Volume Title: Merger Movements in American Industry, 1895-1956

Volume Author/Editor: Nelson, Ralph L.

Volume Publisher: UMI

Volume ISBN: 0-87014-065-5

Volume URL: http://www.nber.org/books/nels59-1

Publication Date: 1959

Chapter Title: The First Merger Wave

Chapter Author: Ralph L. Nelson

Chapter URL: http://www.nber.org/chapters/c2527

Chapter pages in book: (p. 71 - 105)

Chapter 4. The First Merger Wave

A phenomenon as large and widespread as the wave of mergers centering about the peak years of 1899–1901 has called forth many explanations, none of which commanded general acceptance. The data on mergers (and on other important and related economic series) were inadequate for careful tests. Having no even remotely similar precedent, the wave seemed to be historically unique. Thus the phenomenon was explained largely in terms of broad historical developments.

The present examination takes the form of separate empirical tests of relationships between the merger wave and certain historical developments in the United States that have been credited with causing it. Briefly, they are: retardation of industrial growth; the immediately preceding expansion of the national railroad system; the growth of a highly organized capital market; the increase of motivation toward market control. For these developments the data permitted a fairly detailed scrutiny of possible causal relationships. Other major theories could not be considered because of the lack of relevant data.

Relationship to Industrial Retardation

A popular explanation of the early merger movement is that it marked a period in United States economic development in which retardation of growth set in. Mergers, in this context, were interpreted as devices whereby producers could preserve profits in the face of slackening demand and greater pressures of competition. One of the principal exponents of this thesis, Myron Watkins, described the process as follows:

> The opening of a new and wider market involves pioneering costs which call for the compact association of producers. But once a new market has been opened by the joint action of the associated producers, its development attracts the ambition and varied talents of many producers, the prizes for successful competition being high. The third and final phase is reached when the limit of the expansion of a given market has been touched, and the amount and character of its consumption have become settled and known. The gains from initiative and ingenuity are then no longer sufficient to hold producers upon an independent course, and they fall in together for their common enrichment at the expense of consumers.[1]

[1] Myron Watkins, *Industrial Combinations and Public Policy*, Cambridge, 1927, pp. 12–13.

Watkins went on to describe the historical trends to which he attributed the retardation in market growth: the closing of the frontier, the slackening of population growth, the slowing of technological change, and the post-1873 secular decline in prices. In his view, these various tendencies converged at the end of the nineteenth century and set the stage for the merger movement, which he described as "a centralizing phase in the organization of industrial control in the United States."[2]

A thorough test of this hypothesis would involve examination of the cycles of industry growth in the United States, a project much too ambitious to undertake here. Instead, a more limited analysis is offered, which derives its value from examination of specific data on the general patterns of industrial growth in the period before 1895, the growth patterns in industries having high merger activity, and the relation of these patterns to the first merger wave.

Proponents of the retardation thesis have properly emphasized that it is retardation in individual industries rather than retardation in aggregate industrial growth that is important in merger behavior. However, they failed to deal seriously with the next logical step in the thesis, determination of the degree of retardation necessary to compel firms to merge. This omission is understandable, because the tools for predicting competitive behavior are certainly not sharp enough for the task. What the retardation thesis seems to imply, in this respect, is that at the turn of the century there was a change in the pattern of industrial growth of sufficient magnitude or abruptness to force competitors to band together to alleviate the ruinous tendencies of falling demand and drastic price decline. The retardation would have had to take the form of either an absolute decline in production or a drastic drop in the rate of growth prevailing in the period just preceding the merger wave. If the decline were more gradual, it would be difficult to demonstrate that, at a certain date, the retardation had reached that critical level at which firms were compelled to merge. We shall look to see if (1) there was a marked increase in general retardation just preceding the merger movement, and if (2) the industries characterized by high merger activity were in fact those experiencing retardation.

Before testing the growth retardation–merger thesis, let us briefly examine the way in which retardation has been measured. The data are taken from Arthur F. Burns's study of production

[2] *Ibid.*, p. 16.

trends in the United States.[3] They relate to the rate of growth of various series of production data for overlapping decades (eleven years) from 1870 through 1930. The first decade for which growth is measured is 1870–1880, in which 1875 is the central year; the second decade is 1875–1885, and so on. Exponential trends were fitted to the annual data for each of the decades, and the rate of growth was taken from the trend equations thus obtained.

In terms of these rates of growth data, retardation exists if successive decades are consistently characterized by rates of growth lower than the rates of the decades preceding them. Burns found retardation, thus defined, to have been the overwhelmingly common pattern of industry growth in the period 1870–1930.[4]

THE GENERAL PATTERN OF GROWTH

If retardation was a factor in the turn-of-the-century merger movement, there should appear at least sustained retardation in the period immediately preceding the merger wave. Sharply increased retardation would of course be a stronger indication that retardation was a factor. The evidence available to measure the change in industry growth is found in Burns's study, from which Table 41 is reproduced. It includes production series of industries in agriculture and fisheries, mining, manufactures and construction, transportation and trade, thus providing a general picture of the pattern of growth.

The table shows that the two overlapping decades immediately preceding the period of merger activity at the turn of the century, 1890–1900 and 1895–1905, saw the stabilization or reversal of the pattern of retardation characteristic of the decades preceding them. This appears in the proportion of series experiencing an increase at the rate of 10 per cent or more per year, and also in the proportion of series experiencing a negative rate of increase. The decade 1890–1900 saw stabilization in the proportion of series experiencing a rate of increase of 10 per cent or more. The decade 1895–1905 saw a substantial increase in the proportion of the high growth rate series. Comparison of the proportions of increases of 10 per cent and over for the three decades 1900–1910, 1905–1915,

[3] Arthur F. Burns, *Production Trends in the United States Since 1870*, National Bureau of Economic Research, 1934, Chapter III.

[4] Burns also demonstrated the existence of long-run cycles in the secular trend, which he called trend-cycles. He showed their existence by comparing the decade exponential trend rates with the decade rates of what he called the primary trend (*Ibid.*, pp. 175ff.). Adjustment to take account of the long-cycle factor is not required, however, for present purposes; the change in growth patterns that business firms respond to is the gross effect of retardation and trend cycles.

TABLE 41

Increases and Decreases in Production Growth Rates, by Overlapping Decades, 1870–1930

Decade	Total Number of Series Covered	Rates of 10 per cent and Over		Rates of 0 or Less	
		Number of series	Percentage of series covered	Number of series	Percentage of series covered
1870–1880	66	16	24.2	6	9.1
1875–1885	69	20	29.0	5	7.2
1880–1890	97	17	17.5	8	8.2
1885–1895	104	11	10.6	10	9.6
1890–1900	104	10	9.6	8	7.7
1895–1905	104	21	20.2	8	7.7
1900–1910	104	8	7.7	11	10.6
1905–1915	104	4	3.8	17	16.3
1910–1920	104	9	8.7	22	21.3
1915–1925	102	5	4.9	43	42.2
1920–1930	102	6	5.9	26	25.5

Source: Arthur F. Burns, *Production Trends in the United States Since 1870*, National Bureau of Economic Research, 1934, p. 81, Table 13.

and 1910–1920 indicates that the high rate of increase carried well into the twentieth century, probably, at least until the end of high merger activity in 1905.[5]

These data do not reveal the pattern of growth to be expected if the retardation thesis were valid, for the pattern found was marked by neither a continuation of the retardation nor by its marked increase. Indeed, the data reveal quite the opposite picture.

The pattern of changes in Table 41 shows a marked decline in the rate of growth in the 1905–1915 decade. This roughly coincides with the decade of low merger activity from 1905 through 1914. Further, the resumption of higher growth rates in the period 1915–1920 was accompanied by a revival of merger activity. Thus it appears that merger activity was more commonly found in periods of increased general acceleration than in periods of increased retardation in industry growth.

It is dangerous, however, to infer from these findings that industrial growth retardation had no positive connection with

[5] The one and one-half decades preceding the high merger activity of the late 1920's also saw a reversal of the retardation pattern (Table 41). Moreover, the general acceleration of the late 1920's might be understated by Burns's sample, which does not include more recently founded industries and thus may indicate a fictitiously low number of rapidly growing series. A good case probably could be made against the growth-retardation–merger thesis by a detailed examination of the growth rates of high-merger industries in this later period.

mergers. Mergers were prominent in only some of these industries. It is important to know whether the industries of high merger activity were among those characterized by increasing or decreasing rates of growth preceding the initiation of mergers. We turn now to this question.

GROWTH RATES IN INDUSTRIES OF HIGH MERGER ACTIVITY

The data provided by Burns's study permit the testing of the growth-retardation–merger hypothesis for the specific industries in which the greater amount of merger activity took place. Of the seventy-seven series in mining and manufacturing which Burns presents, forty-four are related directly to industries in which there was a high degree of merger activity. Only three two-digit industries of high merger activity—paper and allied products, fabricated metal products, and machinery (except electrical)—had no relevant production series. The industries having high merger activity in 1895–1904 and the number of production series relating to them are presented in Table 42. In terms of firm disappearances, the

TABLE 42

Production Series Related to Industries with High Merger Activity, 1895–1904

Industry	*Net Firm Disappearances*	*Number of Relevant Production Series*
Food and kindred products (20)	524	8
Tobacco products (21)	133	4
Chemicals (28)	221	3
Stone, glass (32) and nonmetallic minerals (14)	276	5
Iron and steel mills, foundries and mines (331, 332, 101)	391	6
Nonferrous smelting, refining, foundries, mines (333–336, 102–104)	85	13
Transportation equipment (37)	127	2
Bituminous coal mining (12)	305	3
Metal products (34)	185	0
Machinery, except electrical (35)	142	0
Paper and allied products (26)	116	0

Source: Worksheets and Table C-2.

eight industries for which relevant production series are available accounted for 83 per cent of all 1895–1904 merger activity, and for 92 per cent of the merger activity in those industries having more than forty disappearances. They were also the industries of highest merger activity relative to industry size.

The trend of the growth rate pattern for the forty-four production series applicable to the eight industries of greatest merger activity is presented in Table 43. It gives the same kind of information that was presented in Table 41 for the 104 series included there, but Table 43 is more detailed in that it also shows the trend in the 0 to 5 per cent and 5 to 10 per cent classes of growth rates, as well as in the other two classes of 10 per cent and over and below 0 per cent.

Table 43 reveals that the period immediately preceding the intense merger activity beginning in 1898 was characterized by

TABLE 43

Annual Growth Rates of Industries with High 1895–1904 Relative Merger Activity, by Overlapping Decades, 1870–1915

Decade	Total Number of Series Covered	Percentage of Series by Average Annual Growth Rate of Output			
		10% or more	5.0–9.9 %	0.0–4.9 %	Less than 0
1870–1880	23	26.1	43.5	21.7	8.7
1875–1885	24	37.5	45.9	8.3	8.3
1880–1890	38	18.4	44.7	34.2	2.7
1885–1895	44	9.1	43.1	45.5	2.3
1890–1900	44	11.4	43.1	41.0	4.5
1895–1905	44	31.8	47.7	18.2	2.3
1900–1910	44	11.3	41.0	41.0	6.7
1905–1915	44	6.8	25.0	59.1	9.1

Source: Table C-2.

acceleration rather than retardation in the growth of the industries of high merger activity. In the three overlapping decades 1885–1895, 1890–1900, and 1895–1905 there were successively larger decade-rates of growth. The proportion of series experiencing annual rates of growth of more than 10 per cent increased from 9.1 per cent to 31.9 per cent of the total number of series. The proportion of series experiencing a 5.0 to 9.9 per cent rate of growth increased from 43.2 per cent to 47.8 per cent of the total. The proportion of the total number of series experiencing a less than 5 per cent rate of growth decreased from 47.8 per cent to 20.5 per cent of the total.

After the 1895–1905 decade the retardation resumes, but not sufficiently to offset the preceding acceleration. The decade 1900–1910 saw a return to the growth-rate pattern of the 1885–1895 decade, and not to the lower growth rates that a projection of the pre-1885 retardation pattern would signify. Thus a substantial in-

crease in retardation does not reappear until after the period of high merger activity.

The growth rates for individual high merger industries bear out these findings. As Table 44 shows, in none of the eight industries

TABLE 44

Average Annual Percentage Rates of Growth for Eight Industries of High 1895–1907 Merger Activity, by Overlapping Decades, 1870–1915

Industry	No. of Series	Decade							
		1870–1880	1875–1885	1880–1890	1885–1895	1890–1900	1895–1905	1900–1910	1905–1915
Food (20)	8	4.66	6.58	4.58	5.30	3.70	6.53	2.58	2.73
Tobacco (21)	4	3.30	5.50	8.13	4.75	2.13	3.30	4.80	5.05
Chemicals (28)	3	13.75	15.85	6.70	5.73	7.57	6.33	5.07	3.27
Stone, glass, etc. (32, 14)	5	...	...	11.68	8.72	13.62	20.72	11.20	6.16
Iron and steel (331–332, 101)	6	12.28	10.20	7.92	3.43	4.35	9.85	5.18	3.92
Transportation equipment (37)	2	−4.1	−3.7	1.1	0.55	1.3	13.15	−0.55	4.35
Nonferrous metals (333–336, 102–104)	13	9.06	7.90	5.95	10.15	9.02	7.88	4.74	5.34
Bituminous coal (121)	3	5.25	11.45	8.00	5.10	5.87	9.07	6.07	3.70

Source: Table C-2.

was there an appreciable increase in retardation in the three decades 1885–1895, 1890–1900, and 1895–1905. Four of the eight industries (32 and 14; 331–332 and 101; 37; and 121) enjoyed a sustained acceleration over this period. Two (20, 21) saw a reversal of a previous pattern of retardation. In one (28), the 1895–1905 rate of growth was higher than the 1885–1895 rate but lower than the 1890–1900 rate. Only one industry, nonferrous metals (manufacturing, 333–336, and mining, 102–104), experienced a sustained retardation over the three overlapping decades. It is noteworthy that merger activity in nonferrous metals remained at a fairly high level in the decade 1905–1914, while that of most other industries dropped off sharply after 1902. Thus the 1905–1915 acceleration of nonferrous production coincided with a relative increase of nonferrous merger activity.

CONCLUSION

Statistical examination of the growth-retardation–merger relationship indicates that there is little empirical basis for believing that the turn-of-the-century merger wave was caused by a general

retardation in industry growth thought to be prevalent at that time. The last one and one-half decades of the nineteenth century saw the halting and reversing of the previous decline in growth rates for industry in general. In the industries of high merger activity, the reversal of retardation was even more pronounced than it was for industry in general. Measured on an industry-by-industry basis, retardation was generally absent from industries of highest merger activity in the decade and one-half preceding the merger wave. Indeed, these findings suggest that more satisfactory explanations of merger movements may be found in periods of accelerating growth than in periods of retardation. This possibility is explored in more detail in Chapter 5.

England had a large merger wave almost simultaneous with the early American movement. Apparently the merger wave in Britain, like that in the United States, occurred during a period of acceleration rather than of retardation. The British experience is presented in detail in Appendix A.

Development of the Transportation System

Another frequent explanation for the merger movement at the end of the nineteenth century is the achievement of a national network of railroads at that time. This brought about a fundamental change in the nature of markets for goods, it is held. Producers now found it possible to sell their goods in wider markets, thus bringing themselves into more direct competition with other producers who previously had enjoyed a degree of geographical isolation. One of the principal exponents of the thesis, Joe S. Bain, summarized the development as follows:

> "Competition was intensified by the continuing growth of the railroad systems, which tended to bring all of the principal firms together in direct competition for a single national market. The economy was passing from a situation where a fairly large number of small manufacturers sold their products, each in a limited local market somewhat protected by high costs of transportation, to a situation where a few large firms vied among themselves for sales in a single market. In the new environment, price competition was potentially ruinous to all."[6]

[6] Joe S. Bain, "Industrial Concentration and Government Anti-Trust Policy," in *The Growth of the American Economy*, H. F. Williamson, ed., Prentice-Hall, 1944, p. 710.

In this view, producers combined to eliminate increasing competition. Through merger, ruinous price competition could be avoided, and the markets for their products could be "stabilized."

Running through much of the transportation growth–merger hypothesis, and frequently taken as an inseparable part of it, is the argument that the development of national markets permitted the realization of economies of scale in production. This argument will not be examined here for the following reasons. First, the empirical examination of scale economies is much too complex to permit a satisfactory analysis in this limited study.[7] Second, transportation improvement is only one of the ways by which the market expansion needed to realize economies of scale can be achieved. Population growth within fixed geographical regions, cultural change, and per capita income growth are factors of possibly greater importance. Brief comment on the significance of scale economies is made in a later section. The present task is to examine transportation development as a cause of mergers, apart from economies of scale.

PLAN OF EMPIRICAL EXAMINATION

If transportation growth favored mergers we should expect the industries in which the greatest merger activity occurred to have the following characteristics: First, the product would be of such nature that per-mile transportation costs are fairly large relative to product price. Reduced transportation costs would produce a large relative change in delivered prices in distant markets, and thus provide the stimulus required to induce faraway producers to meet the prices of near-by producers. Second, the production of the product would be quite widely dispersed. If all producers were located in the same small geographical area a decline in transportation costs would not change the character of the competition; it would already be a national market in the sense that all sellers could compete for the patronage of all buyers.

To test the validity of the transportation growth–merger hypothesis in this context, three separate factors in the relationship will be examined. First, it must be determined whether, as a matter of fact, the transportation network did expand, and transportation costs did decline, in the years preceding the merger movement. If these developments did not occur, or if there were only a small growth in transportation, the hypothesis would fail for lack of a causal factor.

[7] Some observations concerning their significance are given in a later section of the chapter.

Second, given the underlying pre-merger transportation developments, it is then necessary to determine the proportion of the merger movement accounted for by industries having high per-mile transportation costs relative to the price of the product. This provides a rough measure of the proportion of total merger activity that could have occurred in response to declines in transportation cost. If this share is relatively small, the transportation growth factor can have played only a contributory rather than a dominant role in the movement.

Third, it must be determined whether the industries with high per-mile transportation costs relative to product price had widely dispersed producing centers. If these industries were concentrated in relatively small geographical areas, then reductions in transportation costs would not alter the effective market areas of firms relative to each other.

PRE-MERGER TRENDS IN TRANSPORTATION GROWTH

The data describing transportation growth apply to railroads only. This was the overwhelmingly important form of interregional freight transportation in the last two decades of the nineteenth century. It was also the only form of transportation for which comprehensive detailed data were available.

The development of the railroad transportation system and the trend in freight rates and wholesale prices are described in Table 45. The period 1882–1900 saw a large absolute expansion in the railroad system. Miles of track increased from 114,400 to 193,000, or by 69 per cent. Ton-miles of freight carried increased from 39.3 million to 141.6 million, an increase of 260 per cent. The cost of freight transportation dropped from 1.236 cents per ton-mile in 1882 to 0.729 cents in 1900, a drop of 41 per cent.

It is not possible to compare the 1882–1900 changes with transportation growth of earlier periods since data on freight ton-miles and revenue per ton-mile are unavailable before 1882. However, the 1882–1900 development can be compared with that of the post-1900 period. The period 1900–1916, being comparable in length to the 1882–1900 period and preceding the World War I period of rapidly increased activity, was chosen. The comparisons are presented in Table 45. The data are of average annual rates of change computed, using the compound-interest formula, from the values for the initial and terminal years of each period.

The data presented in the table indicate a higher rate of railroad transportation growth in 1882–1900 than in 1900–1916. This was true for both miles of track and for ton-miles of freight hauled.

TABLE 45

Railroad Mileage, Freight Ton-Miles, Freight Revenue per Ton-Mile, and Wholesale Prices, 1882–1916

Year	Railroad Mileage (thousands of miles)		Freight Ton-Miles (millions)		Freight Revenue per Ton-Mile (cents)		Wholesale Price Index (BLS, 1926=100)
1882	114.4		39.3		1.236		66.1
1884	125.1		44.7		1.124		60.5
1886	133.6		52.8		1.042		56.0
1888	154.2		65.4		0.977		57.4
1890[a]	163.4	163.6	79.2	76.2	0.927	0.941	56.2
1892		171.6		88.2		0.898	52.2
1894		178.7		80.3		0.860	47.9
1896		182.8		95.3		0.806	46.5
1898		186.4		114.1		0.753	48.5
1900		193.3		141.6		0.729	56.1
1902		202.5		157.3		0.757	58.9
1904		213.9		174.5		0.780	59.7
1906		224.4		215.9		0.748	61.8
1908		233.5		218.4		0.754	62.9
1910		240.3		255.0		0.753	70.4
1912		246.8		264.1		0.744	69.1
1914		252.1		288.8		0.737	68.1
1916		254.3		383.5		0.719	85.5

AVERAGE ANNUAL PERCENTAGE RATES OF CHANGE:

Period	Railroad Mileage	Freight Ton-Miles	Intensity of Track Utilization	Revenue per Ton-Mile	Wholesale Prices
1882–1900	+3.0	+7.3	+4.3	−3.7	−0.9
1900–1916	+1.9	+5.8	−3.9	no appreciable change	+2.7

[a] The two values for 1890 represent a shift in data sources. For the period 1882–1890 the Interstate Commerce Commission compiled railroad statistics from annual issues of *Poor's Manual of Railroads*. From 1890 forward the data were compiled from the direct reports of railroads to the I.C.C.

Source for railroad statistics: *Historical Statistics of the United States, 1789–1945*, Bureau of the Census, 1949, pp. 200, 203, Series K-2, 15, 16, 29, 45, and 47.

However, some of the growth in track mileage may have duplicated existing railroad connections. This is suggested by the fact that the rate of growth in the intensity of track utilization was only slightly larger in 1882–1900 than in 1900–1916. The development for the whole period before and after the merger wave primarily represented the progressive rail saturation of limited geographical areas rather than the tying together of distant markets.[8]

[8] However, most pre-1882 economic activity was centered in the northeastern section of the country. The filling-in of the rail network may thus have had a greater effect on competition than the extension of the transcontinental rail lines through the sparsely populated and economically small western part of the country.

The cost of rail freight transportation, as indicated by revenue per ton-mile, dropped at an average rate of 3.7 per cent per year in the eighteen years preceding the turn of the century, and remained essentially constant in the sixteen years following 1900. In absolute terms the pre-1900 and post-1900 changes were distinct. However, relative to the wholesale price level of commodities, the price of rail freight transportation declined at about the same rate in 1882–1900 and 1900–1916. From 1882 to 1900 revenue per ton-mile declined markedly, while wholesale prices declined moderately. From 1900 to 1916 revenue per ton-mile remained constant, while wholesale prices rose substantially. In both periods the annual percentage change in revenue per ton-mile was about 2.8 points below that of wholesale prices.

These findings thus suggest that transportation growth in the decade and one-half before the merger wave was not radically different from that in the decade and one-half following it. In both periods the growth was large and represented intensive rather than extensive growth in the railroad system. There was a sustained fall in the relative price of transportation all through the period, with no sharp break in 1900. The somewhat larger pre-1900 rate of growth might have made it more likely that a merger wave would occur about 1900 rather than later. However, the evolutionary pattern of development throughout the period indicates that this difference was probably unimportant.

It is probable that the pre-1882 growth of railroads was even more rapid than the 1882–1900 growth. Thus, while it can be argued on this theory that the merger wave would have been less likely to occur after 1900, there is no equally strong evidence that it could not have occurred considerably earlier than 1900. Probably any period from 1875 to 1900 could be characterized as following upon a decade of very rapid transportation growth.

MERGER ACTIVITY AND TRANSPORTATION COSTS

While transportation growth in 1882–1900 was not greatly different from that of the period following, it was, nevertheless, large and significant. Therefore further exploration of the transportation growth–merger relationship is of interest, and we turn to the question whether mergers occurred in industries we would expect to respond more vigorously to changes in transportation costs—i.e., in industries where transportation costs are high, but not prohibitive, relative to the price of the product.

In order to demonstrate the incidence of high and low trans-

portation costs among industries in which merger activity occurred, the following breakdown by transportation costs has been made:

1. Industries with a characteristically local market
2. Industries with low transportation costs relative to price of product
3. Industries with high transportation costs relative to price of product
4. Industries for which the role of transportation costs could not be clearly ascertained

The first category, local market industries, includes breweries, firms producing brick, sand and gravel, crushed stone, ice, and the like. The extreme weight and bulk of the products, and the ubiquity of their source materials have restricted their markets to local areas despite marked reductions in transportation costs. This category also includes highly perishable products. The second category, industries with national markets but low transportation costs in relation to price of product, contains nonperishable and semiperishable products whose production involved complex preparation processes. The third category, industries with national markets and high transportation costs, includes basic minerals and products of large bulk and weight with a low degree of fabrication. It also includes products such as sheet glass which, by virtue of their fragility, involve high transportation costs. The fourth, nonallocable, category includes nonperishable products of low bulk and weight, with a moderate degree of fabrication, and highly fabricated but bulky products. In this category were also placed those products whose transportation cost characteristics were too unclear (to the writer) to allow assignment to another category. The detailed breakdown by industry and product is presented in Table C-3.

The breakdown of merger activity by the role of transportation costs is summarized in Table 46. The measure of merger activity used is firm disappearances by consolidation and acquisition. From the table it can be seen that at least a majority of mergers occurred in industries in which transportation costs were an important factor in the delivered price of the product. One of 2,546 firm disappearances which could be allocated to a major or minor transportation-importance category, 1,457, or 57 per cent, occurred in industries where transportation costs were important. The remaining 1,089 disappearances, or 43 per cent, occurred in industries where a reduction in transportation costs could be expected to have had little effect. In calculations based on the consolidation series only,

TABLE 46

Merger Activity in Terms of Relative Importance of Transportation Costs to the Industry, 1895–1904

Transportation costs of—	Firm Disappearances		Percentage of Total Disappearances	
	All merger activity	Consolidations only	All merger activity	Consolidations only
Major importance	1,457	1,258	48.4	50.5
Minor importance				
Local Industries	304	289	10.1	11.6
National industries: low transportation costs	785	573	26.1	23.0
Importance not ascertained	466	373	15.5	15.0
	3,012	2,493	100.0	100.0

Data for consolidations are listed separately (and examined separately throughout this test of the transportation hypothesis) because of the large differences in cut-off limits imposed on the consolidations and acquisitions series (see Chapter 2). There was the risk that measures of total merger activity might contain appreciable numbers of acquisitions of small firms, not comparable in size to consolidation disappearances, a factor that might weaken the test. Detail may not add to totals because of rounding.

Source: Table C-3.

59 per cent of allocable disappearances occurred in industries in which transportation costs were important.

The proportion of merger activity in which transportation cost reductions may have had an effect is sufficiently large to warrant further investigation. However, a substantial share of merger activity occurred in industries in which transportation cost declines would not have had an appreciable effect. Therefore it cannot be concluded, on the basis of this evidence, that mergers occurred in high transport-cost industries with greater intensity than in low transport-cost industries. The next section brings other evidence to bear.

GEOGRAPHICAL CONCENTRATION AND MERGER ACTIVITY

The transportation growth–merger thesis implies that high transport-cost industries exhibiting merger activity would have widely dispersing producing centers. If most producers were concentrated in small geographical areas there would be no exclusive local markets for reduced transportation costs to destroy.

At the same time, there is some logical reason to expect that high per-mile transportation costs and geographical concentration should go together. Firms with high transportation costs are forced to locate in those usually restricted areas which are optimally located with respect to materials, power and labor resources, and

buyers. Thus, on the purely technical grounds of cost minimization, we should expect to find higher geographical concentration in industries with high per-mile transportation costs than in those with lower costs. It follows that we might expect to find closer proximity of firms in those very industries in which transport-cost reductions are supposed to break down barriers between distant firms. Thus the historical decline in transport costs might be credited wrongly with achieving a condition which already existed. This is merely an exercise in deductive logic, however. We shall do better to examine the empirical evidence.

An indication of the greater geographical concentration of high transport-cost industries is provided in Table 47. The geographical

TABLE 47

Geographical Concentration of Manufacturing among Industries Classified by the Size of Transportation Costs Relative to Product Price, 1895–1904

Transportation Costs Relative to Product Price	*Number of Industries*	*Average Index of Geographical Concentration*	
		Simple	*Weighted*[a]
High	10	0.510	0.557
Low	6	.477	.479
Local markets	?	.312	.293
Cost not ascertained	5	.451	.454
Total	23	.471	.511

[a] Weighted by net firm disappearances.

Source: Tables C-3 and C-4.

concentration of an industry was measured by using, as an index, the proportion of industry wage-earner employment in the three adjoining states of highest employment. These indexes were derived from the *1905 Census of Manufactures* for 23 two- and three-digit industries for which merger activity was recorded. The industries accounted for 1,676 net disappearances, or 68.5 per cent of the 2,445 net manufacturing disappearances of 1895–1904. Among these industries the high transport-cost industries showed higher geographical concentration than either low transport-cost industries or merger industries in general.

To determine more directly whether there was a negative relationship between merger activity and geographical concentration, as the transportation growth–merger thesis implies, a correlation analysis was made. It was possible to correlate relative merger activity with geographical concentration for twenty two- and three-digit industries. The comparison is presented in Table 48. It can

TABLE 48

Relative Merger Activity and Geographical Concentration for Twenty Industries, 1895–1904

Standard Industrial Classification	Relative Merger Activity[a]		Geographical Concentration
	All merger activity	Consolidations only	
Meat products (201)	0.294	0.013	0.547
Dairy products (202)	.201	1.38	.290
Canning fruits and vegetables (203)	.786	.728	.307
Grain mill products (204)	.153	.138	.247
Tobacco products (21)	.949	.573	.543
Textiles (22)	.136	.135	.480
Lumber and furniture (24–25)	.083	.068	.180
Paper and allied products (26)	.561	.540	.455
Printing, publishing (27)	.031	.026	.336
Industrial organic chemicals (282)	.061	.041	.280
Paints (285)	.334	.324	.542
Fertilizers (287)	.953	.746	.274
Petroleum (291)	.007	.007	.365
Leather (311)	.163	.159	.505
Glass (321–323)	.402	.398	.636
Iron and steel (331–332)	2.505	2.311	.688
Farm machinery (352)	.730	.709	.518
Electrical machinery etc. (36)	.439	.388	.571
Motor vehicles (371)	2.190	1.654	.507
Ship and Boat building (373)	.342	.328	.348
Coefficient of rank correlation:[b]			
All merger activity		+0.421	
Consolidations only		+0.479	

[a] Measured as ratio of merger capital to industry capital. For a more detailed description of this measure see Chapter 2.

[b] Both coefficients of correlation are significant at the 5 per cent level but not at the 1 per cent level of significance.

Source: Table C-4.

be seen that a moderate degree of positive relationship existed between the merger activity of an industry and its geographical concentration, which suggests that less intensive merger activity occurred in industries in which producing centers were widely dispersed.

When the high- and low-transport cost industries are examined separately, the negative relation between geographical concentration and merger activity suggested by the transportation growth–merger hypothesis is further contradicted, as Table 49 shows. The average relative merger activity in high-transport cost industries (0.620 and 0.528) is lower than that in low-transport cost industries (0.721 and 0.574). Moreover, the rank correlation between mergers and geographical concentration in high-transport cost industries is

TABLE 49

Relative Merger Activity and Geographical Concentration in Fifteen Industries with High and Low Transportation Costs, 1895–1904

High Transport Cost				*Low Transport Cost*			
	Relative Merger Activity				*Relative Merger activity*		
Standard industrial classification	*All merger activity*	*Consolidations only*	*Geographical concentration*	*Standard industrial classification*	*All merger activity*	*Consolidation only*	*Geographical concentration*
201	0.294	0.013	0.547	21	0.949	0.573	0.543
204	.153	.138	.247	282	.061	.041	.280
24–5	.083	.068	.180	285	.334	.324	.542
26	.561	.540	.455	352	.730	.709	.518
287	.953	.746	.274	36	.439	.388	.571
291	.007	.007	.365	371	2.190	1.654	.507
321–3	.402	.398	.636	373	.342	.328	.348
331–2	2.505	2.311	.688				

	All merger activity	*Consolidation only*
Average relative merger activity:		
High transport-cost industries	0.620	0.528
Low transport-cost industries	0.721	0.574
Coefficient of rank correlation between merger activity and geographical concentration:		
High transport-cost industries	+0.571	+0.327
Low transport-cost industries	+0.357	+0.286

Source: Table C-4.

higher (+0.571 and +0.327) than in low-transport cost industries (+0.357 and +0.286). While the sampling reliability of this test is small, the findings are nonetheless opposite to the comparison that the transportation growth–merger hypothesis would lead us to expect.[9] High-transport cost industries should, on that theory, exhibit a more negative merger–geographical concentration correlation than that exhibited by low-transport cost industries.

CONCLUSION

From an empirical examination of the relationship between the growth of the railroad transportation system and the 1895–1904 merger movement certain relationships have been demonstrated. First, the merger wave occurred during a large and protracted expansion of the railroad system, and during a substantial decline in the relative cost of transportation. Second, a considerable part of total 1895–1904 merger activity in manufacturing and mining took place in those industries in which transportation costs were large relative to the price of the product.

However, the geographical concentration of high-transport cost industries was higher than that for low-transport cost industries, suggesting that there were few geographical barriers to be broken down by transportation cost reductions. Moreover, while the transportation growth–merger hypothesis would lead us to expect a negative relationship between merger activity and geographical concentration, the results show a positive relationship between them. The relationship was more positive for industries with high transport costs than for those with low transport costs, again in contradiction to what we would expect if transportation growth had a significant effect on merger behavior. The findings therefore cast doubt on the theory that mergers occurred principally among firms that had seen the growth of transportation destroy their local markets, formerly protected by the barriers of high transport costs.

It appears that the high proportion of merger activity occurring in industries with high transport costs was not due to reductions in these costs. The more correct interpretation seems to be that the industries in which merger activity occurred were only incidentally those with high transport costs. Since mergers occurred in a number of important industries and since these industries

[9] The samples are too small to permit firm conclusions to be drawn from the comparisons. Neither correlation departs significantly from zero at either the 1 per cent or the 5 per cent level of significance. The difference between the two correlation coefficients is likewise not statistically significant.

were as commonly characterized by high as by low transportation costs, it follows that a substantial part of merger activity involved industries with high transportation costs. Beyond this, however, no cause and effect inference seems justified.

Examination of the English merger movement indicates that in England, too, transportation factors were not likely to have been important (see Appendix A). The significant developments in English transportation occurred too many decades before the merger movement to be credited with playing an important role in mergers.

The Capital Market

Another common explanation of the timing of the early merger wave is the development in the United States of an organized large-scale capital market. The existence by the late 1890's of a large capital market has been held necessary for the absorption of the large securities issues of the multimillion dollar consolidations of the era. A corollary thesis is that an organized capital market was the milieu in which financiers and promoters could marshal the financial power needed to induce or coerce independent firms to surrender their independence and enter the large consolidations. Without a highly developed market for capital, it is argued, the large, highly capitalized consolidations of the period would have been difficult, if not impossible to accomplish.

The emergence of the merger movement is so intricately interwoven with concurrent developments in the capital market as to prohibit simple cause and effect explanations. It has been argued with persuasiveness that an organized large-scale capital market was a prerequisite for absorbing the large securities issues of the multimillion dollar consolidations of the era.[10] On the other hand it has been argued that the formation of many new highly capitalized consolidations was the substance upon which the capital market fed in its rapid growth to maturity.[11] Conclusive tests of these relationships are beyond the scope of this study. Instead a brief description of the growth of the securities markets in this period is offered, as a context in which to place subsequent examinations of specific aspects of the capital market–merger relationship.

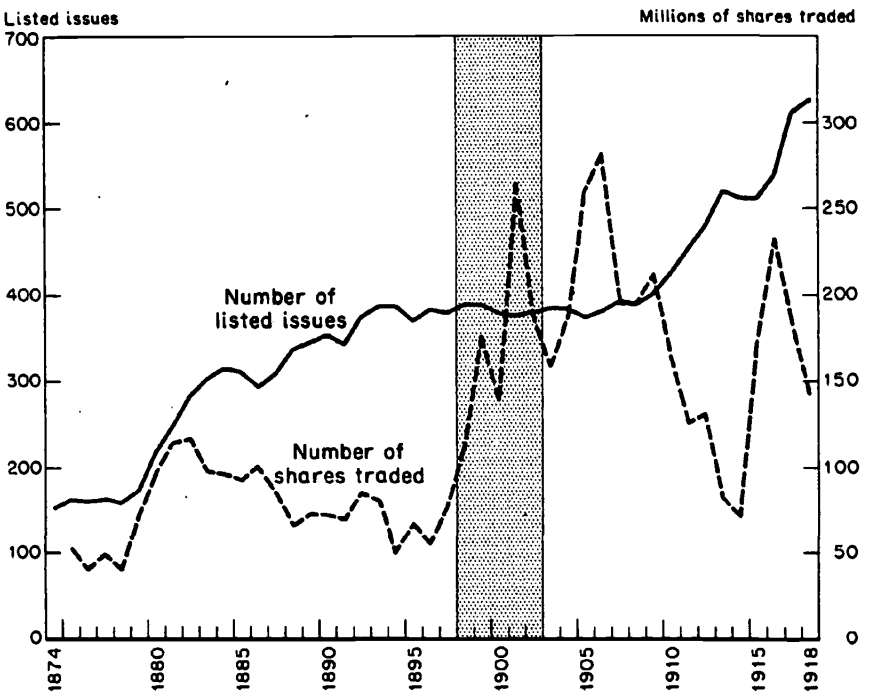
[10] See, for example, George J. Stigler, "Monopoly and Oligopoly by Merger," *Papers and Proceedings of the American Economic Association*, May 1950, pp. 27–31.

[11] T. R. Navin and M. V. Sears, "The Rise of a Market For Industrial Securities, 1887–1902," *The Business History Review*, June 1955.

The growth of the capital market in the years leading up to the merger movement is reflected in the growth of the New York Stock Exchange. From the years following the Civil War until the mid-1890's the number of stock issues listed rose almost continuously (Chart 4). An increasing number of firms, mainly railroads, elected

CHART 4

Number of Listed Stock Issues and Number of Stock Shares Traded, New York Stock Exchange, 1874–1918



Shaded area represents the five peak years of merger activity.

to seek the wider sources of funds available by listing securities on the organized exchange. In contrast to the growth in the number of issues, the period 1882–1896 exhibited a decline in the total number of shares traded. The average volume of trading per issue therefore declined markedly. Railroad stocks dominated the Exchange in this period as industrials had not yet gained general acceptance among investors.[12] It was therefore principally the rail-

[12] *Ibid.*

road issues that suffered from the progressively more shallow market. This period was followed by the extensive railroad reorganizations of the 1890's, largely under the leadership of J. P. Morgan.[13]

After 1895 the number of listed issues leveled off, while trading activity rose sharply; the market for the average issue became much deeper than before. These changes probably reflected two developments. First, the extensive railroad reorganizations succeeded in replacing many small railroad issues with fewer large issues. Second, and less important, the listing of a new industrial consolidation often meant that the issues of the several firms entering the consolidation went off the list. The long-run increase in the number of issues listed was thus offset by the railroad and industrial consolidation issues of this period. Since the railroad reorganizations began in the early 1890's and industrial issues did not gain wide acceptance until 1897, it seems likely that the stock issues of industrial mergers were more the beneficiaries of the deepening of the market than its cause.

Among the outstanding stock market features of the period after 1897 was the increased sale of new industrial issues to the public,[14] hitherto sold principally by stockholder subscription. The post-1897 period was also noted for the development of the large-scale underwriting of industrial securities—a development not fully established, however, until after 1902. It is worth notice that the total volume of trading activity of 1901 was exceeded in only one year before 1919.

This description suggests that, by the late 1890's, the capital market had reached a sufficiently advanced stage of development to be capable of playing an important role in the merger movement. The quantitative and qualitative growth of the New York Stock Exchange from the early 1880's to the late 1890's was appreciable and was apparently based largely on factors other than the financing of mergers. With these developments at least tentatively established, an examination of certain aspects of the role of the capital market in the merger movement may proceed.

A rough demonstration of the degree to which merging firms employed the organized securities markets in marketing their securities issues can be made by determining the proportion of 1897–1902 consolidations whose stock appeared in the lists of securities traded on the New York Stock Exchange in the three

[13] See E. G. Campbell, *The Reorganization of the American Railroad System, 1893–1900*, Columbia University Press, 1938.

[14] Navin and Sears, *op. cit.*

years following the formation of each consolidation. Because case-by-case treatment of the disposition of stock issued by consolidations was impracticable, listing of a common or preferred stock on the New York Stock Exchange is here assumed to signify public trading activity for the stock. The share of the consolidations of the period of greatest merger activity, 1897–1902, whose stocks were traded on the New York Stock Exchange is presented by years in Table 50.

TABLE 50

Consolidations of 1897–1902 Whose Stocks Appeared on the New York Stock Exchange in the Three Years Following Consolidation

Year	Consolidations		Gross Disappearances		Capitalizations (millions of dollars)		Percentage of Traded to All Consolidation Activity		
	Traded	All	Traded	All	Traded	All	Consolidations	Disappearances	Capitalizations
1897	2	9	27	73	70.0	110.9	22.2	37.0	63.1
1898	11	26	177	311	527.2	616.2	42.3	56.9	85.6
1899	31	106	529	1213	1333.3	2038.9	29.2	43.6	65.4
1900	3	43	20	338	81.0	382.7	6.1	5.9	21.2
1901	4	52	29	413	1471.0	1872.8	7.7	7.0	78.5
1902	5	49	29	315	188.5	689.1	10.2	9.2	27.4
Total	56	285	811	2663	3671.3	5710.6	19.6	30.5	64.3

Source: Worksheets and *The Commercial and Financial Chronicle, Investors Supplement*, 1900–1905.

The proportion was about one-fifth of all 1897–1902 consolidations, accounting for about one-third of gross firm disappearances and more than three-fifths of authorized capitalizations.

These consolidations were the larger ones of the period. The average capitalization of the consolidations traded on the New York Stock Exchange was $65.6 millions, while the average capitalization of consolidations not listed was $8.9 millions. The average gross firm disappearances into listed consolidations was 14.5 firms, while the average for nonlisted was 8.1 firms. Only 19.6 per cent of consolidations of all sizes were listed on the Exchange, whereas 64.8 per cent of consolidations capitalized at $20 million-and-over, and 78.6 per cent of $50 million-and-over consolidations, were listed.

When securities not listed on the New York Stock Exchange but listed on the Boston, Philadelphia, or Baltimore exchanges are included in the list, the proportion of 1897–1902 consolidations whose stocks were traded on the organized exchanges increases somewhat. The percentage for consolidations increases from 19.6

per cent to 23.2 per cent; that for gross firm disappearances from 30.5 per cent to 32.4 per cent; and that of consolidation capitalizations from 64.3 to 68.4 per cent.

These estimates of the proportion of consolidations that utilized the securities markets exclude those whose securities were traded on the unlisted markets and on the minor organized exchanges. By the very nature of the market, detailed statistics for such trading were not available. Some idea of the amount of unlisted and minor exchange trading is provided by the general quotation section of the *Commercial and Financial Chronicle, Investors Supplement*, which gives bid and asked quotations not only for securities of listed companies but also for unlisted and inactive stocks. A light sampling of this section uncovered a number of consolidations whose stocks were apparently traded in the minor exchanges or in the unlisted market. Therefore, the proportion of 1897–1902 consolidations using the major stock exchanges can be taken as a rough minimum limit of the proportion of consolidations whose securities were actively traded in the various securities markets.

From these findings we might infer that a substantial share of 1897–1902 consolidation activity resulted in the listing of securities on the organised securities markets. Without knowledge of how many consolidations used the stock exchanges directly to market their new security issues, it is still a reasonable conjecture that many of them found the organized exchanges either directly or indirectly helpful in raising capital. As anticipated, the issues of the more highly capitalized larger consolidations were listed more commonly than those of smaller consolidations.

Next to be examined is the importance of the sale of industrial securities to the general public for cash during the five-year period of high merger activity, 1898–1902. The findings will provide an indirect clue to the role of the securities markets of the period in selling new issues generally and, by inference, in marketing consolidation issues. The inferential error cannot be very grave because consolidation issues predominated among new securities issues of these years. The amount of common and preferred stock issues sold to the general public for cash can be compared with the amount of such issues exchanged for the tangible and intangible assets and the securities of other companies, including predecessor companies. In a period of high merger activity we should expect that the volume of stock exchanged for securities and assets of other companies would show a much greater degree of increase than the volume of stock sold to the general public for cash. If, instead, the relative increase proved greater for cash sales

to the public, we might attach greater importance to such sales and to the organized exchanges, in feeding the merger boom.

Estimates of the amount of equity securities issued for public cash sale and to other companies for assets and securities are provided in *A Study of Saving in the United States*.[15] These two values are compared in Table 51 for the low merger year 1897, the high

TABLE 51

Comparison of Cash Sale of Industrial Common and Preferred Stock to General Public and Issue of Such Stock for Assets or Securities of Other Companies, 1897–1907
(*amounts of stock in millions of dollars*)

	Amount		*Percentage*			
Period	*Cash issue to general public*	*Exchanged for assets or securities of other companies*	*Cash issue to general public*	*Exchanged for assets or securities of other companies*	*Amount issued for all purposes*[a]	*Percentage of two indicated purposes to all purposes*
1897	4	62	6.0	94.0	138	47.8
1898–1902	360	3,026	10.6	89.4	6,205	54.6
1903–1907	28	285	8.8	91.2	447	70.0

[a] Includes (in addition to the indicated purposes) other cash issues, and stock issued to own shareholders for new money, or as stock dividends; and stock issued for acquisition or retirement of own securities. Some of total stock issued was classified as unissued, unsold, or disposition unknown.

Source: Raymond W. Goldsmith, *A Study of Saving in the United States*, Vol. I, Tables V-23 and V-24, pp. 503–505.

merger years 1898–1902, and the low merger years 1903–1907. The comparisons indicate that, as merger activity increased, volume of stock sold to the public for cash rose relatively more than that of stock exchanged for other companies' assets or securities. Also, the public sale of stock declined relatively more as merger activity waned.

These findings provide positive though not decisive support for the theory that the development of a large-scale capital market was necessary to support the merger movement. A well-developed market might be essential even though none of the new security issues was sold to the public for cash. The ability to readily "cash in" securities received in exchange for assets of merged firms would have been an important factor in persuading entrepreneurs to join consolidations. Without well-developed securities exchanges, un-

[15] Raymond W. Goldsmith, *A Study of Saving in the United States*, 3 vols., Princeton University Press, 1955 and 1956.

certainty about the ability to realize cash for consolidation securities might have precluded widespread consolidation activity.

Another way of testing indirectly the theory that development of the capital stock market was a factor in the timing of the large merger wave and in merger activity in general is by comparing changes in merger activity with changes in stock prices. Two measures of merger activity—net firm disappearances by merger, and adjusted merger capitalizations—have been correlated with the industrial stock price index, and with the industrial production index. The production index was introduced into the analysis on the assumption that the level of industrial activity is an important factor in mergers. If differences between the effects of industrial activity and of stock prices on mergers appear, they may help to reveal the influence of stock prices.

Quarterly series for mergers, stock prices, and industrial production were obtained for the period 1895–1904, which encompassed the huge turn-of-the-century merger wave. Table 52 gives

TABLE 52

Coefficients of Correlation of Merger Activity with Stock Prices and Industrial Production by Quarters, 1895–1904

	Measure of Merger Activity	
	Firm disappearances	*Capitalization*
Coefficients of Simple Correlation between—		
Mergers and stock prices	+0.613	+0.536
Mergers and industrial production	+0.259	+0.179
Coefficients of partial correlation between—		
Mergers and stock prices after allowing for changes in industrial production	+0.608	+0.564
Mergers and industrial production after allowing for changes in stock prices	−0.243	−0.274

Source: Quarterly data, Tables B-1, B-2, and C-7.

the results of correlating each of the two measures of merger activity with stock prices and industrial production. Partial correlation analysis was also employed, as the intercorrelation between stock prices and industrial production was sufficiently high (+0.659) to make the simple correlation coefficients somewhat misleading.[16]

[16] The coefficients of simple and partial correlation between mergers and stock prices are significantly greater than zero at the 1 per cent level of significance for both measures of merger activity. Neither the simple nor partial correlation coefficients between mergers and industrial production depart significantly from zero, with use of the 5 per cent level of significance, for either measure of merger activity.

Merger activity exhibits a moderate positive relationship to stock price changes both before and after allowing for production level changes. This is true of both measures of merger activity in roughly the same degree. These correlations were obtained using unsmoothed merger data, which were subject to sharp interquarter irregular variations; with smoothed merger data, the correlations would be higher.

The relationship of merger activity to changes in industrial production is much lower than its relationship to stock price changes. The positive simple correlation coefficients and negative partial coefficients suggest that the changes in stock prices were responsible for the positive simple correlation between mergers and industrial production. When the effects of stock price changes are removed by partial correlation the "pure" relationship between industrial production and mergers becomes slightly negative. Since merger activity generally tends to follow business conditions rather than to move opposite to them, this finding suggests that, in years of peak merger activity, movements in stock prices may be more important than those in industrial production.[17]

STOCK MARKET EXPERIENCE OF LARGE CONSOLIDATIONS

Much of the debate over the desirability and consequences of the early merger wave has turned around the financial success of the large mergers of the period. Arthur Stone Dewing argued that "the trusts turned out ill," while Shaw Livermore argued that Dewing's findings needed reappraisal. Dewing compared the earnings of thirty-five prominent consolidations in the ten years following the merger with the earnings of the constituent companies before the merger, and with the promoters' estimates of prospective earnings. He concluded that the consolidations as a whole were not particularly successful.[18] Livermore traced the earnings records of 328 mergers until 1932 and concluded that the proportion that were successful was large enough to raise a serious question about Dewing's findings.[19]

An important aspect of the financial experience of these early mergers, not examined in either of the two studies, is the dividend record and market-price experience of their common stock. Com-

[17] The experience in the late 1920's also tends to support this hypothesis. Stock prices rose 150 per cent from 1926 to 1929, merger activity rose 165 per cent, and industrial production rose only 25 per cent.

[18] Arthur S. Dewing, "Statistical Test of the Success of Consolidations," *Quarterly Journal of Economics*, November 1921, pp. 84–101.

[19] Shaw Livermore, "The Success of Industrial Mergers," *Quarterly Journal of Economics*, November 1935, pp. 68–96.

mon stock, unlike senior issues, carried no guarantee of dividends or interest. It was commonly issued in payment for the goodwill of the acquired companies, whereas bonds and preferred stock were issued for tangible assets. The behavior of the common stock, therefore, might indicate more accurately the degree to which organizers of mergers erected sound financial structures and succeeded in obtaining profitable control of their markets.

Therefore, an examination of the dividend and market-price records of the common stock of thirteen large 1899 or 1901 consolidations was undertaken.[20] The market price of the stock of each was recorded on the first market day in December of the year of the consolidation. As most of them were organized in the first half of the year, the observation date is five to ten months after the organization—sufficient time for the stock to have been "seasoned" in the market and for the promoters to have played their role and left the market. A nine-year interval was chosen for tracing the dividend records of the consolidations; that is, a medium-run period, with terminal dates of December 1908 and December 1910 at which the industrial stock price index was neither at a peak nor a trough. The stock was assumed to have been sold on December 21 of either 1908 or 1910. Crude rates of return were computed, representing the compound-interest growth in the value of the stock over the period. The dividends received were included in the growth, but were assumed to be not reinvested. The reinvestment assumption would have entailed a detailed investigation of market prices throughout the period and numerous other more complicated computations, which because of the relative shortness of the period would have increased the rate of return very little.

The market records of the common stocks of the thirteen large consolidations are presented in Table 53.

If an individual had invested the same amount of money in each of the thirteen stocks, his return on his investment over this hybrid nine-year period would have been 5.9 per cent. If he had invested an amount in each of the thirteen stocks proportional to the size of its authorized capitalization his return would have been 7.4 per cent. This would not have been much better than the 7 per cent dividend commonly offered on the industrial preferred issues of this period and the 5 per cent nominal interest rate on industrial bonds. However, it contrasts favorably with the yields on railroad bonds of 3.9 per cent in December 1899 and 3.7 per cent in

[20] Selection of the thirteen consolidations focused on the need for wide industrial representation in the sample as well as on highly capitalized firms whose securities had public sale and continuous price records in the financial journals.

December 1901. Railroad bonds were the only securities for which true yield data could be found.

Thus, on the average, the common-stock investor realized a positive though not very large return on his investment in the nine-year period following the merger, a period which spanned two serious

TABLE 53

Nine-Year Market Experience of Common Stocks of Thirteen Large 1899 and 1901 Consolidations

Company	*Date of Organization*	*Market Price Dec. 1 (2) of Organization Year*	*Market Price Dec. 21 9 years later*	*Dividends Received*	*Crude Average Annual Percentage Rate of Return*
United Shoe Machinery	2/7/99	$33.00	$178.91	$29.34	+22.7
American Car & Foundry	2/20/99	16.75	45.25	16.00	+15.5
American Smelting & Refining	4/4/99	40.25	79.00	31.25	+11.9
U.S. Steel	4/1/01	43.50	72.63	21.75	+9.0
American Locomotive	6/10/01	31.13	36.00	10.00	+4.4
American Woolen	3/29/99	22.00	28.00	0.00	+2.7
Distilling Co. of America	7/12/99	8.50	5.95	4.12	+1.9
Republic Iron & Steel	5/3/99	25.38	24.00	0.00	−0.6
American Can	3/19/01	16.25	9.00	0.00	−6.4
Allis-Chalmers	5/7/01	20.50	8.13	0.00	−7.8
American Ice	3/11/99	34.13	4.65	9.00	−9.7
Union Bag & Paper	2/27/99	25.50	9.25	0.00	−10.7
U.S. Cotton Duck	6/4/01	20.50	4.60	0.00	−15.3
Geometric average of rates of return:					
Simple					+5.9
Weighted[a]					+7.4
Railroad bond yields:[b]					
Dec. 1899					+3.9
Dec. 1901					+3.7

[a] Weighted by size of authorized capitalization.

[b] Frederick R. Macaulay, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, National Bureau of Economic Research, 1938.

Source: Moody's Manuals and *Commercial and Financial Chronical*, for appropriate years.

crises in the stock market and a major business depression. Further, common stock was junior to usually heavy issues of 7 per cent cumulative preferred stock and 5 per cent bonds. That seven of the thirteen common stocks paid dividends, and seven of the thirteen offered a positive return on the investment over this period indicates that the promise to investors of increasing equity value was at least partly realized in a fair share of cases.

The almost equal number with unsatisfactory market records suggests, on the other hand, that a good fraction of the consolidations did not bear out this promise. Possibly the proportion of unsatisfactory outcomes corresponds to the risks promoters were willing to take. Yet, in the optimism of the years of peak merger activity, the risk of failure must have looked very small to promoters.

These findings, on balance, probably weaken the argument that the consolidation movement was due exclusively to the desire of promoters for high, quick-turnover profits to the neglect of sound financial principles. One need only recall the personal dislike of the conservative promoter J. P. Morgan for the speculative promoter "Bet-a-Million" Gates to illustrate the diversity of motives and techniques among the organizers of early mergers. It seems unlikely, for example, that Morgan, who had just spent a decade trying to produce order in the financial structures of railroads, would zealously participate in the gross overcapitalization of industrial mergers. The statistical test remains inconclusive. The market dominance achieved by many of these consolidations may have permitted profits sufficiently large to cover their high-interest and preferred-dividend commitments—fixed obligations that would have caused trouble to consolidations failing to secure strong market positions.

CONCLUSION

The organized securities market had experienced important and substantial growth in the last quarter of the nineteenth century, probably as a concomitant of the general economic growth of the country, and was therefore large enough to support the huge turn-of-the-century merger wave. The market's immediate relationship to the merger movement was complex; changes in the capital market permitted developments in merger activity which, in turn, caused further changes in the capital market. However, in view of the earlier and important role played by railroad reorganizations in these changes in the capital market, industrial mergers were probably more the beneficiaries of the changes in the capital market than a cause of them.

A large fraction of the larger and more important 1897–1902 consolidations listed their stock on the organized securities exchanges where it entered into trading activity. Moreover, industrial securities sold for cash to the general public became a relatively larger part of new securities issues during the large merger wave.

A correlation analysis of merger activity and stock-price changes, using industrial production as a control variable, indicated that in this period of peak merger activity mergers were more closely related to stock-price changes than to industrial activity changes. Indeed, though mergers are probably related positively to long-run movements in industrial production, in this period the effect of stock-price changes apparently overrode the immediate influence of industrial production.

The market experience of the stocks of a small sample of consolidations suggests that investors in the common stocks of the leading consolidations fared not much worse than holders of preferred stock and perhaps a little better than bondholders. So far as it goes, this finding lends no support to either of the extreme views —that common stock of mergers was an investment success, or that it was merely a device for exploiting gullible investors.

The British merger movement also paralleled more closely changes in stock prices than changes in industrial production (see Appendix A). Since the greatest growth in the British capital market probably occurred much earlier than that in the United States, it is not a development that can be designated as an immediate cause of the British merger wave very late in the nineteenth century. Developments in business organization may be relevant here. Not until the 1880's in England were the full potentialities of limited liability realized in corporate practice (though legally prepared for much earlier): what was achieved quickly in the United States was achieved gradually in Great Britain. A convergence of unrestricted corporate behavior and large capital markets may have been important in setting the stage for mergers, and may help explain the almost simultaneous occurrence of great merger waves in the two countries. at the turn of the century.

The Market Control Motive

A frequent explanation for the merger movement is that mergers represented attempts on the part of businessmen and financiers to achieve market control.[21] One cannot measure the market control motive directly. As one of the many manifestations of the profit motive. market control may be substituted for by other profit-increasing conditions. Moreover, it is inextricably tied up with

[21] See, for example, Joe S. Bain, in *The Growth of the American Economy*, 2nd ed., H. F. Williamson, ed., Prentice-Hall, 1951, Chap. 32; and Hans B. Thorelli, *The Federal Antitrust Policy, Origin of an American Tradition*, Johns Hopkins Press, 1955, p. 280.

external economic forces on the entrepreneur.[22] Lacking direct observation of the motive, we may study its effects. By examining the results of the merger wave in terms of market control achieved we may be able to make inferences about the importance of the desire for such control.

EVIDENCE OF MARKET CONTROL

The data describing the degree of market control achieved by the major mergers of the 1895–1904 period are taken from *The Truth About The Trusts.*[23] In this book Moody estimated the share of the industry controlled by each of ninety-two important trusts. No attempt was made to construct independent estimates of shares of markets controlled, either for the trusts listed by Moody or for those he did not list, with the following exception. Two industries in which a high degree of local market control was the characteristic result of the merger have been added to Moody's list—breweries and ice companies. They were assigned to a percentage-controlled category designated "large." It should be added that Moody used this qualitative designation for a number of industries, where the apparent industry control was substantially more than 50 per cent.

If we assume that the Moody estimates individually are reasonably accurate, then our estimates of the proportion of merger activity resulting in market dominance can be regarded as minimum estimates. A considerable number of mergers not included by Moody probably achieved a high degree of control in local or regional markets, where the computations of exact percentages were not possible.

The number of consolidations achieving given degrees of market control presented below do not exactly correspond to those presented in Moody, for two reasons. First, the present writer adopted different class intervals than Moody's, in order to center the more common percentages within the class interval. Second, Moody listed a number of nonmanufacturing or nonmining mergers, and of pre-1895 trusts, which have been excluded because not covered by the merger data of this study. One major trust, Standard Oil, was left out because almost all of its merging activity took place well before 1896.

Certain adjustments were required in the totals for numbers of

[22] A common explanation of the "increased desire for market control" in certain industries in the 1890's was the downward pressure on prices caused by what was thought to be declining demand for the product, aggravated by too much productive capacity.

[23] John Moody, *The Truth About The Trusts*, Moody, 1904.

consolidations, firm disappearances, and capitalizations. Earlier consolidations entering into later consolidations were deducted from the totals, both for number and capitalizations of mergers; only the capitalization of the last consolidation in the period was included.[24] But firms absorbed by earlier consolidations later absorbed by further consolidations were included in the disappearances total. In industries in which acquisition was the dominant form of merger, the capitalization of the latest incorporation of the parent company was included in the capitalization totals, to make these mergers comparable to consolidations in this dimension of size.

The distribution of merger activity in industries in which market dominance was achieved is presented in Table 54. It is

TABLE 54

Proportion of Merger Activity Accounted for by Merged Firms That Achieved Market Control, 1895–1904

Percentage of Industry Controlled	*Consolidations and Parent Companies*		*Firm Disappearances*		*Capitalizations* (millions of dollars)	
	Number	*Per cent of total*	*Number*	*Per cent of total*	*Value*	*Per cent of total*
42.5–62.5	21	6.7	291	9.7	613.5	10.3
62.5–82.5	24	7.7	529	17.6	2,130.6	35.7
82.5-over	16	5.1	343	11.4	998.0	16.7
"Large"	25	8.0	302	10.0	455.5	7.6
	86	27.5	1,465	48.6	4,197.6	70.4
Total merger activity	313	100.0	3,012	100.0	5,960.9	100.0

Source: See accompanying text.

evident that a substantial share of total 1895–1904 merger activity did result in securing a leading and often dominant share of the market. Almost one-half of firm disappearances, and seven-tenths of merger capitalizations were accounted for by mergers that gained a leading position in the market. Considering that these are minimum estimates, it might not be too misleading to place the actual share of disappearances into market-leading firms as high as two-thirds of all merger disappearances, and the share of such firms' capitalizations as high as three-fourths or four-fifths of all merger capitalizations.

[24] For a list of major consolidations subsequently entering larger consolidations, see Table C-6.

CONCLUSION

Whatever the precise share of merger activity resulting in the control of markets, the above evidence shows that it was substantial. As we have noted, it would be extremely shaky reasoning to attribute this high "monopolization" activity to a fundamental increase in businessmen's desire for market control. But the findings do warrant certain inferences. First, they tend to demonstrate the existence of a fairly strong desire to avoid rigorous competition. Second, if we assume that the promoter and financier were important motive forces in the merger movement, it seems probable that the promise of "monopoly" profits would have served as one of the more effective inducements for firms to surrender their independence.

Note on Economies of Scale

Technological revolution leading to great economies of production in large-scale enterprises has been regarded by many merger students as of transcendent importance. Examination of this factor is not feasible, largely because the data on mergers lack sufficient detail for an assessment of scale economies on an individual merger basis. A few observations of certain aspects of the phenomenon may be in order, however, for indirect light on its importance in the early merger movement.

In scanning the basic data gathered in this study, one is struck by the overwhelming share of merger activity made up of what appear to be horizontal mergers. The vertical merger was characteristically found in the primary metals industries, but appeared only infrequently in the great variety of other industries having large merger activity. This suggests that the economies of vertical integration, upon which many merger students have placed great stress, played a relatively small role in the merger movement.

Another feature of the merger movement is the great diversity in types of production operations among the industries in which mergers occurred. The description of the industrial composition of the merger movement presented in Chapter 3 demonstrated that variety. It is hard to believe that such a variety of technological developments as would be needed to bring production economies of scale to these diverse industries could have converged in the same short period of time.

In the present chapter, the joint contribution of the capital market and the promoter in the creation of firms controlling major

shares of their markets emerges as an important factor. It may have overridden other developments that presumably might have exerted an influence on merger activity. Emphasis on the control of markets might well have been more important than cost factors in determining firm size. It would be difficult to demonstrate that the most efficient or potentially most efficient firm size from the cost standpoint was systematically related to the size of the market —as would have to be demonstrated if scale economies were to be reconciled with market control.[25]

Lacking more complete data with which to test the reasoning, however, this discussion of scale economies must remain conjectural.

Summary and Conclusions

We have examined four historical developments that have been prominent among the explanations of the early merger movement. Other common explanations could not be tested, notably economies of scale, for want of adequate data. Even although the examination is incomplete, the detailed tests of the several hypotheses serve to place the merger wave in clearer perspective.

The findings concerning the role of industry growth retardation in the early merger movement raise a serious question as to the validity of that hypothesis. The years preceding the merger wave saw a reversal of the pattern of retardation, especially in the very industries where merger activity was highest. The observed pattern of industry growth acceleration could hardly be credited with causing the kind of increased competitive pressure on business firms that the retardation hypothesis alleged. Indeed, we would expect that acceleration of market growth would cause a relaxation of competitive pressures, and thus a diminution of the impetus toward merging.

The transportation system underwent a large and protracted expansion in the decades preceding the merger wave. The effect of this development on merger activity is hard to assess, however. It probably did place geographically separated firms in more direct competition with one another. On the other hand, mergers occurred more commonly in industries that were geographically concentrated than in those more widely dispersed. Furthermore, the

[25] Stigler (*op. cit.*, p. 29) found that the near-monopolies created at the turn of the century almost invariably experienced a substantial decline in market share as time passed.

growth of transportation was accompanied by, and was probably a partial cause of, acceleration in market growth, which permitted a firm to pursue a more independent course. The period was also characterized by substantial increases in the tariff, protecting domestic industries from international competition. In view of these offsetting factors it seems unlikely that transportation growth could be accounted a major cause of the merger movement.

The findings concerning the role of the capital market in the merger movement lend considerable support to the thesis that the development of the capital market was a major cause. The high correlation between merger activity and stock prices suggests that much of the merger activity of the period had its origin in, or was influenced by, the stock market. Further examination indicated that capital market factors overrode the level of industrial activity in influencing merger activity. This suggests that cost-price relationships in business firms were a less important influence than many students believed.

The desire for market control probably played at least a permissive role in the merger movement. The large proportion of merger activity resulting in market control suggests that the desire for the protection thus afforded to profits must have been a factor of substantial importance in inducing firms to merge. With the growth of the capital market this desire found an effective means of implementation. Coupled with the expectation of gains to be reaped from a rising stock market, the added promise of protected profits must have represented a compelling argument for independent firms to join into consolidations.