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CHAPTER 3

Patterns and Trends in Diversification

How important are multi-industry firms in the American economy and how large are their nonprimary activities? In how many industries do large multiestablishment firms maintain production? The first part of this chapter is devoted to answering these questions. The second traces the trends in diversification since 1929 for large manufacturing companies. Most of the results in this part of the study are based on information for the 111-firm sample. The generalizations, therefore, apply primarily to large companies. Since, in terms of industry composition, the sample is not representative of the universe of large firms, measures of diversification for the sample as a whole cannot be taken as accurate estimates of average diversification for all large firms. However, they give a rough indication of the level of this average as well as a number of other characteristics of diversification for large companies in general.

The discussion in this chapter focuses primarily on the manufacturing activities of companies. Nonmanufacturing activities are discussed mainly in Chapter 6.

Summary

Firms that have establishments in more than one industry account for less than 1 per cent of the total number of firms in each of six sectors of the economy.[1] However, in 1954, in the six sectors combined they contributed roughly 38 per cent of the employment of all firms. Their role was largest in manufacturing and second in mineral extraction industries. Using the ratio of nonprimary to total employment as a measure of diversification, companies in manufacturing appear to be considerably more diversified than those in the other five sectors.

For the sample of 111 companies, the mean value of the ratio of payrolls in nonprimary manufacturing activities to total manufacturing payrolls was 39.2 per cent (using the 4-digit definition of primary industry). It declined moderately to 36.0 per cent when activities characterized as integration were excluded. Another measure of diversification is the number of industries in which firms maintain operations. The 111 firms produced goods and services in an average of 15.6 manufacturing industries, or 20.4 if nonmanufacturing activities are included.[2] They maintained

[1] The six sectors were those covered in the 1954 Economic Census and consisted of manufacturing; extraction of minerals; wholesale, retail, and service trades; and public warehousing.

[2] Once again, the 4-digit level of industry detail was employed.

separate establishments in an average of 9.7 manufacturing industries. A rather surprising fact was the large proportion of activities that were of relatively minor importance to individual companies. In the manufacturing operations of the 111 companies, 45.3 per cent of the separate industrial activities accounted individually for less than 2 per cent of the manufacturing employment of their companies.

The current widespread interest in diversification might suggest the phenomenon is of recent origin. The evidence, however, points to a contrary conclusion. The annual rate of product additions for the group of 111 companies was higher in the 1929–39 period than it was in 1939–50, though for either of the above periods it was substantially less than the rate in 1950–54. Further, although one might normally expect that suspension of activities would be more frequent in periods of low economic activity (particularly when suspension does not necessitate the sale of a plant), the annual rate of product abandonments rose over time and was roughly three times as high in the 1950's as in the 1930's. In consequence, the decline from the first to the second period was more marked, and the rise in the third period less pronounced, when measured by net than by gross product additions.

If an increase in diversification is measured by the decline in the relative importance of a firm's primary activities, a majority of the 111 companies showed an increase in diversification for the period 1947–54. However, the average decline for the 111 companies was relatively modest, being 5 percentage points or 7.2 per cent (a drop from 69.0 per cent to 64.0 per cent for the ratio of primary industry payrolls to total company payrolls in manufacturing).

When a separate activity is recorded only if it is primary to at least one plant, the number of manufacturing activities for the 111 companies combined increased from 823 in 1947 to 1,073 in 1954. However, in 1954, a considerable proportion of the new activities were still relatively small as compared with the size of their companies.

With companies grouped by primary industry, the same groupings tended to show the highest frequencies of product additions in successive periods. Thus some groups of companies appear to have consistently diversified more than others, and, in consequence, differences among companies in degree of diversification must have increased over the 1929–54 period. Another important characteristic of the trends in diversification has been that new activities have tended increasingly to be in industries less closely related to the primary ones in terms of production processes employed or the final uses of products.

Multiestablishment Enterprises

Multiestablishment firms, that is, firms operating more than one plant or establishment, represent a larger proportion of all firms in the higher than in the lower size classes of companies. Therefore, they play a much greater role in the economy than their relative numbers would suggest. In each of the six broad sectors of the economy covered in the 1954 Census, the number of multi- as compared with single-establishment companies was fairly small (Table 6). For the aggregate of the six sectors, they accounted for only 2.45 per cent of all companies reporting in the Census.[3]

TABLE 6

THE ROLE OF MULTIUNIT AND MULTI-INDUSTRY COMPANIES IN 1954

	All Industries	Minerals	Manufacturing	Wholesale	Retail	Selected Service	Public Warehouses
Multiunit companies as percentage of all companies	2.45	6.67	3.07	4.64	2.53	1.35	3.68
Multi-industry companies as percentage of all companies	.246	1.25	1.30	.555	.098	.067	.016
Multi-industry companies as percentage of multiunit companies	10.04	18.73	42.29	11.97	3.87	4.96	4.47
Multiunit employment as percentage of employment for all companies[a]	52.03	57.12	64.41	26.75	38.67	23.38	24.18
Multi-industry employment as percentage of employment for all companies[a]	38.37	35.01	53.02	11.31	20.84	9.82	2.20
Multi-industry employment as percentage of multiunit employment[a]	73.74	61.29	82.32	42.29	53.89	42.00	9.09

SOURCE: Based on data in *Company Statistics,* Table C.

[a] The classification of employment according to industry categories was based on the industry of the parent company rather than of the establishment.

Yet, as Table 6 shows, multiunit companies accounted for roughly 52 per cent of the employment of all companies in the six sectors combined. The highest ratios were those for manufacturing and minerals extraction, for which they were 64.4 per cent and 57.1 per cent, respectively. The importance of multiunit firms is likely to be greater in industries with a relatively high average size of firm since company size is positively related to the

[3] Multi-industry companies, that is, those that operated establishments in more than one industry, were, of course, an even smaller proportion of the total number of firms in the six sectors, accounting for only a fraction of 1 per cent of the latter. "Industry" for this purpose was defined at the 4-digit level.

relative numbers of multi- as compared with single-establishment companies.[4]

Multi-industry companies accounted for roughly 38 per cent of total employment in the six sectors. Their relative roles within these sectors were, however, very unequal. In manufacturing, they contributed approximately 53 per cent to total employment, and for mineral industries 35 per cent. Though there were important differences, for five of the six divisions (all except public warehousing) a substantial percentage of the employment of multiunit firms was contributed by firms that maintained establishments in more than one industry. The differences among the various sectors are larger for the ratio of multi-industry to total employment than they are for the ratio of multi-industry to multiunit employment. Multi-industry companies contributed 82 per cent to the employment of multiunit companies in manufacturing and 61 per cent in mineral extraction industries. For the other sectors, the ratios were distinctly smaller. Thus if the relative importance of multi-industry companies is taken as a very rough measure of diversification, the latter appears to be strongest in manufacturing.

Multi-industry companies vary considerably in their relative importance among industry categories within each of the sectors of the economy, and particularly within the manufacturing sector. Generally, they are more important in industries in which average firm size is high.

The Magnitude of Nonprimary Activities in Aggregative Data

A primary industry is one that is associated with the largest individual activity of the firm. Differences in degree of specialization of operations in the primary activities of companies can be examined through aggregative industry data as well as on the basis of information for individual companies. In the former, the ratios of nonprimary to total employment can be based on information showing total employment of all companies classified in a particular industry and aggregate employment restricted to the primary industry of the same grouping of companies.[5]

[4] For seventy-one industries, the Spearman coefficient of rank correlation between the ratio of number of multi- to single-unit companies (based on data in U.S. Bureau of the Census, *Company Statistics: 1954 Censuses of Business, Manufacturing, Mineral Industries*, Washington, 1958, Table 2) and average size of firm in the industry (based on data described in Appendix D) was .77.

[5] These ratios give us a measure of specialization of activities in the primary industry that automatically gives greater weight to a large than to a small company. This may be distinguished from average ratios for particular industries, derived from data for individual companies, where the ratios are not weighted for differences in company size. Unweighted average ratios are better suited than aggregative data for the purpose of measuring the extent of diversification in a "typical" company. Census data for industry aggregates also

The ratios will vary depending on how *industry* is defined in each case. Thus, if industry is defined as one of the six broad sectors described earlier, the relevant percentage of nonprimary employment to total employment for each sector is as follows: manufacturing, 9.9 per cent; mining, 8.2 per cent; wholesale trade, 3.6 per cent; retail trade, 3.5 per cent; and services, 1.3 per cent. This measure, however, would not allow for the fact that an important proportion of activities outside the major division represents integration rather than diversification. Moreover, the activities to be found within the major division are highly heterogeneous. Indeed, diversification is to be found primarily in the heterogeneity of a firm's output within its primary division rather than outside it. Thus the above definition of industry is far too broad. Using the same six divisions in which to classify the enterprises, but substituting the previously described 3-digit definition of primary industry, the ratios of nonprimary to total employment were as follows: manufacturing, 21.4 per cent; minerals, 9.2 per cent; retail trade. 5.5 per cent; wholesale trade, 4.6 per cent; and services and public warehousing, less than 2 per cent.

Table 7 is a frequency distribution for eighty-six manufacturing and mining and thirty-four trade and service industries for the ratio of employment in nonprimary activities to employment in the primary industries of the companies concerned. Appendix Table D–6 shows the ratio in question for each of 120 industries. It is apparent from these tables that,

TABLE 7
NONPRIMARY INDUSTRY EMPLOYMENT AS
PERCENTAGE OF PRIMARY INDUSTRY EMPLOYMENT, 1954

Manufacturing and Mining		*Trade and Services*	
Nonprimary as Percentage of Primary Employment	Number of Industries	Nonprimary as Percentage of Primary Employment	Number of Industries
.0– 4.9	17	0– .9	7
5.0– 9.9	18	1–1.9	12
10.0–14.9	10	2–2.9	3
15.0–19.9	8	3–3.9	5
20.0–24.9	9	4–4.9	3
25.0–29.9	7	5 and over	4
30.0–39.9	2		
40.0–49.9	7		
50.0 and over	8		
Total	86		34

SOURCE: *Company Statistics*, Table 2.

incorporate single-unit as well as multiunit companies. For this reason, they will show a relatively smaller volume of nonprimary activities than would be true for samples of companies restricted to multiunit enterprises.

on the basis of data for establishments,[6] in most industrial categories companies with highly homogeneous product structures predominate.

A rather interesting aspect of the aggregative ratios of nonprimary to primary employment for the eighty-six manufacturing and mining industries is that nonprimary activities appear relatively larger, compared with those in primary industries, on the basis of employment than on the basis of number of establishments. This was true for fifty-four of eighty-six industries. It implies that for the majority of industries the average size of establishments in nonprimary industries was larger than that for the primary ones—a conclusion opposite to that indicated at another point in the study for the sample of 111 large enterprises. This finding, however, can be explained by the fact that multi-industry companies tend to be larger and thus generally operate larger plants than do single-industry firms. Thus the establishments in nonprimary industries, as they are owned by the larger, multi-industry firms, tend to be larger than the average establishment in the primary industries. In short, if we exclude single-industry companies, and particularly the large numbers of single-establishment companies in most industry classes, aggregative data would probably point to the same conclusion as data for the 111 large companies.

Diversification Patterns for the 111-Firm Sample

For this sample, the data permitted a distinction to be made between activities associated with diversification and those characterized as integration. For the 111 companies, the mean value of the ratio of payrolls in the primary 4-digit industry to total *manufacturing* payrolls, excluding those associated with integration, was 64.0 per cent with a standard deviation of 28.7 percentage points.[7] When payrolls associated with integration activities were included in the denominator, the ratio dropped only slightly to 60.8 per cent, and the standard deviation to 24.8 percentage points. The inclusion of activities outside manufacturing in the analysis permitted the use of only a 2-digit level of industry detail for the above relationships. Further, the information was for employment rather than payrolls. The mean ratio of primary 2-digit employment to total employment (including that in nonmanufacturing) was 81.2 per cent when integration employment was subtracted from the denominator, and only

[6] Establishment data may be distinguished from data that would not classify *all* of the output or employment of a multiproduct establishment into a single industry.

[7] The average ratio for the 111 companies of primary plus secondary industry payrolls to total manufacturing payrolls (excluding those associated with integration) was 78.9 per cent. The secondary industry is defined as the second largest for the individual firm, not counting those classified as integration.

60.4 per cent when it was not excluded. The standard deviations were 18.8 and 20.5 percentage points, respectively. Thus it appears that exclusion of integration affects the ratios of primary to total employment far more when nonmanufacturing activities are included in the analysis. This stems from the fact that, for manufacturing enterprises, integration as compared with other activities is more important outside manufacturing than within it.

For the two ratios which include nonmanufacturing activities, the coefficient of variation was distinctly higher with integration employment included in the denominator: 33.9 per cent compared with 23.2 per cent if integration employment is excluded. This indicates a more stable relationship among the companies between primary employment and that part of nonprimary employment associated with diversification than be-

TABLE 8

AVERAGE RATIOS OF PRIMARY INDUSTRY EMPLOYMENT TO TOTAL EMPLOYMENT AND PRIMARY INDUSTRY PAYROLLS TO TOTAL MANUFACTURING PAYROLLS, 111 LARGE ENTERPRISES, 1954

Primary Industry of Company	Number of Companies	*Average Primary Two-Digit Ratio*		*Average Primary 4-Digit Ratio*	
		Unadjusted Employment[a]	Adjusted Employment[b]	Unadjusted Employment[a]	Adjusted Manufacturing Payrolls[c]
Food products	12	.659	.933	.530	.783
Tobacco manufactures	5	.832	.999	.585	.726
Textile mill products	4	.651	.754	.444	.514
Paper products	8	.780	.893	.410	.576
Chemicals	14	.606	.752	.338	.478
Petroleum	10	.306	.886	.306	.927
Rubber products	5	.558	.697	.344	.477
Stone, clay, and glass products	7	.683	.833	.502	.637
Primary metals	10	.656	.831	.573	.723
Fabricated metal products	5	.586	.685	.524	.529
Machinery	13	.555	.807	.400	.609
Electrical machinery	5	.585	.667	.302	.365
Transportation equipment	13	.663	.728	.587	.682
Ratio of variances[d]		4.291	1.891	2.461	3.716

SOURCE: Special census tabulation.

[a] Ratio based on data for employment; employment associated with integration not subtracted from denominator.

[b] Ratio based on data for employment; employment associated with integration subtracted from denominator.

[c] Ratio based on data for payrolls restricted to manufacturing; payrolls associated with integration subtracted from denominator.

[d] For each column the ratio of the variance between industries to that within industry cells with $N_1 = 12$, $N_2 = 98$.

tween the former and *all* nonprimary employment (including integration).

In a majority of the thirteen industry groups of companies, average primary 4-digit employment was less than 50 per cent of total employment unadjusted for integration (Table 8). On the same basis, primary 2-digit employment was between 55 per cent and 70 per cent of total employment in ten of the thirteen industry groups. Because no adjustment was made for employment associated with integration, the ratios tend to understate the extent of specialization of operations in the company's primary industry. With the adjustment, the specialization of employment in the primary 2-digit industry exceeded 70 per cent in ten of the thirteen groups. On the adjusted basis also, and using data for payrolls for manufacturing operations, the primary 4-digit industry accounted for more than 50 per cent of total manufacturing payrolls in all but two of the thirteen industry categories. All four measures of primary industry specialization in Table 8 showed wide differences in average ratios between industry groupings of companies.[8]

TABLE 9

DISTRIBUTION OF COMPANIES BY NUMBER OF PRODUCTS AND SERVICES PRODUCED IN 1954

Number of Products and Services[a]	*Number of Companies*	
	All Products and Services Counted	Only Manufacturing Products Counted
1– 5	9	17
6–10	10	30
11–15	16	19
16–20	23	18
21–25	25	9
26–30	9	10
31–35	5	3
36–40	7	1
40 and over	7	4

SOURCE: Product record described in Chapter 2.

[a] Products or services falling within the same 4-digit industry counted as one product or service.

As distinct from the relative magnitude of nonprimary activities measured by either payrolls or employment, one might wish to inquire into the number of separate products and services that the 111 firms produced in 1954. At the 4-digit level of detail, the arithmetic mean for the 111 companies was 15.6 excluding nonmanufacturing activities and 20.4 including the latter. Table 9 is a frequency distribution showing the number of companies falling into various classes based on number of activities in 1954.

[8] The variance between industry means was, in the case of all four ratios, significantly greater than that between companies within industry classes.

Table 10 shows the number of manufacturing industries in which the 111 enterprises maintained establishments in 1954. The nonprimary activities of *plants* did not enter into the count of industries. (In this respect Table 10 differs from Table 9.) The average number for the 111 companies was 9.7. The electrical machinery group accounted for the largest number per company (22.2) and petroleum for the lowest average number (3.9) of the thirteen groups.

Table 10 also shows the number of minor manufacturing activities in which the 111 firms were engaged—that is, activities which account for a relatively small proportion of the company's manufacturing employment. The table indicates the proportion of activities that contributed more than 2 per cent and more than 1 per cent of total manufacturing employment for the companies in question.[9] It is rather surprising to find that for a majority of the 111 large enterprises, minor activities accounted for a substantial proportion of the total number of industrial activities in which the companies were engaged. In six of the thirteen industry groups, at least one-third of the manufacturing activities individually contributed not more than 1 per cent to the manufacturing employment of their companies. When the boundary between minor and nonminor activities is set at 2 per cent, a third or more of the activities were minor in eleven of the thirteen industry groups. For the 111 companies combined, 45.3 per cent of all manufacturing activities fell below the 2 per cent boundary and 32.4 per cent fell below the 1 per cent boundary. This seems to indicate that, for large enterprises, a considerable proportion of the individual manufacturing operations in which companies are engaged are not crucial and, probably, not even important to the success of the enterprise as a whole. A reason for the existence of a large number of relatively minor activities is that many of them are new to companies and have not had time to attain the size intended for them in long-term plans. This, however, is likely to explain only a part of the phenomenon.

An increase in the number of minor activities in which a firm is engaged may reduce the effectiveness of central controls over a firm's operations. However, from the point of view of an investor in the firm, the hazards associated with new and risky ventures are smaller when these activities account for a small proportion of the total employment (and investment) of the firm.[10]

[9] The 1 per cent and 2 per cent boundaries for minor activities are, perforce, somewhat arbitrary. Thus, it is interesting to see to what extent the results are affected by changing the boundary.

[10] While the hazards of unfavorable surprises are likely to be smaller, so are the effects of favorable ones.

TABLE 10

NUMBER OF 4-DIGIT MANUFACTURING INDUSTRIES FOR 111 LARGE ENTERPRISES, 1954

Primary Industry of Company	Number of Companies	Total Number of Industries	Average Number per Company	Number with over 2 Per Cent of Total Manufacturing Employment	Percentage of Total Number[a]	Number with over 1 Per Cent of Total Manufacturing Employment	Percentage of Total Number[b]
Food products	12	132	11.0	60	45.4	81	61.4
Tobacco manufactures	5	22	4.4	17	77.3	18	81.8
Textile mill products	4	30	7.5	20	66.7	23	76.7
Paper products	8	68	8.5	45	66.2	52	76.5
Chemicals	14	173	12.4	99	57.2	116	67.0
Petroleum	10	39	3.9	22	56.4	24	61.5
Rubber products	5	62	12.4	36	58.1	45	72.6
Stone, clay, and glass products	7	61	8.7	35	57.4	50	82.0
Primary metals	10	110	11.0	46	41.8	57	51.8
Fabricated metal products	5	55	11.0	36	65.4	44	80.0
Machinery	13	89	6.8	66	74.2	76	85.4
Electrical machinery	5	111	22.2	44	39.6	60	54.0
Transportation equipment	13	121	9.3	61	50.4	79	65.3
Total	111	1,073	9.7	587	54.7	725	67.6

SOURCE: Special census tabulation.

[a] Those with over 2 per cent of manufacturing employment as a percentage of all activities.

[b] Those with over 1 per cent of manufacturing employment as a percentage of all activities.

TABLE 11

TOTAL NUMBER OF ESTABLISHMENTS AND PROPORTION IN PRIMARY INDUSTRIES, 111 LARGE ENTERPRISES, 1954

Primary Industry of Company	Number of Companies	Total Number of Establishments	Average Number per Company	Percentage of Establishments in Primary 4-Digit Industry
Food products	12	1,149	95.7	43.0
Tobacco manufactures	5	57	11.4	33.9
Textile mill products	4	74	18.5	29.0
Paper products	8	276	34.5	30.6
Chemicals	14	656	46.8	24.6
Petroleum	10	157	15.7	62.0
Rubber products	5	225	45.0	18.9
Stone, clay, and glass products	7	211	30.1	43.6
Primary metals	10	464	46.0	32.7
Fabricated metal products	5	212	42.4	37.0
Machinery	13	163	12.5	28.2
Electrical machinery	5	358	71.6	24.0
Transportation equipment	13	341	26.2	52.6

SOURCE: Special census tabulation.

TABLE 12

RATIO OF NUMBER OF MANUFACTURING PRODUCTS TO NUMBER OF 4-DIGIT MANUFACTURING INDUSTRIES, 111 LARGE ENTERPRISES, 1954[a]

Primary Industry of Company	Ratio
Food products	1.18
Tobacco manufactures	1.18
Textile mill products	1.30
Paper products	1.72
Chemicals	1.63
Petroleum	2.15
Rubber products	2.47
Stone, clay, and glass products	1.51
Primary metals	1.39
Fabricated metal products	1.58
Machinery	2.01
Electrical machinery	1.61
Transportation equipment	1.69
All companies	1.61

SOURCE: Product record for 1954 described in Chapter 2, and special census tabulation.
[a] Number of products based on data from public records. Number of industries is that shown in census establishment data.

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PRODUCT STRUCTURE IN MANUFACTURING FOR 11

Industries of Products	*Industries of Companies*					
	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)
Ordnance					7	
Food products	85				4	
Tobacco manufactures		18				
Textile mill products	2	2	16	3	8	
Apparel			6			
Lumber and wood[b]	2	1		11	5	
Furniture				1	1	
Paper products	5	1	1	39	4	
Printing and publishing	2	1		5	2	
Chemicals	47	1	6	22	161	57
Petroleum and coal products				1	9	17
Rubber products			1	1	1	
Leather	3					
Stone, clay, and glass products	1		5	8	7	
Primary metals					17	2
Fabricated metal products	3	2	1	1	9	2
Machinery[c]	4		1	17	23	2
Electrical machinery				2	6	
Transportation equipment	1				3	
Instruments[d]				3	2	1
Misc. manuf. industries	1		2	3	7	3
Total	156	26	39	117	280	84
Average per company	13.0	5.2	9.7	14.6	20.0	8.4

For the thirteen industry groups, there was no correlation between the relative numbers of minor and nonminor activities and average diversification in each industry, as measured by the D_3 measure of diversification. This indicates that the large role of minor activities noted above is not a characteristic peculiar to highly diversified companies.

Differences among the thirteen industry groups in the extent to which manufacturing activities were concentrated in the primary 4-digit industry followed roughly the same pattern when measured on the basis of the distribution of establishments among industries as they did on the basis of payroll data. On the average, however, primary industry specialization

13
ARGE ENTERPRISES GROUPED BY INDUSTRY, 1954

and Number of Products[a]

Rubber (5)	Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total (111)	Total Less Primary Industry Additions
8	1	1	1	3	2	15	38	38
				1			90	5
							18	0
20	2			1	2		56	40
6							12	12
2	3	1	1	1	2	1	30	30
3	2	2	1	5	4	1	20	20
2	9		8	4	2	1	76	37
		1	2	4	2	1	20	20
29	19	9		1	14	8	374	213
1	1	7		1		1	38	21
17	1		1			3	25	8
2							5	5
7	35	6	4	2	12	6	93	58
3		49	10	18	18	26	143	94
10	5	42	20	7	21	26	149	129
8	4	19	23	74	30	43	248	174
8	2	8	4	17	53	21	121	68
13		4	6	9	7	44	87	43
3	4		3	8	6	6	36	36
11	4	4	3	3	4	1	46	46
153	92	153	87	159	179	204	1,729	
30.4	13.1	15.3	17.4	12.2	35.8	15.7	15.6	

SOURCE: Product record described in Chapter 2.

[a] Numbers in parentheses refer to number of companies in the specified industry.

[b] Except furniture.

[c] Except electrical.

[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

based on data for numbers of establishments (Table 11) was lower than that based on payrolls. This reflects the fact that, for the 111 companies, plants associated with primary industries are larger as well as more numerous than those associated with nonprimary manufacturing activities.

The thirteen industry groups of companies differ also in the degree of product homogeneity which characterizes their plants. Table 12 shows the ratios of number of manufactured products (based on public records) to number of manufacturing industries (based on census plant data). The average ratio for the 111 companies was 1.61. The plants of companies in the petroleum, rubber products, and machinery industries tended to be

more heterogeneous than those of other companies, while those of companies in food, tobacco, and textile mill products were more homogeneous than average for the establishments of all companies in the sample. Product data compiled for 1954 is also revealing with respect to the composition of industrial activities to be found under common ownership. Table 13 shows the 1954 product patterns for the 111 companies at the 2-digit level of industry detail. On the basis of the average number of manufactured products per company in 1954, the more diversified companies fell in the electrical machinery, rubber products, chemicals, and fabricated metal products industries, while companies with the most homogeneous product structures were to be found in the tobacco and petroleum industries. Of interest also is the composition of activities under common ownership. For roughly half of the thirteen industrial categories into which companies were classified, chemical industries accounted for the largest number of nonprimary products. (Nonprimary is defined here as falling outside the primary 2-digit industry.) Frequency of activity in chemical industries was especially striking for companies in the paper; petroleum; rubber products; stone, clay, and glass; and food products industry groups. For textile mill products companies, the apparel and chemical industries accounted for the largest number of nonprimary products. For companies classified in the machinery industry, primary metals contributed the largest number of products outside the primary industry. Tobacco companies revealed no concentration of activities outside of tobacco manufacturing, and the remaining categories of companies —namely, transportation equipment, electrical machinery, fabricated metal products, primary metals, and chemicals—had the largest number of their nonprimary manufacturing activities in the machinery industry. Besides chemicals and machinery, other nonprimary activities frequently engaged in by the 111 companies were primary metals, fabricated metal products, electrical machinery, and ordnance.[11]

An indication of the heterogeneity of ventures within nonprimary industries may be obtained from an examination of the activities of food products companies in the chemical industries. Seven of the twelve companies in the sample produced drugs or toilet preparations or both. These products included, among others, soaps, epsom salts, vitamin-mineral fortifiers, and drugs for liver disorders and for arthritis. One meat-packing firm produced a purified form of ACTH, and an alcoholic beverage

[11] A somewhat more detailed breakdown in the Code for some industries, e.g., chemicals, may have exerted a moderate influence on the results in that two or more nonprimary products are less likely to fall in the same 4-digit industry (and thus be counted only once) when the industry breakdown is more detailed.

company manufactured hydrogen peroxide and perfume bases. Apart from drugs and toilet preparations, cleaning compounds were produced by four companies, fatty acids and adhesives each by three companies, and fertilizers, sulphuric acid, and products for paint manufacturing each by two companies. The wide range of industrial chemicals produced by the companies is exemplified by the meat-packing firm that produced chemicals used in the separation of nonmetallic ores, the dairy products company that manufactured plastic molding compounds, and the alcoholic beverage company that produced butyl acetate and liquefied propane and butane.

Appendix Table B–2 shows the number of companies in the 111-firm sample that maintained production in the twenty-one 2-digit manufacturing industries. There were fifty-three companies with nonprimary operations in machinery, forty-eight in fabricated metal products, and forty-seven in chemicals. Of the remaining eighteen 2-digit industries, nonprimary activity counts ranged from zero to thirty-three. Only tobacco, of the twenty-one categories, showed zero operations emanating from nontobacco companies. The next lowest were food products and leather products, with four companies each (once again excluding companies with primary operations in the industries).

The Measurement of Trends

The magnitude of a movement toward diversification can be measured in ways similar to those by which diversification at a point in time was measured, namely, both in terms of the number of products added to a firm's product structure and in terms of the change in the relative importance of a firm's primary industry. Most of our data on changes over time were derived from public sources of information for which data on volume of sales or output of individual products were not available. Therefore, the data consist primarily of frequencies of product additions between successive points in time, recorded at the 4-digit level of industry detail.[12] Negative changes in heterogeneity, that is, product abandonments, were measured in the same way as additions. Information on trends was restricted to the 111-firm sample. The average frequencies of additions for this group of companies do not necessarily approximate an average for the universe of large firms. However, the changes over time in number of additions and abandonments and, to a large extent,

[12] In using the 4-digit SIC Code for counting the number of product additions, several products added within a specified interval of time and falling within the same 4-digit industry were counted as one addition in that period. The reason for this procedure is explained in Chapter 2.

TAI

MANUFACTURING PRODUCT ADDITIONS OF 11

Industries of Companies

Industries of Product Additions	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)	Rubber (5)
Ordnance					2		
Food products	38						
Tobacco manufactures		1					
Textile mill products			2		1		5
Apparel			4				
Lumber and wood[b]	1						1
Furniture							1
Paper products	1		1	22			2
Printing and publishing							
Chemicals	11		2	5	53	9	7
Petroleum and coal						10	
Rubber products			1	1	1		5
Leather							
Stone, clay, and glass products			4	2	3		3
Primary metals					3		
Fabricated metal products		1	1		1	1	2
Machinery[c]	1		1		3	2	2
Electrical machinery							3
Transportation equipmcnt					1		4
Instruments[d]					1	1	2
Miscellaneous			2	1	2	1	2
Total additions	52	2	18	31	71	24	39
Primary industry additions	38	1	2	22	53	10	5
Total less primary industry additions	14	1	16	9	18	14	34

the industries most frequently entered, are likely to be similar for the sample and for large firms in general. In a later section of this study (Chapter 7) it is shown that the characteristics of industries that attract diversifying entry proved substantially the same on the basis of aggregative data as for the 111-firm group.

For reasons discussed in Chapter 2, the 1929–54 period was divided into three shorter intervals of time: 1929–39, 1939–50, and 1950–54. The

E 14
LARGE ENTERPRISES, BY INDUSTRY, 1929–39

and Number of Additions[a]

Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Additions	Primary Industry Additions	Total Less Primary Industry Additions
				1	2	5	0	5
						38	38	0
						1	1	0
				1		9	2	7
						4	0	4
	1					3	0	3
	3	1	2	2		9	0	9
4		1		1		32	22	10
1		1		1		3	0	3
9					5	101	53	48
1						11	10	1
					1	9	5	4
				2		2	0	2
13	1	1		1	1	29	13	16
	12	1		5	4	25	12	13
5	21	1	1	8	12	54	1	53
2	2	3	20	11	15	62	20	42
	1		9	20	9	42	20	22
				1	10	16	10	6
		1	1	4	4	14	0	14
2			2	3		15	0	15
37	41	10	35	61	63	484		
13	12	1	20	20	10		207	
24	29	9	15	41	53			277

SOURCE: Product record described in Chapter 2.
[a] Numbers in parentheses refer to number of companies in the specified industry.
[b] Except furniture.
[c] Except electrical.
[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

availability of additional data from the Census of Manufactures for the years 1947 and 1954 led us to examine also the changes that occurred in the 1947–54 interval. For this period, it was also possible to examine one aspect of change in the composition of output not necessarily related to diversification, namely, the relative importance in 1947 and 1954 of the firms' largest activities in 1947. Changes in the importance of the initial year's primary industries can occur to a marked degree without net in-

TABL
MANUFACTURING PRODUCT ADDITIONS OF 111

Industries of Product Additions	*Industries of Companies*						
	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)	Rubber (5)
Ordnance					2		6
Food products	21				1		
Tobacco manufactures							
Textile mill products			7		3		6
Apparel			2				
Lumber and wood[b]	2						
Furniture							1
Paper products			1	12	1		
Printing and publishing	1			1			
Chemicals	10	1	4	8	48	30	11
Petroleum and coal				1	1	4	
Rubber products				1			5
Leather							1
Stone, clay, and glass products			2	3	1		2
Primary metals					2	2	2
Fabricated metal products	1				1	1	3
Machinery[c]			1	6	12		2
Electrical machinery				2	1		1
Transportation equipment					1		9
Instruments[d]				2	1		1
Miscellaneous				2	1		3
Total additions	36	1	17	38	76	37	53
Primary industry additions	21	0	7	12	48	4	5
Total less primary industry additions	15	1	10	26	28	33	48

creases or declines in diversification, since new primary industries can supplant former ones, leaving the degree of specialization in the primary industry unchanged.

Trends in Diversification

In the period 1929–54 the 111 large companies added 1,389 products in manufacturing activities. These product additions appear to account for

15

LARGE ENTERPRISES, BY INDUSTRY, 1939–50

and Number of Additions[a]

Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Additions	Primary Industry Additions	Total Less Primary Industry Additions
		1	3	3	4	19	0	19
						22	21	1
						0	0	0
						16	7	9
						2	0	2
1			1			4	0	4
2				3		6	0	6
3		4				21	12	9
			1	1		4	0	4
6	1	1		6		126	48	78
1					1	8	4	4
1					1	8	5	3
						1	0	1
10				2	4	24	10	14
	5		3	4	4	22	5	17
	3	3	2	7	9	30	3	27
		6	14	7	12	60	14	46
		3	6	21	7	41	21	20
			1	4	16	32	16	16
1			5	2	5	17	0	17
		3		2		11	0	11
25	9	21	36	62	63	474		
10	5	3	14	21	16		166	
15	4	18	22	41	47			308

SOURCE: Product record described in Chapter 2.

[a] Numbers in parentheses refer to number of companies in the specified industry.

[b] Except furniture.

[c] Except electrical.

[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

well over half of the separate industrial activities in which the firms were engaged in 1954. Table 14 shows, for the 1929–39 period, the number of products added in each 2-digit manufacturing industry by the various industry groupings of companies. Tables 15 and 16 give the same information for 1939–50 and 1950–54, respectively. Table 17 is a frequency distribution for each period showing the number of companies falling into various classes based on number of product additions.

TAB
MANUFACTURING PRODUCT ADDITIONS OF 11

Industries of Companies

Industries of Product Additions	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)	Rubber (5)
Ordnance					3		4
Food products	11				2		
Tobacco manufactures							
Textile mill products			1	3	3		11
Apparel							3
Lumber and wood[b]				4	2		1
Furniture				1	1		1
Paper products	1			11	1		
Printing and publishing				1	1		
Chemicals	17		1	11	40	15	4
Petroleum and coal					2	4	1
Rubber products				1			6
Leather							1
Stone, clay, and glass products				2	1		
Primary metals					4		
Fabricated metal products					3		3
Machinery[c]				3	11		2
Electrical machinery					1		3
Transportation equipment					2	1	8
Instruments[d]					1	1	2
Miscellaneous			1	1	5		4
Total additions	29	0	3	38	83	21	54
Primary industry additions	11	0	1	11	40	4	6
Total less primary industry additions	18	0	2	27	43	17	48

There were 484 products added by the 111 firms in 1929–39, 474 in 1939–50, and 431 in 1950–54. Since the three periods are unequal in duration, a more meaningful comparison may be derived from the annual rates—namely, 48.4, 43.1 and 107.8 for 1929–39, 1939–50, and 1950–54, respectively. In short, the annual rate of product additions for the group of companies was higher in 1929–39 than in 1939–50, though clearly less than in 1950–54. The addition of products normally entails expenditures

: 16
LARGE ENTERPRISES, BY INDUSTRY, 1950–54

and Number of Additions[a]

Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Additions	Primary Industry Additions	Total Less Primary Industry Additions
1	1				11	20	0	20
						13	11	2
						0	0	0
2						20	1	19
						3	0	3
				2		9	0	9
			1		1	5	0	5
1		1				15	11	4
		1				3	0	3
2	1		1	3	2	97	40	57
						7	4	3
		1				8	6	2
						1	0	1
5	2			1		11	5	6
	5	1	1	3	4	18	5	13
	3	2		2	6	19	2	17
	5	1	18	11	24	75	11	64
1	2	2	3	12	7	31	12	19
	1	4	5	2	22	45	22	23
3			2	1	2	12	0	12
1	2	1	2	1	1	19	0	19
16	22	14	33	38	80	431		
5	5	2	18	12	22		137	
11	17	12	15	26	58			294

SOURCE: Product record described in Chapter 2.
[a] Numbers in parentheses refer to number of companies in the specified industry.
[b] Except furniture.
[c] Except electrical.
[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

on plant and equipment, research, and product promotion, so that comparisons of frequency of product additions with capital expenditure rates are of some interest. In the 1950–54 period, capital expenditures for the 111 companies, even after adjustment for price changes, proceeded at an annual rate considerably greater than twice that of 1929–39. Thus, on this basis, the movement toward diversification in the earlier as compared with the later period appears to have been strong. The moderate decline

TABLE 17
111 LARGE ENTERPRISES DISTRIBUTED BY NUMBER OF PRODUCTS AND SERVICES ADDED, 1929–54

Number of Products and Services Added[a]	*Number of Companies*			Number of Products Added in Manufacturing	*Number of Companies*		
	1929–39	1939–50	1950–54		1929–39	1939–50	1950–54
0	12	17	17	0	17	17	22
1–2	23	27	30	1–2	29	38	32
3–4	25	23	26	3–4	27	20	26
5–6	17	8	15	5–6	14	9	13
7–8	10	15	8	7–8	8	10	6
9–10	7	5	4	9–10	5	6	3
11–14	8	9	5	11–14	6	6	4
15–17	5	4	3	15–17	2	3	2
18 and over	4	3	3	18 and over	3	2	3

SOURCE: Product record described in Chapter 2.
[a] Includes nonmanufacturing as well as manufacturing products and services.

in the rate of product additions from the 1929–39 to the 1939–50 period also shows that diversification does not closely follow cyclical fluctuations in general business activity. This stems at least partly from the fact that diversification is at times a defensive measure intended to counteract declines in demand for the primary activities of companies. Further, it can frequently be accomplished through merger, or by shifting productive capacity from other uses, rather than by capital outlays.

Changes in the product structures of firms followed a variety of paths, though, as will be shown in Chapter 7, there was considerable similarity in the economic characteristics of entered industries. An example of differing patterns for similar companies is that of two firms whose primary activity consisted in manufacturing railroad cars and related equipment. Both were faced with a demand that showed little prospect of growth, if not a likelihood of secular decline. Both chose to diversify, but in sharply differing ways. In the 1929–39 period, one began producing tanks (ordnance) while the other chose to operate a bank. The first acquired a large subsidiary in the 1939–50 period which was engaged in the construction of petroleum refineries and general chemical processing plants. The subsidiary also produced plastics, refractory products, utility-power piping systems, and metal panels for buildings. Through another acquisition in the same period, it also began producing earth-moving equipment. On the other hand, the parent company was legally obliged to divest itself of the maintenance and operation of railroad passenger cars. In the 1950–54 period, the company withdrew from production of earth-moving equipment but, through the acquisition of still another subsidiary, began

producing highway truck trailers. It also entered into the production of rocket motors for guided missiles and the manufacture of alloy steels.

The second firm added only one category of manufactured products, namely, pressed-steel products, in the 1939–50 period. In the same interval, it disposed of property used in producing motor-driven rail cars, trucks and buses, snow sweepers, and gas engines; it closed a shipyard and facilities used in producing interior woodwork. In 1950–54, however, it acquired facilities to produce tools and sheet metalworking equipment, computers and electronic components for data-processing equipment, radar equipment, air-frame components, aircraft ordnance, fire-control systems, and navigational instruments.

Examples of dissimilar companies entering the same industries are also abundant. Thus in 1929 one firm produced only incandescent lamps and vacuum tubes for radio receiving sets. Another, though it could be classified in the same 2-digit industry, produced a large variety of electrical machinery for public utility systems and a considerable number of electric home appliances, lamps, scientific instruments, passenger and freight elevators, insulating materials, and numerous other products. Although their lists of product additions were not identical, in the 1929–54 interval both firms began producing fluorescent lighting fixtures, radio and television receiving sets, special tubes for military and industrial uses, X-ray equipment, electronic equipment for industrial uses, and nuclear reactor equipment. In 1954 both also maintained research laboratories for missile systems and for atomic energy.

The most common pattern—namely, that of similar companies diversifying (and also, integrating) in similar ways—may be illustrated by two rubber-tire manufacturers. In the 1929–54 period, both began producing synthetic rubber and a variety of rubber products, such as rubber athletic goods and synthetic fibers for tires. Both also began producing plastic materials and products, aviation equipment, and components for guided missiles. Of course, no two companies that have actively diversified their product structures will have followed identical paths. For example, one of the two tire manufacturers also began producing internal combustion and underwater engines—the other did not. In the category of plastic products, one produced seat covers; the other manufactured plastic tiles. In the category of aviation equipment, one produced jet-assist take-off units and aircraft wheels; the other manufactured airplane assemblies and flight trainers. The essential similarity of the patterns is, however, unmistakable.

As may be judged from Tables 14, 15, and 16, when only additions

outside the primary 2-digit industries of companies are considered, the manufacturing industries entered most frequently by the 111 companies in the 1929–39 period were those falling into the chemicals and fabricated metal products industries. Among the industry classes with very few nonprimary additions were: food products, tobacco, and petroleum and coal products. (The counts for the first two were zero and for the third the count was one.) In the 1939–50 and 1950–54 periods, industry classes accounting for the largest number of nonprimary additions were chemicals and machinery. Among those with few or zero instances of entry were once again the food products, tobacco, and petroleum and coal products categories. Appendix Tables B–7 through B–9 show the *number of companies* that added products in each of the twenty-one 2-digit manufacturing industries in the three periods studied. The tables show that, even after primary product additions are excluded, a substantial percentage of companies entered the chemicals and machinery categories in each of the three periods, and the fabricated metal products group in the first two of the three periods. The reasons for the frequent choice of these industries for diversification are discussed in Chapter 7.

It would appear from the above that, in the three periods, roughly the same 2-digit industries tended to remain the most attractive as measured by the frequency with which companies added products in these industries. This impression is supported by more formal tests. The correlation was .93 between number of products added in 1929–39 and 1939–50 in each of the twenty-one 2-digit manufacturing industries. For 1939–50 and 1950–54 the correlation was .94. Since the number of companies with primary activities in each of various manufacturing industries differed considerably, a better indication of degree of continuity in the choice of industries for diversification may be secured by examining those additions that fell outside the primary industries of companies. This reduces the bias in frequencies of additions that stems from the composition of our sample. On the latter basis, the correlation coefficient for frequencies in the 1929–39 and 1939–50 periods was .84—that is, only slightly lower than the degree of correlation present when additions in primary groups are included. For the frequencies in the 1939–50 and 1950–54 periods, excluding those in primary industries, the correlation was .90.

Product abandonments display a somewhat surprising pattern. As Tables 18 through 20 show, the period of highest annual frequency of abandonments was 1950–54 (16.8 per year), followed by 1939–50 (12.6 per year), with 1929–39 showing the lowest annual rate (5.7 per year). An abandonment most frequently takes the form of discontinuance in pro-

duction rather than the sale of a business. Consequently, if abandonments responded strongly to cyclical influences, one would expect a high rate of abandonments when economic activity is at an ebb and both demand and earnings are relatively low. This is the reverse of the observed pattern. It is obvious, however, that the total number of products that can be abandoned by a firm is limited by the number of separate industrial activities in which it is engaged. In the two later periods, the 111 enterprises were engaged in a larger number of activities and this increased the number of possible product abandonments. Another source of the change might be related to the trend of diversification away from similar or related production processes and products (discussed in detail in a later section); possibly this introduces increased risks, and consequently a greater frequency of product abandonments. Certainly the lower rate of abandonments in 1929–39 as compared with 1950–54, coupled with the relatively high rate of additions in the former period, clearly indicates that the movement toward product heterogeneity is not of recent origin.

Viewed in terms of the industries into which product abandonments fall, the pattern resembles that for product additions. This is to be expected to some degree, since industries which account for a large proportion both of additions and of the total number of a firm's activities offer the largest opportunities, in a statistical sense, for deletions of products. It is clear that the number of abandonments in a given industry is limited by the number of activities to be found therein, and that a positive relation between number of activities and frequency of abandonments is to be expected in the absence of offsetting factors. Appendix Tables B–10 through B–12 show the *number of companies* that abandoned activities in each of the twenty-one 2-digit manufacturing industries in the 1929–39, 1939–50, and 1950–54 periods.

Variability Among Companies in Diversification Movements

In each of the three periods studied, there was a pronounced tendency for the same companies to show the highest frequencies of additions. Two tests were applied to establish this conclusion. First, the frequencies of additions in successive periods were compared for companies grouped by number of additions in one of the periods. Second, companies were grouped by primary industry, and the groups were then ranked by frequency of product additions in each period. The rankings for successive periods were then compared.[13]

[13] Individual companies, as distinct from groups of companies, were not ranked on the basis of number of product additions because of the very large number of tied ranks that would have been generated.

TABL

MANUFACTURING PRODUCT ABANDONMENTS OF

	Industries of Companies					
Industries of Product Abandonments	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)
Ordnance						
Food products	2					
Tobacco manufactures						
Textile mill products			1			
Apparel						
Lumber and wood[b]						
Furniture						
Paper products				2	1	
Printing and publishing					1	
Chemicals					4	1
Petroleum and coal						3
Rubber products						
Leather						
Stone, clay, and glass products					1	
Primary metals						
Fabricated metal products		1			1	4
Machinery[c]						
Electrical machinery						
Transportation equipment						
Instruments[d]						
Miscellaneous						
Total abandonments	2	1	1	2	8	8
Primary industry abandonments	2	0	1	2	4	3
Total less primary industry abandonments	0	1	0	0	4	5

Differences between groups of companies remained relatively stable when frequencies of product additions in successive periods were examined. Table 21 shows that when companies were grouped into five classes by number of manufactured products added in the period 1929–39, the frequency with which products were added in the 1939–50 period was substantially higher for companies falling in the upper classes with respect to 1929–39 product additions. Substantially the same results may be observed for the 1950–54 product additions when companies are grouped

E 18
111 LARGE ENTERPRISES, BY INDUSTRY, 1929–39

and Number of Abandonments[a]

Rubber (5)	Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Abandonments	Total Less Primary Industry Abandonments
							0	0
							2	0
							0	0
2							3	2
							0	0
						1	1	1
							0	0
							3	1
							1	1
1	1	1				1	9	5
						1	4	1
1							1	0
1							1	1
	1				1	1	4	3
		4					4	0
					1	1	8	8
			1	2	1		4	2
					1	1	2	1
		1	1	1		5	8	3
1							1	1
					1		1	1
6	2	6	2	3	4	12	57	
1	1	4	0	2	1	5		
5	1	2	2	1	3	7		31

SOURCE: Product record described in Chapter 2.

[a] Numbers in parentheses refer to number of companies in the specified industry.

[b] Excluding furniture.

[c] Excluding electrical.

[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

by number of products added in 1939–50.[14] Generally speaking, the

[14] Companies at the extremes of the distribution in one period may be expected to move toward the center in a subsequent period. Thus it is not surprising that the range of variations between classes of companies is smaller when the classes are defined by frequency of product additions in an earlier period rather than in the current period. Despite this tendency, the ranking of groups of companies in terms of number of products added remained unchanged for the two sets of successive periods. This conclusion would have been equally supported by a table which grouped companies by frequency of product additions in the later period and then showed, for the resulting groups, the number of additions in an antecedent period. A table of this type can be readily derived from the data in Appendix B.

TABL

MANUFACTURING PRODUCT ABANDONMENTS OF

Industries of Product Abandonments	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)
	Industries of Companies					
Ordnance						
Food products	11					
Tobacco manufactures						
Textile mill products		1	4			
Apparel						
Lumber and wood[b]	1			1		1
Furniture						
Paper products	1	2		9		
Printing and publishing						
Chemicals	1			2	12	4
Petroleum and coal						1
Rubber products						
Leather						
Stone, clay, and glass products					2	
Primary metals					5	
Fabricated metal products					1	2
Machinery[c]	1					1
Electrical machinery						
Transportation equipment					1	
Instruments[d]				1		1
Miscellaneous						1
Total abandonments	15	3	4	13	21	11
Primary industry abandonments	11	0	4	9	12	1
Total less primary industry abandonments	4	3	0	4	9	10

companies that added most products in 1929–39 also showed the largest number of additions in 1939–50. Similarly, the companies that diversified most, as judged by number of additions in 1939–50, showed the highest change toward diversification in 1950–54. As a result, absolute differences between companies in number of separate activities are likely to have been substantially greater in 1954 than they were in 1929.[15]

[15] The data necessary for a measure of variability among companies in diversification in 1929 were not developed.

E 19
111 LARGE ENTERPRISES, BY INDUSTRY, 1939–50

and Number of Abandonments[a]

Rubber (5)	Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Abandonments	Total Less Primary Industry Abandonments
							0	0
							11	0
							0	0
							5	1
							0	0
			3			2	8	8
		1					1	1
			1				13	4
							0	0
	4	1				2	26	14
		1	1				3	2
							0	0
					2		2	2
	1	1					4	3
		2	2			1	10	8
	2	3	1			1	10	9
	1	2		10		6	21	11
2				1	1	3	7	6
1		2		1	1	3	9	6
2						2	6	6
1					1		3	3
6	8	13	8	12	5	20	139	
0	1	2	1	10	1	3		
6	7	11	7	2	4	17		84

SOURCE: Product record described in Chapter 2.

[a] Numbers in parentheses refer to number of companies in the specified industry.

[b] Excluding furniture.

[c] Excluding electrical.

[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

With companies grouped by primary industry (Tables 14, 15, and 16), the results were substantially similar. When the thirteen industry groups were ranked by number of product additions per company in manufacturing for each of the three periods, rank correlation for the 1929–39 and 1939–50 rankings was .69; for 1939–50 and 1950–54, it was .80. Once again, the results point to an increase in absolute differences among companies in number of separate activities.

Continuity in patterns between successive periods was revealed not

TABL

MANUFACTURING PRODUCT ABANDONMENTS OF 111

Industries of Product Abandonments	*Industries of Companies*					
	Food (12)	Tobacco (5)	Textiles (4)	Paper (8)	Chemicals (14)	Petroleum (10)
Ordnance						
Food products	6					
Tobacco manufactures						
Textile mill products			2		1	
Apparel	1					
Lumber and wood[b]						
Furniture						
Paper products						
Printing and publishing					1	
Chemicals	6		1		5	1
Petroleum and coal					1	
Rubber products				1		
Leather	1					
Stone, clay, and glass products			1	1		
Primary metals					1	
Fabricated metal products					2	1
Machinery[c]					1	
Electrical machinery						
Transportation equipment						
Instruments[d]						
Miscellaneous					2	
Total abandonments	14	0	4	2	14	2
Primary industry abandonments	6	0	2	0	5	0
Total less primary industry abandonments	8	0	2	2	9	2

only through a tendency for the same companies to show the highest rates of product additions but in the extent of variation among companies in frequencies of additions. For the 111 companies, the coefficients of variation for number of additions of manufactured products in the 1929–39, 1939–50, and 1950–54 periods were 120 per cent, 107 per cent, and 126 per cent, respectively.

E 20

LARGE ENTERPRISES, BY INDUSTRY, 1950–54

and Number of Abandonments[a]

Rubber (5)	Stone, Clay, and Glass (7)	Primary Metals (10)	Fabricated Metal Products (5)	Machinery (13)	Electrical Machinery (5)	Transportation Equipment (13)	Total Abandonments	Total Less Primary Industry Abandonments
							0	0
							6	0
							0	0
1							4	2
							1	1
						1	1	1
							0	0
							0	0
	1						2	2
	2		1				16	11
							1	1
1						1	3	2
							1	1
	2					1	5	3
			1				2	2
			1			1	5	4
1				2		4	8	6
				1	1		2	1
1						2	3	1
						1	1	1
	1	2	1				6	6
4	6	2	4	3	1	11	67	
1	2	0	1	2	1	2		
3	4	2	3	1	0	9		45

SOURCE: Product record described in Chapter 2.

[a] Numbers in parentheses refer to number of companies in the specified industry.

[b] Excluding furniture.

[c] Excluding electrical.

[d] Professional, scientific, and controlling instruments, photographic and optical goods, watches and clocks.

The Role of Technical Propinquity

Technical propinquity between products may be visualized in at least two ways. Type 1 propinquity refers to one or more of the following: similar or complementary uses of products, similar production processes, and the use of common raw materials for the products. In short, it concerns relations between the physical characteristics of products. In Type 2

TABLE 21
NUMBER OF PRODUCTS ADDED IN SUCCESSIVE PERIODS BY CLASSES OF COMPANIES

	Classes on Basis of Number of Products Added[a]					
	0	1–2	3–4	5–8	9–25	Total
Number of companies in each class (based on 1929–39 additions)	17	29	27	23	15	111
Products added, 1929–39	0	43	92	148	201	484
Average per company, 1929–39	0	1.5	3.4	6.4	13.4	4.4
Products added, 1939–50	25	83	121	114	131	474
Average per company, 1939–50	1.5	2.9	4.0	5.0	8.7	4.3
Number of companies in each class (based on 1939–50 additions)	17	38	20	19	17	111
Products added, 1939–50	0	59	69	124	222	474
Average per company, 1939–50	0	1.6	3.5	6.5	13.1	4.3
Products added, 1950–54	27	90	64	105	145	431
Average per company, 1950–54	1.6	1.3	3.2	5.5	8.5	3.9

SOURCE: Product record described in Chapter 2.
[a] The classes were selected with a view to approximating an equal number of companies in each class.

propinquity, resources other than "material" that are useful in producing one product are also useful in producing another. These resources may consist of research and development staffs, the availability of experienced salesmen, the requirement of common managerial skills for two or more products, and others. While the presence of Type 1 propinquity renders the presence of Type 2 propinquity more likely, the two types of technical relations between products can be usefully distinguished for analytic purposes.

The Standard Industrial Classification Code is generally based on Type 1 propinquity. Therefore, the greater the number of product additions in the primary 2-digit industry of a company as compared with those outside it, the greater is the relative influence of Type 1 propinquity. When relative frequencies of additions within and outside of primary 2-digit industries are examined, a distinct decline is shown in the proportion of total manufacturing additions contributed by the primary industries. Primary industry additions accounted for 42.8 per cent of total additions in 1929–39, 35.0 per cent in 1939–50, and only 31.8 per cent in 1950–54.[16] Thus the importance of Type 1 propinquity appears to have declined.

[16] The proportion of abandonments of manufactured products that fell within the primary 2-digit industry of companies was similar to that for product additions. In 1929–39 the ratio of primary industry to total abandonments was 43.9 per cent compared with 38.8 per cent for 1939–50 and only 33.8 per cent in 1950–54. For reasons indicated earlier, the pattern of abandonments is likely to resemble that for additions.

There were wide differences among companies in the proportion of their additions that fell in the primary 2-digit industries.[17] Prior to 1950, there appears to be no systematic relation between the number of additions that companies made within and outside their primary 2-digit class. As a test, the 111 companies were grouped in thirteen 2-digit industries by primary activity, and the resulting groups were ranked first by number of products added within primary 2-digit industries, and second by number added outside the primary industries. The coefficient of rank correlation (Spearman's) for the two rankings for 1950–54 additions was .66. However, for the two sets of rankings in the two earlier periods, namely, 1929–39 and 1939–50, the coefficients were only .01 and .19, respectively. The presence of correlation in the 1950–54 period between frequency of additions within and outside the primary industry of companies suggests that the ability to diversify in any direction may be increasingly governed by the characteristics of the diversifying firm. In particular, the ability of a firm's employees to deal with the complex technologies of industries that attract diversification may be of decisive importance.

Trends after 1947

For the 1947–54 period, information was available from the Censuses of Manufactures that shows the relative magnitude of each manufacturing activity for an individual company. Thus, for example, the change in importance to the firm of its primary activity could be traced. Census data, however, classify all of the payrolls or employment of a plant in its primary industry and thus tend to understate increases in diversification. As noted in an earlier section, recently commenced activities are frequently too small to account for the major activity of a plant. Moreover, the Classification Code tends to classify products in the newest industries into previously existing categories.

Notwithstanding these limitations, census data show that substantially more companies increased than decreased the number of their activities from 1947 to 1954. The increase in diversification is also revealed in a decline, for the majority of firms, in the ratio of payrolls in the primary

[17] The primary industry of companies was determined on the basis of employment data for 1954. Some of the companies probably altered their primary 2-digit industry in the course of the 1929–54 interval of time. This introduces an element of error in comparisons of primary and nonprimary additions. Since, however, the overwhelming majority of companies in the group of 111 did not change primary 2-digit industries in the course of the 1929–54 period, the error is not likely to be large.

industry to total manufacturing payrolls for the firms.[18] The magnitude of this decline, however, was not very large—a fact which may be attributed at least partly to the limitations of the data, noted above.[19]

Based on establishment data, the number of 4-digit manufacturing activities in which the 111 large enterprises were engaged increased from 823 to 1,073 in the period 1947–54—a rise of 30.4 per cent. If activities that are of relatively minor importance[20] to individual companies are excluded, the rise from 1947 to 1954 is considerably smaller. This is to be expected, since new products added by means other than merger cannot immediately be produced in large volume. It is necessary to develop markets and to overcome numerous delays associated with acquisition of plant and equipment, raw materials, and skilled personnel before production can commence on a large scale. None of the new activities referred to above had had a life of more than seven years, and some doubtless were introduced in the terminal year of the period. In consequence, if we exclude minor activities, the residual number shows an increase from 625 to 725 in the 1947–54 period—a rise of only 16.0 per cent. When companies are grouped by industry, all groups except those in food products, tobacco, and primary metals categories showed an increase from 1947 to 1954 in number of 4-digit activities (Table 22). When minor manufacturing activities are again excluded, the food products and tobacco groups show a slight increase rather than a decline, but the decline for primary metals is considerably sharper.

Table 23 shows that in ten of thirteen industry groups of companies, the ratio of primary 4-digit industry payrolls to total manufacturing payrolls (excluding those associated with integration) showed a decline from 1947 to 1954. Thus, on the basis of the relative importance of non-primary activities, diversification increased in most industry categories. For the ten groups of companies which show a decline in the average ratio, the average drop was eight percentage points or 11.7 per cent. For all 111 companies combined, the average decline was five percentage points or 7.2 per cent. The average ratio rose for companies in food products, tobacco, and primary metals. The sharpest declines were for rubber products and chemicals. As suggested earlier, when a rapid increase takes place in the number of activities in which firms are engaged, the rise in

[18] Primary industry specialization may, of course, change as the result of uneven growth of *existing* activities and not only as the result of acquisition of new ones.

[19] For example, a new product might have been added to a plant classified in the primary industry.

[20] Minor activities are here defined as those which individually account for less than 1 per cent of a firm's manufacturing employment.

TABLE 22
NUMBER OF MANUFACTURING ACTIVITIES, 111 LARGE ENTERPRISES, 1947 and 1954

Primary Industry of Company	Number of Companies	*Number of Four-Digit Manufacturing Activities*			
		1947	1947[a]	1954	1954[a]
Food products	12	144	78	132	81
Tobacco manufactures	5	23	17	22	18
Textile mill products	4	25	19	30	23
Paper products	8	42	38	68	52
Chemicals	14	130	90	173	116
Petroleum	10	39	22	39	24
Rubber products	5	45	27	62	45
Stone, clay, and glass products	7	52	44	61	50
Primary metals	10	113	70	110	57
Fabricated metal products	5	52	35	55	44
Machinery	13	72	65	89	76
Electrical machinery	5	98	57	111	60
Transportation equipment	13	88	63	121	78
Total	111	823	625	1073	725

SOURCE: Special census tabulation.
[a] Excluding activities that account for less than 1 per cent of a company's manufacturing employment.

TABLE 23
AVERAGE PRIMARY INDUSTRY SPECIALIZATION, 111 LARGE ENTERPRISES, 1947 AND 1954

Primary Industry of Company	Number of Companies	*Average Ratio of Primary Four-Digit Industry Payrolls to Total Manufacturing Payrolls*[a]	
		1947	1954
Food products	12	.763	.783
Tobacco manufactures	5	.596	.726
Textile mill products	4	.536	.514
Paper products	8	.626	.576
Chemicals	14	.607	.478
Petroleum	10	.967	.927
Rubber products	5	.718	.477
Stone, clay, and glass products	7	.727	.637
Primary metals	10	.689	.723
Fabricated metal products	5	.598	.529
Machinery	13	.681	.609
Electrical machinery	5	.380	.365
Transportation equipment	13	.745	.682
All companies	111	.690	.640

SOURCE: Special census tabulation.
[a] Payrolls associated with integration excluded from the measure of total manufacturing payrolls.

the ratio of nonprimary payrolls to total payrolls is likely to be greater in the long than in the short run. This follows from the fact that activities undertaken in the recent past through means other than merger will not have had time in the short run to attain their intended ultimate share in total operations. It contributes to explaining the small decline in primary industry specialization compared with the percentage increase in number of activities.

Excluding payrolls associated with integration from the denominator of the ratio, sixty-four of the 111 companies showed a decline in primary industry specialization from 1947 to 1954, forty showed a rise in the ratio, and seven remained unchanged (Table 24). In the same interval of time, fifty-seven of the 111 companies showed an increase in number of 4-digit manufacturing activities, thirty-two showed a decline, and twenty-two remained unchanged. When both minor activities and those associated with integration were excluded, the number of companies showing no change in number of activities increased from twenty-two to thirty-six, primarily at the expense of the group that showed a decline. Using the binomial distribution, the number of companies which show a rise in

TABLE 24
CHANGES IN PRIMARY INDUSTRY SPECIALIZATION AND IN NUMBER OF ACTIVITIES, 111 LARGE ENTERPRISES, 1947–54

	Number of Companies with Increases	Number of Companies with Decreases	Number of Companies with No Change
A. Primary industry specialization (excluding integration payrolls from denominator of ratio)	40	64	7
B. Primary industry specialization (including integration payrolls in denominator of ratio)	41	65	5
C. Total number of four-digit manufacturing industries	57	32	22
D. Number of four-digit manufacturing industries (excluding those with less than than 1 per cent of company employment)	62	24	25
E. Number of four-digit manufacturing industries (excluding those with less than 1 per cent of company employment and those associated with integration)	53	22	36

NOTE: At 4-digit level of industry detail. The denominators of measures of concentration were restricted to manufacturing payrolls.
SOURCE: Special census tabulation.

the count of 4-digit activities exceed significantly at the 1 per cent level the number that show a decline. This was true counting (1) all 4-digit activities, (2) all nonminor ones, and (3) all those that were neither minor nor associated with integration. On the basis of the same test, the number of companies with a decline in primary industry specialization exceeded significantly at the 5 per cent level the number which showed a rise (both when integration payrolls were excluded from denominators of the ratios and when they were not).

The above results indicate a clear preponderance in the number of companies which became more diversified in the 1947–54 period. Substantially the same conclusions may be reached from Table 25. The latter shows an increase from 1947 to 1954 in the number of companies associated with relatively low primary industry specialization and a decline for those associated with high specialization. Thus, in 1954, thirty-eight of the 111 companies reveal primary industry specialization of less than 50 per cent compared with twenty-eight in 1947. Conversely, thirty-three companies were associated with a concentration of 80 per cent or more in 1954 compared with forty-two in 1947.

TABLE 25
DISTRIBUTION OF 111 COMPANIES BY PRIMARY AND BY PRIMARY PLUS SECONDARY INDUSTRY SPECIALIZATION, 1947 AND 1954

Primary Industry Specialization[a] (per cent)	*Number of Companies* 1947	1954	Primary and Secondary Industry Specialization[b] (per cent)	*Number of Companies* 1947	1954
0–29.9	6	10	0–49.9	4	9
30–39.9	9	14	50–59.9	10	10
40–49.9	13	14	60–69.9	12	12
50–59.9	12	10	70–79.9	17	23
60–69.9	16	18	80–89.9	21	16
70–79.9	13	12	90–99.9	26	22
80–89.9	13	9	100	23	19
90–99.9	17	12			
100	12	12			

SOURCE: Special census tabulation.

[a] Payrolls in primary 4-digit industry as percentage of total company payrolls in manufacturing activities. Payrolls for activities associated with integration excluded from measure of total company payrolls.

[b] Payrolls in primary plus secondary (second largest for the firm) 4-digit industry as percentage of total company payrolls in manufacturing activities. Payrolls for activities associated with integration excluded from the measure of total payrolls. If the secondary activity was associated with integration, it was not incorporated in the measure of primary plus secondary payrolls. Instead the second largest activity characterized as diversification (if one existed) was used.

As distinct from measures of change in diversification, an indication of *turnover* in output composition may be secured from changes in the rank of particular activities within the output structures of individual firms. Thus, for sixteen of the 111 companies, the primary industry in 1954 was different from that in 1947. For sixteen companies, also, the activity that was second largest in 1947 had been eliminated completely by 1954. In all, for fifty-nine of the 111 companies, the industry that was second largest in 1947 had either been downgraded by 1954 or, alternatively, (in a few instances) had become primary. However, a considerable number of the instances of change in rank for the activity that was second largest in 1947 involved merely an interchange in rank between the second and third largest activity.

The Role of Regulation

Regulation has doubtless affected the diversification patterns of individual companies. Since this subject is largely outside the scope of the present study, one or two examples will suffice to illustrate the relation. For example, a consent decree in 1920 has directly limited the scope of activities of meat-packing firms. The Motor Carriers Act of 1935 imposed minimum rate regulation on common and contract carriers and may have thus stimulated the acquisition of trucking fleets by manufacturing firms. The antimerger legislation of 1950 has probably had a broad range of effects, though the period covered by our study ends too early to assess them. In general, however, most changes in product structure did not take place through merger—a circumstance that has limited the effects of merger regulation on diversification patterns.