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THE BENEFITS OF STRATEGIC HOMOGENEITY AND STRATEGIC HETEROGENEITY: THEORETICAL AND EMPIRICAL EVIDENCE RESOLVING PAST DIFFERENCES

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Past research on the relationship between strategic variety and industry profitability has argued for either high homogeneity or high heterogeneity. In this paper, we review the literature on strategic variety and use it to develop hypotheses suggesting that the relationship between strategic variety and average industry profits is curvilinear. Based on our analysis of 61 industries, we find empirical support for our hypotheses, suggesting that very high levels of heterogeneity or homogeneity are more likely associated with industry profitability, while the industries in our sample displaying moderate levels of strategic variety are most likely to suffer from widespread financial losses.

How different should strategies of firms in the same industry be? Both the practitioner's and the researcher's literature contain conflicting answers to this basic question.

Benchmarking, studying other firms for ideas to adopt, has become an accepted managerial practice (Pryor, 1989). On the other hand, managers are advised that a 'follow the leader' strategy is a risky one, and that they should seek out unique niches to fill, following strategies that are difficult to replicate (Kiernan, 1993).

Theories of tacit collusion suggest that an industry pursuing homogeneous strategies is better suited to oligopolistic behavior and the improved industry profitability it offers. But theories of strategic groups and the contestability of their markets, theories of organizational ecology and niches, and theories of organizational learning and experimentation all suggest that heterogeneity is associated with higher profits. In a study of 12 industries, Miles, Snow, and Sharfman (1993) found that industries containing the widest variety of strategies were the most profitable. However, Cool and Dierickx (1993) found that over time, as the strategies pursued in a single industry became increasingly different from one another, the average profits enjoyed by all the firms in that industry fell.

In summary, there are strong arguments, empirical evidence, and managerial proponents to support two camps: one claiming homogeneity is good and one claiming heterogeneity is good. The research completed to date has advocated one position or the other. But we see no reason why accepting the arguments for one position requires us to reject the arguments for the other. We suggest that they are *both* correct, and that the situation to be avoided is not heterogeneity,

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or homogeneity, but the middle ground between the two extremes.

In this paper, we review the literature on strategic variety and use it to develop hypotheses suggesting that the relationship between strategic variety and average industry profits is curvilinear. Based on our analysis of 61 industries, we find empirical support for our hypotheses, suggesting that very high levels of heterogeneity or homogeneity are more likely associated with industry profitability, while the industries in our sample displaying moderate levels of strategic variety are most likely to suffer from widespread financial losses.

CONCEPTUAL DEVELOPMENT OF HYPOTHESES

Serious consideration of strategic variety began when the notion that firms in the same industry pursue different strategies was first proposed by Hunt (1972). He used the concept to help explain the observed levels of performance in the mobile home industry, concluding that firm performance in this industry could be understood by viewing the industry as comprising several strategic groups that were heterogeneous in terms of the strategies they pursued. Newman (1978) expanded on Hunt's concept of strategic heterogeneity and operationalized it in terms of strategic distance. Strategic distance has been defined as 'the degree to which strategies in different groups differ in terms of key strategic decision variables, such as advertising, cost structure, R&D, organization of production, etc.' (Porter, 1979: 218).

This conceptual view of strategic variety as the strategic distance between firms in an industry has widespread acceptance. However, there are important differences in the perspectives researchers have adopted. Virtually all the research on strategic variety has focused on either the benefits of homogeneity (research reflected in our first hypothesis) or on the benefits of heterogeneity (reviewed for our second hypothesis).

Hypothesis 1: Very high levels of strategic homogeneity will be associated with high levels of average industry profitability.

The argument for this hypothesis is based on the theory of tacit collusion. Porter provides a summary statement of this literature: 'Divergent strategies reduce the ability of the oligopolists to coordinate their actions tacitly ... reducing average industry profitability. ... The greater the distance [between firms' strategies], other things being equal, the more difficult tacit coordination becomes, and the more vigorous rivalry is likely to be in the industry' (1979: 217–218).

Newman tested and found support for the general hypothesis that as strategic distances increase, it becomes increasingly difficult for tacit collusion to be effective. Cool and Dierickx (1993) also found empirical support for this idea. Between 1970 and 1982, as the strategic distance of firms in the pharmaceutical industry rose from 0.678 to 0.711 and then to 0.786, the industry's average ROS fell from 0.241 to 0.191 to 0.166.

To understand how heterogeneity can have a detrimental effect on tacit collusion, it is useful to consider Schelling's (1960) classic example of how tacit collusion works. In attempting to illustrate how tacit collusion can take place naturally (and innocently), Schelling approached his fellow New Yorkers with the following puzzle. Two friends who cannot communicate with one another are to meet on a known date, but at an unknown time and place. What should they do? The majority of his respondents suggested they go to Grand Central Station at high noon on the meeting date. Schelling argued that Grand Central Station and high noon offered 'focal points' for New Yorkers that they could use to cooperate without communication—a classic example of effective tacit collusion.

To understand the impact of heterogeneity on the effectiveness of collusion, consider the likely outcome of Schelling's experiment had he included non-New Yorkers in his sample. Had he quizzed Texans, mid-Westerners, Alaskans, and Californians, it seems likely that friends from these groups would have had more difficulty in arranging a meeting without communicating the details of time and place because they lack common focal points. Note that for Schelling's experiment to fail, it is probably not necessary to go to extremes and identify radically different groups (say, different nationalities) for the study. In other words, the members in our hypothetical replication are all Americans, yet they are not similar enough for tacit collusion to work. For tacit collusion to work very well, those involved must

be very similar, which is why we have hypothesized that industries which are very homogeneous will be highly profitable.

Hypothesis 2: Very high levels of strategic heterogeneity will be associated with high levels of average industry profitability.

There are a number of complementary perspectives that help explain why very heterogeneous industries might enjoy higher than normal average profitability.

Strategic groups, mobility barriers, and contestable markets

The bodies of literature on strategic groups and strategic heterogeneity are closely related. In considering the relationship between distinct strategic groups and industry profitability, Porter suggested that if industry members differ greatly enough, their differences could 'not only insulate them from entrants new to the industry, but they could also insulate firms in a strategic group from ... firms from another group in the same industry' (1979: 215). He termed such barriers to competition between strategic groups 'mobility barriers,' and suggested that they could be erected by investments in areas, such as advertising and R& D, that create a distance between one strategic group and another.

Hatten and Hatten (1987) made a similar point when they argued that markets become less contestable as strategic distances increase. They suggested that if a strategy is distinct enough, it may distance the firm (or firms, in the case of strategic groups) from the competitive fray in which more similar firms find themselves. This idea is often discussed in terms of niche theory, discussed next.

Organizational ecology and niche theory

Organizational ecologists have regularly made reference to the general benefits of variety for the health and vitality of the population of organizations being considered (Hannan and Freeman, 1989). To understand why variety might be considered beneficial to a population's health, consider the work of Hatten and Hatten (1987). They viewed the population of firms as existing in a space comprising numerous niches, of which some are tenable, but many are not. Given the uncertainties of competition and the difficulties of predicting organizational success or failure, for the population as a whole, they suggest that one of the most effective means of testing the tenability of a niche is for an individual organization to experiment by entering it.

So, for example, Miller experimented by moving a narrowly focused brand of beer into a national mainstream market, and its success in moving from seventh to second place in national market share gave rise to a widespread movement that involved several firms in efforts to establish large share, national brands. Then, in the face of this consolidation, entrepreneurs began testing the concept of premium-priced micro breweries. Once the viability of this strategy became clear, the number of micro breweries began to grow sharply, and as a result, we have a brewing industry with very different, yet equally viable, strategic groups filling different niches (Hatten and Schendel, 1977). The ability of firms to learn from experiments such as these in the brewing industry suggests our final argument based on organizational learning, linking high heterogeneity to industry profitability.

Organizational learning

Miles *et al.* suggest that one of the most important benefits of variety is what they call a 'spillover' effect in which firms 'improve their strategies by borrowing from the experience of other firms in the industry' (1993: 164). Hatten and Hatten explain how this can happen: when an extremely profitable firm is found to differ from other members of the industry on a given variable, managers in less profitable firms 'may examine their companies' current and potential decisions on that variable.' They argue that 'in a competitive world ... it seems prudent to exploit your competitors' experiences' in this manner (1987: 333). This is the basic idea behind benchmarking. Of course, in order for competitors to have different experiences to share, the competitors must be experimenting with different strategies.

Experimentation is an essential component of an organization's learning how to adapt successfully to a changing environment. For this reason, Miles *et al.* (1993) extended theories of requisite variety from cybernetics (Ashby, 1956) to suggest why high levels of strategic variety should be

associated with high levels of industry profitability. They concluded that 'an industry must possess a level of variety requisite to its environment or it will experience decline' (p. 165). When they conducted empirical tests of this idea across 12 industries, Miles *et al.* found a significant correlation between strategic variety and ROI, as well as between strategic variety and stock price changes. These empirical results, as well as the preceding theoretical arguments, suggest that high levels of strategic heterogeneity will be associated with high average industry profitability.

Hypothesis 3: Moderate levels of strategic variety will be associated with low levels of average industry profitability.

Based on simple reasoning alone, it follows that if we expect higher than average levels of profitability to be associated with very high levels of strategic homogeneity or very high levels of strategic heterogeneity, then moderate levels of strategic variety must be associated with lower than average levels of profitability. However, we can also cite theoretical and empirical evidence as to why this should be the case.

Imagine travelling along a conceptual continuum of strategic variety from high homogeneity to high heterogeneity. As we move from very homogeneous industries to moderately homogeneous industries, we begin to find industries that can no longer effectively operate as oligopolies because their differences limit effective tacit collusion (as suggested by our Hypothesis 1).

But, at some point along this continuum, we would expect the differences between the strategies being followed by firms in the industry to be so different that they are most likely associated with niches other firms will not find contestable because of the mobility barriers these distances constitute (as suggested by our Hypothesis 2). However, what if the strategic distances are not as great? Is there some middle ground in which the levels of strategic variety are low enough to hurt tacit collusion but not great enough to erect mobility barriers, or represent new niches, or provide the level of experimentation required for significant new learning? If so, then we would expect these moderate levels of strategic variety to cause industries to yield inferior levels of performance.

In fact, a careful review of the literature suggests that there is both theoretical and empirical support for this idea. Cool and Dierickx (1993) point out that a negative relationship between strategic distance and industry profitability (i.e., the relationship implied by our Hypothesis 1) only applies as long as firms are close enough to compete for the same customers. Otherwise, there is not the group interdependence that oligopolistic conduct is based on (Porter, 1979). This is a point Scherer (1980) also makes when he argues that as heterogeneity increases, opportunities for oligopolistic coordination become limited. Empirically, Cool and Dierickx (1993) were able to show that as the strategic distances separating firms within an industry increase, the negative impact of between-group rivalry can outweigh the (still negative) impact of within-group rivalry. But, we would not expect this relationship to be linear because the literature reviewed earlier suggests that there will be a point along the strategic variety continuum at which the strategic distances are so great that the markets are no longer contestable by members of another strategic group (Hatten and Hatten, 1987). However, theory suggests that this will occur only at very high levels of strategic difference, and at moderate levels of heterogeneity we should find industries that enjoy neither the benefits of homogeneity nor the benefits of heterogeneity. This suggests the curvilinear relationship between strategic variety and industry profitability depicted in Figure 1.

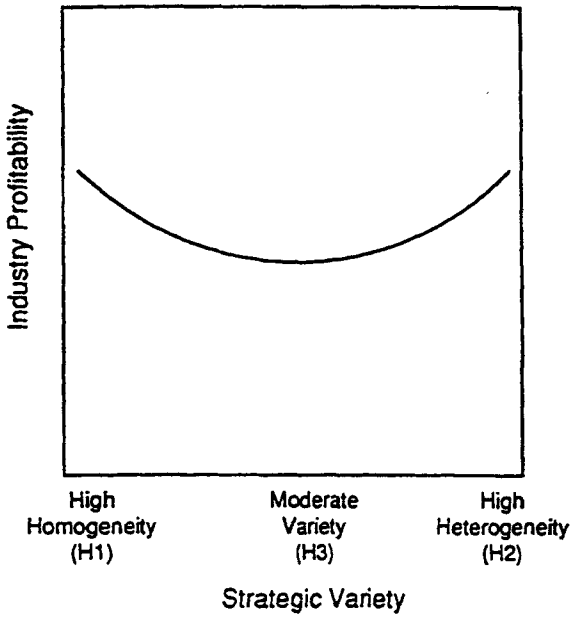

Figure 1. Graphical representation of hypotheses

METHODOLOGY

Sample

In order to identify an appropriate sample of industries, a list of all 4-digit SIC code manufacturing industries was drawn from the U.S. Industrial Outlook and then compared to the industries represented in the COMPUSTAT tapes. We excluded any industries for which there were not at least four firms from the New York or American Stock Exchanges represented. This resulted in a final sample of 61 industries comprising 613 firms. Industries and sample sizes are detailed below.

Measures

Strategic variety

Following the conceptual work of Porter (1979) and the empirical work of Miles *et al.* (1993), we used three factors to capture the concept of strategic variety: (1) a marketing factor, measured by ratio of advertising to sales; (2) a capital intensity factor, measured by the dollar value of plant, property, and equipment per employee; and (3) an R&D factor, measured by the ratio of R&D expenditures to sales. Data for these measures were taken from the COMPUSTAT tapes and averaged for the years 1983–87.

Our intention was to use these data to replicate the Miles *et al.*'s (1993) method for calculating strategic variety. This would have entailed clustering on the three strategic factor variables to identify strategic groups, standardizing the three strategic variables by cluster, making all possible comparisons between the strategic groups in an industry, summing the absolute value of the differences between each industry's groups on each of the three dimensions, and then summing these three scores to create an overall measure of strategic variety for each industry. However, while using this method, we encountered a methodological problem that severely compromised its validity. Lehmann (1979) states that, as a rule of thumb, it is not possible to get more than $n/30$ to $n/50$ reliable clusters from a data set. This would mean that for our data set the most reliable cluster solution for each industry would be approximately 2. Yet, for all two-cluster solution industries, regardless of the raw mean values for each strategic factor variable, the conversion to a standardized *Z*-score results in standardized values of 0.7071 and –0.7071, and a variety index for the industry of 1.4142. Of course, this fails to capture any differences in strategic factor variables across strategic groups and produces spurious results.

To avoid this problem, we adopted the coefficient of variation (the standard deviation divided by the mean) as a measure of heterogeneity. It has been used successfully in the Top Management Team literature as a measure of TMT heterogeneity (Bantel and Jackson, 1989; Murray, 1989), and is considered an appropriate measure of heterogeneity for 'interval level variables with a theoretically fixed zero point,' such as we had (Bantel and Jackson, 1989: 114). We calculated a coefficient of variation for each strategic factor variable by industry, and then summed the three heterogeneity measures within each industry to produce the variable overall strategic variety. Table 1 provides the overall strategic variety scores by industry, and the coefficient of variation scores used to calculate them.

Industry performance

Industry performance was measured as average ROI for all observations in each industry over the time period 1984–87. A 1-year shorter time period than that used to calculate industry variety was deemed appropriate in order to capture any lag between firms' strategic decisions and industry performance outcomes. Table 2 shows the means, standard deviations, and intercorrelations for all variables across industries.

Control variables

To control for the effect of industry structure on industry performance, we included industry concentration ratio and industry sales growth in our analyses. In their extensive review of the empirical literature on the relationship between industry structure and industry performance, Capon, Farley, and Hoenig (1990) found that both of these variables were widely cited as positively affecting industry performance. Industry concentration ratio was measured by sales of the top eight firms relative to the others within the same four-digit SIC code. Industry sales growth was measured as the change in industry average annual sales in constant 1982 dollars for the period 1983–87.

Table 1. Strategic variety data by industry

SIC	Industry	*N*	Capital intensity heterogeneity	Marketing heterogeneity	R&D heterogeneity	Overall strategic variety
2011	Meat packing	8	0.459	1.976	2.646	5.080
2015	Poultry and egg	4	0.431	1.732	0.000	2.163
2082	Malt beverages	4	0.230	0.527	1.731	2.488
2211	Cotton fabric mills	6	0.195	0.733	0.589	1.517
2221	Manmade fiber and silk mills	4	1.599	1.106	0.663	3.368
2253	Knit outerwear mills	8	0.486	1.192	0.000	1.678
2273	Carpets and rugs	5	0.202	2.000	0.956	3.158
2451	Mobile homes	9	0.336	0.740	1.414	2.489
2511	Wood furniture	4	0.407	1.039	0.707	2.153
2621	Paper mills	19	0.412	2.414	2.026	4.853
2631	Paperboard mills	5	0.320	0.000	0.000	0.320
2711	Newspapers	12	0.321	0.935	0.000	1.256
2721	Periodicals	4	0.495	0.922	0.000	1.417
2731	Book publishing	7	0.527	0.367	2.449	3.343
2821	Plastic resins and fibers	5	0.271	1.225	0.713	2.209
2834	Pharmaceuticals	53	0.611	5.346	4.411	10.368
2835	Diagnostic substances	14	1.120	1.659	1.418	4.197
2836	Biological products	4	0.338	0.872	1.240	2.450
2844	Toilet preparations	18	0.450	2.728	2.887	6.066
2851	Paints and allied products	9	0.659	2.147	2.684	5.491
2911	Petroleum refining	35	0.776	4.440	3.647	8.863
3011	Tires and inner tubes	6	0.467	1.000	0.566	2.033
3312	Blast furnaces and steel mills	18	0.429	3.000	1.315	4.744
3317	Steel pipe	6	1.002	0.000	1.519	2.520
3334	Primary aluminium	7	0.805	0.000	2.373	3.179
3411	Metal cans	6	0.288	0.000	1.947	2.234
3442	Metal doors	5	0.291	1.400	1.531	3.222
3443	Fabricated metal pipe	6	0.469	0.000	1.408	1.877
3452	Bolts, nuts, rivets, and washers	9	0.335	2.000	2.748	5.083
3523	Farm machinery	8	0.671	0.685	0.400	1.756
3533	Oil and gas field machinery	8	0.423	2.186	1.822	4.431
3541	Metal cutting machine tools	6	0.075	1.528	1.878	3.481
3564	Blowers and fans	6	0.262	2.236	1.077	3.575
3571	Electronic computers	21	0.491	2.782	0.714	3.987
3578	Calculating and accounting equipment	4	0.390	1.000	0.490	1.880
3579	Office machines	4	0.375	0.707	0.744	1.826
3585	Refrigeration and heating equipment	11	1.140	0.949	2.095	4.184
3612	Transformers	4	0.234	1.225	0.354	1.812
3621	Motors and generators	6	0.212	0.915	0.544	1.671
3634	Electronic housewares	6	0.160	0.538	1.456	2.155
3651	Radio, televisions, phonographs	7	0.693	0.733	0.606	2.032
3663	Communications equipment	25	0.862	1.648	2.527	5.036
3672	Printed circuit boards	5	0.394	2.000	0.816	3.211
3674	Semi conductors	24	0.651	2.560	3.097	6.308
3678	Electronic connectors	6	0.413	1.414	2.086	3.913
3711	Motor vehicles	10	0.432	0.750	2.262	3.444
3714	Motor vehicle parts	24	0.327	2.317	4.316	6.960
3721	Aircraft	6	0.204	2.236	0.375	2.815
3724	Aircraft engines	8	0.368	2.646	2.426	5.440
3728	Aircraft parts	7	0.319	0.000	1.473	1.792
3822	Environmental controls	8	0.293	1.856	0.549	2.698
3823	Process control instruments	12	0.377	1.414	1.494	3.285
3825	Electricity measuring instruments	16	0.454	1.956	2.180	4.590
3841	Surgical and medical instruments	12	0.606	1.254	0.886	2.746
3842	Surgical appliances	10	0.499	2.728	2.485	5.712
3845	Electromedical equipment	9	0.422	1.842	0.700	2.964
3851	Ophthalmic goods	4	0.282	0.404	0.474	1.160
3861	Photographic equipment	16	0.685	3.818	3.858	8.361
3911	Jewelry	4	0.522	1.000	0.000	1.522
3944	Games and toys	10	0.466	1.166	1.369	3.001
3949	Sporting goods	6	0.396	0.599	0.935	1.931

Table 2. Descriptive statistics

Variables	Means	S.D.	1	2	3	4	5	6	7	8
1. Industry concentration ratio	0.52	0.21	1.00							
2. Industry sales growth	0.02	0.01	0.01	1.00						
3. Product categories	6.03	3.07	0.93***	−0.33***	1.00					
4. Marketing heterogeneity	1.49	1.07	−0.02	0.06	0.22	1.00				
5. Capital intensity heterogeneity	0.47	0.26	−0.05	−0.02	0.14	0.08	1.00			
6. R&D heterogeneity	1.47	1.09	0.11	−0.01	0.22	0.55***	0.19	1.00		
7. Overall strategic variety	3.43	2.96	0.04	0.03	0.26**	0.86***	0.28***	0.88***	1.00	
8. Average industry ROI	0.50	0.12	0.08	0.01	0.30**	−0.25	−0.12	−0.13	−0.22†	1.00

† $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Because many 4-digit SIC codes contain non-competing products, industries may consist of firms which have high strategic variety across product segments, but low strategic variety within product segments. In other words, some industries may consist of strategic groups of firms which are widely separated, but firms within strategic groups are relatively homogeneous. In such cases, industry profitability may be due not only to strategic heterogeneity between strategic groups producing dissimilar products, but also to strategic homogeneity within strategic groups producing similar products.[1] Because one would expect that the potential for this confounding effect would be a function of the number of product categories within an industry, the number of product categories within each industry was included in the analysis. This was measured by total number of 5-digit SIC codes within each corresponding 4-digit SIC code.[2]

Analysis

To test our three hypotheses, a hierarchical regression was used to model the relationship between averagage industry ROI and overall strategic variety. The control variables along with the linear component of overall strategic variety were ordered before the quadratic component of overall strategic variety, and the increment in variance accounted for by the higher-order term was tested for significance. A statistically significant increment would suggest that the relationship was similar to the U-shaped curve depicted in Figure 1, confirming all three hypotheses.

Table 3 provides the results of the regression analysis used to test Hypotheses 1, 2, and 3. The table displays the raw and standardized beta coefficients and associated p-values for the curvilinear regression of ROI on overall strategic heterogeneity. Neither industry concentration nor industry sales growth are significant, which is supportive of previous research that suggests that the relationship between industry structure variables and performance is at best modest (Phillips, 1976; Capon *et al.*, 1990). However, the number of product categories within each industry is significant. The proportion of variance explained by the higher-order term ($R^2 = 0.29$) is significant. There are also significant linear and quadratic components for total heterogeneity with corresponding betas in the predicted direction, supporting our three hypotheses. This indicates that the relationship is the curvilinear U-shape we hypothesized.

Using this regression equation, predicted values for ROI were plotted against observed scores in Figure 2. Based on these results, it can be concluded that industries that have either high homogeneity or high heterogeneity will have relatively higher levels of average industry profitability, while industries with moderate levels of strategic variety will have relatively lower levels of average industry profitability. In fact, the estimated regression equation predicts that industries with moderate levels of variety will be unprofitable.

[1] We would like to thank one of the reviewers for pointing this out to us.

[2] To further examine the potential for this confounding effect, we identified industries that were both high in strategic variety and had a large number of multiple products as measured by 5-digit SICs. We then repeated the analysis without these industries. The exclusion of these observations made no differences in the conclusions we reached from our statistical tests.

Table 3. Results of curvilinear regression of average industry ROI on overall strategic variety

Variable	Beta[a]	*t*	*p*-value	R^2	ΔR^2	*F*	*p*-value
Linear model				0.22	0.22	4.03	0.006
Industry concentration ratio	0.09 (0.0005)	0.77	0.446				
Industry sales growth	0.17 (0.312)	1.33	0.191				
Product categories	0.45 (0.018)	3.44	0.001				
Overall strategic variety	−0.35 (−0.014)	−2.84	0.006				
Quadratic model				0.29	0.07	4.63	0.001
Industry concentration ratio	0.10 (0.0006)	0.90	0.373				
Industry sales growth	0.16 (0.309)	1.37	0.177				
Product categories	0.39 (0.016)	3.04	0.004				
Overall strategic variety	−1.25 (−0.079)	−3.16	0.003				
Overall strategic variety^2	0.96 (0.094)	2.39	0.021				

[a] Standardized betas reported in parentheses.

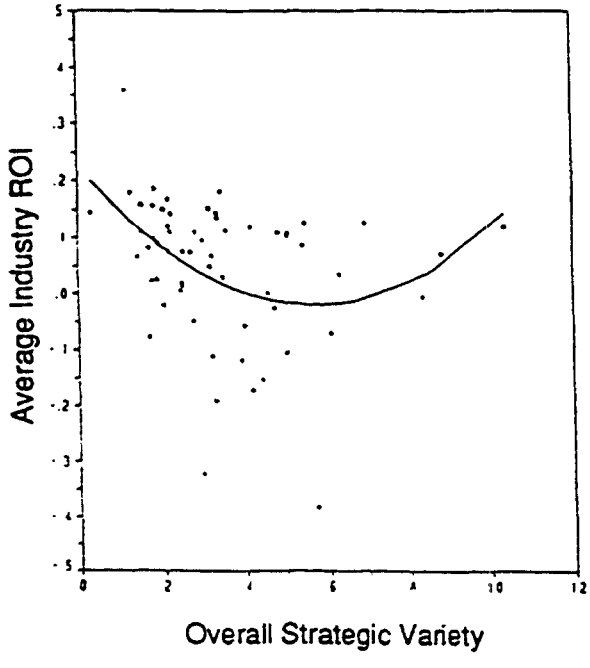

Figure 2. Scatter plot of predicted vs. observed values of average industry ROI given overall strategic variety

To further explore the variety–performance relationship, additional post hoc analyses were completed. We were interested in the types of industries most likely found in the various regions of Figure 2. Therefore, we subdivided the data into a 2×3 matrix of profitable and unprofitable industries by high, medium, and low variety. (The cutoff points chosen, 2 and 6, were, by necessity, based on judgement, because there are no *a priori* reasons to identify particular coefficients of variation scores as natural break points). The results of this categorization scheme are presented in Table 4 and discussed below.

We were also interested in understanding the relative importance of our three dimensions of strategy as individual 'drivers' of the variety–performance relationship. The results of multiple linear and curvilinear regressions of ROI onto the three individual heterogeneity measures are reported in Tables 5 and 6. Again, the only control variable that is significant is number of product categories within each industry. Of the three regressions, only the model containing marketing heterogeneity is significant in its linear component, and is approaching significance at the 0.05 level in its quadratic component. The overall curvilinear model is sig-

Table 4. Clasification of industries by overall strategic variety and industry average ROI

Industry Average ROI			
	Cell 1	Cell 2	Cell 3
	2211 Cotton fabric mills 2253 Knit outerwear mills 2631 Paperboard mills 2711 Newspapers 2721 Periodicals 3443 Fabricated metal plate 3523 Farm machinery 3578 Calculating and accounting equipment 3579 Office machines 3612 Transformers 3728 Aircraft parts 3851 Ophthalmic goods 3911 Jewelry 3949 Sporting goods	2011 Meat packing 2015 Poultry and egg 2082 Malt beverages 2221 Manmade fiber and silk mills 2273 Carpets and rugs 2451 Mobile homes 2511 Wood furniture 2621 Paper mills 2731 Book publishing 2821 Plastic resins 2836 Biological products 2851 Paints and allied products 3011 Tires and inner tubes 3317 Steel pipe 3334 Primary aluminum 3411 Metal cans 3442 Metal doors 3452 Bolts, nuts, rivets, and washers 3541 Machine tools, metal cutting 3564 Blowers and fans 3585 Refrigeration and heating equipment 3634 Electronic housewares 3711 Motor vehicles 3721 Aircraft 3724 Aircraft engines 3822 Environmental controls 3825 Electricity measuring instruments 3944 Games and toys	2834 Pharmaceuticals 2911 Petroleum refining 3674 Semiconductors 3714 Motor vehicle parts
	Avg. ROI = 0.13 Avg. variety = 1.55	Avg. ROI = 0.10 Avg. variety = 3.32	Avg. ROI = 0.09 Avg. variety = 8.12
0			
	Cell 4	Cell 5	Cell 6
	3621 Motors and generators	2835 Diagnostic substances 3312 Blast furnaces and steel mills 3533 Oil and gas field machinery 3571 Electronic computers 3651 Radio, television, and phonographs 3663 Communications equipment 3672 Printed circuit boards 3678 Electronic connectors 3823 Process control instruments 3841 Surgical and medical instruments 3842 Surgical appliances 3845 Electromedical equipment	2844 Toilet preparations 3861 Photographic equipment
	Avg. ROI = −0.08 Avg. variety = 1.67	Avg. ROI = −0.14 Avg. variety = 3.85	Avg. ROI = −0.04 Avg. variety = 7.21
	High Homogeneity 2	Moderate Variety	6 High Heterogeneity

nificant, with the total variance explained ($R^2 = 0.27$) being only slightly less than that explained by the overall strategic variety model ($R^2 = 0.29$). The beta coefficients for the linear and quadratic components of the production and R&D heterogeneity models have the predicted signs, but that are not statistically significant.

DISCUSSION

The results of this research support the hypotheses developed. In particular, the industries in our sample that had the highest levels of strategic homogeneity or the highest levels of strategic heterogeneity were the most likely to have above-average profits. This suggests a reconciliation between the two opposing camps of high homogeneity vs. high heterogeneity; both camps appear to be correct in their arguments. Summarized in another way, our results suggest that the industries having moderate levels of variety were the most likely to operate at an average loss.

In fact, this latter statement may be the more insightful description of our data. While much of the theory we reviewed earlier in the paper spoke of the benefits of high homogeneity or high heterogeneity, the scatter plot of our data presented

Table 5. Results of linear regressions of average industry ROI on individual heterogeneity measures[a]

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.23	4.18	0.005
Industry concentration ratio	0.07 (0.0004)	0.57	0.570			
Industry sales growth	0.17 (0.324)	1.38	0.173			
Product categories	0.44 (0.018)	3.40	0.001			
Marketing heterogeneity	−0.36 (−0.24)	−2.93	0.005			

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.13	2.24	0.076
Industry concentration ratio	0.07 (0.0004)	0.56	0.577			
Industry sales growth	0.13 (0.239)	0.97	0.335			
Product categories	0.37 (0.015)	2.77	0.008			
Capital intensity heterogeneity	−0.16 (−0.078)	−1.31	0.197			

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.16	2.66	0.042
Industry concentration ratio	0.10 (0.0006)	0.83	0.412			
Industry sales growth	0.14 (0.263)	1.08	0.286			
Product categories	0.399 (0.016)	2.99	0.004			
R&D heterogeneity	−0.23 (−0.026)	−1.79	0.079			

[a] Standardized betas reported in parentheses.

in Figure 2 seems to say more about the dangers of moderate levels of variety. Note that there are several profitable industries with moderate levels of variety, and in fact, the levels of profitability achieved by very homogeneous or very heterogeneous industries do appear to be very different from that achieved by the many profitable industries having moderate levels of variety.

What is different about the middle region of our variety dimension (and what gives our curve much of its U-shape) is that almost all of the unprofitable industries are in this area of our scatter plot. Given our judgementally chosen break points of 2 and 6, only one industry in the high homogeneity range and two industries in the high heterogeneity range operated at a loss, while 12 industries (i.e., 80% of all industries that were operating at a loss) were found in the moderate variety range. To us, this suggests that our theoretical development regarding the benefits of strategic homogeneity or strategic heterogeneity should be supplemented with further work on the dangers of having moderate levels of variety. Our data suggest that industries are more likely profitable if they have very little or very much variety. Perhaps there is a 'stuck-in-the-middle' phenomenon similar to Porter's (1980) ideas on generic strategies that can be developed to explain this. If so, then strategists may be able to receive prescriptive advice about the dangers of not being similar enough to or different enough from the other competitors in their industry.

Table 6. Results of curvilinear regressions of average industry ROI on individual heterogeneity measures[a]

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.27	4.15	0.003
Industry concentration ratio	0.06 (0.0004)	0.50	0.614			
Industry sales growth	0.18 (0.348)	1.51	0.137			
Product categories	0.38 (0.016)	3.12	0.003			
Marketing heterogeneity	−0.87 (−0.101)	−2.85	0.006			
Marketing heterogeneity^2	0.56 (0.014)	1.82	0.074			

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.17	2.23	0.064
Industry concentration ratio	0.05 (0.0003)	0.43	0.672			
Industry sales growth	0.14 (0.257)	1.05	0.297			
Product categories	0.36 (0.014)	2.70	0.009			
Capital intensity heterogeneity	−0.71 (−0.338)	−1.76	0.084			
Capital intensity heterogeneity^2	0.58 (0.181)	1.43	0.160			

Variable	Beta	*t*	*p*-value	R^2	*F*	*p*-value
				0.19	2.52	0.040
Industry concentration ratio	0.11 (0.0006)	0.88	0.385			
Industry sales growth	0.11 (0.202)	0.82	0.414			
Product categories	0.346 (0.014)	2.50	0.016			
R&D heterogeneity	−0.70 (−0.079)	−1.87	0.067			
R&D heterogeneity^2	0.52 (0.015)	1.34	0.184			

[a] Standardized betas reported in parentheses.

The range of industry variety scores we observed suggests several potentially important points for future research. These results also offer useful information for researchers interested in studying strategic groups. While the conclusion that Thomas and Venkatraman (1988) reached concerning the universal presence of variety in all industries is undoubtedly true in some theoretical sense, as a practical matter, some industries are much more homogeneous than others. For example, researchers interested in studying strategic groups would not be well advised to focus on the paperboard mill industry where we observed no differences whatsoever in R&D or marketing and only minimal differences in our production variable. On the other hand, researchers who look to the pharmaceutical industry for examples of strategic groups (e.g., Cool and Dierickx, 1993; Meising and Lubatkin, 1993) should have no trouble finding them. The 53 pharmaceutical firms

in our sample varied widely, especially in terms of their marketing and R&D intensity. This is intuitively consistent with our understanding of the generic drugs, patented prescription drugs, and over-the-counter drugs strategic groups.

The range of industry variety scores we observed also gives rise to questions about why industries differ on this measure and what might predict this industry variation. Rigorous consideration of this question is well beyond the scope of the present research, but Table 4 suggests some interesting patterns. The three most interesting cells in Table 4 are cells 1, 3, and 5, corresponding roughly to the extremes of the U-shaped curve. Cell 1 (profitable homogeneous industries) is heavily populated with commodity producers such as cotton fabric mills, knit outerwear mills, paperboard mills, and fabricated metal plate—all industries that appear to be good candidates for straightforward cost-based competition where the winning strategy is probably well known. Cell 3 contains industries with clearly recognizable strategic groups. We have already mentioned the patent/generic/over-the-counter strategic groups that constitute the pharmaceutical industry, but the OEM and the replacement parts strategic groups in the motor vehicle parts industry are just as recognizable. In such industries, the stategic groups serve distinct markets and may thereby avoid the level of rivalry present in slightly more homogeneous industries. Consider, for example, the industries listed in Cell 5. A number of these industries produce goods with many potential substitutes. While there may be different strategic groups in each of these industries, the differences between them are not likely to be great enough to prohibit product substitution across groups. For example, a firm may have invested heavily in developing and marketing the very latest generation of diagnostic substances, but these new products are very likely to compete with older, but still surviving, generations of diagnostic substances. The same goes for virtually every industry in this cell: computers, communication and audiovisual equipment, process controls, and medical equipment.

Our results offer potentially useful information regarding the types of strategic variety that are the most powerful predictors of firm performance. The literature has been fairly consistent in referring to marketing, R&D, and capital intensity as the three most important dimensions of strategic space. However, our results show that marketing is much more useful than R&D or capital intensity. In fact, marketing variety alone is almost as good a predictor of industry profitability as our measure of overall variety. We wonder if other variables, such as the firm's sales growth rate and the breadth of its target market, might not be more useful than the typically identified dimensions of strategic variety, and we see the need for empirical tests of this question.

Finally, the present research linking variety to average industry profitability should be supplemented with research considering other measures of performance. While we were unable to find any literature supporting the idea, it appears to us that variety might be even more strongly related to growth of revenues and profits than to average industry profitability. As industries discover new ways to compete and open up new niches, we suspect the revenue and profit potential of the industry as well as individual firm growth will increase faster than the average profitability of industry incumbents.

Despite the theoretical and empirical evidence supporting our hypotheses, this study is nonetheless open to a number of fair criticisms. One criticism concerns the content validity of our independent strategic variety variables due to aggregating SBU level data to the firm level. Although this type of data aggregation produces unbiased estimates of the true regression coefficients, it does result in inflated R^2s (Lang, Dollinger, and Marino, 1987). Thus, although we are confident in the curvilinear nature of the relationship, some caution should be used in interpreting the strength of the relationship. It is unfortunate that organizational researchers are too often faced with similar problems when interpreting results due to the constraints of using existing data bases that were not assembled for the purposes of the research.

A second criticism concerns the use of 4-digit SIC codes to classify the industries used in this study. Although classifying industries according to 4-digit SICs has a well-established precedent in strategic management research (e.g., Cool and Schendel, 1988; Cool and Dierickx, 1993; Lawless, Bergh and Wilsted, 1989; Rumelt, 1991), it may be too broad to capture the effects of intraindustry strategic homogeneity and heterogeneity on industry profitability. This might be the case when there exist segments within an industry that

produce noncompeting products. In such industries, industry profitability may be due not only to strategic heterogeneity between firms producing dissimilar products, but also to strategic homogeneity among firms producing similar products. While certainly not a perfect solution to this criticism, we feel that the use of number of product categories within each industry as a control variable in our analyses obviates the potential for any confounding effects.

Notwithstanding these potential limitations, we feel this study begins to integrate long-standing, disparate perspectives on the relationship between strategic variety and industry profitability. Based on the findings of this research and the success of research to date that links strategic variety to performance, we are optimistic about the potential of further research in this stream.

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