing to increases in merger activity at the turn of the twentieth century (76, p. 64; 93, p. 32).

One such circumstance, according to Bain, was the development of a national transportation system at the end of the nineteenth century (6, p. 710). Bain's thesis is that competition was intensified by the continuing growth of the railroad systems, which acted to bring producers, formerly separated geographically, together in direct competition for a single, national market (6, p. 710). Mergers represented a device by which producers could eliminate this increased competition (6, p. 710).

The transportation growth-merger hypothesis implies, among other relationships, that merger activity would occur to a greater extent in industries in which a product's transportation cost was high, rather than low, relative to its price (61, p. 79). That is, an improved transportation system could have only a minute effect on the potential geographic market for products whose transportation costs were previously low. A national market probably already existed for such products. In contrast, the high transportation costs of other products could be expected to be reduced considerably, paving the way for producers' entrances into national markets (61, p. 79). These producers would have an incentive to avoid the intensified competition that would potentially ensue by merging.

To test the relationship that merger activity occurred with greater frequency in high transport-cost industries than in low transport-cost industries, Nelson assigned merger activity, where possible, in the period 1895-1904 to one of two categories: 1) industries with low transportation costs relative to product price; and 2) industries with high transportation costs relative to product price (61, p. 83). The specific, numerical relation of high and low transportation costs to price was undefined. Of the merger activity that clearly fit into either of the two divisions, 57 percent occurred in high transport-cost industries as opposed to 43 percent in low transport-cost industries (61, p. 84, Table 46). This finding tends to confirm the transportation growth-merger hypothesis.

According to Nelson, the transportation growth-merger thesis further implies that in the high transport-cost industries exhibiting merger activity, production would be widely dispersed geographically (61, p. 84). The reasoning is that reduced transportation costs could hardly change the state of competition if producers were concentrated in one small geographic area (geographic concentration of one) (61, p. 84). Nelson, however, failed to recognize that, once geographic concentration became less than one, merger activity could not be expected to become any more frequent with decreases in geographic concentration (29, pp. 94-96). For example, if, within a particular industry, 80 percent of the firms are located remotely from the other 20 percent, there is no reason to expect less merger activity than if the figures were 60 and 40 (29, pp. 94-96). That is, in either instance the firms in each group might have merged among themselves just as well as with firms in the other group (29, pp. 94-96).

This objection to Nelson's logic demonstrates that the thesis does not necessarily imply a negative relation between merger activity and geographical concentration as suggested by Nelson. Hence, Nelson's finding that the association between merger activity and geographical concentration (61, p. 86, Table 14) was positive in the 1895-1904 period appears irrelevant, and, thus, the improvement of the transportation system must tentatively stand as a condition contributing to increased merger activity.

A second circumstance which has been asserted as inducing the early merger movement is the development of the modern corporation

(76, pp. 28,64; 93, p. 82). The liberalization of state incorporation laws in the last two decades of the nineteenth century supposedly effected this development by eliminating several restrictions on mergers (76, p. 28, footnote 14; 93, p. 82). The New Jersey Holding Company Act of 1888 initiated sufficiently severe competition among several states to garner business incorporations that, by 1900, corporations in many states could hold stock in other corporations and merge with other corporations, were allowed to do business outside the state of incorporation, could exchange capital assets for stock without unanimous consent of stockholders, and were permitted high limits on their capitalizations (61, p. 65; 76, p. 28; 93, p. 82).

According to Nelson, observing the distribution of consolidation activity according to both magnitude of capitalizations and industrial variety by state of incorporation in the period 1895-1904 suggests the degree to which consolidation activity responded to changes in the corporation laws of different states (61, p. 66). Nelson found that the eight leading states in the number of incorporations attracted more highly capitalized consolidations and a wider industrial variety of consolidations than did states with a fewer number of incorporations (61, pp. 65-70, Tables 36-40). To Nelson, these two findings indicate that corporation laws permitting freer choice of lines of business and setting higher limits on authorized capitalizations lured many, large consolidations that might have otherwise incorporated in their home states (61, p. 70).

However, Nelson's assertion may be qualified by the fact that it is quite conceivable that the economic environment in states having liberal incorporation laws simply was not conducive to the formation of businesses. A more correct statement about the influence of the development of the modern corporation on the early merger movement would be that the liberalization of incorporation laws permitted merger activity to take place on a greater scale than would have been the case in the absence of such liberalization, but that the relaxation of incorporation laws, in itself, was not a sufficient condition for large-scale merger activity.

The two historical developments of the modern corporation and a national transportation system have been assigned only relatively minor roles by some students in comparison with a third major historical development, that of an organized, large-scale capital market in the latter part of the nineteenth century (49, pp. 162-163,167; 72, p. 492; 93, p. 82). Stigler has advanced the thesis that a large capital market was essential to the marketability of the large securities of the early multi-million dollar consolidations (76, pp. 27-31). To establish the validity of this thesis, it is necessary to determine, first, if the capital market had reached a sufficiently advanced stage to be capable of playing an important role in the early merger movement and, second, if, in fact, the consolidations of this early merger period used, to any great extent, the capital market to market their securities.

Some indication of the development of the capital market at the time of the first merger movement may be gained by viewing the growth of the New York Stock Exchange (61, p. 90). From the end of the Civil War until the mid-1890's the number of stock issues listed rose almost every year, thus increasing the "breadth" of the capital market (61, p. 90). From 1895 to 1904 the number of listed issues remained practically constant in contrast to the sharp rise in trading activity; that is, the market for the average issue deepened (61, p. 91). Nelson concludes that the "breadth" and "depth" of the capital market had increased, by the late 1890's, by a degree great enough to enable the capital market to play an important role in the 1895-1904 merger movement (61, p. 91).

Next to be examined is the degree to which the merging firms utilized the organized securities markets in marketing their securities issues. This question can be answered either directly or indirectly. Directly, the estimated proportion of all 1897-1902 consolidations whose stocks were traded on the New York Stock Exchange in the three years following the time of consolidation was 64.3 percent in terms of capitalizations (61, p. 92, Table 50). Further, this estimate is a minimum proportion of consolidation activity that utilized all securities markets because securities traded on the unlisted securities markets and on minor organized exchanges were excluded (61, p. 93).

An indirect demonstration of the degree to which the early consolidations employed the securities markets to market their

securities issues may be noted by ascertaining the importance of the sale of industrial securities to the general public for cash in the 1898-1902 period (61, p. 93). The finding would indicate the role of the securities exchanges in selling new issues generally and, by inference, in marketing consolidation issues since consolidation issues predominated among new securities issues of the 1898-1902 period (61, p. 93). If, during a merger boom, cash sales of securities to the public increased relative to the amount of stock exchanged for the securities and assets of other companies, the organized securities market would appear to facilitate the increased merger activity (61, pp. 93-94). In fact, a comparison of the 1903-1907 period of low merger activity with the 1898-1902 period of peak merger activity reveals that cash issues of stock did increase relative to stock exchanged for other companies assets or securities (61, p. 94, Table 51), suggesting that the use of organized exchanges to effect cash sales of stock served to enhance the marketability of consolidation issues and, thus, the likelihood of consolidation.

A second thesis about the role of the capital market in the early merger movement, 1895-1904, is that an organized capital market provided a medium by which promoters of mergers could gather the financial power needed to induce independent firms to consolidate (49, pp. 162-163; 61, p. 89). Supposedly, the act of consolidation afforded promoters and participating entrepreneurs an opportunity to market new securities against the same assets because the dis- counted values of expected future earnings of the combined enterprises

frequently exceeded the existing book value of assets (49, p. 163). The promoter of a merger had an incentive to inflate the value of expected future earnings because doing so would increase his profits, or the difference between the old and new asset valuations (49, p. 163). Thus, proponents of the thesis would argue that promotional profits were a dominant motive for merger in the 1895-1904 period.

As in measuring the market control motive, it is difficult, if not impossible, to assess directly the importance of promotional profits in inducing mergers in the 1895-1904 period. Even if a direct appraisal were possible, it must be remembered that some promotion is required for most mergers, if only to ameliorate differences among the participating industrialists about the operation or management of the combined firms. Further, to the extent that the motive behind a particular merger rests on the opportunity to gain monopoly profits or to achieve reduced costs in operation or any other sound economic base, the potential for promoter's profits deserves less consideration than otherwise as an inducement to merger.

Nonetheless, a judgment, however tenuous, of an ex post nature may be made of the promoter's role in the early merger movement by determining the failure rate among these early mergers. Ostensibly, mergers based on the chance to gain market control, reduced costs of operation, or some other "real" profit would be more likely to succeed than would mergers formed solely on the basis of promotional considerations. The studies of Dewing, Livermore and the National

Industrial Conference Board all attest to a relatively high incidence
of failure, ranging from 47 percent to 85 percent, among early mergers
(49, pp. 164-165; 59, pp. 28-119). Markham infers that promotional
profits were likely the dominant motive in the formation of mergers
that failed, while the profitable mergers probably were founded to a
great extent on the very real possibilities of market dominance and
economies of consolidation (49, p. 163). It must be added, however,
that there may be and likely are other variables, such as business
conditions, affecting the success or failure of mergers.

Regardless of the motives of promoters in forming mergers, their
task would require less effort to the degree that conditions exist to
1) ease the difficulty of financing mergers and 2) enhance the profit
potential of mergers. It would seem that rising securities demand,
as reflected by rising securities price in the 1895-1904 period
(61, p. 164, Table C-7) would insure a market for the typically large
stock issues of the multi-million dollar consolidations of this period.
In addition, the business prosperity of the 1890's and early 1900's
(61, p. 164, Table C-7) would be expected to increase, more than
decrease, the prospects for a merger's profitability (49, pp. 46-54;
90, p. 35).

Nelson has statistically tested the relation of business and
capital market conditions to merger activity for the period 1895-
1904 (61, pp. 119-120). There was significant correlation at the
5 percent level of significance between merger activity and industrial
stock prices, but no significant correlation between merger activity

and industrial production (61, p. 95, Table 52). The findings tend
to confirm that a thriving capital market was conducive to the
large-scale merger activity that occurred at the turn of the twentieth
century and that the effect of business conditions was only minimal,
if present at all.

In summary, almost all of the explanations of the 1895-1904
merger movement considered in this study appear to have some statistical
basis. There is evidence to indicate that the motive of market
control, the developments of a national transportation system and
the modern corporation, and conditions in the capital market all were
responsible to some degree for the 1895-1904 merger movement.

The 1919-1930 merger movement

The size of the 1919-1930 merger movement as measured by the
total number of acquired firms was over three times that of the 1895-
1904 merger movement. While approximately 3,000 firms were acquired
in the 1895-1904 period, about 11,000 firms were involved in mergers
during 1919-1930. Yet, the effect of the second merger movement on
the structure of, and competition in, American industry was not nearly
as pronounced or necessarily as detrimental as its size would suggest.
The characteristics of the movement which explain this unexpected
result are to some degree related to factors which may have prompted
the 1919-1930 merger movement.

One of the characteristics responsible for retarding the move-
ment's effect on competition is that public utility firms and banking
concerns accounted for 24 percent and 9 percent, respectively, of the

acquired firms in 1919-1930 (49, p. 168, Table 5). That is, one-third of the 1919-1930 mergers occurred in industries regulated to some degree by public authority, or where competition was not expected to operate (49, p. 169). Hence, the monopoly motive would appear in-applicable to at least one-third of the mergers in the 1919-1930 period.

Stigler, however, felt that many mergers transformed industries dominated by a single firm into oligopolies and was led to characterize the period as one of "merger for oligopoly" (76, p. 31). As examples, he cites the cement, can, petroleum, automobiles, agricultural imple-ments and glass industries (76, p. 31). Supposedly, though the number of firms was reduced through merger, mergers enabled many firms to strengthen their competitive position against the industry leader (49, p. 168).

The examples are, of course, of an ex post nature, since it remains unknown the number of mergers undertaken precisely to allow for more effective competition against the industry leader. Further, the extent to which oligopolies arose by the merger route in the 1920's may be overstated. Of 22 oligopolistic industries studied by Weston, only nine, or less than half, sprang up by merger (93, p. 64).

A second characteristic which undoubtedly acted to restrain the movement's effect on industry structure deals with the ratio of firm disappearances during the movement to the total number of firms in operation for several industrial groups (49, p. 169). Using rather

broad industrial groups, Markham found that in only two of six manu-
facturing and mining industry groups was the proportion of firm dis-
appearances in the 1919-1930 period relative to the total number of
firms operating in 1929 greater than 2 percent (49, p. 168, Table 5).
It would be expected that as mergers occurred with greater frequency
between firms within the same industries than between firms in
different industries, the proportion would increase. Thus, the low
ratios that actually prevailed would seem to indicate that mergers
were formed across industry lines more often than within industries.
If merger activity were of this nature, evidently the 1919-1930
mergers were primarily vertical and conglomerate in type (49, pp.
170-171) and could have hardly affected industry structure directly.
The implication of this finding is that motives associated with
vertical and conglomerate mergers may have induced, to some degree,
the second merger movement. Apparently, firms wanted to obtain the
technical gains of vertical integration, to reduce their dependence
on other firms for inputs and to achieve cost reductions by consolidat-
ing sales, distribution and advertising organizations (49, p. 210;
90, p. 61; 93, p. 83).

Though the desires of firms to merge for oligopoly and to gather
the economic benefits of vertical and conglomerate mergers may have
accounted for some of the 1919-1930 mergers, Markham, Thorp and
Weston have assigned some emphasis to the professional promoter in
inspiring the second merger movement (49, p. 173; 77, pp. 85-86;
93, p. 83). As mentioned in the examination of the promoter's role

in the first merger movement, it is difficult to differentiate between promotion based on the opportunity for some "real" gain through merger and promotion based solely on the possibility of promoter's profits. Yet, certainly the business prosperity and the rising securities prices of the 1920's (61, p. 166, Table C-7) made promotion easier than would have been the case in their absence.

Statistically, conditions of business and the capital market appear to have been important factors in the second merger movement. For the period 1919-1931, Nelson found a significant correlation at the 5 percent level between merger activity and both industrial production and stock prices (61, p. 118, Table 60).

Summarily, the available evidence is consistent with ascribing some influence to the motive of oligopoly, of gains from vertical and conglomerate mergers and of promoters' profits in prompting the 1919-1930 merger movement.

The 1943-1948 merger movement

The explanations offered here of the 1943-1948 merger movement are not of the large-scale merger activity which occurred at the turn of the twentieth century and in the 1920's. As Graph 2.1 on pages 18-20 clearly reveals, the 1943-1948 merger movement did not achieve the size proportions of the first two merger movements. This disparity in size between the 1943-1948 merger movement and both of the earlier merger waves is important to note for it suggests that conditions associated with the earlier merger movements may not have been present to the same degree, if at all, during the 1943-1948 period.

In itself the relatively small magnitude, in terms of number of acquired firms of the 1943-1948 merger movement would discourage attributing the movement to the traditional motive of market control. Also, the merger activity of the 1940's displays other properties which appear to be inconsistent with the market control motive.

One of the properties concerns the distribution of the acquired and the acquiring firms by size classes. The relevant information is not explicitly available for the 1943-1948 period, but the Federal Trade Commission's study of the 1940-1947 mergers would seem to permit a sufficiently reliable degree of generalization about the 1943-1948 mergers. The Commission found "that fully 93 percent of all the firms bought out in the 1940-1947 period held assets of less than $5 million, and 71 percent had less than $1 million of assets" (36, p. 28). Table 2.2 below further illustrates that over 60 percent

Table 2.2. Size of acquiring and acquired concerns, 1940-1947[a]

Size class ($ million of assets)	Acquisitions made by acquiring concerns	Concerns acquired
Under $1	239	1,468
$1 - $4	365	455
$5 - $9	264	58
$10 - $49	590	66
Over $49	604	15
	2,062	2,062

[a]Source: (85, p. 176, Table 47).

of all acquisitions were made by firms with assets greater than $10 million. Presumably, the desire to increase market power would have

been reflected to a greater extent by large firms merging with large firms, rather than with small firms as the data indicate. In fact, no mergers occurred between firms, each with assets of over $100 million, and only one took place between firms, each with assets greater than $50 million (22, p. 47).

An additional property of the 1940's merger movement that serves to further refute attempts to accredit the movement to a drive for monopoly pertains to the economic relationship between the merging firms. A crude inference about this relationship can be made by relating the number of firm disappearances through merger to the number of firms in operation for various industries. Again, the pertinent information has been assembled only for the period 1940-1947. Markham estimates that in 13 of 14 manufacturing industries the ratio of firm disappearances in 1940-1947 to the number of firms in operation in 1947 was less than 4 percent (49, p. 175, Table 6). Usually, the ratio would be expected to increase as mergers occurred to a greater extent between firms in the same industries than between firms in different industries. The low ratio found in almost all industries (49, p. 175, Table 6) suggests that horizontal merger activity was not very extensive. Ostensibly, the goal of market control would be more readily achieved by horizontal merger than other types. Thus, the relatively small number of acquired firms, the preponderance of acquisitions of small firms by larger firms, and the relatively infrequent horizontal merger activity all intimate that merger activity in the 1940's did not have as its aim market control (49, p. 179).

The obverse inference that may be drawn from the low percentage of firm disappearances to total firms in operation for most industries is that a large proportion of merger activity in the 1940's was vertical and conglomerate in nature. Again, as in the 1920's, the logical implication is that the merging firms desired to gain the economic benefits of vertical and conglomerate mergers. Some evidence on the actual frequency of this motive is available from the Butters-Lintner study of 1940-1949 mergers (17,18). Their field survey of over 100 mergers showed that approximately one-third of those acquisitions were made to achieve a greater degree of vertical integration (18, p. 378) and that over half represented attempts to reduce cyclical fluctuations in business by adding a new product (18, p. 376).

Inasmuch as the merger movements of 1895-1904 and 1919-1930 were associated to a large extent with a thriving capital market and occurred during business prosperity, it would seem appropriate to examine the correlation of merger activity in the 1940's with movements in industrial production and stock prices. Nelson determined there was significant positive correlation at the 5 percent level between mergers and stock prices, but none between mergers and industrial production, for the period 1943-1954 (61, p. 118, Table 60). For the period 1943-1948, where merger activity was substantially greater than that during the subsequent six-year period 1949-1954, correlations were computed using Nelson's quarterly data series of the three variables as presented in Table 2.3 on page 40. The results

obtained differed from Nelson's in that merger activity did not appear
to be significantly related, at the 5 percent level, to either industrial
production or stock prices for the period 1943-1948. Apparently, the
association between movements in merger activity and movements in

Table 2.3. Firm disappearances, stock prices and industrial produc-
tion (1947-1949) = 100), by quarters, 1943-1948[a]

Year	Quarter	Disappearances	Stock prices	Industrial production
1943	1	50	127.6	123
	2	50	138.1	127
	3	51	138.8	129
	4	59	135.3	130
1944	1	78	137.3	129
	2	85	140.6	126
	3	84	146.7	123
	4	78	148.0	123
1945	1	68	155.9	125
	2	60	164.3	119
	3	84	169.9	100
	4	109	188.9	87
1946	1	108	196.4	85
	2	146	205.4	87
	3	114	190.5	93
	4	65	170.5	96
1947	1	112	178.1	99
	2	104	171.2	99
	3	87	180.5	99
	4	102	180.5	102
1948	1	67	172.6	103
	2	59	185.6	103
	3	53	182.8	104
	4	44	180.4	104

[a]Source: (61, p. 168, Table C-7).

stock prices during the period 1943-1954 was not present in the same
degree during the sub-period 1943-1948.

The lack of a significant relation between merger activity and stock prices for the 1943-1948 period appears to be consistent, or at least does not conflict with, the suggestion made by Butters and Lintner and Weston that the low prices of securities in relation to earning levels prompted many firms to acquire, by stock purchase, other firms instead of constructing plants (17, p. 77; 93, pp. 81,84). That is, depressed stock prices tended to stimulate mergers because buyers could acquire assets at a lower cost by purchasing another company, than by building the facilities themselves.

According to Weston, an additional variable that appears to have been a dominant force in merger activity of 1940's, especially of the peak years 1943-1948, was the extremely high level of taxation (85, p. 84). Butters and Lintner have explained the role of taxes in motivating mergers and examined the extent to which taxes may have induced merger activity during the 1940's (20,21).

The federal tax structure exerted pressure on the owners of closely held businesses to sell out or merge with large companies in two ways. First, the owner may have lessened the impact of paying the federal estate tax on his heirs by selling the business (17, p. 70), even though the amount of the tax remained constant. If owners of closely held businesses are to pass their holdings on to their heirs, they must accumulate large amounts of liquid assets in order to provide for the payment of their estate tax and for their other liquidity needs (20, p. 72). The heavy taxation, including the personal and corporate income tax, of liquid assets during the war made accumulation

of such assets costly and exerted some pressure on owners to seek
other means of providing for the estate tax (17, p. 72). By selling
the stock in their businesses, owners relieved, to some degree, the
burden placed on heirs of paying the estate tax (17, p. 70).

Second, the sale enabled the owners of closely held businesses
to take their profits out of the business by the capital gains route
(20, p. 70). The gains from such sales were, in general, long-term
capital gains, and were taxed at a maximum rate of 25 percent (17,
p. 72). If the funds were taken out of the business as dividends,
they could be taxed twice, once at the corporate level as earnings,
and once again as dividends, at the personal income tax rates, which
were as high as 82 percent, under the 1948 Revenue Act (17, p. 73).

The Butters-Lintner field survey of over 100 mergers from 1940
to 1949 provides some indication of the extent to which taxes were
a motivation for the sale of companies (17,18). Taxes appeared to
be a major consideration in the sale of 10 percent of all companies
sold and 25 percent of all companies with assets greater than $1
million (18, p. 366). The 10 percent accounted for 25 percent of
the assets of all companies sold and 33 percent of the assets of all
acquired companies with assets greater than $1 million (18, p. 366).
Unsurprisingly, taxes were relatively more important in the sale of
large companies than small companies (18, p. 366).

In summary, the 1943-1948 merger movement does not appear to
have reflected attempts by business firms to gain market control.
Instead the objectives of acquiring firms seem to have been the

achievement of a more substantial degree of vertical integration and diversification, while tax considerations were of some influence in motivating the sale of firms. Further, the relatively low securities prices prevailing in the stock market created an environment conducive to the satisfaction of these objectives.

The State of Merger Theory

The magnitude of merger activity has been subject to wide fluctuations and the foregoing analysis has attempted to explain why those fluctuations, commonly termed "merger movements," occurred when they did. Yet, between the occurrences of merger movements some "minimal" or "normal" level of merger activity has been maintained. Thus, it appears that pressures are exerted at all times on firms to participate in mergers and that in some periods conditions exist which are especially conducive to merger activity. Merger theory examines the "normal" pressure on firms to grow by merger instead of by internal expansion.

Model of the firm: goals

A theory that purports to explain the economic behavior of decision-making units is necessarily built upon some premise about the goals of decision-makers. For example, the premise of the theory of consumer behavior is that consumers act to maximize satisfaction (35, pp. 26-42). The theory of pricing and production postulates that firms act to maximize profits (35, pp. 189-297). This study assumes that long-run profit maximization guides the firm's endeavors in merger activity.

The approach to the theory of the firm adopted by this study treats the business firm as an organization designed to implement the economic objectives of an individual or group who are both its owners and managers (9, p. 238). At the time of Marshall, when the traditional theory of the firm was first synthesized (51, pp. 323-503), owner-managed firms were probably the dominant form of business enterprise, in terms of both numbers and asset control (27, p. 221). In general, the traditional theory of the firm and its profit maximization assumption seemed sufficiently realistic to explain the actual behavior of most business firms in the nineteenth and early twentieth centuries (27, p. 222).

In recent years there has emerged a growing dissatisfaction with this earlier concept of the business firm (9,11,27,45,50). The traditional theory has been criticized for the inapplicability of its profit maximization assumption to the behavior of firms in which management is separate from ownership (27, p. 221; 11, pp. 33-37). It is held that the traditional theory fails to account for the differing motives of managers and owners (50, pp. 185-186).

The primary source of present dissatisfaction with the traditional theory is the shift from ownership control to management control of corporate decision-making that has occurred within the twentieth century (9). Though data have not been compiled on changes in the distribution of all corporations by type of control, evidence on changes in the type of control within the 200 largest non-financial corporations does permit, by inference, a generalization about the

extent of management control over all corporate behavior. The 1929 study of Berle and Means (12) disclosed that management control existed in 44 percent of the 200 largest non-financial corporations and ruled over 58 percent of the total assets of the 200 corporations (12, p. 115). Larner's 1963 study (47) yielded comparable figures of 84 percent and 85 percent (47, p. 783, Table 2). Clearly, within the large corporation the separation of management and ownership has grown extensively. Further, from Bain's estimate that the 200 largest non-financial corporations account for 55 percent of all non-financial corporate assets (7, p. 87), it may be inferred that the objectives of managers who are not necessarily owners guide the use of a large percentage of the productive capacity of the American economy.

Whether this movement toward a management-controlled economy necessitates a drastic revision of the theory of the firm depends on whether management objectives do, in fact, differ markedly from the objectives of owners. Critics of the traditional theory argue that managers desire prestige, power and salary (9, p. 248; 50, pp. 186-187), and that these elements increase with the size of the firm (50, p. 186). Hence, the rational goal of managers is to maximize growth (50, p. 188). On the other hand, if owners, as stockholders, desire to receive the largest possible dividend, their objective would be to maximize profits (65, p. 18).

The traditional theorists, even if they admit the shortcomings of their theory, remain unconvinced of the superiority of a managerial theory of the firm (9,35,65). Ferguson states ". . . the assumption

of profit maximization is the only one providing a general theory of firms, markets and resource allocation that is successful both in explaining and predicting business behavior" (35, p. 191). Baldwin contends ". . . that profit maximization is a fairly close approximation to the actual motives of the typical large corporation . . ." (9, p. 254).

Actually, even if the manager's objective is growth maximization, it need not conflict with the owner's goal of profit maximization. As profits are the main source of funds for growth, the maximization of growth would entail the maximization of profits (64, pp. 29-30; 65, p. 11). Nelson and Penrose both argue that differences among long-run goals of the firm, such as growth maximization and profit maximization, are largely a choice of words (58, p. 61; 64, p. 30). Further, the policies of "target return pricing" and "sales maximization" that ostensibly are pursued by growth-oriented managers may be consistent with long-run profit maximization (9, p. 241; 65, p. 12).

Model of the firm: growth

Merger and internal expansion are the two forms of firm growth. The forces that lead to a choice between merger and internal expansion as a method of growth can best be understood in the context of firm growth itself. That is, an inquiry into the nature of the growth process itself and a recognition of the inducements for, and restraints on, firm growth may facilitate an understanding about the firm's preference for a specific method of growth.

In addition to profit maximization, models of firm growth usually assume that the supplies of capital, labor and management are not fixed and that opportunities for profitable investments exist somewhere in the economy (64, p. 43). The effect of these two assumptions is to assure that the resources required for growth are available, if the firm is willing to pay the price for them, and that there exists a profitable use of the resources.

In firm growth models, the firm is usually conceived of as a pool of productive resources which management allocates among the functional activities of the firm (58, p. 61; 64, p. 24). Robinson has categorized the firm's functional activities into five major groups: 1) technical production activities, 2) marketing activities, 3) managerial activities, 4) financial activities and 5) risk-absorption activities (68, pp. 10-93). For each functional activity there is an optimum (lowest cost) level of the activity, and when all activities are functioning simultaneously at optimum levels, the firm is producing at the optimum firm scale in that the firm enjoys the lowest average total cost of production per unit (58, p. 61; 68, p. 95).

Management's task is to "reconcile," through resource allocation and in accordance with profit maximization, the optimal levels of the firm's functional activities in order to achieve the optimum firm scale (58, p. 64; 64, pp. 67-68). An adjustment of the various optima of the firm is necessary because it is unlikely ". . . that all the functions of the firm reach their optimum size at one and the same total output of product" (68, p. 94). For example, the optimum

technical production unit might be represented by X units of output, while the optimum marketing unit would require that X + 100 units of output be produced. Thus, production at scale X would not allow marketing economies to be fully realized. Stated differently, at a scale of X + 100 units of output the marketing activity would contain "excess capacity" (58, p. 63) or "unused resources" (64, pp. 65-74) in that the same amount of marketing resources could be employed in marketing additional product.

According to Penrose and Narver, growth is the response that occurs when management attempts to resolve the imbalances in the scale of production that may exist among the various optima of the firm (58, p. 63; 64, pp. 65-74). In the example above it would be possible to utilize marketing resources more fully by increasing the size of the technical production unit. This increase in size is termed growth. Thus, growth, as perceived by Narver and Penrose, is a likely result of the existence of excess capacity or incomplete utilization of resources (58, p. 64; 64, pp. 65-74).

Penrose's theory implies that growth would cease once excess capacity disappeared or complete utilization of resources was obtained. However, several factors act to create excess capacity at various times. One such factor, internal to the firm, is resource indivisibility (64, pp. 68-70). Assume, for example, that the resources required to effect an increase in the size of the technical production activity are available only in distinct, separate units, and assume, also, that one unit of the technical production resources would

increase the size of the technical production activity by 200 units of output. Using the above illustration on the imbalance of the marketing and technical production optima, it is apparent that the addition of one unit of the technical production resource results in a level of the technical production activity which is larger, by 100 units of output, than that of the optimum marketing unit. Excess capacity has occurred in technical production because resources were not divisible to the point where just 100 units of output could be added to technical production capacity. Management now has an incentive to increase the scale of its marketing activities in order to utilize fully technical production resources. Further, if marketing resources are not completely divisible, the new level of marketing capacity may be greater than that of technical production, and, once more, excess capacity would exist in the marketing unit.

Among the external factors creating excess capacity are a growing demand for products, changes in the supply of inputs, changes in technology and developments in management techniques (64, p. 65). Each of these factors may cause imbalances among the various optima of the firm and induce growth (85, p. 63).

There is not complete agreement that growth management will be terminated when resources are fully utilized, as implied by Penrose's theory (10). Barton argues that growth still might occur even if the firm had arrived at the optimum firm scale (10, p. 368). Regardless of whether the firm contained any unused resources, expansion would be profitable if the expected marginal rate of profit were greater than the marginal cost of capital (10, p. 368).

If the assumptions of the growth model are relaxed, it may be seen that in reality obstacles to growth exist. First, the resources of labor, capital and management may not be readily available at the price the firm is willing to pay for them (64, p. 43). Second, there may exist a lack of opportunities for profitable investment (64, p. 43). To some degree, this second limit to growth is related to the factors considered by management as affecting an investment's profit potential. For instance, management may be concerned with the market competition that may be faced in expansion or with risk and uncertainty involved in expansion (64, pp. 43-64).

Growth by merger

This study assumes that management's choice of the method of firm growth is guided by profit maximization. In accordance with profit maximization, management would consider factors such as the speed, cost and uncertainty of growth as well as other factors affecting the profitability of growth in determining the method of firm growth. _Ceteris paribus_, it would be expected that management would prefer less costly growth to more costly growth, faster growth to slower growth, growth with less uncertainty of loss to more uncertainty and growth with less restraints to more restraints. The question becomes, then, does merger have an advantage over internal growth with regard to the above factors?

First, under certain conditions growth by merger _may_ be secured with less money outlay by purchasing the stock of an existing company

rather than constructing the desired facilities and hiring new personnel to operate the facilities (93, p. 74). According to Butters and Lintner, it would be possible to obtain savings in money cost if the stock of the to-be-acquired firm is selling below the replacement cost[1] of that firm's assets (17, p. 76). Such a situation might arise if buyers and sellers of the stock underestimate the earning capacity of the firm. An additional money savings may result by hiring the acquired firm's personnel at their present prices rather than being forced to suffer the costs of recruiting new personnel and to compensate the recruited personnel, as might be the case in internal expansion (64, p. 127).

Second, growth by merger may often be more quickly accomplished than internal growth (93, p. 74). Internal expansion requires that time be expended in the construction of plants and the search for personnel to operate the facilities (58, p. 70; 64, p. 127), while the plants and personnel are already available in growth by merger. Of course, a merger does consume time in locating a firm that fits the acquiring firm's needs and gaining the approval of the merging companies' stockholders (60, p. 59), but it seems unlikely that the time involved would be as great as that in internal expansion.

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[1]Replacement cost is the value of a corporation's capital assets "as determined by the cost of replacing equipment with new models and designs capable of performing operations identical to those performed by the old equipment" (100, p. 276).

Third, growth by merger may be accomplished with less uncertainty of investment loss than internal growth (24, p. 23; 41, p. 122). That is, the acquired firm may have already demonstrated its revenue-yielding capacity, while no such certainty about the return from investment in internal expansion exists (93, p. 74). It may be expected, however, that the price of such a firm would reflect its earning power, and, hence, it might be more profitable to expand internally than to purchase that firm.

Fourth, growth by merger, accomplished through an exchange of stock, may be more easily financed than internal growth (64, p. 70). The financing of internal growth may require a public sale of the firm's stock. It is possible that owners of a firm which is a likely object of acquisition would be more willing to accept an acquiring firm's stock in payment than would investors in a public sale of stock of the firm contemplating growth (93, p. 74). Such a situation might occur if higher risk were attached to internal growth.

Fifth, growth by merger may avoid the intensified competition that may result from internal expansion (93, pp. 74-75). Merger, unlike internal growth, does not add capacity to the market and, thus, avoids exerting any downward pressure on prices (17, pp. 77-78; 43, p. 554). If the desire to avoid competition is extended further to include a drive for market control, it is apparent that market control may be achieved with less effort through merger than internal expansion (93, p. 75).

CHAPTER III.   STATEMENT OF HYPOTHESES

Introduction

As stated in the introductory chapter, the purpose of this study
is to relate movements in specific economic variables to the rate of
corporate merger in accordance with the study's central hypothesis
that business, capital market and growth conditions have influenced
the rate of corporate merger in American manufacturing during the
period 1951-1966. Much, if not all, of the basis for this central
hypothesis is to be found in the survey of explanations of earlier
merger movements and the examination of merger theory.[1] Specifically,
the review of explanations of earlier merger movements indicates that
periods of rising merger activity have usually occurred in times of
business prosperity and favorable financial markets.[2] In addition,
merger theory suggests that large-scale merger activity can be ex-
pected to develop during periods in which conditions are particularly
conducive to business expansion.[3]

A complete statement of hypotheses about factors affecting merger
activity would reflect the motivations of both the acquiring firm
and the acquired firm in merging. However, the hypotheses of this
study are set forth from the viewpoint of only the acquiring firm.
That is, no hypothesis is specifically suggested about the role of the

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[1]See pp. 22-43.

[2]See pp. 32-33,36,39-41.

[3]See pp. 43-52.

acquired firm's incentives for merger in the 1951-1966 merger movement. Such incentives of the acquired firm may arise from tax, management and investment considerations (18, pp. 368-374). These factors are difficult, although not impossible, to quantify for a statistical analysis; a descriptive analysis has been made of their effects on merger activity (17,18).

Probably a more serious complication than the effects of seller motivations in describing the time pattern of merger activity is accounting for the interval of time required to effect merger decisions. Though time also elapses between decisions to expand internally and the actual internal expansion, the time element involved in merger expansion is somewhat different. Internal expansion may be arranged fairly quickly in that contract awards for plant construction and orders for machinery may follow closely a firm's decision to expand, and, yet, considerable time may pass before plant construction is complete and the facilities are operable (60, p. 59; 61, p. 107). In contrast, the arrangement of mergers consumes time in gaining approval from stockholders of merging companies and authorization for corporate charter changes from state commissions, but once these barriers are overcome, the plant facilities are immediately operable (60, p. 59; 61, p. 107).

The resources available for this study rule out any attempt to determine the time lag of merger consummations behind merger decisions, but an attempt is made to take account of possible time lags in the response of merger activity to movements in specific

economic variables. A lagged response may occur for at least two reasons: 1) firm decision-makers may not be immediately aware of changes in economic conditions that would ordinarily be considered conducive to growth by merger, or, stated differently, firm decision-makers may lack complete or perfect knowledge of environmental changes that would be expected to result in increased merger activity; and 2) firm decision-makers, even if they possess perfect knowledge, may require a prolonged and sustained period of conditions considered favorable to growth by merger before embarking on merger activity simply to insure that such conditions are not temporary. The possibility of time lags suggests that relationships hypothesized between merger activity and the economic variables be expressed in terms of unit time periods, for example, t_1, t_2, ..., t_n. Further, since merger data could be obtained only on an annual basis, it is necessary to assume a unit time period is one year in length.

Finally, limited resources prevent a case-by-case approach to the problem of determining the economic environment conducive to merger activity. While an examination of mergers individually could be expected to determine particular and immediate factors affecting the timing of mergers, case studies of all or even a majority of the mergers in the 1951-1966 period would require a large quantity of financial and time resources. If relatively few mergers were examined, generalization of findings based on a few cases would be tenuous. Further, the use of a case-by-case approach may blind the researcher to major economic conditions affecting the entire economy.

Therefore, this study adopts an aggregate approach to the problem
of ascertaining the major economic forces responsible for, or correlated
with, the 1951-1966 merger movement. The aggregate approach may be
expected to permit more general applicability of findings than the
case-by-case approach. As part of the aggregate approach, hypotheses
are stated at both the aggregate manufacturing and the individual
manufacturing industry levels.

Hypotheses

As has been noted, various hypotheses about the relation of
merger activity to business and capital market conditions have been
tested for the periods covering the earlier merger movements (61,
pp. 106-126; 93, pp. 75-81), but these hypotheses have remained un-
examined for the 1951-1966 period covering the renewal of large-
scale merger activity. The growth-merger hypotheses to be set forth
in this study have not been tested for any period. If it may be
shown that grounds exist for business, capital market and growth-
merger hypotheses, it would seem appropriate to correlate statistically
business, capital market and growth conditions to the rate of corporate
merger in the period 1951-1966.

In addition to introducing growth conditions as a possible
determinant of merger activity, this study seeks to correlate merger
activity to both growth and business conditions within individual
industries as well as within aggregate manufacturing. Previous
studies of the statistical relationships of merger activity to

business and capital market conditions have been confined to the aggregate manufacturing level. An industry level of analysis may provide an understanding of movements in the level of merger activity within individual industries.

Finally, the approach of this study differs from that of earlier studies in that account is taken of possible lagged responses of merger activity to business, capital market and growth factors. Earlier studies have related merger activity in one time period to economic conditions in the same time period, even though several students have indicated that lagged responses may exist (60,61,93). The present study introduces time lags where it is felt that a priori reasoning and the results of previous studies justify doing so.

Business cycle hypotheses

It has been noted previously that the three earlier merger movements occurred during periods of prosperity. Further, Nelson's and Weston's comparisons of reference cycles[1] with merger cycles in the period 1895-1956 point to a high degree of conformity between the two (61, pp. 108-116; 93, pp. 77-79). Yet only in the period 1919-1931 was the statistical correlation of merger activity to industrial production positively significant at the 5 percent level of significance (61, p. 108). Indeed, in correlating merger activity to industrial production in the interwar period 1919-1941, Weston

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[1]As used here, reference cycles denote cycles in general business activity determined by movements in economic series, such as industrial production and wholesale prices (37, pp. 258-297).

arrived at a negative, though insignificant, relation (93, p. 80).
Thus, it appears that business conditions have not markedly affected
merger activity at all times and even may not have consistently
influenced merger activity in the same direction at all times. Hence,
there may be a basis for expressing two opposing hypotheses about
the effects of business activity on the rate of corporate merger.

A first "business cycle" hypothesis of merger activity, one
that may be termed the "prosperity" thesis, is that upward movements
in business activity are associated with increasing merger activity,
or, more precisely, a direct association exists between changes in
the level of business activity and changes in the level of merger
activity. This hypothesis is expressed for both aggregate manu-
facturing and individual manufacturing industries.

The reasoning supporting the "prosperity" thesis evolves from
a consideration of the similarity of external expansion and internal
expansion as investment ventures of the firm. Plant construction,
and new orders for durable equipment, which occur in internal expan-
sion, constitute investment from both the standpoint of the firm and
the economy (93, p. 76). While external expansion, or merger, repre-
sents only a change of ownership of productive facilities and is not
counted as investment for the economy as a whole (93, p. 76), the
acquisition of a firm is an act of investment on the part of the
acquiring firm not dissimilar to the investment in internal expansion.
For both types of investment, firm decision-makers must weigh the
costs of expansion against the expected future earnings of expansion
(61, p. 106).

If internal expansion reacts positively to the business cycle, it may be expected that external expansion would behave likewise. In fact, internal expansion, as indicated by plant construction and new orders for durable equipment, apparently increases as the level of business activity rises (60, pp. 56-59; 93, p. 76). Thus, the similarity of internal expansion and merger as acts of investment suggests that a direct relation may exist between changes in the level of business activity and changes in the level of merger activity.

A second "business cycle" hypothesis offered by this study is that cyclical downturns in business activity are associated with increases in merger activity, or there is an inverse relation between changes in the level of merger activity and changes in the level of business activity. This "recession" thesis is asserted for both aggregate manufacturing and individual manufacturing industries.

The "recession" thesis obtains its support from two simple factors that may have special importance in periods of receding business activity. Ostensibly, during a recession firms would be especially motivated to preserve profits by either increasing revenues or lowering costs. Acquisitions of other firms would be expected to raise revenues and, to the extent that economies of operations would result, lower costs also (59, p. 62; 93, p. 80).

For both "business cycle" hypotheses, it is assumed that changes in the level of merger activity in a time period are related to changes in business conditions in the immediately preceding time period. That is, there is a one year lagged response of changes in

merger activity to changes in business activity. In his study of the conformity of merger cycles to reference cycles between 1920 and 1938, Weston found that merger cycle peaks, on the average, lagged behind reference cycle peaks by about one quarter of a year and that troughs in merger activity trailed reference cycle troughs by four quarters, or one year (93, p. 77). Since only annual merger data are available and, thus, require that time lags be expressed in discrete units of one year, a lagged response of one year would seem appropriate. If, as Nelson suggests, a prolonged period of prosperity is necessary to convince firms that the time is ripe for expansion (61, p. 111), and a lengthy period of recession is required to make firms pessimistic, the assumed one-year lag may not be unrealistic.

Capital market hypotheses

The survey of explanations of earlier merger movements indicated that the capital market served as a medium by which the securities of large consolidations could be marketed and by which promotional profits of consolidations could be obtained.[1] While an investigation of the importance of these two factors in the current merger movement is beyond the scope of this study, the study does consider how conditions in the stock market may have otherwise influenced merger activity in the period 1951-1966.

Other effects of capital market conditions on merger activity arise in the financing of mergers. Acquisitions are primarily

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[1]See pp. 28-33.

financed in one of four ways: 1) use of the acquiring firm's internal cash funds; 2) sale of acquirer's stock; 3) exchange of the acquirer's stock for the acquired firm's stock; and 4) borrowing of cash funds (84, pp. 94-101). Only the second, third and fourth methods are involved in the discussion here. As well as reflecting the risk and uncertainty attached to any investment, the cost of borrowing reflects the opportunity cost of the use of internal cash funds, as in 1), and thus the discussion on borrowing as a means of financing acquisitions would appear applicable to the first method of financing acquisitions.

Two suggestions have been offered about the manner in which conditions in the stock market may affect the financing of mergers, either by new stock issues or by exchange of stock between the merging companies. Nelson makes the following hypothesis:

> Firms expanding by merger, as in other forms of firm growth, frequently turn to public sources for the needed extra funds. New capital issues are most common when the acquired firms are purchased for cash; but when the purchase is made by exchange of stock, new securities are frequently issued to increase working capital. Even when a pure stock-for-stock transaction is made, the organizers of the merger are sensitive to the recent trend of the stock market, because ratios of exchange are partly determined by the market prices of the securities of the merging firms. We might expect to find mergers occuring -- as with other aspects of corporate financing -- when the recent history of stock prices has indicated a strong tendency toward further increase (61, p. 107).

From the acquiring firm's viewpoint the ratio of exchange of stock becomes more favorable as the price of its stock rises relative to the price of the to-be-acquired firm's stock. Unless movements in the prices of the two stocks are independent of each other, however, it remains unclear why rising stock prices would affect the stock of

the acquiring firm more than that of the acquired firm. Yet a thriving stock market would appear conducive to new stock issues, either to increase working capital or to finance the cash purchase of another firm. That is, a rising demand for securities, as reflected by rising stock prices, could be expected to insure a market for new stock issues.

Conditions in the stock market may also exert an influence on merger activity by affecting the stock-earnings ratios[1] of various companies (52, pp. 79-80). During a period of rising stock prices, the prices of the stocks of certain firms, aided by public speculation and optimistic projected earnings reports, may increase far beyond levels warranted by actual prospective earnings (52, pp. 79-80). As a result the stock-earnings ratio of these firms may rise considerably above that of other firms (52, pp. 79-80). Ceteris paribus, firms in the former group would be motivated to acquire firms in the latter group for the purely financial reason that the acquisition would increase the earnings and assets per share of the acquiring firms (52, pp. 79-80). In turn, the improved (lower) stock-earnings ratio of the acquiring firms would be expected to facilitate further price rises in their stocks.

Thus, the improved marketability of new issues of securities and the disparities in the stock-earnings ratios of various firms which

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[1]The stock-earnings ratio is obtained by dividing the market value of a firm's stock by the earnings of the firm.

both may develop during a thriving stock market suggest the following hypothesis: changes in the level of merger activity are directly associated with changes in the level of stock prices. Since data on stock prices have not been compiled by industry, the hypothesis is expressed only at the aggregate manufacturing level.

The supply of loanable funds constitutes an additional source of capital required to finance mergers. Often firms finance acquisitions of the stock or assets of other firms by borrowing cash from banks, insurance companies and other financial institutions (84, pp. 99-100). Ostensibly, the amount of funds borrowed for investment purposes would vary indirectly with the cost of borrowing, or, primarily, the interest rate. Thus, a second capital market hypothesis of this study is that changes in the level of merger activity vary inversely with the level of interest rates. As with the stock market-merger hypothesis, this hypothesis is expressed only for aggregate manufacturing.

For both capital market hypotheses, it is assumed that changes in merger activity in one time period are related to changes in stock prices and interest rates in the same time period. That is, there is no time lag in the response of merger activity to capital market conditions. In comparing merger cycles with stock price cycles over the period 1899-1949, Nelson found that both peaks and troughs in each were closely related time-wise (61, p. 114). While trends in stock prices and interest rates may enter into the decision-maker's consideration of growth by merger, the ratios of exchange, as determined by the stock prices of the merging firms, and the level of interest

rates at or near the proposed time of the consummation of mergers, ultimately influence the cost of financing mergers. If the price of the acquiring firm's stock falls markedly or the price of the to-be-acquired firm's stock increases substantially prior to the proposed time of consummation, the merger may be cancelled (13, p. 1). Further, as acquiring firms would not likely borrow funds for acquisitions until near the proposed time of consummation, a marked increase in interest rates prior to that time might curtail many acquisition plans. Thus, it would seem that firm decision-makers would be more concerned with the level of stock prices and interest rates at or near the proposed time of merger than at any time before.

Growth hypotheses

Because merger is one of the two primary methods of firm growth, it may be expected that conditions affecting the profitability of growth may affect merger activity also. Among the variables which determine the prospects for growth are the level of demand and the level of earnings (39). These are also variables which specifically enter into many firms' evaluations of candidates for acquisition (4, p. 108).

Gort's study (39) of the diversification patterns of 111 firms in the 1929-1954 period indicates that trends in demand and earnings levels may affect growth patterns in two ways. First, it was found that the firms entered industries with greater rates of increase in demand and earnings levels far more often than industries with smaller rates of increase in demand and earnings levels (39, p. 41).

Second, decreases or small rates of increase in the demand and earnings levels of the industries in which the firms principally produced tended to exert a positive influence on their expansion into other industries (39, p. 6). The two findings indicate that both increasing and declining demand and earnings levels may encourage business expansion, or growth.

Thus, there are grounds for offering two opposing hypotheses about the influence of growth conditions on merger activity. The first growth hypothesis is that changes in the level of merger activity vary directly with changes in the levels of demand and earnings. A second growth hypothesis is that changes in the level of merger activity vary inversely with changes in the levels of demand and earnings.

Both of the opposing growth hypotheses are expressed at the aggregate manufacturing level and the individual manufacturing industry level,[1] and both assume that changes in merger activity in one time period are related to changes in demand and earnings levels in the immediately preceding time period. It is likely that a lagged response does exist simply because firm decision-makers may not be immediately aware of trends in demand and earnings levels.

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[1]Presumably, trends in demand and earnings levels in the industry of the acquired firm as well as the industry of the acquiring firm would be relevant in indicating the possibilities for growth. However, because merger data are available by industry of only the acquiring firm, the growth hypotheses at the industry level are expressed solely from the viewpoint of the acquiring firm. That is, the hypotheses state that the level of an industry's merger activity varies either directly or inversely with the industry's demand and earnings levels.

CHAPTER IV. DATA AND METHOD

Data

The hypotheses of the present study are confined to the manu-
facturing sector of the economy and have been set forth at the aggre-
gate manufacturing level and, in most instances, the individual manu-
facturing industry level. Definitions of aggregate manufacturing
and individual manufacturing industries are taken from the Standard
Industrial Classification Manual (82). Manufacturing establishments
include "those engaged in the mechanical or chemical transformation
of organic or inorganic substances into new products and usually
described as plants, factories or mills, which characteristically
use power driven machines and materials handling equipment" (82,
p. 43).

The manufacturing division of economic activity as a whole
contains five subdivisions: 1) 20 two-digit major industry groups;
2) three-digit industry groups making up each two-digit group; 3)
four-digit industries comprising each three-digit industry group;
4) five-digit product classes entering into each four-digit industry;
5) six-digit products making up each product class (82, pp. 43-121).
An illustration of the subdivisions follows in Figure 4.1.

Because it was not possible to obtain merger data for sub-
divisions below the two-digit level, this study considers the indi-
vidual manufacturing industry as one of the 20 two-digit major
industry groups. Aggregate manufacturing represents a combination
of the 20 major industry groups.

Standard industrial classification code	Designation	Name
20	Major industry group	Food and kindred products
201	Industry group	Meat products
2011	Industry	Meatpacking
20111	Product class	Fresh beef
201111	Product	Whole carcass beef

Figure 4.1. Illustration of standard industrial classification of
economic activity[a]

[a]Source: (82).

Further, because only annual data on merger activity could be
obtained, it is necessary to express data on the levels of business
activity, stock prices, interest rates, demand and earnings on an
annual basis.

Measures of merger activity

The magnitude of merger activity for any period may be depicted
by either the number of acquired firms or the dollar value of assets
of acquired firms. Since the latter measure could not be acquired,
it is necessary to use the former measure. The Bureau of Economics
of the Federal Trade Commission (83) is the source of the number of
firms acquired annually in aggregate manufacturing and each of the
20 "industries" during the period 1951-1966.

Measures of business conditions

The Federal Reserve index of industrial production (79) and the Bureau of Labor Statistics index of wholesale prices (80) are the two measures of the level of business activity employed in this study. Each measure is available annually during the period 1950-1965[1] for aggregate manufacturing and each of the 20 "industries."

Measures of growth conditions

The measure of the level of demand in this study is the level of value added, taken from the Annual Survey of Manufactures (81), and adjusted for price changes. While value of shipments represents an alternative indicator of the level of demand, value added figures avoid the duplication in the value of shipments figure which results from the use of products of some establishments as materials by others (81). The level of earnings is depicted by the rate of return on stockholders' equity after taxes, taken from the Quarterly Financial Report for Manufacturing Corporations (86). Both measures are available on an annual basis during the period 1950-1965 for aggregate manufacturing and each of the 20 "industries."

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[1]The hypotheses state that changes in merger activity in one time period are related to changes in business and growth conditions in the immediately preceding time period. Therefore, changes in merger activity in the period 1951-1966 are compared to changes in business and growth conditions in the period 1950-1965.

Measures of capital market conditions

Standard and Poor's common industrial stock price index (83) is chosen as the measure of the level of stock prices in preference to the Dow-Jones common industrial stock price index (83) because the former is based on 425 stocks and the latter on 30 stocks. The level of interest rates is measured by Moody's average of yields on Aaa corporate bonds (56). Ostensibly, the yield that must be paid on bonds may be considered as a "kind" of interest rate or cost of investment funds. Both measures are obtained annually for the 1951-1966 period and enter into tests of hypotheses at the aggregate manufacturing level.

Notation

Notation of the variables depicting merger activity and business, capital market and growth conditions is as follows:

M_t = number of firms acquired in period t;

x_t^1 = level of industrial production in period t;

x_t^2 = level of wholesale prices in period t;

x_t^3 = level of profit rates (rates of return) in period t;

x_t^4 = level of value added in period t;

x_t^5 = level of stock prices in period t;

x_t^6 = level of bond yields in period t.

As the hypotheses of the present study seek to explain the rate of corporate merger in the period 1951-1966 and not the actual level

of merger activity, it is necessary to compare percentage changes in
the level of merger activity (M_t) to percentage changes in the levels
of variables X_t^1 through X_t^6. Notationally, annual percentage changes
in M_t, X_t^5 and X_t^6 for the period 1951-1966 and in X_t^1, X_t^2, X_t^3 and X_t^4
for the period 1950-1965 were computed as follows:

$$\Delta M_t = (M_t - M_{t-1})/M_{t-1};$$
$$\Delta X_t^1 = (X_t^1 - X_{t-1}^1)/X_{t-1}^1;$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot$$
$$\cdot \quad \cdot \quad \cdot \quad \cdot$$
$$\Delta X_t^6 = (X_t^6 - X_{t-1}^6)/X_{t-1}^6.$$

Method and Model

In notational form the hypothesized relationships of the study,
together with the level at which each are stated, are summarized in
Table 5.1.

Table 5.1. Hypothesized relationships by level of analysis

Variable	Hypothesized relation	Variable	Level of analysis
ΔM_t	Positive and negative	ΔX_{t-1}^1	Aggregate manufacturing and individual industry
ΔM_t	Positive and negative	ΔX_{t-1}^2	Aggregate manufacturing and individual industry
ΔM_t	Positive and negative	ΔX_{t-1}^3	Aggregate manufacturing and individual industry
ΔM_t	Positive and negative	ΔX_{t-1}^4	Aggregate manufacturing and individual industry
ΔM_t	Positive	ΔX_t^5	Aggregate manufacturing
ΔM_t	Negative	ΔX_t^6	Aggregate manufacturing

The statistical procedure adopted to examine the relationship in Table 4.1 is multiple regression and correlation analysis (62, pp. 159-243; 75, pp. 277-301). To the extent that any cause-and-effect relationship, as in regression, may be said to exist between changes in business, capital market and growth conditions and changes in merger activity, ΔM_t may be considered the "dependent" variable in the regression model, and ΔX_{t-1}^1, ΔX_{t-1}^2, ΔX_{t-1}^3, ΔX_{t-1}^4, ΔX_t^5 and ΔX_t^6 may be termed the "independent" variables.

The multiple regression models to be set forth here assume that the independent variables are measured without error and that the dependent variable responds linearly to the independent variables (75, pp. 164-165). The adequacy of the form of the linear models may be indicated by the degree of intercorrelation (multicollinearity) among the independent variables (34, p. 100) and the Durbin-Watson test statistic for serial correlation (28). If two independent variables are closely correlated with each other, one is undoubtedly redundant (34, p. 100). Further, if serial correlation appears to exist, there may be one or more other pertinent variables which help to explain the behavior of the dependent variable (34, p. 100). Thus, the presence of serial correlation and multicollinearity call for revisions of the form of the regression model.

Because data limitations prevent a statistical analysis of all of the hypothesized relationships at the industry level, it is necessary to submit different regression models for the levels of aggregate manufacturing and individual industries.

Regression Model I, for each of the 20 "industries" is as follows:

$$\Delta M_t = \mu + B_1 \Delta X^1_{t-1} + B_2 \Delta X^2_{t-1} + B_3 \Delta X^3_{t-1} + B_4 \Delta X^4_{t-1} + \epsilon,$$

$$\epsilon \sim NI\ (o,\ \sigma^2). \tag{4.1}$$

The regression equation estimating Model I takes the following form:

$$\Delta M_t = b_o + b_1 \Delta X^1_{t-1} + b_2 \Delta X^2_{t-1} + b_3 \Delta X^3_{t-1} + b_4 \Delta X^4_{t-1}. \tag{4.2}$$

Values of the partial regression coefficients, or the b's (75, pp. 287-301), multiple correlation coefficient (75, pp. 287-301) and F-ratios (75, pp. 287-301) resulting from tests of the hypotheses for each of the 20 "industries" are found in Table 5.1 in Chapter V.

Regression Model II, for aggregate manufacturing, is as follows:

$$\Delta M_t = \mu + B_1 \Delta X^1_{t-1} + B_2 \Delta X^2_{t-1} + B_3 \Delta X^3_{t-1} + B_4 \Delta X^4_{t-1}$$

$$+ B_5 \Delta X^5_t + B_6 \Delta X^6_t + \epsilon,\ \epsilon \sim NI\ (o,\ \sigma^2). \tag{4.3}$$

The regression equation estimating Model II takes the following form:

$$\Delta M_t = b_o + b_1 \Delta X^1_{t-1} + b_2 \Delta X^2_{t-1} + b_3 \Delta X^3_{t-1} + b_4 \Delta X^4_{t-1}$$

$$+ b_5 \Delta^5_t + b_6 \Delta^6_t. \tag{4.4}$$

Values of the partial regression coefficients, multiple correlation coefficient and F-ratio resulting from tests of the hypotheses at the aggregate manufacturing level are found in Table 5.2 in Chapter V.

CHAPTER V.   RESULTS AND CONCLUSIONS

Findings at the Industry Level

Regression and correlation analysis of time series data of ΔM_t for the period 1951-1966 and of ΔX_{t-1}^i ($i = 1,2,3,4$) for the period 1950-1965 produced the results found in Table 5.1[1] on page 74.   As may be noted from Table 5.1, none of the multiple correlation coefficients (R's) was significant at the 5 percent level.   Since R^2 represents the percentage of variation in the dependent variable associated with variation in the independent variables (75, p. 187), the independent variables included in regression model I, or Equation 4.1, would appear to be unimportant in explaining variation in ΔM_t, or the rate of merger, during the 1951-1966 period.

The hypothesis underlying the significance tests of the F-ratios is that the partial regression coefficients (b's) do not differ from each other and from zero (62, p. 187).   As all F-ratios at the industry level were insignificant at the 5 percent level, the influence of the independent variables on ΔM_t would appear not to depart significantly from each other and from zero.

The partial regression coefficient of a specific independent variable provides the change in the dependent variable associated

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[1]While values of correlation between the independent variables are not provided in Table 5.1, the test for serial correlation yielded negative results, and multicollinearity did not appear to be serious.

Table 5.1. Test results of model I

Standard industrial classification code	Partial regression coefficients				Multiple correlation coefficients	F-ratio
	b_1	b_2	b_3	b_4	R	
20	-3.6	1.8	-0.5	1.5	0.42	0.55
21	-0.5	-0.2	-0.8	-0.0	0.61	1.50
22	6.5	-4.9	0.2	-7.0	0.47	0.70
23	1.6	2.2	-0.1	-2.6	0.35	0.35
24	6.0	-8.3	1.7	16.0	0.62	1.56
25	9.2	-3.6	0.2	-10.7	0.67	2.10
26	-8.2	1.6	2.6	-0.5	0.48	0.75
27	33.7	--[a]	-1.6	-28.4	0.45	0.95
28	-0.7	-0.3	-0.5	-0.4	0.49	0.80
29	14.6	-1.1	2.9	-6.9	0.49	0.78
30	0.6	-1.5	1.1	1.9	0.53	1.00
31	-24.2	-3.8	-0.8	3.2	0.68	2.16
32	-4.4*	4.3	-0.6	5.0	0.65	1.80
33	-3.1	-0.8	0.5	2.8	0.54	1.05
34	-0.5	1.4	-0.4	2.1	0.30	0.24
35	-2.5	-1.0	-0.7	2.6	0.63	1.67
36	-0.7	-1.5	0.5	-4.9	0.60	1.44
37	-1.4	2.2	-0.1	0.3	0.42	0.54
38	-1.2	--[a]	-0.2	-0.1	0.25	0.24
39	-6.0	9.9	2.1	4.2	0.40	0.48

[a]A measure of ΔX_t^2 was unavailable for the two-digit industries 27 and 38.

*Value is significant at the 5 percent level.

with a unit change in the independent variable when all other variables are fixed (75, pp. 279-281). Other than b_1 in major industry group 32, the industry partial regression coefficients were not significant at the 5 percent level, indicating that ΔM_t was not altered significantly when the level of any of the other variables was changed.

These findings do not warrant acceptance of "business cycle" and growth hypotheses of the rate of corporate merger at the industry level in the period 1951-1966. That is, the data do not support either the negative or positive relationship hypothesized between changes in business and growth conditions and the rate of merger within individual industries.

However, for at least two reasons, the hypotheses are not necessarily refuted. First, depicting the magnitude of merger activity by the total number of acquired firms instead of by dollar value of the total assets of acquired firms may provide an inaccurate view of movements in merger activity. While the number of acquired firms may change little from one period to another, the value of the assets of the acquired firms may change considerably due to marked changes in the sizes of the acquired firms. It is conceivable that the dollar measure of merger activity is more responsive to changes in business and growth conditions than is the numerical measure.

A second qualification of the reliability of the findings deals with the concept of an industry employed in tests of hypotheses at the industry level. As was illustrated by Figure 4.1, each two-digit major industry group is composed of four further subdivisions.

Probably, the four-digit classification corresponds more closely to the economic concept of an industry than any of the other classifications. It is possible that merger activity is associated to a greater extent with business and growth conditions at the four-digit level than at the two-digit level. In the process of aggregating changes in the variables from the four digit level to the two-digit level, the responses of merger activity to business and growth conditions may be offsetting and, as a result, no response is noted at the aggregate, or two-digit industry level.

As indicated in the data section of Chapter IV, it was not possible to obtain either the dollar measure of merger activity by industry or merger data for any industry level more refined than that of the two-digit industry level. Therefore, this study was unable to eliminate the two afore-mentioned limitations of the data employed to test the hypotheses presented in the study.

However, data more reliable than that of this study do exist as the Federal Trade Commission has recorded almost all mergers in which the firms involved are larger than $1 million in assets. If access to the Federal Trade Commission's files could be obtained, an exhaustive research of the lists of recorded mergers may allow a dollar measure to be attached to the magnitude of merger activity and may permit each merger to be assigned to the four-digit industry of both acquiring firm and acquired firm. By relating these data to existing measures of business and growth conditions at the four-digit industry level, more meaningful tests of hypotheses of merger activity at the industry level may result.

An additional data limitation of the study resulted from the lack of a suitable measure of capital market conditions at the industry level. Measures of either stock prices or the supply price of new capital have yet to be compiled for the individual industry. Thus, the study was unable to ascertain the influence of conditions in the capital market on merger activity within individual industries. Additional research could provide measures of capital market conditions and permit the capital market hypothesis of merger activity to be tested at the industry level.

Findings at the Aggregate Level

Regression and correlation analysis of ΔM_t, ΔX_t^5, ΔX_t^6 for the period 1951-1966 and of ΔX_{t-1}^i (i = 1,2,3,4) for the period 1950-1965 yielded the results found in Table 5.2 on page 78. The significance of the multiple correlation coefficients at the 1 percent level indicates that regression model II, or Equation 4.3, appears to embody the major economic factors associated with the rate of corporate merger in American manufacturing during the period 1951-1966.

Further, the significance of the F-ratio at the 5 percent level suggests that certain, if not all, of the partial regression coefficients differed from each other and from zero. That is, it would appear that movements in certain of the variables depicting business, capital market and growth conditions were significantly associated with movements in the level of merger activity in aggregate manufacturing during the period 1951-1966.

Table 5.2. Test results of models II, IIa, IIb, IIc and IId

Statistic	Model				
	II	IIa	IIb	IIc	IId
b_1 [a]	-3.75 (-1.85)*	-1.39 (-2.28)**	-1.42 (-2.28)**	-2.10 (-1.43)	-3.99 (-2.19)*
b_2	1.87 (1.19)		0.81 (0.74)		2.20 (1.58)
b_3	-0.24 (-0.67)				
b_4	2.87 (1.46)			0.72 (0.53)	2.57 (1.49)
b_5	0.95 (3.57)***	0.92 (3.72)***	0.94 (3.71)***	0.90 (3.51)***	0.91 (0.24)***
b_6	0.20 (0.43)				
R $\bar{R}$ [b] F	0.8887*** 0.8445*** 5.0086*	0.8438*** 0.8289*** 14.8355***	0.8520*** 0.8266*** 9.7092***	0.8481*** 0.8149*** 9.3955***	0.8807*** 0.8463*** 8.6390***

[a]Figures in parentheses below the partial regression coefficients are their t-values.

[b]$\bar{R}$ is R adjusted for degrees of freedom and may be used as a basis for comparing the adequacy of form of various regression models involving subsets of variables in an original regression model (72, pp. 444-445).

*Value is significant at the 10 percent level.

**Value is significant at the 5 percent level.

***Value is significant at the 1 percent level.

T-tests of the partial regression coefficients show, however, that only b_5 was significant beyond the 5 percent level. Stated differently, of the variables included in model II, only changes in the level of stock prices appear to have been associated with the rate of merger. In addition, the extremely low t-values of b_3 and b_6 indicate that movements in earnings and interest rate levels had little, if any, association with the rate of merger, while the much higher t-values of b_1, b_2 and b_4 point to a more significant association of the rate of merger with business conditions and changes in demand. Thus, the rate of merger during the period 1951-1966 would seem to have been more closely aligned with changes in the levels of industrial production (X_t^1), wholesale prices (X_t^2), demand (X_t^4) and stock prices (X_t^5) than with the levels of earnings (X_t^3) and interest rates (X_t^6).

In accordance with this finding, model II was tested in four reduced forms involving ΔX_t^i (i = 1,2,4,5). Tests of reduced models IIa, IIb, IIc and IId gave the results presented in Table 5.2 on page 78. Though serial correlation was present neither in any of the four reduced models nor in model II, ΔX_t^1 and ΔX_t^4 were highly intercorrelated (r_{14} = 0.9117), and, thus, any conclusions drawn from the test results of models including both of those variables must take into account, or at least recognize, this problem of multicollinearity.

Under each reduced form of model II, the multiple correlation coefficient (R) and F-ratio were significant at the 1 percent level.

That is, even though ΔX^3_{t-1} and ΔX^6_t were deleted from model II, each of the reduced models appears to contain the economic variables associated with the rate of merger during the period 1951-1966. In fact $\bar{R}$ was greater for IId than for II, suggesting that the inclusion of ΔX^3_{t-1} and ΔX^6_t in II did not help to "explain" ΔM_t to a greater extent than did the variables contained in IId.

However, though $\bar{R}$ was highest under IId, multicollinearity was also present between ΔX^1_{t-1} and ΔX^4_{t-1} and a more appropriate model might not include one of those variables. Since b_1 was consistently more significant than b_4, the data seemed to "fit" more adequately models IIa and IIb, each containing ΔX^1_{t-1}, than IIc, containing ΔX^4_{t-1}. Further, as $\bar{R}$ was greater under IIa than under IIb, it would appear that the addition of ΔX^2_{t-1} to IIa in order to form IIc did not "explain" the variation in ΔM_t to any higher degree than simply ΔX^1_{t-1} and ΔX^5_t in IIa. That is, IIa appears to embody the significant economic variables, namely, changes in the levels of industrial production and stock prices, correlated with the rate of corporate merger at the aggregate manufacturing level during the 1951-1966 period.

Thus, the data seemed to have supported the capital market hypothesis of a positive association between the rate of merger and changes in the level of stock prices. This tentative conclusion is consistent with the findings of Nelson (61, p. 118, Table 60) and Weston (93, p. 80) that merger activity in the periods 1895-1904, 1919-1930 and 1919-1941 was positively related to the level of stock prices.

The basis for the capital market hypothesis, as outlined in Chapter III[1], is two-fold. First, new securities issues may occur with merger, and a thriving capital market, as depicted by rising stock prices, would seem to insure a market for new securities issues. Second, because a firm's stock-earnings ratio may become abnormally high during periods of rising stock prices, the firm would be motivated financially to lower its stock earnings ratio by acquiring another firm with a much lower stock-earnings ratio. A decision on which of these two factors was the more important in motivating merger activity in the period 1951-1966 is not possible here, but apparently a flourishing stock market was favorable in some manner to the development of large-scale merger activity.

As well as supporting the capital market hypothesis of merger activity, the data tended to confirm the "recession" thesis[2] of merger activity, as indicated by the significantly negative partial regression coefficient of ΔX^1_{t-1}. While Weston also found a negative, though insignificant, relation between merger activity and business activity in the period 1919-1941 (93, p. 80), merger movements have generally occurred during prosperous times. In addition, Nelson's study of the correlation of the two variables in the periods 1895-1904 and 1919-1931 yielded positive correlation coefficients (61, p. 118, Table 60). Further, if the "recession" thesis holds, the

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[1] See pp. 60-64.

[2] See pp. 59-60.

rising merger activity of 1951-1966, at first glance, would seem inconsistent with the business prosperity that generally occurred during that period.

However, the "recession" thesis of the rate of merger states that changes in the level of merger activity are inversely associated with changes in the level of business activity, or industrial production. The hypothesis was tested by correlating annual percentage changes in the level of merger activity, or ΔM_t in the period 1951-1966 to annual percentage changes in the level of industrial production, or ΔX_{t-1}^1, in the period 1950-1965. A negative partial regression coefficient would arise if positive ΔM_t's were associated with negative ΔX_{t-1}^1's or if ΔM_t and ΔX_{t-1}^1 moved in opposite directions. In the former case, the level of business activity would necessarily fall from one period to the next, but business activity generally rose over the 1950-1965 period, and, hence, this case would appear inconsistent with rising levels of merger activity. In the latter case, the level of business activity would increase as long as ΔX_{t-1}^1 was positive, yet declining. This case would appear compatible with the rising levels of merger activity in the period 1951-1966.

As stated in Chapter III,[1] the reasoning supporting the "recession" thesis of merger activity would seem to imply the former case above. Ostensibly, during recessions firms are especially motivated to increase revenues and reduce costs in order to maintain profits. Mergers, to

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[1] See pp. 59-60.

the extent that they increase sales and achieve economies of operation
(lower costs) are a means of preserving profits. Thus, according to
the "recession" thesis, the association of positive ΔM_t's with
negative ΔX^1_{t-1}'s would seem necessary for the negative relationship
that actually occurred between changes in the level of merger activity
and changes in the level of business activity. However, as indicated
previously, business activity generally rose during the period 1950-
1965. That is, ΔX^1_{t-1} was generally positive and, hence, would not
appear consonant with the rising level of merger activity, or positive
ΔM_t, that commonly occurred in the 1951-1966 period.

Since both ΔX^1_{t-1} and ΔM_t were usually positive, the inverse
relationship present during the period 1951-1966 between changes in
the level of merger activity and changes in the level of business
activity was apparently due to the movements of ΔM_t and ΔX^1_{t-1} in
opposite directions, as explained in the latter case above. As the
change in the rate of business activity decreased (increased), the
change in the rate of merger activity increased (decreased).

One possible explanation of the indirect association of changes
in the level of merger activity with changes in the level of business
activity, even with general increases in both merger activity and
business activity during the 1951-1966 period is as follows: while
the business prosperity of the 1951-1966 period stimulated business
expansion, the increases in business activity were not of sufficient
magnitude to allow producers to achieve desired profit levels by
internal expansion; as a result, producers have resorted to expansion
by merger.

As in the analysis conducted at the industry level, data limitations existed in tests of hypotheses at the aggregate manufacturing level. One notable limitation resulted from the use of bond yields as an indirect measure of capital costs or the interest rates of funds borrowed for acquisition purposes. Though this study assumed that movements in bond yields reflected movements in interest rates, there was no means of determining the degree to which the two movements were coincident, or, stated differently, the extent to which the assumption was justified. If a direct indicator of capital costs at the aggregate level could be obtained, a more appropriate and reliable test of the capital market-merger hypothesis would result.

A second important data limitation, and one equally germane to the industry level of analysis, of the analysis at the aggregate level was that merger data could be obtained only on an annual basis and, as a result, the time lags assumed in the hypotheses were necessarily stated in discrete units of one year. Thus, even if a priori reasoning had suggested that movements in merger activity lag movements in a specific economic variable by a period which was not a unit number of years, this study would have been unable to test such a lagged relationship. In fact, the growth hypotheses[1] set forth in this study may be a case in point. It was assumed that a period of one year was necessary for producers to become aware of

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[1] See pp. 64-65.

trends in demand and earnings levels, while, actually, between one and two years may be required for the trends to become evident to producers. Since the Federal Trade Commission has compiled quarterly merger data, it would seem appropriate to test more precisely any lagged relationships which may exist between merger activity and specific economic variables.

The data limitations present in the tests of hypotheses at both the industry level and aggregate manufacturing level suggest that further research is required to ascertain completely and reliably the factors responsible for, or correlated with, the 1951-1966 merger movement, or merger activity in general. Further, the public policy implications of merger activity, as outlined in Chapter I,[1] made clear that further research is warranted.

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[1] See pp. 3-13.

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