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DIVERSITY, DIVERSIFICATION, AND PROFITABILITY AMONG BRITISH MANUFACTURING COMPANIES, 1972–84

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This study investigated the causal relationships between diversity, diversification, and profitability among 304 large British manufacturing companies that differed in both product and multinational diversity. Diversity and profitability were positively related up to a point; after that point, increases in product diversity were associated with declining profitability. The results were unclear with respect to the underlying causal relationships. Product diversification did not increase profitability, and there was limited evidence that profitability promoted diversification. For multinational diversification, however, we found that profitability in the home market encouraged overseas expansion that in turn increased profitability.

Since Rumelt's (1974) pioneering study, the relationship between corporate diversification and firm performance has attracted more attention than any other area of strategic management research. Yet, despite a burgeoning empirical literature, no consensus has emerged as to the impact of diversification on performance—indeed, recent studies have increased the inconsistencies between the findings of different researchers. A major motive for our research was our belief that the failure of empirical research to make more substantial progress in revealing the relationship between diversification and performance has been due in part to weaknesses in the methodology and data of prior studies.

The principal contributions of our study to understanding the relationship between diversification and performance are improved methods and new data. Prior studies have either been agnostic as to causation or have presumed performance differentials to be outcomes of the diversification strategies adopted. Our study considered alternative directions of causation in the relationship of performance and diversification. A second weakness of

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previous studies has been their focus on static relationships, with the result that they have been of limited value as a basis for drawing normative conclusions for the conduct of corporate strategy. The key issue for managers is not whether diversified firms are more profitable than specialized firms, but whether diversification increases profitability. We distinguished between *diversity*, which measures the spread of a company's activities at a point of time, and *diversification*, which measures increases in diversity over time, and estimated both dynamic and static relationships. A further feature of our methodology is that we critically examined the Wrigley-Rumelt categorization of diversification strategies (Rumelt, 1974; Wrigley, 1970), the measure of corporate diversification used in most prior studies, by comparing its explanatory power with that of a quantitative index of product diversity. This study also encompassed a broader concept of diversity than prior studies by considering both product and multinational diversity.

Finally, most prior studies have used U.S. data, many of them using the same sample of firms as Rumelt's original study. Our data set was new: it comprised 304 British manufacturing companies and covered the period 1972 to 1984. This was the first large-sample, multivariate analysis using British data.

FINDINGS OF PREVIOUS RESEARCH

Empirical research into diversification and performance has investigated cross-sectional relationships, typically among groups of 40 or more firms. Table 1 summarizes the key features of the main studies.

The primary emphasis of previous empirical research has been associating profitability differentials with different diversification strategies. Rumelt (1974) set the pattern for subsequent research by developing a taxonomy of diversification strategies. He found that related diversification was associated with a higher profitability than was unrelated diversification and that the more narrowly focused related-constrained diversification was more profitable than the looser related-linked diversification. Berry (1975) supported those results, finding that diversification across four-digit Standard Industrial Classification (SIC) codes was positively related to firm performance and that broader-spectrum diversification across two-digit SIC codes was negatively related to performance.[1]

Subsequent studies have used multivariate analysis to separate the impact of diversification strategy from other influences on corporate performance. Christensen and Montgomery (1981) and Bettis and Hall (1982) showed that the differences in profitability between strategic categories that Rumelt observed could be attributed mainly to industry effects. In a subse-

[1] Studies in the finance literature have further confirmed the poor performance of unrelated diversification. Those studies have shown that, whether measured by accounting returns or returns to shareholders, conglomerates performed either no better than, or significantly worse than, control groups of nonconglomerates (Mason & Goudzwaard, 1976; Melicher & Rush, 1973; Weston, Smith, & Shrieves, 1972).

TABLE 1
Empirical Studies of the Relationship Between Diversification and Firm Performance

Study	Sample	Findings
U.S. studies		
Weston et al. (1972)	48 conglomerates and 50 mutual funds, 1960–69	Conglomerates showed higher security returns but were less effective at diversifying risk than mutual funds.
Melicher & Rush (1973)	45 conglomerates and 45 nonconglomerates, 1966–71	No significant differences between the two groups in either ROI or security returns.
Rumelt (1974)	500 industrial companies, 1949–69	Dominant-constrained and related-constrained companies most profitable; single and dominant vertical firms had low growth in sales and earnings; acquisitive conglomerates had high growth in sales and earnings.
Berry (1975)	460 industrial companies, 1960 and 1965	Growth of assets positively related to change in four-digit SIC index of diversity and negatively related to change in two-digit SIC index of diversity.
Mason & Goudzwaard (1976)	22 conglomerates and a matched sample of 22 portfolios of specialized firms, 1962 and 1967	ROA and equity returns higher for the control sample than for the conglomerates.
Biggadike (1979)	68 diversifying ventures by 35 large corporations	New ventures require an average of 7 years before reaching profitability.
Christensen & Montgomery (1981)	128 *Fortune* 500 companies, 1972–77 (subsample of Rumelt, 1974)	Dominant-constrained, dominant-linked, and related-constrained firms most profitable; vertically integrated firms least profitable. High performance of related-constrained firms due to location in profitable, growing, concentrated markets. Unrelated firms were located in stagnant, unprofitable, unconcentrated markets.
Bettis (1981)	80 *Fortune* 500 companies, 1973–77 (subsample of Rumelt, 1974)	Related-constrained firms more profitable than unrelated, owing primarily to the impacts of advertising, R & D, risk, and capital intensity.
Bettis & Hall (1982)	Same as Bettis (1981)	Higher profitability of related firms due to the presence of four pharmaceutical companies in the related group.
Rumelt (1982)	273 *Fortune* 500 companies, 1955–74 (extension of Rumelt, 1974, sample)	Related-constrained firms earned ROA > average; dominant-vertical and unrelated-business firms earned ROA < average. After adjustment for industry effects, single-business and dominant-constrained firms earned ROA > average; unrelated firms earned ROA < average.

TABLE 1 (continued)

Study	Sample	Findings
Stubbart & Grant (1983)	90+ large divisionalized companies	Dominant-constrained and related-constrained firms showed highest ROI, ROE, and sales growth.
Michel & Shaked (1984)	51 companies from the *Fortune* 250, 1975 and 1981	Unrelated diversifiers earned higher risk-adjusted equity returns than related diversifiers.
Palepu (1985)	30 food products companies, 1973–79	Related diversifiers earned higher return on sales than unrelated diversifiers.
Dolan (1985)	80 *Fortune* 500 companies	After adjustment for industry effects, unrelated firms earned higher ROE but had lower valuation ratios.
Montgomery (1985)	Same as in Christensen & Montgomery (1985)	An SIC-based measure of diversity was insignificantly associated with ROI once industry structure, industry profitability, and market share were taken into account.
Rajagopalan & Harrigan (1986)	Same as in Bettis (1981), data for 1978–80.	Equity returns and risk-adjusted accounting returns insignificantly different between Rumelt categories.
Varadarajan & Ramanujam (1987)	225 companies, 1980–84	Related diversifiers earned significantly higher ROE and ROI than unrelated diversifiers.
Dubofsky & Varadarajan (1987)	Same as in Michel & Shaked (1984)	Confirmed Michel & Shaked's finding that unrelated diversifiers earn higher risk-adjusted equity returns than related diversifiers, but showed no difference in ROA.
Non–U.S. studies		
Grinyer, Yasai-Ardekani & Al-Bazzar (1980)	48 large U.K. companies, early 1970s	Differences between strategy categories mainly insignificant. Only dominant business firms earned a higher ROI.
Itami et al. 1982	112 large Japanese companies, 1963–73	After size, industry growth, concentration, and R & D accounted for, dominant-constrained firms earned higher ROI with lower earnings variability
Lecraw (1984)	200 large Canadian manufacturing firms, 1961–75	ROE significantly higher for related-diversified and vertically integrated firms.
Luffman & Reed (1984)	439 U.K. companies from the *Times* 1000, 1970 and 1980	Unrelated and dominant companies earned higher equity returns than related and single-business firms; unrelated diversifiers had highest growth in sales and ROC.
Buhner (1986)	40 large, diversified German firms, 1966–81	Weak positive correlations between risk-adjusted equity returns and both product and geographical diversity.

quent study, Montgomery (1985) found diversity to be unrelated to profitability when industry and market-share variables were controlled for. However, in updating his earlier study, Rumelt (1982) confirmed that, even after adjustment for interindustry differentials, related-constrained diversifiers earned the highest returns on assets.

Several studies using more recent data have found that unrelated diversification serves firms as well as, if not better than, more focused strategies. Michel and Shaked (1984), who used returns to stockholders, and Dolan (1985), who used accounting returns, both observed that unrelated diversifiers outperformed other strategy types, and Rajagopalan and Harrigan (1986) found insignificant differences in accounting and stockholder returns between the Rumelt categories. Dubofsky and Varadarajan (1987), replicating Michel and Shaked's (1984) study, confirmed the superior stock-market performance of unrelated diversifiers but found no significant differences in accounting returns. Although Michel and Shaked's and Dubofsky and Varadarajan's studies adjusted for risk, they did not take industry effects into account.

Findings concerning relationships between diversity and profitability appear to be highly susceptible to choices concerning profitability measures, time period, control variables, and method of analysis. Yet inconsistency of results has done little to inhibit researchers and consultants from offering general guidance to managers on the conduct of diversification strategy.[2] Since managers want more than the oversimplified maxims some consultants offer, and theory points to the existence of general relationships between diversification and performance, there is a strong case for extending the field of research beyond the samples of U.S. *Fortune* 500 companies that Rumelt and most other researchers have studied.

Outside the United States, very few studies have used multivariate analysis on large samples.[3] Similarities between the United States and Britain in industry structure, financial markets, and management methods make use of British data a natural extension of U.S. research. We anticipated that British data might shed new light on the inconclusive findings of U.S. studies. The only extant large-sample British study (Luffman & Reed, 1984) was methodologically flawed in so far as the data covered only two years (1970 and 1980) and the analysis was univariate with no allowance made for determinants of performance other than diversification.

HYPOTHESES

Our starting point for generating testable hypotheses concerning the relationships between diversity, diversification, and profitability was the eco-

[2] For example, on the basis of both their own observations and their interpretation of the research findings of others, Peters and Waterman coined their "golden rule" of excellence: "Stick to the knitting" (1982: 294).

[3] Exceptions are the studies by Itami, Kagono, Yoshihara, and Sakuma (1982), Lecraw (1984), and Buhner (1986).

nomic theory of organization (Alchian & Demsetz, 1972; Teece, 1980; Williamson, 1975, 1979, 1981). On the basis of some plausible assumptions concerning transaction and information costs, managerial motivation, and economies of scope, we derived five hypotheses, four concerning the impact of diversity on profitability and one concerning the impact of profitability on diversification.

A major organizational consequence of diversification is the increased importance of a corporation's head office. When firms are specialized by industry, resource allocation occurs through the interactions between firms and the suppliers of resources in the markets for those resources. Within a diversified firm, corporate management allocates resources between divisions and, hence, between industries. Also, the managers of operating divisions are responsible to a corporate head office that occupies an intermediate position between senior operating managers and shareholders. Williamson (1979, 1981) argued that the internalization of transactions and control within diversified companies generates efficiencies through two main sources.

First, the allocation of resources between business units by a corporate head office can avoid the costs specialized firms incur in using the markets for capital, labor, and other resources. In particular, diversified firms can make better resource allocation decisions than can firms relying on resource markets because corporate managers have superior access to information on the productivity of individual factors of production than managers relying on the market have (Alchian & Demsetz, 1972). Second, the separation of strategic and operational control in diversified firms may permit them to overcome some of the agency problems that afflict large management-controlled corporations:

> Since the general management of an M-form conglomerate is disengaged from operating matters, a presumption that the general office favors profits over functional goals is warranted. Relatedly, the general office can be regarded as an agent of the stockholders whose purpose is to monitor the operations of the constituent parts. Monitoring benefits are realized in the degree to which internal monitors enjoy advantages over external monitors in access to information (Williamson, 1981: 1639).

Hence, since all large, diversified U.K. firms have divisionalized structures (Channon, 1973), we predicted that internalization efficiencies would offer cost advantages to diversified firms.

> *Hypothesis 1: Diversified firms are more profitable than specialized firms.*

At the same time, internal governance is neither costless nor frictionless. One consequence of increasing diversity may be disproportionately rising costs of administration and increased inflexibility. Diversification, by creating an additional level of corporate management to control and coordinate operating units, not only imposes increased administrative cost but may cause inefficiencies arising from lack of adaptability to environmental change,

politicization of strategic decision making, and strain on top management as the corporate center seeks to manage an increasing number and diversity of businesses.[4] Decentralization through divisionalized corporate structures may only partially mitigate some of those inefficiencies.[5]

> *Hypothesis 2: Profitability declines exponentially with increasing diversity.*

The relative costs and benefits of corporate diversity are likely to depend on how the different business activities of a firm are related to one another. Where separate business activities use a common, indivisible input, a diversified firm can exploit *economies of scope*. Economies of scope arise not just from tangible inputs like a common R&D department or a common distribution system but also from intangible assets like brand names and production know-how, the use of which may be transferable at a negligible marginal cost.[6] The potential for exploiting economies of scope depends crucially on the closeness of the relationships between a firm's businesses. In the case of product scope, a firm whose different product divisions are linked by common customers, distribution channels, or technologies will have greater potential for exploiting economies of scope than a diversified firm where such links are absent. It also seems likely that firms can more readily exploit economies of scope in intangible, firm-specific assets such as technological innovations, brand reputation, and production know-how through multinational diversification than through product diversification. That is, deployment in a single industry in different countries will be more successful than deployment in different industries.[7]

> *Hypothesis 3a: Concerning product scope, related diversity is more profitable than unrelated diversity.*

> *Hypothesis 3b: Multinational diversity is more profitable than product diversity.*

It is also likely that the trade-off between the costs and benefits of diversity changes over time. It seems plausible that technological change has the effect of reducing the costs of internal organization relative to the costs of market organization. Just as the development, initially by General Motors

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[4] Increasing cost and inefficiency may be partly a consequence of diversity per se and partly a result of the increasing firm size associated with diversity. Williamson (1967) argued that increasing firm size necessitates the addition of levels to a management hierarchy, with consequent distortion of information, loss of control, and increase in administrative costs.

[5] Mintzberg (1979: 380–430) argued that divisionalization increases bureaucracy within divisions, may create conflict between corporate and divisional managers, and may reduce overall corporate profitability by encouraging the subsidization of unprofitable divisions by profitable ones.

[6] In fact, as Teece (1982) argued, economies of scope are not a sufficient condition for diversification to be profitable. In addition, there must be transaction costs that make it unprofitable to exploit economies of scope by selling the services of a common resource to another firm.

[7] See Caves (1971, 1982).

and Du Pont, of the divisionalized corporation greatly facilitated the management of diversified firms, so subsequent advances in organization, management systems, and decision-making techniques have continued that process. Critical administrative developments have included innovations in strategic planning techniques associated with General Electric, Profit Impact of Market Strategy (PIMS), and the Boston Consulting Group, new approaches to financial monitoring and control pioneered by companies such as ITT in the United States and Hanson Trust in Britain, increased administrative efficiency through technological advances in information processing and telecommunications, and learning-by-doing in the management of acquisitions. Dundas and Richardson (1982) observed that although conglomerate firms performed poorly during the 1970s, firms that, over time, developed small, focused corporate head offices with sound and simple internal controls and clear criteria and procedures for acquisitions stood out as strong performers. Hence, improved corporate management of diversified enterprises implies that, over time, diversified firms become more efficient than comparable specialized firms.

Hypothesis 4: Over time, diversified firms increase their profitability relative to that of specialized firms.

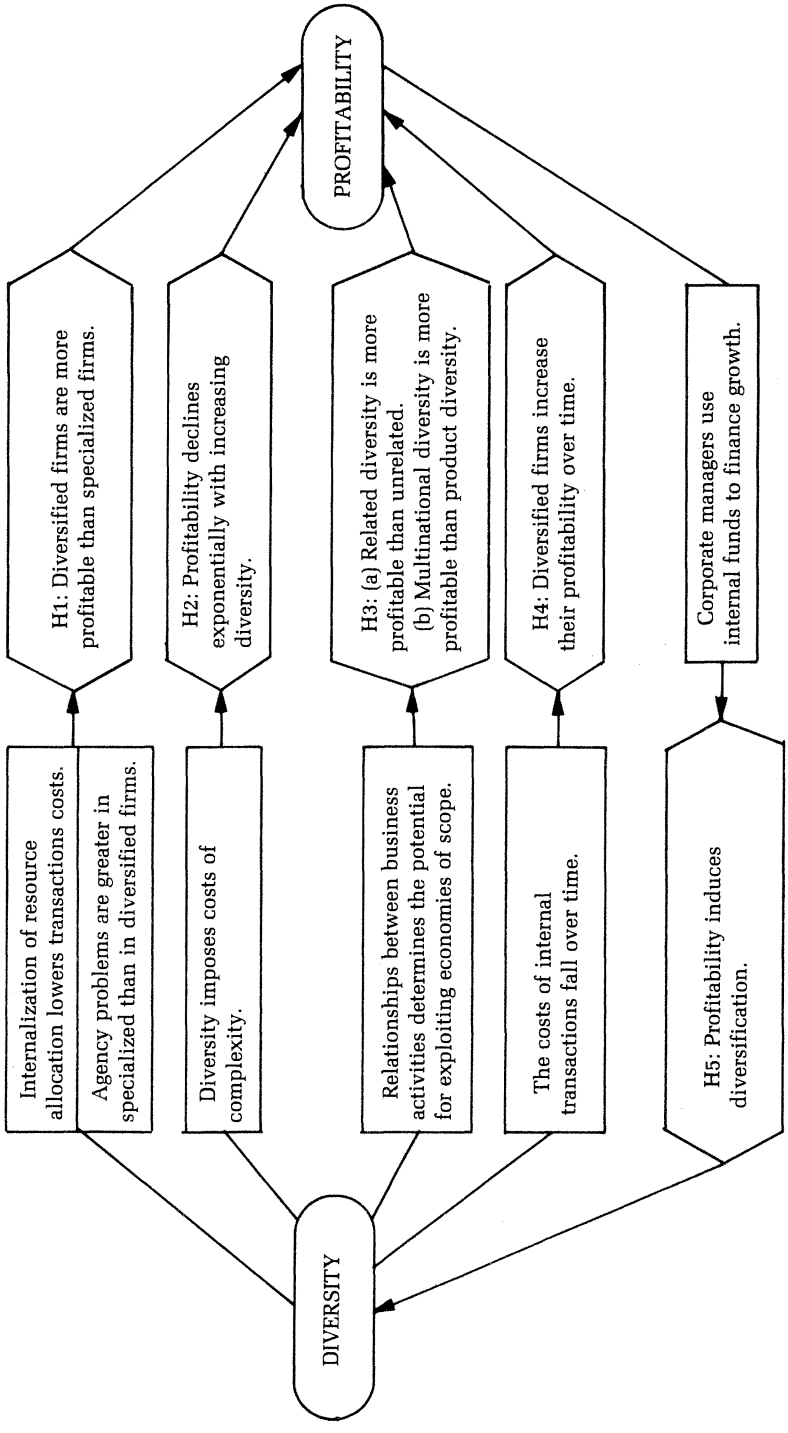
Our presumption so far has been that causation flows from diversity and diversification to performance. It is also likely that profitability influences diversification. Again, predictions based on a priori analysis are ambiguous: on the demand side, low prospects of future profitability in existing activities might be expected to create incentives for diversification; on the supply side, high profits from existing activities can be used to finance diversification.[8] Empirically, those alternative predictions may be less conflicting than they initially appear. Low-growth industries like the tobacco and oil industries typically offer both high returns on existing capital and poor returns on new investment. Since our interest was in testing hypotheses, our emphasis was on observable rather than expectational variables. Consequently, our final hypothesis focuses on the prediction that current profitability, measured in terms of cash flow, promotes diversifying investment.

Hypothesis 5: Profitability encourages diversification.

Figure 1 summarizes our assumptions concerning intervening organizational and market processes and our hypotheses concerning the relationships between diversity and profitability.

[8] Nickell (1978: 262–264) discussed the influence of internal generation of funds on level of corporate investment. He showed that the availability of internal funds for less capital than external funds speeds the rate at which a firm adjusts its capital stock. Coen (1971) confirmed this effect empirically.

FIGURE 1
Predicted Relationships: A Summary of Assumptions and Hypotheses[a]



[a] The rectangular boxes summarize the assumptions made about the influence of intervening variables. The hexagonal boxes summarize the hypotheses concerning the relationships between diversity and profitability. The arrows show the predicted direction of causation.

METHODS

The Companies Studied

The data set was compiled by eliminating nonmanufacturing, unlisted, and foreign-owned companies from the *Times 1000* compilation of the largest U.K. companies in 1974. The resulting group of 304 companies included most of Britain's largest companies—the principal exclusions were service companies, notably retailers, banks, and insurance companies; oil companies; and several state-owned corporations. Restricting the data set to manufacturers facilitated comparisons of diversity and of accounting profitability.[9]

Our study period, 1972–84, was determined first by the availability of computerized company-accounts data. Second, we wished to study a period long enough both to allow short-term influences on firm profitability to average out and to allow observation of the long-term impact of diversification on profitability.[10]

Missing data reduced the number of observations available for most of our analyses to between 230 and 262 firms, although for one regression equation only 151 firms could be analyzed. Missing data were a consequence either of the deaths of firms during the period, usually owing to acquisition, or of firms' failing to report divisional sales and profits. For purposes of comparability over time and across regression equations, we would have preferred a fixed group of those firms for which full data were available. However, a consequence of that would have been a drastic reduction in degrees of freedom, which would have limited the use and results of multivariate analysis and excluded many of the most active diversifiers.

The exclusion of firms that did not survive the period was a potential source of bias to our results. Moreover, if disappearance during the period represented failure due to choice of strategy, important evidence was lost by examining survivors only. However, inspection of the excluded firms showed that their profitability was not significantly below that of the survivors and that their principal characteristic was relatively small size.[11]

The Measures of Diversity

Diversity is the spread of a firm's activities across markets. We used three measures of corporate diversity. (1) We allocated each firm to one of

[9] The accounting conventions used by banks, insurance companies, and oil companies were significantly different from those employed by manufacturing companies. In addition, there were substantial differences among service companies in their disaggregation of financial data by business activity.

[10] Our main findings were not sensitive to changes in the beginning and ending years. However, the shorter the time period chosen, the lower was the explanatory power of our regression equations and the less significant were our diversity variables. Hence, we present results only for the longest period for which data were available, 1972–84.

[11] Of the 304 firms present in 1974, 43 were no longer in existence as independent quoted companies by the end of 1984. Of those , 36 had been acquired. During the period 1972–75, the average *ROA* of the surviving firms was 18.10 percent and that of the nonsurvivors was 15.80 percent. The difference was not significant at the 0.05 level.

Rumelt's strategic categories, using the classification system he devised (Rumelt, 1974). Firms were classified into eight categories of corporate strategy according to the extent of their product diversity and the relationships between their different activities. (2) We devised a quantitative *index of product diversity* (*PDIV*), a Herfindahl-type measure (Hirschman, 1964) based on the share of a firm's sales in each industry group. The index is similar to the diversification index used by Berry (1975). (3) We devised an *index of multinational diversity* (*MDIV*), which measured diversity as the proportion of a firm's revenue derived from operations outside the United Kingdom.

The chief merit of the diversity indexes, *PDIV* and *MDIV*, is that they are continuous, quantitative measures that can identify and measure differences in diversity both between firms and across time. The strategic-category approach has the advantage of taking into account the relatedness of a firm's activities as well as its breadth of diversity.

In contrast to earlier researchers who have used "diversification" and "diversity" synonymously, we used diversification to mean increases in diversity over time (i.e., Δ *PDIV* and Δ *MDIV*). We referred to reductions in diversity as "specialization."

Measures of Performance

We chose pre-tax return on net assets (*ROA*) as our primary measure of firm profitability. The use of accounting return as a measure of a firm's profit performance has been a subject of considerable debate (for a summary, see Aaker & Jacobson, 1987: 283–284). Our justification for using accounting return was, first, that managers and external analysts often use return on net assets as a measure of the effectiveness and efficiency of top management; second, the impact of corporate strategy on a firm's performance is more directly reflected in accounting profit than in stock price, which measures investors' expectations about future profits. To test the robustness of our results, we also used other measures of accounting profitability, including total operating profits, return on equity, and return on sales. Those measures gave results similar to those for return on net assets, although their statistical significance was generally lower. We took measures of profitability, sales, and other financial ratios from the Extel Corporation's EXSTAT data base of U.K. company accounts for the period 1972–86. The EXSTAT data have been widely used in research (cf. Barron, 1986; Mayes, 1983).

Control Variables

To isolate the relationship between diversification and profitability, it was important to control for other variables likely to have an important impact on profitability and to be systematically related to diversification. Prior research has shown industry structure to be the most important determinant of the cross-sectional variability of firm profitability (Schmalensee, 1985). Hence, we classified firms into two-digit Standard Industrial Classification (SIC) categories on the basis of sales revenue and introduced the industry groups as dummy variables to measure industry effects. In addition,

we introduced two firm structure variables: firm size and leverage. Firm size was added because of its correlation with both diversity and performance, through economies of scale and market power (Shepherd, 1975; Winn, 1977). Leverage was added as a key determinant of risk (Hurdle, 1974). We obtained firm size and leverage measures from the EXSTAT data base.

The Appendix outlines definitions and sources for the measures and the estimation process for the diversification and financial variables. Table 2 shows descriptive statistics for and correlations between the quantitative variables. Table 3 shows descriptive statistics for the categorical variables.

Statistical Analyses

Multiple regression analysis was used to distinguish the effects of diversity from the effects on profitability of other variables. To evaluate the explanatory power of the diversity variables relative to that of the other independent variables, we calculated incremental R^2s using a hierarchical regression procedure. The variables were entered in three steps, the industry dummy variables first, the firm-structure variables (size and leverage) second, and the diversity variables at the end. We conducted separate regression analyses to examine static and dynamic relationships.

Analysis of static relationships. Hypotheses 1, 2, and 3 were tested by regressing profitability on diversity while we controlled for the effects of industry, firm size, and leverage. To minimize the effects of short-term and cyclical influences on profitability, we used averages for the period 1972–84. The high degree of serial correlation in each of the independent variables over time supported our use of 13-year averages. We modeled the predictions of Hypotheses 1 and 2 through introducing the following quadratic relationship between profitability (*ROA*) and diversity (*DIV*):

$$ROA = a + b\,(DIV) + c\,(DIV^2)$$

Hypothesis 1 predicts that coefficient b is positive, and Hypothesis 2 predicts a negative sign for coefficient c. We then tested Hypothesis 3 by including product diversity and multinational diversity separately and by introducing the Rumelt strategic categories as independent variables.

Analysis of dynamic relationships. Our second set of regression equations analyzed changes over time. This dynamic analysis served two purposes. First, it allowed us to directly test Hypothesis 4, which linked diversity with changes in profitability over time, and Hypothesis 5, which linked profitability to diversification. Second, it permitted us to investigate the direction of causation in the association between diversity and profitability in order to test Hypothesis 1, positing profitability as a positive function of diversity, against Hypothesis 5, positing diversification as a positive function of profitability.

Our first set of equations regressed changes in profitability over the period on diversification over the period and the initial level of diversity. The prediction of Hypothesis 1 that profitability is positively related to diversity also implies that diversification will increase profitability over

TABLE 2
Means, Standard Deviations, and Correlation Coefficients for the Quantitative Variables

Variables	Means	s.d.	Correlation Coefficients[a] 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Product diversity[b]	2.40	1.32																	
2. Product diversity[c]	2.37	1.47	92*																
3. Product diversity squared[b]	7.50	8.67	95*	87*															
4. Change in product diversity[d]	0.85	0.56	−35*	−42*	−43*														
5. Change in product diversity[e]	0.65	0.91	−29*	−30*	−31*	71*													
6. Multinational diversity[b]	0.20	0.20	07	14	09	09	06												
7. Multinational diversity[c]	0.17	0.19	12	11	13	15	15	80*											
8. Multinational diversity squared[b]	0.08	0.12	02	04	06	06	05	94*	89*										
9. Change in multinational diversity[d]	0.07	0.13	21	24*	18	−02	05	−08	−09	−15									
10. Change in multinational diversity[e]	0.05	0.12	26*	24*	25*	16	11	−02	−08	−05	62*								
11. Return on net assets[b]	16.02	5.05	07	04	06	−04	06	19	14	18	15	17							
12. Change in return on net assets[d]	−5.34	9.52	10	12	11	02	−03	13	09	10	05	12	−11						
13. Growth of sales revenue[f]	3.05	2.67	33*	36*	29*	15	10	22	26*	18	30*	34*	15	15					
14. Cash flow[b]	13.70	5.65	05	01	03	−05	−01	09	09	06	13	10	91*	09	18				
15. Log of sales revenue[b]	4.68	1.34	31*	29*	29*	−03	08	51*	52*	43*	29*	30*	12	06	−04	14			
16. Log of sales revenue[c]	4.26	1.32	38*	30*	37*	−04	03	48*	48*	46*	14	21	08	04	−07	−02	88*		
17. Leverage[b]	0.49	1.34	00	−04	00	24*	26*	17	18	18	06	02	−22	−12	14	−30*	12	15	
18. Leverage[c]	0.51	33.88	−08	−08	−06	19	20	12	16	13	01	00	−18	04	04	−35*	14	20	63*

[a] The decimal points have been omitted from the correlation coefficients.
[b] Averaged over the period 1972–84.
[c] Averaged over the period 1972–74.
[d] Change measured as the average for 1982–84 minus the average for 1972–74.
[e] Change measured as the average for 1978–80 minus the average for 1968–70.
[f] Ratio of average for 1982–84 to average for 1972–74.
* $p < 0.01$

TABLE 3
Means and Standard Deviations of the Categorical Variables

Variables	Means[a]	Standard Deviations
Rumelt categories		
Single-business	0.20	0.40
Dominant-constrained	0.07	0.25
Dominant-linked	0.10	0.30
Dominant-unrelated		
Dominant-vertical	0.07	0.26
Related-constrained	0.20	0.40
Related-linked	0.17	0.38
Unrelated	0.18	0.40
Industry groups		
Food, drink, tobacco	0.12	0.32
Chemicals	0.08	0.26
Metal manufacture	0.08	0.26
Mechanical engineering	0.28	0.45
Instrument engineering	0.01	0.12
Electrical engineering	0.08	0.26
Shipbuilding	0.00	0.00
Vehicles	0.04	0.19
Metal goods	0.04	0.20
Textiles	0.09	0.29
Leather and leather goods	0.04	0.19
Clothing and footwear	0.10	0.29
Bricks, pottery, etc.	0.01	0.08
Timber, furniture, etc.	0.01	0.12
Paper, printing	0.04	0.20
Other manufacturing	0.01	0.12

[a] Categorical variables were entered into the regressions as dummy variables. Hence the mean for each category indicates the number of firms in that category as a proportion of the total.

time, with some lag in the relationship likely. We estimated both lagged and simultaneous relationships. Prior research suggested that a four-year lag was appropriate.[12] The initial levels of diversity were included in order to test Hypothesis 4, that diversity would be related to increasing profitability over time. Industry effects, initial firm size, and initial leverage were included as control variables.

We also regressed sales growth on changes in diversity. Our suspicion here was that, if diversification was failing to generate increased profitability,

[12] Diversification occurs both by acquisition and by internal investment. In the case of acquisition, the effects on profitability typically take four to five years to be fully felt (Meeks, 1976). Where diversification involves the establishment of a new venture, the returns can take up to eight years to materialize fully (Biggadike, 1979). However, because of the influence of other factors, it was unlikely that we would be able to identify the lagged effect of diversification upon profitability beyond a four-year period.

it might be because growth rather than profit motivated the diversification (Marris, 1967).

In the second set of dynamic regression equations, we tested the alternative hypothesis that profitability was driving diversification (Hypothesis 5). Diversification over the period was regressed on cash flow from operations over the period. We considered cash flow to be the best indicator of the availability of internally generated investment funds. We also included firm size and leverage as independent variables in the belief that they would influence the availability of investment funds. We included the initial level of diversity as an independent variable on the basis that, if complexity limits diversity (Hypothesis 2), diversification would be negatively associated with initial diversity. Industry dummy variables and the initial levels of firm size and leverage were included as control variables.

Simple differences were used to measure changes in diversity and profitability. So that choices of beginning and ending years would not be unduly influential, we measured changes over the period as the difference between the average for the first three years of the period (1972–74) and the average for the last three years (1982–84).

Regression analysis employing variables measuring changes over time is a subject of some controversy. Critics have cited the use of change variables in behavioral research as a source of unreliability and bias (Cronbach & Furby, 1970; Johns, 1981). However, in industrial economics research and in strategic management research, change variables have been widely used as a means of identifying the effects of market structure and strategy on performance (e.g., Buzzell & Wiersema, 1981; Cowling & Waterson, 1976). Two problems arise in using change variables: bias arising from errors in variables is magnified, and choices as to how change is measured place arbitrary restrictions on the regression coefficients estimated. The first problem is serious for behavioral research, in which measured values may only be indicators of underlying theoretical variables. The principal source of measurement error in our variables arose from differences in firms' accounting practices. To the extent that those differences were constant over time, change data removed a major source of cross-sectional error. As to the second problem, our use of change variables imposed some restrictions but relieved others by enabling us to simultaneously examine the dynamic effects both of our static variables, the indexes of multinational and product diversity (*PDIV*, *MDIV*), and of our dynamic variables ($\Delta PDIV$, Δ *MDIV*).

RESULTS

Static Relationships

Table 4 shows the results of the regression of profitability on diversity. The first equation yielded a positive association between diversity and profitability, but only multinational diversity had a coefficient significantly different from zero. The second equation revealed a clear quadratic relationship between product diversity and profitability. In the case of multinational

TABLE 4
Results of Regression of Profitability on Diversity[a]

Independent Variables	Equations: Diversity Variables, in Linear Form	Diversity Variables, in Quadratic Form	Product Diversity Only, in Quadratic Form	Rumelt Categories
Industry groups[b]				
Chemicals	1.44	1.54	1.41	1.52
	(1.34)	(1.34)	(1.33)	(1.31)
Metal manufacture	−1.06	−1.17	−1.20	−1.19
	(1.34)	(1.33)	(1.33)	(1.34)
Mechanical engineering	−0.07	0.05	−0.09	−0.06
	(1.09)	(1.10)	(1.08)	(1.04)
Instrument engineering	0.04	0.78	0.54	−0.28
	(2.43)	(2.45)	(2.42)	(2.48)
Electrical engineering	4.95***	5.47***	5.32***	4.69***
	(1.34)	(1.36)	(1.34)	(1.35)
Vehicles	−0.47	−0.39	−0.49	−0.49
	(1.68)	(1.68)	(1.67)	(1.62)
Metal goods	0.73	0.72	0.59	0.86
	(1.56)	(1.56)	(1.55)	(1.55)
Textiles	−2.48†	−2.34†	−2.42†	−3.13*
	(1.32)	(1.32)	(1.31)	(1.30)
Clothing and footwear	2.65	2.93	2.79	1.97
	(1.62)	(1.62)	(1.60)	(1.65)
Bricks, pottery, etc.	−0.60	−0.64	−0.75	−0.69
	(1.25)	(1.25)	(1.24)	(1.22)
Timber, furniture, etc.	15.82***	16.30***	16.37***	15.07***
	(3.22)	(3.21)	(3.21)	(3.34)
Paper, printing	0.35	0.56	0.47	−0.31
	(1.51)	(1.51)	(1.50)	(1.58)
Other manufacturing	2.92	3.07	2.85	0.93
	(2.68)	(2.69)	(2.66)	(2.46)
Log of sales (1972−84)	0.10	0.14	0.09	−0.05
	(0.29)	(0.30)	(0.29)	(0.27)
Leverage (1972−84)	−3.91***	−4.03***	−3.96***	−4.30***
	(0.85)	(0.85)	(0.84)	(0.85)
Product diversity (1972−84)	0.24	1.88*	1.84*	
	(0.24)	(0.77)	(0.77)	
Product diversity squared		−0.25*	−0.25*	
		(0.11)	(0.11)	
Multinational diversity (1972−84)	5.28**	2.40	5.21**	6.04***
	(1.75)	(4.66)	(1.73)	(1.62)
Multinational diversity squared		4.50		
		(6.93)		
Rumelt categories[b]				
Dominant-constrained				−0.66
				(0.95)
Dominant-linked and dominant-unrelated				−0.98
				(1.91)
Dominant vertical				−0.59
				(1.36)

TABLE 4 (continued)

Independent Variables	Equations: Diversity Variables, in Linear Form	Diversity Variables, in Quadratic Form	Product Diversity Only, in Quadratic Form	Rumelt Categories
Related-constrained				2.52
				(1.77)
Related-linked				−0.17
				(0.73)
Unrelated				1.23
				(0.88)
Constant	15.44	13.52	13.59	17.12
R^2	0.300	0.316	0.314	0.314
Adjusted R^2	0.250	0.260	0.262	0.254
ΔR^2 due to:				
Industry groups[c]	0.168***	0.172***	0.173***	0.169***
Log of sales and leverage[c]	0.070*	0.078**	0.068*	0.069*
Diversity variables[c]	0.062***	0.066***	0.074***	0.072**
F	5.960***	5.678***	5.985***	5.540***
N	255	255	255	255

[a] The table shows unstandardized regression coefficients with standard errors in parentheses. The Appendix gives definitions and measurements of the variables; Tables 2 and 3 give their time periods and descriptive statistics.

[b] The regression coefficients for the industry and Rumelt categories show each category's impact on profitability relative to that of the excluded category (food, drink, and tobacco in the case of the industry groups, the single-business group in the case of the Rumelt categories).

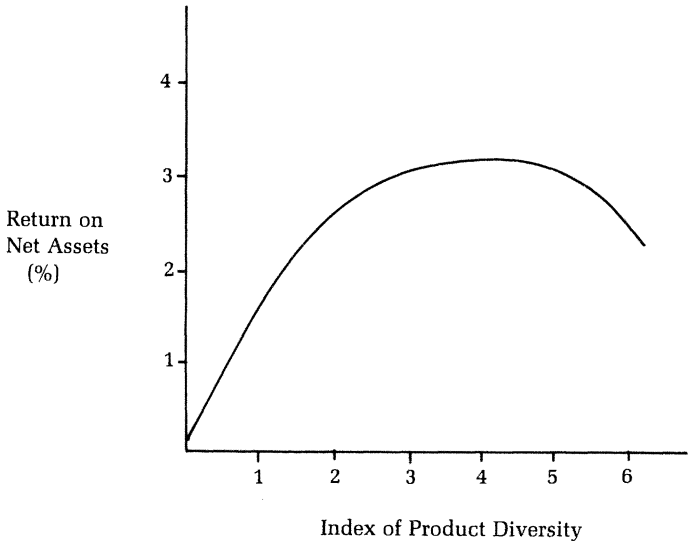
[c] A three-stage hierarchical regression routine was used to measure the increase in R^2 arising from the addition of the three sets of independent variables. F-tests measured the significance of the change in the R^2.

† $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

diversity, the quadratic term ($MDIV^2$) was not statistically significant. The third equation, which included product diversity in quadratic form and multinational diversity in linear form, was the optimal formulation in terms of explanatory power. Figure 2 graphs the relationship between product diversity and profitability as estimated by that equation. The graph shows that profitability increased with the index of product diversity up to a level of 3.7; only the most diversified 10 percent of the corporations studied exceeded that level of product diversity.

In the fourth equation, we substituted Rumelt's strategic categories for the index of product diversity. The insignificance of the regression coefficients for the Rumelt categories and the similar changes in R^2 for the diversity variables in equations three and four show that using Rumelt's strategic

FIGURE 2
Relationship Between Product Diversity and Return on Net Assets [a]



[a] The graph shows the increments in return on net assets associated with increasing levels of product diversity as estimated by the equation whose results appear in Table 4, column 3.

categories provided no additional explanation of interfirm differences in profitability over that provided by the simple index of product diversity.

Diversity, both product and multinational, accounted for a small proportion (6.2–7.4%) of the overall variance of profitability across the firms—much less than the influence of industry membership (16.8–17.3%) and marginally less than the firm-structure variables, sales and leverage (6.8–7.8%).

Dynamic Relationships

Tables 5 and 6 show the results of the regression equations involving the change variables. Table 5 shows results that are only modestly consistent with those shown in Table 4. The first equation showed no significant association between diversification and changes in profitability over the period. When a four-year lag was introduced in the second equation, multinational diversification became significantly associated with increases in profitability, but product diversification remained insignificant. Similar results were found for sales growth (Δ *SALES*): multinational diversification had a positive coefficient, the size and significance of which increased substantially with the introduction of a four-year lag, and product diversification was insignificantly associated with sales growth.

Changes in profitability over the period were positively associated with initial levels of diversity. Together, diversity and lagged diversification explained 7.5 percent of interfirm differences in changes in profitability and 23.7 percent of interfirm differences in sales growth.

Our finding that diversification had a more significant impact on firm growth than on profitability lent weight to the view that the positive relationship between diversity and profitability is due to profitability driving diversification (and hence growth) rather than to the opposite configuration. However, when we tested Hypothesis 5 directly by regressing diversification on current cash flow, the results were far from conclusive. Table 6 shows that cash flow was positively associated with both product and multinational diversification, but only the relationship with multinational diversification was statistically significant, and in both equations, the change in R^2 resulting from the addition of cash flow was small and insignificant. The dominating variable in both equations was the initial level of diversity—diversification was greatest among firms that were undiversified at the beginning of the period, and the most diversified firms reduced their diversity over time. That pattern was consistent with the quadratic relationship between diversity and profitability we estimated (Table 4): firms continued to diversify until they encountered negative returns from diversification. Leverage had a significantly positive association with product diversification, indicating that high levels of debt imposed no effective constraint on firms' expansion through diversification. Firm size was positively related to multinational diversification but negatively related to product diversification.

Comparisons between the index of product diversity based on sales data (*PDIV*) and an identical index of product diversity based on firms' profits by activity provided further insight into the direction of the relationship between product diversification and profitability. Dividing the period into three subperiods, we found the average levels of product diversity measured by sales revenue for the firms in the sample to be 2.373, 2.432, and 2.431 for 1972–75, 1976–79, and 1980–84, respectively. The average levels of product diversity measured by profits for the same periods were 2.204, 2.265, and 2.056.

These data may be interpreted thus: since, on the average, firms were typically more diverse in terms of sales than in terms of profits, it follows that profits were more heavily weighted toward firms' primary activities than were sales. The implication is that firms earned higher profit margins on their core activities than on their diversified activities. Moreover, as firms' diversity in terms of sales revenue *increased* over the period, diversity in terms of profits *declined*. This pattern points to diversified activities earning declining profit margins over the period. These data are consistent with the view that the association between product diversification and profitability arises from high-performing firms using their profit earnings to finance diversification.

TABLE 5
Results of Regression of Changes in Profitability and Sales Growth on Diversification[a]

	Return on Net Assets		Growth of Sales Revenue	
Independent Variables	**No Lag**	**Four-year Lag**	**No Lag**	**Four-year Lag**
Industry groups[b]				
Chemicals	−5.20	−5.04	0.37	0.17
	(3.56)	(3.81)	(0.94)	(0.65)
Metal manufacture	−12.70***	−14.10***	−0.86	−0.93
	(3.49)	(3.99)	(0.92)	(0.69)
Mechanical engineering	−7.97**	−9.32**	0.45	0.39
	(2.75)	(3.02)	(0.72)	(0.67)
Instrument engineering	−8.68	−10.21	−0.24	−0.84
	(6.08)	(6.50)	(1.60)	(1.12)
Electrical engineering	−2.88	−2.66	1.72†	1.69*
	(3.63)	(4.44)	(0.95)	(0.86)
Vehicles	−3.18	−3.95	−0.10	−0.29
	(4.34)	(4.64)	(1.14)	(0.99)
Metal goods	−7.85	−6.14	0.16	−0.11
	(4.15)	(4.63)	(1.09)	(0.80)
Textiles	−6.53†	−7.72*	−0.35	−0.56
	(3.42)	(3.89)	(0.90)	(0.67)
Clothing and footwear	−9.64*	−10.08*	−0.43	−0.64
	(4.34)	(4.65)	(1.14)	(0.85)
Bricks, pottery, etc.	−2.57	−4.39	0.59	0.42
	(3.26)	(3.53)	(0.86)	(0.71)
Timber, furniture, etc.	−36.14***	−36.71***	1.79	1.63
	(7.23)	(7.71)	(1.90)	(1.32)
Paper, printing	−7.09†	−8.06†	0.52	0.39
	(3.78)	(4.25)	(0.47)	(0.58)
Other manufacturing	−11.79	−13.33	0.52	0.35
	(9.98)	(10.75)	(0.99)	(1.08)
Log of sales (1972−74)	−0.03	−0.02	−0.67	−0.70
	(0.27)	(0.21)	(0.51)	(0.50)
Leverage (1972−74)	−0.24	0.31	0.09	0.13
	(0.87)	(0.67)	(0.40)	(0.30)
Product diversity (1982−84 minus 1972−74)	0.43		0.24	
	(0.36)		(0.22)	
Product diversity (1978−80 minus 1968−70)		−0.28		0.16
		(0.90)		(0.16)
Multinational diversity (1982−84 minus 1972−74)	2.11		6.50***	
	(3.78)		(1.52)	
Multinational diversity (1978−80 minus 1968−70)		8.06*		9.12***
		(4.00)		(1.88)
Product diversity (1972−74)	0.87†	1.46*	−0.49	−0.23
	(0.48)	(0.56)	(0.89)	(0.65)
Multinational diversity (1972−74)	2.26*	2.38*	1.88†	0.96
	(1.00)	(1.02)	(1.04)	(1.23)

TABLE 5 (continued)

Independent Variables	Return on Net Assets		Growth of Sales Revenue	
	No Lag	Four-year Lag	No Lag	Four-year Lag
Constant	−1.16	0.81	2.13	2.43
R^2	0.241	0.263	0.199	0.375
Adjusted R^2	0.140	0.150	0.109	0.275
ΔR^2 due to:				
Industry groups[c]	0.180***	0.178***	0.043	0.039
Log of sales and leverage[c]	0.009	0.010	0.014	0.018
Diversity variables[c]	0.053**	0.075	0.142***	0.237***
F	2.830***	2.760***	2.427***	4.819***
N	163	163	163	163

[a] The table shows unstandardized regression coefficients with standard errors in parentheses. The Appendix gives definitions and measurements of the variables; Tables 2 and 3 give their time periods and descriptive statistics.

[b] The regression coefficients for the industry groups show each group's impact on profitability relative to that of the excluded industry (food, drink, and tobacco).

[c] A three-stage hierarchical regression routine was used to measure the increase in R^2 arising from the addition of the three sets of independent variables. F-tests measured the significance of the change in the R^2.

† $p < .10$, two-tailed test.
* $p < .05$, two-tailed test.
** $p < .01$, two-tailed test.
*** $p < .001$, two-tailed test.

TABLE 6
Diversification Regressed on Cash Flow[a]

Dependent Variables	Product Diversity, 1982–84 minus 1972–74[b]	Multinational Diversity, 1982–84 minus 1972–74[b]
Industry groups[b]		
Chemicals	0.09	0.06†
	(0.29)	(0.04)
Metal manufacture	0.66*	−0.01
	(0.30)	(0.04)
Mechanical engineering	0.34	0.05†
	(0.25)	(0.03)
Instrument engineering	0.22	0.05
	(0.53)	(0.07)
Electrical engineering	0.06	0.07†
	(0.31)	(0.04)
Vehicles	0.05	−0.01
	(0.34)	(0.05)
Metal goods	0.42	0.06
	(0.34)	(0.05)
Textiles	0.20	0.00
	(0.29)	(0.04)

TABLE 6 (continued)

Dependent Variables	Product Diversity, 1982–84 minus 1972–74[b]	Multinational Diversity, 1982–84 minus 1972–74[b]
Clothing and footwear	0.72*	−0.02
	(0.36)	(0.05)
Bricks, pottery, etc.	0.11	0.06
	(0.28)	(0.04)
Timber, furniture, etc.	−0.13	−0.08
	(0.65)	(0.09)
Paper, printing	−0.13	−0.03
	(0.32)	(0.04)
Other manufacturing	−0.37	0.03
	(0.85)	(0.04)
Log of sales (1972–74)	−0.09†	0.03***
	(0.05)	(0.01)
Leverage (1972–74)	0.35*	0.02
	(0.18)	(0.02)
Product diversity (1972–74)	−0.28***	
	(0.05)	
Multinational diversity		−0.18***
(1972–74)		(0.05)
Cash flow	0.00	0.00**
	(0.01)	(0.00)
Constant	−0.08	−0.11
R^2	0.269	0.154
Adjusted R^2	0.196	0.090
ΔR^2 due to:		
Industry effects[c]	0.056	0.082
Log of sales and leverage[c]	0.032	0.024
Initial diversity[c]	0.180***	0.035*
Cash flow[c]	0.001	0.013
F	3.703***	2.412***
N	189	243

[a] The table shows unstandardized regression coefficients with standard errors in parentheses. The Appendix gives definitions and measurements of the variables; Tables 2 and 3 give their time periods and descriptive statistics.

[b] The regression coefficients for the industry groups show each group's impact on profitability relative to that of the excluded industry (food, drink, and tobacco).

[c] A three-stage hierarchical regression routine was used to measure the increase in R^2 arising from the addition of the three sets of independent variables. F-tests measured the significance of the change in R^2.

† $p < .10$, two-tailed test.
* $p < .05$, two-tailed test.
** $p < .01$, two-tailed test.
*** $p < .001$, two-tailed test.

DISCUSSION

On the Profitability of Diversified Corporations

The findings lend support to our first two hypotheses. For the most part, diversity was positively associated with profitability, consistent with Hypothesis 1. However, in the case of product diversity, we observed diminish-

ing returns to diversification and, after a point, further increases in diversity were associated with declining profitability, consistent with Hypothesis 2. The tendency for the firms that were the most diversified in 1972–74 to reduce their diversity during subsequent years further supports the implication of those results: firms face constraints on the amount of product diversity they can successfully manage.

This finding of a quadratic relationship between diversity and profitability sheds new light on the findings of prior studies. Direct comparisons are not easy because most research has measured diversity by the Wrigley-Rumelt strategic categories. However, Montgomery (1982) showed that a continuous diversity index, similar to the index of product diversity used in this study, corresponded closely to the Wrigley-Rumelt categories. Hence, the previous research finding that related-business firms are generally more profitable than unrelated firms may not be due to related diversification's superiority to unrelated diversification, but rather to the fact that the unrelated category typically contains the most diverse companies. To this extent, our findings are consistent with those of Rumelt (1974, 1982), but our interpretation differs.

Causality in the Relationship: Hypothesis 1 Versus Hypothesis 5

Further investigation of the mainly positive relationship between diversity and profitability by analyzing changes over time offered only limited insight into causality. In the case of product diversification, the relationship was weak in both directions: diversification was unrelated to subsequent changes in profitability, and current profitability (cash flow) was insignificantly related to diversification. Our failure to find relationships between product diversification and changes in profitability may reflect the influence of intervening variables. Whether diversification was by acquisition or new venture (Lamont & Anderson, 1985) may be be important. Or relationships may not be evident because returns from diversification take longer than four years to materialize. In that case, there is little prospect that statistical analysis can identify the impact of diversification.[13] However, additional information shed further light on the relationship. The observation that firms earned a higher margin on their core activities than on their diversified activities was consistent with the view that profits drive diversification rather than vice versa.

In the case of multinational diversification, a strong two-way causation was evident: profitability in the domestic market encouraged overseas expansion, and expansion in turn generated increased profit. We also ob-

[13] It was also suggested to us that the absence of a positive relationship between diversification and changes in profitability might be a result of the bid premiums paid by firms that diversify by acquisition; such premiums might depress a firm's profitability. This was unlikely in our analysis because, when measuring profitability, we excluded goodwill from the net assets of firms.

served diversified firms improving their performance over time, which was consistent with the prediction that technological, organizational, and managerial innovations have made corporate organization more efficient than market organization (Hypothesis 4).

The Role of Relatedness in Diversity-Performance Relationships

Our study found the Rumelt classification of diversification strategies to be of little value in understanding the relationship between diversity and profitability. The differences in profitability between categories that we did observe appeared to be due more to differences in the overall index of diversity than to the nature of the relationship between firms' businesses. Our findings offer further support to the case Montgomery (1982) made for continuous, quantitative, SIC-based measures of diversity in preference to strategic categories.

On the other hand, we did observe clear differences between product and multinational diversity in their relationships with profitability. As already noted, we observed no evidence of an association between high levels of multinational diversity and a downturn in profitability, which suggested either that the benefits of multinationality were sufficiently large to offset any additional costs of managing complexity or that multinational diversity did not impose such severe managerial and organizational problems as product diversity. Moreover, the strong two-way relationship between multinational diversification and profitability that we observed contrasted with the weak relationships for product diversification.

Our findings support the hypothesis that multinational diversification offers greater potential for exploitation of economies of scope and for economizing on transaction costs than does product diversification. However, generalization is hazardous: the low rate of return earned in British manufacturing industries during most of the period may be the principal explanation for the profitability of multinational diversification.

The underlying issue—the role of relatedness in the diversification-performance relationship—remains uncertain. Despite our failure to identify significant performance differences between Rumelt's strategic categories, it does not follow that relatedness has no effect on the success of diversification. The key problem is the identification and measurement of relatedness. The relatedness underlying our categorization of firms is market or technological linkage. However, the potential for firms to create competitive advantages through the exploitation of economies of scope in intangible assets may be associated with other dimensions of relatedness. For example, successful diversification may be based on intangible, firm-specific assets such as financial management skills, superior access to capital markets, expertise in identifying takeover candidates and managing turnarounds, and organizational structures and control systems that permit the efficient and flexible management of diversified corporate empires. Within our unrelated business category were Hanson Trust and BTR. Both were prominent conglomerates whose businesses, although diverse, shared certain strategic similarities,

and above all were amenable to the particular organizational and financial management skills for which the corporate managements of these companies are well known.

The Importance of Diversification as a Determinant of Firm Profitability

Finally, our results concerning the impact of diversity and diversification on performance need to be balanced by the observation that those variables, however measured, accounted for a small proportion of interfirm differences in profitability. Industry membership accounted for a larger proportion. Those findings confirm Schmalensee's (1985) findings that industry effects were far more important than firm effects in determining interfirm differences in accounting rates of return. However, that does not imply that diversification strategy has little impact on firm performance. Our analysis only estimated simple, cross-sectional, functional relationships between profitability and fairly crude indexes of diversity. The total impact of diversification on performance depends on complex interactions between diversification strategy, corporate capabilities and resources, and external environment.

CONCLUSIONS

The research we have presented adds to present knowledge on the performance consequences of diversification both by extending research to British data and by revealing new dimensions of the relationship between diversity and profitability. Our key findings were that diversity and profitability had a positive relationship but that product diversity led to declining profitability once firms encountered limits to complexity. We also found that relatedness, as measured by the Rumelt categorization, was unrelated to differences in profitability. At the same time, multinational diversity was more strongly associated with profitability than was product diversity.

Causality was complex and difficult to diagnose. In the case of multinational diversification, a strong two-way relationship with profitability was apparent. In the case of product diversification, causation was weak in both directions. On balance, the evidence pointed more toward profitability inducing product diversification than toward diversification generating profit. At the same time, we found that diversified firms increased their relative profitability over time, supporting our prediction that technology and learning have increased the effectiveness and efficiency with which diversified corporations are managed.

Two important issues for future research arise from our study. The first concerns the role of relatedness in the relationship between diversification and performance. The poor explanatory power of Rumelt's categorization points to the need to test the usefulness of other diversification measures encompassing relationships between businesses. Promising approaches include the entropy measure of diversity (Jacquemin & Berry, 1979), measures of diversification that take account of cyclicality, such as Amit and Livnat's (1988) measure of efficient conglomerate diversification, and analyses of

matched pairs of businesses along multiple strategic dimensions (Davis, 1987). Even more important is the need for closer investigation of the different dimensions of relatedness between businesses. The Rumelt categorization, like the SIC codes, is based primarily on operational relatedness. Recent research points to the importance of strategic relatedness, through, for example, "financial synergy" (Chatterjee, 1986) and "dominant logic" (Prahalad & Bettis, 1986).

A second issue concerns the relative merits of coarse-grained and fine-grained research methodologies in the study of diversification (Harrigan, 1983). Although large-sample statistical research of the type in this study is a powerful means of identifying general relationships between pairs of variables, it is a comparatively weak method for gaining insight into complex interactions between variables that are not amenable to precise functional modeling. We found that diversification explained only small proportions of interfirm variability in profitability and had difficulty diagnosing causation. Those results reflect the fact that the total impact of diversification on performance depends on interactions between diversification and industry membership, firm resources, and organizational and managerial capabilities. Large-sample studies like ours cannot easily model such complex and idiosyncratic interactions involving a large number of firm-specific factors. To gain insight into the complex interactions between strategy, organization, and environment, detailed examination of the experiences of individual firms is needed. Further investigation may benefit from examining the role of specific organizational structures and management systems developed by the more successful diversified corporations (Dundas & Richardson, 1982) and the interaction between diversification strategies and organizational metamorphosis (Tushman & Romanelli, 1985). The research we have in progress now builds upon the findings of our large-scale statistical analysis by using a small-sample, finer-grained investigation to gain deeper understanding of the relationships between diversity, diversification, and performance that we have observed.

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APPENDIX

Diversity Variables

Rumelt's classification (Rumelt, 1974: 204–209) identifies eight categories of diversification strategy based on (1) the specialization ratio, the proportion of sales attributable to a firm's largest business activity; (2) the relatedness ratio, the proportion of a firm's sales in business activities that are related to one another; and (3) the nature of the relationship between business activities. Three relationships are distinguished: vertical diversification, in which one business is the customer of another; constrained diversification, in which each business is related to every other business; and linked diversification, in which each business is related to at least one other business.

Jammine (1984) classified firms into the Rumelt categories. Classification required a major element of subjective judgment relating to (1) what the boundaries of individual business activities were and (2) whether or not two activities were related. The procedure was to follow Rumelt's (1974) method as closely as possible and to define relatedness in terms of market and technological similarities. Each of the authors of the present study reviewed the categorizations, which were also cross-checked against those of other research (Channon, 1973, 1982). This check revealed a reassuring degree of consistency.

The **index of product diversity (*PDIV*)** was defined as:

$$PDIV = \frac{1}{\sum_i \frac{S_i^2}{\sqrt{N_i}}}$$

where S_i is the proportion of the firm's sales reported in activity i, and N_i is the number of Stock Exchange Classification industries comprising activity i.

Values of *PDIV* correspond to the number of industries in which a firm would be engaged if its sales were equally distributed across each industry. For example, a firm would have a *PDIV* of 4 if its sales were equally distributed over four business activities. Because British firms do not report sales and profits according to any standard industrial classification, we adjusted *PDIV* for differences in the degree of disaggregation of each firm's reporting by dividing each S_i^2 by N_i.

The **index of multinational diversity (*MDIV*)** was measured by firms' reporting the breakdown of sales between U.K. and overseas subsidiaries in their annual reports:

$$MDIV = 1 - \frac{\text{U.K. production}}{\text{total sales}} .$$

Performance Variables

The **rate of return on net assets (*ROA*)** was defined as

$$ROA = \frac{\text{operating profit (before interest and tax)}}{\text{fixed assets + net current assets + short-term loans}} .$$

ROA and the other financial variables are based on company accounts data in which asset values are at historic cost.

Cash flow (*CASHF*) was similar to ROA, but profits were adjusted to eliminate items that did not involve any cash flow:

$$CASHF = \frac{\text{operating profit (after interest and tax) + depreciation}}{\text{fixed assets + net current assets + short-term loans}} .$$

Sales growth (Δ *SALES*) was measured as

$$\Delta\ SALES = \frac{\text{average annual sales revenue 1982–84}}{\text{average annual sales revenue 1972–74}} .$$

Other Variables

Firm size (*SALES*) was measured by sales revenue. The source was the EXSTAT computerized company accounts data base. Because of the skewed distribution of firm size in our data set, we used the logarithm of firm size with its more normal distribution in the regression analysis.

Leverage (*LEV*) was measured as

$$LEV = \frac{\text{total debt (including short-term borrowing)}}{\text{shareholders' funds}} .$$

Industry effects. Using company annual reports, Jammine (1984) assigned the firms to SIC orders 3 to 19 on the basis of their largest activity by sales. The SIC orders were 3, food, drink, and tobacco; 5, chemicals and allied industries; 6, metal manufacture; 7, mechanical engineering; 8, instrument engineering; 9, electrical engineering; 10, shipbuilding and marine engineering; 11, vehicles; 12, metal goods not elsewhere specified; 13, textiles; 14, leather and leather goods; 15, clothing and footwear; 16, bricks, pottery, glass, and cement; 17, timber, furniture, etc.; 18, paper, printing, and publishing; 19, other manufacturing. Order 4, petroleum refining, was eliminated because we excluded oil companies, and none of the firms studied was assigned to order 10, shipbuilding. Each industry, with the exception of the excluded industry (food, drink, and tobacco), was included in the regressions as a binary dummy variable.

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