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# CHAPTER 4

# Diversification and the Size, Growth, and Profit Rate of Companies

THIS chapter discusses certain characteristics of diversifying firms, namely, their size, growth, and profit rate. The relation of diversification to size of firm was studied primarily on the basis of data for the large sample of 721 multiestablishment firms, while that between diversification and growth and profit rates was based on the 111-firm sample.

## *Summary*

For the 721-firm sample it was found that, as of 1954, size of firm showed a strong positive association with number of industries in which companies maintained establishments. However, it was not clearly related to the ratio of nonprimary to primary employment. This means that as company size increases, the share in a firm's total output contributed by the primary activity does not change materially, but the average share contributed by *individual* nonprimary activities tends to decline.

The relation of diversification to company growth is a consequence of reciprocal influences, but not all of them lead to a positive association. Generally, it may be expected that companies will try to select the more rapidly growing industries in which to diversify. Moreover, diversification is also a form of investment, and hence contributes to company growth. On the other hand, unfavorable prospects in the primary industries of companies may spur diversification as a defensive measure. This would tend to offset a positive association between the latter and company growth. For the 111 firms, the relation of growth to diversification did not suggest a clear-cut pattern. However, after 1939 there appeared to be a mild positive relation between the two variables when the latter is measured by frequency of product additions.

For the 111 companies, profit rates in 1947–54 were neither correlated with diversification, measured as of 1954, nor with change in diversification from 1947 to 1954. Similarly, the distribution of company earnings between income retentions and dividend payments was not correlated with diversification.

## *The Relation of Company Size to Diversification*

It was shown earlier that there is a strong positive relation between the average size of firm for an industry and the relative numbers of multi- and single-industry firms therein. This result is attributable in part to the

fact that single-establishment firms are on the average smaller than multi-establishment firms; therefore they are likely to be relatively more numerous in industries with smaller average firm size. (Single establishment firms were, by definition, subsumed in the category of single-industry companies.) The question now asked is whether, within the universe of multiestablishment firms, size of firm is related to diversification.

A priori, there are several reasons to expect a positive relation between diversification and size of firm. If a firm has entered a number of industries on a scale sufficient to be reasonably efficient, it will usually have a fairly large aggregate size. Stated in another way, diversification is a form of investment, and as such contributes to the total size of a firm.

Another reason for expecting a positive relation between the two variables is the likelihood that as the size of a firm increases, its ability to raise investment funds in substantial amounts is enhanced.[1] This advantage may be further reinforced by the possible presence of economies of scale in research and development. As is shown in Chapter 7, the industries which have proved most attractive as investment outlets for diversifying firms are associated generally with heavy capital requirements and high rates of employment of technical and scientific personnel.

It will be recalled that substantial differences were observed among industries in the extent to which the output of firms was heterogeneous. In consequence, the relation between size of firm and diversification is best examined through data for companies within the same industry, rather than for firms falling into diverse industries. In this way, the relation between size and diversification can be more effectively isolated from the other factors that generate interindustry differences in measures of diversification. Accordingly, for this purpose, all multiestablishment companies with 2,500 and over employees were segregated into broad industry categories.[2]

Two measures of diversification—the number of industries in which firms maintain establishments and the relative magnitude of nonprimary employment—were studied. The first was examined by grouping companies into size classes within each of the nineteen industry classes. The choice of size class was to some extent arbitrary, being constrained by census rules regarding nondisclosure of individual company information.

[1] However, beyond some point further increments to firm size are likely to have a diminishing effect on command over capital funds.

[2] The companies comprise the sample of 721 firms described in Chapter 2. Information for a few companies, however, was subsequently omitted to avoid disclosure of individual company information. While the firms are segregated into nineteen 2-digit industries, their separate activities were identified at roughly the 3-digit level of detail.

The number of size classes varied considerably among the nineteen industries and the terminal class differed with respect to the number of companies included in it.[3] Average employment per company in each size class is shown for the nineteen industry categories in Appendix Table C–1.

The number of industries in which multiunit companies maintained establishments showed a strong positive relation to company size in fifteen of the eighteen industry categories in Table 26. The table shows a fairly regular decline in number of industries, as we move to successively lower size classes, in most of the categories of companies. As a further indication of the strong relation between company size and number of industries per company, for almost all categories the highest size class was associated with the largest average number of industries.

For the smaller sample of 111 large enterprises, information on frequency of product additions does not show a clear association between the latter and company size. Table 27 shows the relation between asset size and frequency of product additions for these firms. For companies segregated into five classes based on total assets in 1939, the higher size classes did not show a greater rate of product additions per company in 1939–54 than did the lower ones. For product additions in 1929–39, however, companies with total assets in 1929 of $250 million and over showed a higher frequency of additions than those with assets of less than $250 million, but a consistent rise in additions as one moves to successively higher asset classes is not in evidence.

The difference in conclusions to which the findings in Tables 26 and 27 seem to point can be explained by the difference in the composition of the two samples. The group of 111 enterprises was restricted to very large companies. Thus variations in size within the group were narrower than for the larger sample of multiestablishment firms. Moreover, it seems plausible that, beyond some level, economies of scale are exhausted and size ceases to exert a positive influence on diversification. Still another

[3] The first class consisted of the four largest companies in terms of employment in each industry group. The second was comprised of those companies having ranks 5 through 8. The third consisted of companies with ranks 9 through 20, and all subsequent classes were comprised of successive groups of ten companies, when ranked on the basis of employment size. For the first three classes the breakdown was determined by the fact that data showing the proportion of an industry's output contributed by the four, eight, and twenty largest firms in the industry had previously been published by the Bureau of the Census, thus generating possible "disclosure" problems if a different breakdown were adopted.

For "merchant wholesalers" there was only one class since information for the second class had to be suppressed. Thus comparisons of number of industrial activities for various size classes of companies could only be made for eighteen industries.

The lowest size class was eliminated in industries in which the residual number of companies falling into the class was smaller than four.

TABLE 26

AVERAGE NUMBER OF INDUSTRIES PER COMPANY IN RELATION TO EMPLOYMENT SIZE CLASS OF COMPANY, EIGHTEEN INDUSTRY CATEGORIES

| *Industries of Companies* | *Average Number in Each Size Class*[a] | | | | | | | | | | Industry Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (4) | (4) | (12) | (10) | (10) | (10) | (10) | (10) | (10) | (10) | |
| Mining | 9 | 4 | 3(10) | | | | | | | | 5 |
| Food | 15 | 10 | 4 | 5 | 4 | 3 | 3 | 2 | 3(8) | | 5 |
| Textiles | 6 | 7 | 4 | 3 | 3 | 3 | 2 | 2(6) | | | 3 |
| Paper | 9 | 6 | 4 | 3 | 3(9) | | | | | | 4 |
| Petroleum and coal products | 10 | 10 | 6 | 6(7) | | | | | | | 7 |
| Rubber | 13 | 8 | 3(4) | | | | | | | | 8 |
| Stone, clay, and glass | 9 | 4 | 4 | | | | | | | | 5 |
| Primary metals | 18 | 17 | 9 | 5 | 3 | 3 | | | | | 7 |
| Fabricated metal products | 9 | 5 | 5 | 3(7) | | | | | | | 5 |
| Machinery[b] | 8 | 5 | 5 | 5 | 2 | 4 | 3 | 2 | 2 | 3(8) | 4 |
| Electrical machinery | 20 | 7 | 3 | 2 | 3 | 2 | | | | | 4 |
| Transportation equipment | 15 | 3 | 6 | 6 | 3 | 3 | 3(4) | | | | 5 |
| Instruments[c] | 9 | 2 | 3(10) | | | | | | | | 4 |
| Chemicals | 19 | 11 | 7 | 4 | 5 | 4 | 4 | | | | 6 |
| Retail grocers | 9 | 5 | 3 | | | | | | | | 4 |
| Other retail | 7 | 3 | 2 | 2 | 2 | 2 | 2 | | | | 2 |
| Drug and variety stores | 2 | 2 | 2(8) | | | | | | | | 2 |
| Restaurants and bars | 4 | 2 | 3(6) | | | | | | | | 3 |

SOURCE: Special census tabulation.

[a] Based on data for all multiestablishment companies in the specified industries with 2,500 and over employees, except for several for which data could not be shown because of disclosure problems. Numbers in parentheses indicate the number of companies represented in the class. The first class consists of the largest four, the second, the next four, etc. Numbers in parentheses in the body of the table show the number of companies in a cell where the numbers differ from those in the column head.

[b] Except electrical.

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

factor is that variation between firms in number of product additions depends partly on the companies' primary industries. This relation may be sufficiently strong to obscure others, such as that between diversification and firm size.[4]

For the 721-firm sample, the relation of firm size to diversification was examined with the latter again measured by relative magnitude of nonprimary employment. The method of analysis was to determine the shape

[4] Although data for the larger sample were segregated by industry, the sample of 111 companies was not sufficiently large to permit both industry and size breakdowns.

TABLE 27
COMPANY SIZE AND FREQUENCY OF PRODUCT ADDITIONS

| Asset Size[a] (millions of dollars) | Number of Companies[b] | Total Number of Product Additions | Average per Company |
|---|---|---|---|
| | | 1929–39 | |
| 1929 | | | |
| Under 50 | 31 | 159 | 5.1 |
| 50 and under 125 | 27 | 136 | 5.0 |
| 125 and under 250 | 20 | 102 | 5.1 |
| 250 and under 500 | 14 | 115 | 8.2 |
| 500 and over | 13 | 93 | 7.1 |
| Total | 105 | 605 | |
| | | 1939–54 | |
| 1939 | | | |
| Under 50 | 29 | 353 | 12.2 |
| 50 and under 125 | 33 | 247 | 7.5 |
| 125 and under 250 | 25 | 245 | 9.8 |
| 250 and under 500 | 9 | 105 | 11.7 |
| 500 and over | 13 | 129 | 9.9 |
| Total | 109 | 1079 | |

SOURCE: Product record described in Chapter 2 and data for total assets from Moody's *Industrials*.

[a] Size measured on the basis of total assets.

[b] Asset data were not available in 1929 for six companies, which accounted for fourteen product additions during the 1929–39 period; and for two companies in 1939, which accounted for ten additions during 1939–54.

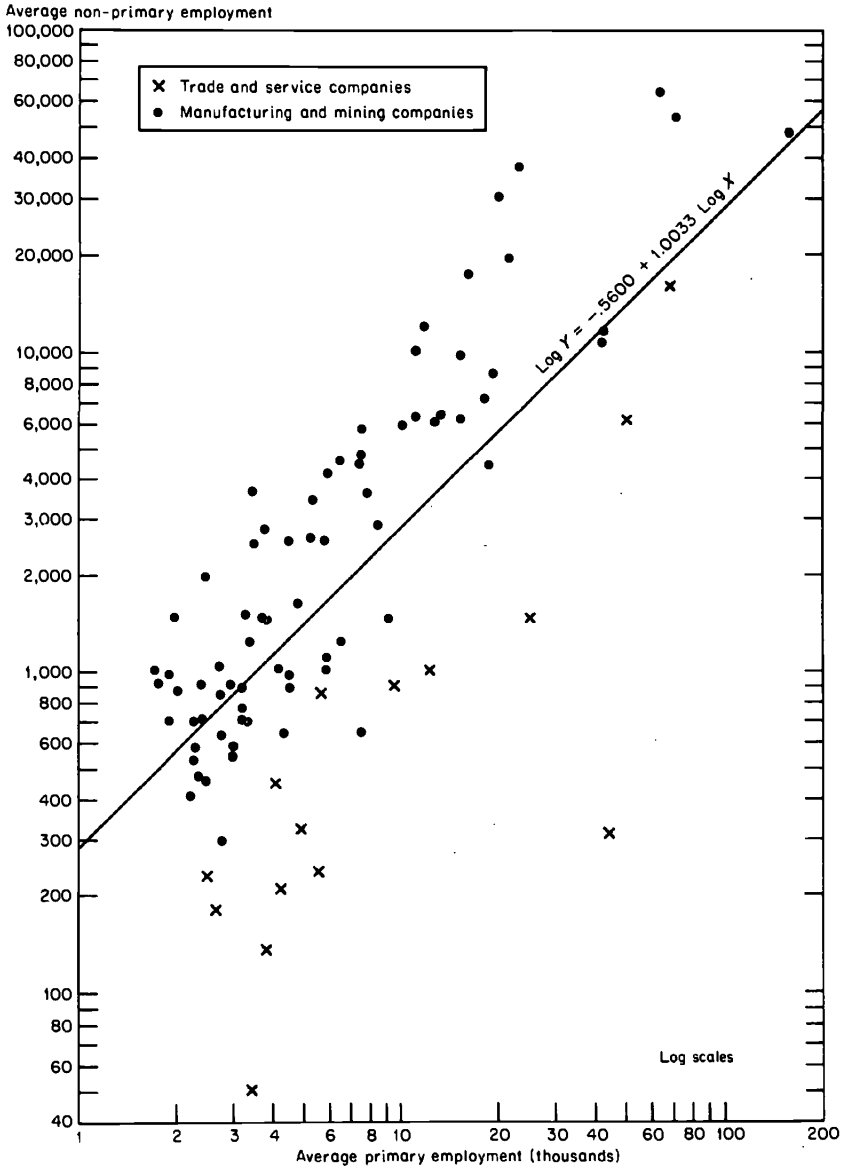
of the curve that relates nonprimary to primary employment.[5] This relation was examined without reference to industry—that is, the observations were not segregated by industry class. The data used consisted of average values for nonprimary and for primary employment for the various size groupings of companies discussed in connection with Table 26.[6]

[5] For companies grouped by industry and by size, as in Table 26, the ratio of nonprimary to primary employment did not vary consistently between successive size groups within the industries. However, this method of analysis gives a biased indication of the relation of nonprimary to primary employment as firm size changes. This is because company size is measured by total employment and, hence, both the numerator and denominator of the above ratio are components of the measure of firm size. To avoid this problem, the method of analysis described in the text was employed.

[6] For reasons of Census Bureau rules on nondisclosure of individual company information, it was not possible to use information for individual companies. The groupings of firms were such that only those within the same 2-digit industries were combined. This increased the homogeneity of companies within groups and thus reduced the disadvantage of using information for groups of companies rather than for individual firms. Data for nonprimary employment are shown in Appendix Table C–3. Those for primary employment were obtained by subtracting nonprimary from total employment (the latter in Appendix Table C–1).

## CHART 1A

## Relation of Number of Primary to Nonprimary Employees, 90 Groups of Companies



When the original observations are converted to logarithms, the following equation, as may be judged from Chart 1A, fits the observations quite well.[7]

$$(1) \qquad \log_{10} Y = -.5600 + 1.0033 \log_{10} X, \quad r = .691 \qquad (.1118)$$

$Y$ denotes nonprimary employment and $X$ is total employment.

The fact that the regression coefficient in the equation approximates unity points to a constant ratio of $Y$ to $X$ in original observations.[8]

Chart 1B shows the scatter around the estimated values when both a straight line and a second degree polynomial are fitted to the observations.[9] The equations, once again with $Y$ denoting nonprimary employment and $X$ primary employment, appear below.

$$(2) \qquad Y = 706.8 + .3918X, \qquad r = .749$$

$$(3) \qquad Y = -792.2 + .6002X - 10^{-6} \times 1.7632X^2$$

It is clear that the straight line does not fit the observations well at both tails of the distribution and, hence, must be rejected as a description of the relation of $Y$ to $X$. Equation 3 gives a somewhat better fit than the straight line, and, though the residual variance in $Y$ is reduced only modestly from 43.9 per cent to 40.5 per cent, the coefficient of $X^2$ was statistically significant. Equation 3 points to only moderate variations in the ratio $Y/X$ for companies in the medium to large size range, and in this respect tends to support the conclusion reached on the basis of Equation 1.[10]

As still another test of the relation between the relative importance of nonprimary employment and company size, data for the sample of 111 large enterprises were analyzed. These companies were ranked on the

[7] Companies in trade and service industries (indicated by crosses in the Chart) fairly consistently show a lower than estimated volume of nonprimary employment. This accords with data shown earlier for industry aggregates, which point to a lower ratio of nonprimary to total employment for trade and service industries compared with manufacturing and mining. The total number of observations was ninety. That is, analysis was based on ninety groups of companies drawn from eighteen 2-digit industries and encompassing 684 individual companies. Information for petroleum companies was not used because most of the nonprimary employment of these firms was associated with integration rather than diversification.

[8] If $\log Y = a + \log X$, then $\log Y - \log X = a$, or $\log \left(\frac{Y}{X}\right) = a$. Hence $\frac{Y}{X}$ is constant.

[9] As in Chart 1A, there were ninety observations. Chart 1B, panel I, shows the scatter for the lower values of $X$, while panel II shows the same information, but on a different scale, for the upper values of $X$. The rectangle in panel II shows the area covered by panel I.

[10] Equation 3 indicates that the ratio is at a maximum for a firm with roughly 21,000 primary industry employees, but varies only within the range of .41 and .53 for companies having from 5,000 to 100,000 primary industry employees. (The ratios were .433, .525, and .416 when $X$ was 5,000, 20,000 and 100,000, respectively.)

## CHART 1B

### Relation of Number of Primary to Nonprimary Employees, 90 Groups of Companies

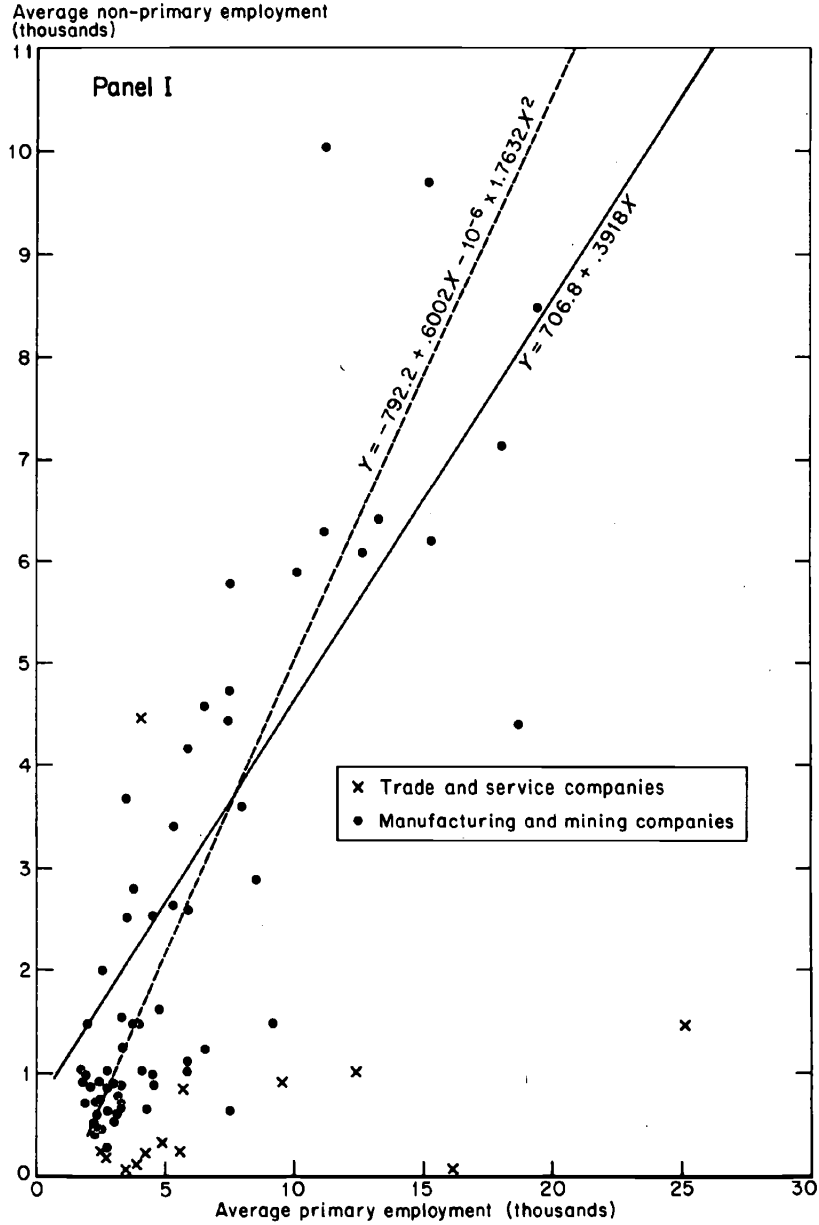
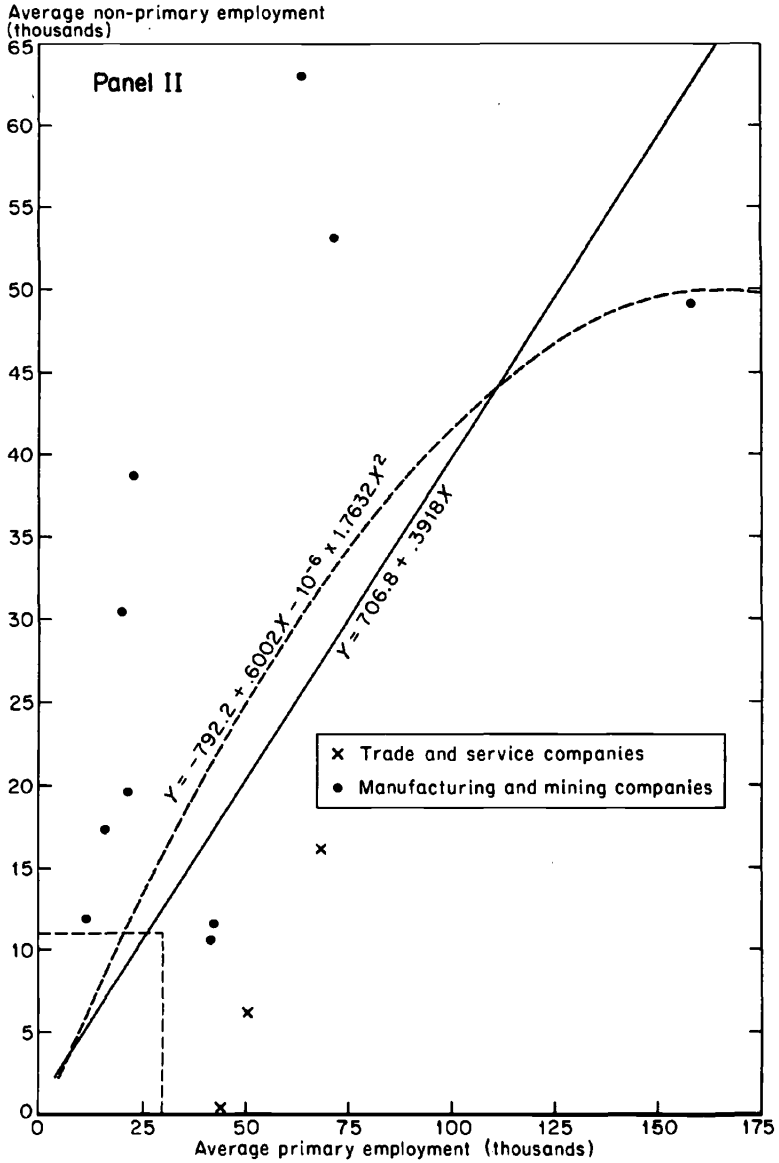


CHART 1B (concluded)



basis of total assets in 1954 and the ratio of nonprimary to total employment. The Spearman coefficient of rank correlation for the two variables was only .14.

It is clear from the preceding discussion that the ratio of nonprimary to primary employment does not show the pronounced positive association with company size which characterizes the relation between the latter and *number* of nonprimary activities (at least as revealed by data for the larger sample of multiestablishment firms). In consequence, it must follow that nonprimary employment increases with company size less than proportionately to number of nonprimary activities. Thus the *average* nonprimary activity accounts for a greater proportion of the firm's total employment in a smaller than in a larger firm.

There are plausible reasons for this phenomenon. It is difficult to envisage a new activity that would, initially at least, account for a large proportion of the total employment of a leading steel or automobile producer. On the other hand, when a small firm diversifies, the new activity is likely to contribute a significant proportion of the firm's total employment. This is especially true if there are sizable economies of scale and if the new venture is initiated on a scale sufficiently large to permit reasonably efficient operation. In short, when the minimum efficient size of establishments in a newly entered industry is relatively high, for a firm of moderate size successful entry will necessarily produce a high ratio of nonprimary to primary employment. This is consistent with a wide dispersion that is present in the ratio of nonprimary to primary employment for the smaller firms among those with 2,500 and over employees. With companies grouped as in Table 26, the groups representing the smaller firms generally contained both firms with zero nonprimary employment and those with very high ratios of nonprimary to primary employment (though frequently the latter had but a single nonprimary activity).

### *Diversification and Company Growth and Profit Rates*

Since no historical information was available for the 721 multiunit companies, analysis of the relation of diversification to growth and profitability was necessarily restricted to the 111 large enterprises.[11]

The direction of causation in the relation between diversification and company growth is by no means clear. On the one hand, diversification is a form of growth. In consequence, firms that have diversified should, in the absence of offsetting factors such as slower growth in the primary

[11] Information on growth was, however, available for 109 rather than all 111 companies.

industry, have grown more on the average than those whose output has remained homogeneous. Conversely, a rapidly growing, and hence more successful, company is under some circumstances likely to diversify more. For example, faster growth may be associated with higher rates of return and, thus, a larger volume of investment funds generated from earnings. This facilitates diversification. Faster growth may also reflect more aggressive managerial policy and, consequently, a greater likelihood that investment opportunities in industries new to the company will be discovered and exploited. Offsetting these two influences leading to a positive relation between growth and diversification is the fact that the rate of growth of a firm is partly dependent upon the rate of growth in demand in its primary industry. Faster growth in primary industry demand will increase the attractiveness of investment opportunities within the existing industrial scope of a firm's output relative to those elsewhere in the economy. Assuming scarcity of managerial, capital, and other resources, this leads to a negative relation between growth and diversification. Alternatively, some low-growth or low-profit-rate firms may undertake to diversify their output as a defensive measure, thus offsetting the positive relation that might otherwise have been present.

To ascertain the association between company growth and diversification, two tests were employed. In the first, growth was measured by the ratio of total assets in 1954 to total assets in 1939. This ratio was then correlated with the composite $D_3$ diversification measure. For 109 companies, the coefficient of rank correlation (Spearman's) was only .16.

In the second test, the 111 companies were grouped by deciles on the basis of growth in total assets for the 1929–39 and 1939–54 periods. The frequency of product additions in the various deciles in the two periods was then examined. Companies associated with higher growth deciles did not reveal greater frequencies of product additions in 1929–39 than did those in the lower deciles (Table 28). For the 1939–54 period, there is indication of a positive relation between growth and frequency of additions, at least starting with the third decile. The decline in frequencies from the first to the third decile suggests, though inconclusively, a U-shaped curve. Generally, data for the 1939–54 period would seem to support the conclusion of a moderate positive relation between diversification and company growth, with exceptions arising from companies that embark upon diversification because of decline or slow growth in demand for their primary products.

The absence of relation in the first test may be explained, perhaps, by

TABLE 28
COMPANY GROWTH IN TOTAL ASSETS AND FREQUENCY OF PRODUCT ADDITIONS

| Growth Deciles and Median Growth in Assets[a] | | Number of Companies[b] | Number of Product Additions | Average per Company[c] |
|---|---|---|---|---|
| | | 1929–39 | | |
| 1. | −45.03% | 11 | 76 | 6.9 |
| 2. | −25.75 | 11 | 75 | 6.8 |
| 3. | −13.75 | 10 | 68 | 6.8 |
| 4. | −5.82 | 10 | 38 | 3.8 |
| 5. | 4.62 | 10 | 34 | 3.4 |
| 6. | 8.51 | 11 | 52 | 4.7 |
| 7. | 15.29 | 11 | 65 | 5.9 |
| 8. | 28.90 | 10 | 74 | 7.4 |
| 9. | 62.20 | 10 | 60 | 6.0 |
| 10. | 156.75 | 10 | 54 | 5.4 |
| All companies | 7.02 | 104 | 596 | 5.4 |
| | | 1939–54 | | |
| 1. | 55.34% | 11 | 102 | 9.3 |
| 2. | 115.07 | 10 | 76 | 7.6 |
| 3. | 150.68 | 11 | 51 | 4.6 |
| 4. | 182.22 | 11 | 88 | 8.0 |
| 5. | 209.07 | 11 | 101 | 9.2 |
| 6. | 249.52 | 11 | 104 | 9.4 |
| 7. | 279.95 | 11 | 100 | 9.1 |
| 8. | 421.28 | 11 | 137 | 12.4 |
| 9. | 587.29 | 11 | 106 | 9.6 |
| 10. | 1,633.24 | 11 | 214 | 19.4 |
| All companies | 230.02 | 109 | 1079 | 9.7 |

SOURCE: Product record described in Chapter 2 and data on total assets from Moody's *Industrials*.

[a] Deciles are in ascending order in terms of growth. Median growth is expressed as a percentage of initial-year assets.

[b] Seven companies for which asset data were not available accounted for twenty-three product additions during the 1929–39 period, and two for ten additions during 1939–54.

[c] The value of $F$ was significant for the 1939–54 period at the .05 level ($F = 2.0624$, with $N_1 = 9$, $N_2 = 99$). That is, the variance between classes was significantly greater than the variance within growth classes.

deficiencies in the data used. Data for total assets were not adjusted for changes in price, with the result that the measure of growth for individual companies was affected by the price level at which tangible assets were acquired. Thus a relatively mild relation between growth and diversification could easily have been concealed by variations in the time at which assets were acquired by different companies. In addition, the measure $D_3$ was based on data for a single point in time, namely, 1954. It is possible that growth rates and the changes in diversification that produced the 1954 pattern do not relate to the same periods in time; in

the second test, on the other hand, both additions and growth were measured for the same interval of time.

The rate of return which companies experience is even more volatile over time than company growth rates. Consequently, when diversification is measured as of one point in time, statements about its relation to profitability must be strongly qualified. Although it is not known when the events that led to the 1954 values of measure $D_3$ occurred, one can still ask if the more diversified companies experienced a higher rate of return. Using data for 110 companies,[12] average net income after taxes for the period 1947–54 was expressed as a ratio to average net worth for the same interval of time.[13] The data were not adjusted for price changes and consequently are subject to the same limitations indicated for growth measured on the basis of total assets. The coefficient of rank correlation (Spearman's) for the indicated measure of rate of return and $D_3$ was $-.04$. This result must not be interpreted to mean that diversification exerted no influence upon the profitability of firms. Obviously the profit experience of the 110 companies depended largely upon that for their primary activities. Absence of breakdowns of earnings according to products or divisions renders it difficult to determine the net contribution of diversification to the profitability of companies. Moreover, numerous factors unrelated to diversification influence the rate of return in both the primary and the nonprimary industries. The results, however, point to a conclusion that the influence of diversification upon profits is not, alone, sufficient to overcome other sources of variation in rates of return.

To remedy the deficiency of measuring diversification at a single point in time, the measure $D_3$ was computed for 1947, as well as for 1954, and the 110 companies were ranked on the basis of the change in $D_3$ between the two dates. This ranking and one based on average rate of return on net worth in 1947–54 led to a rank correlation (Spearman's) of only .09. Thus the result is substantially the same as that based on diversification measured at one point in time.

It is sometimes alleged that diversification is undertaken with the objective of reinvesting corporate income which, if distributed as dividends, would be subject to high marginal tax rates under the federal personal income tax. To test this hypothesis, the ratio of dividends to after-tax income in the 1947–54 period was computed for each of the 110

[12] Data on income were not available for one of the companies in our sample of 111.

[13] Net worth was defined as the balance sheet value of preferred and common stock, earned and capital surpluses, and reserves for contingencies.

companies and then correlated, first, with measure $D_3$ for 1947; and second, with change in $D_3$ from 1947 to 1954. The Spearman coefficients of rank correlation were $-$ .19 and .00, respectively. Thus it is clear that diversification did not produce unusually high rates of income retention, though of course it is still possible that retentions for some companies would have been lower in the absence of diversification.