



---

## Top Management Group Heterogeneity and Firm Performance

Author(s): Alan I. Murray

Source: *Strategic Management Journal*, Summer, 1989, Vol. 10, Special Issue: Strategic Leaders and Leadership (Summer, 1989), pp. 125-141

Published by: Wiley

Stable URL: <https://www.jstor.org/stable/2486586>

### REFERENCES

Linked references are available on JSTOR for this article:

[https://www.jstor.org/stable/2486586?seq=1&cid=pdf-](https://www.jstor.org/stable/2486586?seq=1&cid=pdf-reference#references_tab_contents)

You may need to log in to JSTOR to access the linked references.

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



Wiley is collaborating with JSTOR to digitize, preserve and extend access to *Strategic Management Journal*

## TOP MANAGEMENT GROUP HETEROGENEITY AND FIRM PERFORMANCE

ALAN I. MURRAY

*Faculty of Business, University of Alberta, Edmonton, Alberta, Canada*

*Using a sample of 84 Fortune 500 food and oil companies, observed over the period 1967 to 1981, this paper tests a number of hypotheses relating top management group composition to firm performance. Specifically, it was expected that homogeneous top management groups would interact more efficiently and therefore be preferable when competition is intense, but that heterogeneous groups would facilitate adaptation and therefore be preferable under conditions of environmental change. Partial support for these hypotheses was found; however, the pattern of results also highlights the numerous difficulties in untangling and identifying the determinants of firm performance.*

### INTRODUCTION

Business today is facing an increasingly competitive and changeable environment. To perform well amidst growing competition, greater efficiency is required. To cope well with change firms must be more adaptive. For over two decades organization theorists have sought the optimal structural response to these two conflicting environmental demands. Yet surprisingly little attention had been paid to those responsible for formulating strategic and structural responses—senior management. An exception to this tendency is the work of Hambrick and Mason (1984), who argue persuasively for study of top management groups and go on to present a series of propositions linking group characteristics with performance and other dependent variables.

This paper accepts the Hambrick and Mason challenge and attempts to fill the lacuna they identify. Specifically it sets out to test the links Hambrick and Mason propose between top management group heterogeneity and performance. Based on the work of two provocative theorists, Ouchi and Weick,<sup>1</sup> an argument is

framed suggesting that, as has been found with organization structures (e.g. Burns and Stalker, 1961), a trade-off must be made between adaptability and efficiency when forming a top management team. Specifically, it is argued that a heterogeneous group will prove more responsive to change while a homogeneous group will operate more efficiently in a stable, competitive environment.

### THEORY

Ouchi *et al.* (Ouchi and Johnson, 1978; Ouchi and Price, 1978; Ouchi, 1980, 1981; Wilkins and Ouchi, 1983) extended theories of organizational control initially developed by economists Arrow (1974) and Williamson (1975) to include 'clans'. Clans allow participants to act more or less autonomously because the organization's goals are congruent with their own, and because their appreciation of those goals and the organization's chosen means for their achievement is sufficiently developed that they need little supervision. Since all members have a thorough appreciation of how the organization operates (Ouchi speaks of a 'shared social understanding'), costs of communication and coordination are reduced,

<sup>1</sup> Weick is not the only theorist who had provocatively argued for greater consideration of adaptability, see also March (1976: 69–81), for example.

providing clans with considerable efficiency advantages over markets or bureaucracies.

Wilkins and Ouchi (1983) have found that clans share the following characteristics: a long history; stable membership; an absence of institutional alternatives; participants are made to feel 'their' organization is unique; there is broad interaction among members, enhanced by non-specialized career paths; some initial technical advantage to sustain them through the formative period; the adoption of existing cultures to shorten the formative period; and support from committed external sponsors.

Ouchi has devoted his attention to the problem of making organizations more efficient, and only mentions in passing the implications for organizational adaptability. Conversely, Weick (1977) has developed theories of organizational effectiveness which discount efficiency considerations. Feeling that too much attention has already been given to efficiency—'short-term adaptation'—he has sought to 'repunctuate' the criteria for effectiveness. Effective organizations, Weick says, are garrulous, galumphing, superstitious, hypocritical, monstrous, octopoid, wandering, and grouchy. Essentially, Weick argues that the organization's ability to adapt will be enhanced if greater diversity and variety are sustained than may be required for short-term adaptation. Of course, 'carrying' resources and behaviors that have no current use reduces efficiency levels, implying that a trade-off exists between efficiency and adaptability.

Whenever people adapt to a particular situation, they lose some of the resources that would enable them to adapt to different situations in the future. They sacrifice future adaptability for current good fit. If they try to beat this trap by cultivating future adaptability and sacrificing current adaptation, they are no better off. They live in an eternal state of readiness and loneliness and are able to handle everything except the next customer who walks through the door (Weick, 1977: 199–200).

The trade-off can be seen clearly when the organizational characteristics Ouchi associates with clans are contrasted with those discussed by Weick.

1. Garrulous organizations display a 'diversity of linguistic forms' (Weick, 1977: 222) while clans 'develop "thick" social understandings that

are specific to the organization' (Wilkins and Ouchi, 1983: 472).

2. For clans, strong shared social knowledge is desirable, while long history and stable membership allow social knowledge to become institutionalized. In this way 'institutions are now experienced as possessing a reality of their own, a reality that confronts the individual as an external coercive fact' (Berger and Luckman, 1967: 58). Galumphing organizations, on the other hand 'recombine the available repertoire of means in novel ways' (Weick, 1977: 201). Clan members view the organization's means as absolute; members of galumphing organizations see means as more malleable.
3. Ouchi's clans 'encouraged many individuals to offer their opinions on decisions, rather than have single individuals make decisions. Such collective decision-making may be seen as another means of encouraging the continued reinforcement and development of shared knowledge about the social world through member contact' (Wilkins and Ouchi, 1983: 474). Hypocritical, superstitious, octopoid organizations do the opposite. Hypocritical organizations espouse the received shared knowledge while, in practice, departing from it. Octopoid organizations practice loose-coupling (Glassman, 1973; Weick, 1977), allowing organization participants to act independently of other parts of the organization.

Initially, Ouchi applied his theory to the entire organization but has more recently (Wilkins and Ouchi, 1983) spoken of parts of organizations, groups within organizations, as clans. In this study the primary level of analysis is the group, so rather than talk of 'clannishness', terms from group dynamics—homogeneity and its opposite, heterogeneity—are adopted.

Homogeneity is an aggregate level index of interpersonal similarity along one, or several, dimensions. A very homogeneous top management group, for example, would contain members of similar age, tenure, and background who would have been together for a long period. Ouchi's predictions regarding the effects of clans are consistent with research on group homogeneity, reinforcing the argument that clans and group homogeneity are the same phenomena observed at different levels of analysis.

The main advantage clans have over other forms of organization is their ability to control members implicitly. Homogeneous groups also exert more influence on their members. They tend to be more cohesive (Back, 1951; Shaw and Shaw, 1962), which produces greater conformity (Bovard, 1951; Schachter, Ellertson, McBride and Gregory, 1951; Berkowitz, 1954; Lott and Lott, 1961; Wyer, 1966). Just as members of clans are more likely to achieve the organization's goals, so too are members of cohesive groups (Goodacre, 1953; Van Zelst, 1952a,b; Shaw and Shaw, 1962) unless those goals compete with the group's own goals (Schachter *et al.*, 1951). Clans integrate their members by encouraging frequent interpersonal communication. Similarly, members of cohesive groups also display high levels of interpersonal communication (French, 1941; Back, 1951; Lott and Lott, 1961).

Individuals derive their values from the society in which they grow up. They are also impacted by the historic events which occur during their formative years (Eisenstadt, 1956; Elder, 1975; Hambrick and Mason, 1984; Wagner, Pfeffer and O'Reilly, 1984). Thus, individuals similar in age are molded by a similar environment and tend to emerge with similar values. Individuals who have shared similar educational experiences, or who come from similar occupational backgrounds, are also likely to have similar sets of values.

Those coming to the organization or, to a lesser degree, to the top management group more recently will not only have been less thoroughly socialized into adopting the organization's own norms and values than longer-tenured members, they will also probably have greater familiarity with the values of other institutions.

If the organization's own norms and values are well adapted, introducing outsiders with different values will reduce efficiency. Newcomers will introduce different, non-adaptive values. This will increase the likelihood of misunderstandings and mistrust which will, in turn, elevate the level of conflict (Tuckman, 1965; Hambrick and Mason, 1984). Reducing this counterproductive conflict will be time-consuming and thus reduce the efficiency of the group's task performance.

Heterogeneous groups do have the advantage of enhanced adaptability and greater creativity (Katz, 1982). While heterogeneous groups may contain members whose usefulness is not immediately apparent, thus making them less efficient

in handling the current situation, they are more likely to possess within them the skills required if that current situation changes.

Heterogeneous groups do generate greater conflict but this can be productive (Deutsch, 1969) since resolving the conflict can lead the group to new and better solutions to the problems of environmental adaptation. Thus, the diversity of skills and outlooks characteristic of heterogeneous groups can increase the adaptability of the group. The higher level of conflict associated with heterogeneous groups can enable them to better discern when adaptation is appropriate.

Homogeneous top management groups, then, should contribute to a firm's efficiency (Hambrick and Mason, 1984). Their opposites, heterogeneous groups, should enhance a firm's ability to adapt. But if firms today are facing both increasing competition and more rapid change (necessitating both greater efficiency and greater adaptability), will firms led by homogeneous groups outperform heterogeneous groups, or vice-versa? The answer to this question will depend on both the measure of performance and the actual amount of change and competition to which the firm is exposed.

Commonly used measures of a firm's performance can be separated into two broad categories. First, there are those which assess the stewardship of the top management or how efficiently the firm utilizes its resources to produce a profit. Since the period considered is usually brief these measures can be interpreted as indicators of how well fitted the firm is to present conditions.

The second set of measures is based on the prevailing price of the firm's stock. The efficient-markets hypothesis (see Fama, 1970, for a review) states that the stock price multiplied by the number of shares outstanding is the best available estimate of the true value of a firm. '[P]urchase or sale of any security at the prevailing market price is a zero-NPV transaction.' This quote from Brealey and Myers (1981: 256) captures the idea that the stock price can be thought of as all the firm's future earnings discounted back to the present. As such it is the best estimate we have of the adaptability of the firm. This is not to say that it is accurate, as the volatility of stock prices clearly indicates; however, it has been shown that price/earnings ratios are positively correlated with actual subsequent earnings (Beaver, Lambert and Morse, 1980).

Since heterogeneity is expected to reduce a firm's efficiency, it is anticipated that:

*Hypothesis 1A: Heterogeneity will be negatively related to efficiency-based measures of performance.*

But since heterogeneity is expected to increase the firm's ability to adapt, it is also anticipated that:

*Hypothesis 1B: Heterogeneity will be positively related to adaptability-based measures of performance.*

Efficiency is used here not in the narrow sense of achieving a given output with fewer inputs, but in the sense of exploiting a given industry/market niche more effectively. Efficiency becomes especially important for a firm when competition exists within that niche. When competition is strong the firm must find a sustainable competitive advantage. It must either find ways to differentiate its products/services from those of competitors or it must produce the same products or services for less cost according to Porter (1980). Given that doing this is more important in a highly competitive environment, and if heterogeneity is inconsistent with efficiency, as the term is used here, it is hypothesized that:

*Hypothesis 2: Heterogeneity will be more negatively related to efficiency-based measures of performance under conditions of strong competition than under conditions of less strong competition.*

Just as the effects of heterogeneity may be mediated by the level of competition, the amount of change should mediate the effect of heterogeneity, since the ability to adapt is important only when adaptation is necessitated by change.

Change here refers to variations in the set of environmental constraints on a firm's behavior that are of sufficient magnitude and duration to necessitate alteration of the firm's strategy if optimal performance under the new conditions is to be realized. Change should not be equated with mere turbulence or oscillation in environmental constraints which may be already anticipated and allowed for in the firm's current strategy. Thus:

*Hypothesis 3: Heterogeneity will be more positively related to adaptability-based measures of performance under conditions of change than under conditions of relative stability.<sup>2</sup>*

The hypotheses presented above are shown diagrammatically in Figure 1.

## METHODS

### The sample

The sample had to satisfy a number of conditions. First, it had to be large enough to ensure that the tests based on it had sufficient power. Second, given that a large sample had to be used, comparable data across subjects had to be available. This criterion restricted the sample to large, publicly traded firms. Third, performance is a problematic dependent variable as it has so many proven predictors (Lenz, 1981), at various levels of analysis. The firm-level predictors could be controlled for, but this left a number of industry-level variables to account for (see, for example, Weiss, 1971; Vernon, 1972). These variables could also be controlled for by measuring them explicitly or, given that these effects are not of primary interest, the sample could be drawn from only a few industries with dummy variables included to capture the industry effects.

A sample satisfying these criteria included those firms in the 1975 *Fortune* 500 list of manufacturing corporations who derived the bulk of their income from either the oil industry or the food industry (for a list of firms included in the sample see the Appendix).

For a number of reasons, multiple observations of each subject were made. First, it seemed reasonable to expect that the composition of the top management group was, to some extent, determined by the organization's structure, systems, and culture. To assess the effects of top management group composition on performance independent of other aspects of the organization, then, it was necessary to represent each subject in the analysis. This required the use of a set of

---

<sup>2</sup> Hypotheses 2 and 3 imply complementary hypotheses regarding the effect of heterogeneity ( $\times$ ) competition on adaptability-based measures of performance and heterogeneity ( $\times$ ) change of efficiency-based measures of performance. But since the literature reviewed here suggests no hypotheses regarding these relationships they have not been examined.

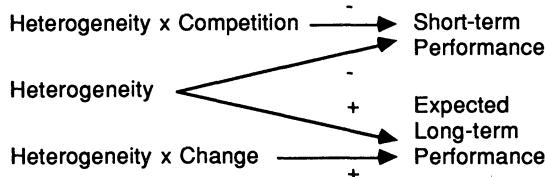


Figure 1. Hypothesized relationships.

dummy variables equal to the number of subjects. Clearly, this would have exhausted all the degrees of freedom in a cross-sectional design. This problem was resolved by taking multiple cross-sections. It was assumed that the firm-specific effects were constant across time. Second, parameter estimates obtained from a single cross-section could be partially a function of the specific conditions prevailing at the time the cross-section is drawn. Taking multiple cross-sections under differing conditions reduced the likelihood that parameter estimates were biased in this way. Third, taking multiple cross-sections enlarges the sample size and thus enhances the power of tests based on the sample.

Altogether, measures were taken from each of the organizations eight times, at 2-year intervals, starting in 1967. By basing the sample on the 1975 *Fortune* 500 list, which is mid-way through the observation period, possible biases due to either left or right censoring (Tuma and Hannan, 1979) were minimized. The 1975 *Fortune* 500 list contained 84 companies which met the selection criteria: 26 integrated oil companies and 58 food companies. Sampling was restricted to two industries, since this provided the best compromise between the various constraints described above.

The choice of the food and oil industries was made for specific reasons. First, these two industries are the most numerously represented in the *Fortune* 500 list in any given year. Second, they have very different characteristics. By looking at quite different industries the generalizability of the results is increased. Third, since an interest of this study is the impact of change, and since the oil crisis occurred near the middle of the observation period, it was desirable to include in the sample industries which were differentially affected by this major economic event.

### Measurement of the variables

This study examines the relationship between the independent variable—top management group

heterogeneity—and the dependent variable—firm performance. The relationship is hypothesized to be moderated by competition and change. This section describes how each of these variables was measured.

Heterogeneity is a group-level index of the degree of similarity between members of a group. As such, its value depends on the dimension or dimensions upon which it is based. In this study a number of underlying dimensions form the basis for the measure of heterogeneity used. These include the age of members, their tenure with the firm and with the top management group, as well as their occupational and educational backgrounds.

Producing a group-level index of heterogeneity from its individual-level components involved a number of steps. First, information on each executive in each top management group of each of the firms in the sample was gathered for each time period. This produced a total of 10,960 individual-level observations. Information on each of these individuals was obtained from the Dun and Bradstreet *Reference Book of Corporate Managements* (1968, 1970, 1972, 1974, 1976, 1978, 1980, 1982). From these directories each executive's age was determined by subtracting his date of birth from the current year. Tenure with the firm was calculated by subtracting from the current year the year in which the executive joined the firm. Tenure with the top management group was calculated in the same manner, except that the date of entry to the top management group was the subtrahend.

Seven categories of university degrees provided a basis for determining educational background: undergraduate liberal arts; undergraduate science, engineering, or business; undergraduate or graduate law; master of business administration; other masters degrees; completion of an executive training course; and doctorate. Executives were coded one for each category in which they had earned a degree or diploma, zero otherwise.

Assignment to occupational categories was more difficult. Here, eight categories were used: legal; financial or accounting; general business; marketing or public relations; engineering; research and development; production or operations; and miscellaneous. Placement of each executive in a given category was subjective and was based on an evaluation of the executive's employment history. In the majority of cases the appropriate category was obvious as the subject

had remained in one occupational track throughout his career. Occasionally, the executives had changed occupations in mid-career. In such cases the executive was coded according to his earlier occupational category.

After the individual-level data were obtained, the next step was to create aggregate- or group-level indices. This posed a problem. The difficulty lay in deciding who should be included in the top management group and who should be excluded. Shaefer and Janger (1982) resolved this question by referring it to the CEOs of the firms in their sample. For this study Shaefer and Janger's approach was not appropriate. In many cases the CEOs who presided in the early years had long since departed. Even among those who remained, obtaining responses would have been time-consuming and would have considerably reduced the sample size (Shaefer and Janger had a response rate of only 32 percent).

Instead, a different solution was adopted. Two top management groups were defined. One, referred to hereafter as the inclusive group, contains all the executives included in the lists submitted by corporations to Dun and Bradstreet. The second group, referred to as the exclusive group, contains only those executives with the following titles: Chairman of the Board; Vice-Chairman; Chief Executive Officer; Chief Operating Officer; President; Senior Vice-President; and Executive Vice-President. Persons holding these titles were usually also on the board of directors. Vice-presidents, company secretaries, treasurers, and presidents of divisions, were not included under this second definition but, typically, were included in the inclusive group.

Having obtained the relevant data on each executive, and having determined who to include and who not to include in the top management group, the next step was to produce measures of the diversity or dispersion within the group on each of the dimensions, as well as measures of average tenure for the tenure variables. For the continuous measures this was relatively straightforward. Average tenure with the firm was simply the mean of the individual tenure of each of the group's members. Average tenure with the top management group was constructed in the same way. How diverse the group was in age and tenure was calculated by taking the coefficient of variation for each of the variables:

age, tenure with the firm, and tenure with the top management group. The coefficient of variation was chosen in preference to variance as it is independent of the mean, which is included as a separate variable.

Constructing measures of diversity for the categorical indicators (education and occupational background) was more complicated. Two measures were used here, one derived from Blau (1977) is of the form  $1 - p_i^2$ , where  $i$  is the proportion of the group in the  $i$ th educational or occupational category. The other measure taken from Shannon (1949), is of the form  $1 - \log(1/p_i)$ , where  $p_i$  has the same meaning as it does above. In either case, if all members of the group were in one category, a situation of extreme homogeneity, the measure took on a value of zero. Educational diversity was calculated by summing within each top management group the number of managers within each category and then dividing by the sum of these sums. This produced the proportion,  $p$ , in each category. Two measures of educational diversity were obtained by using the proportions thus derived in each of the two diversity measures just described. Occupational diversity was constructed in exactly the same way except that, of course, occupational categories were used as the basis of the measures.

Having thus aggregated the data on the individual executives to the group level for each of the dimensions of interest, the final step was to collapse these into one overall heterogeneity index. To obtain this index, principal components factor analysis was applied to the nine underlying dimensions. Since there was no *a priori* reason to expect differences across years in the factor loading pattern, that is in the correlation between the nine underlying dimensions and the heterogeneity factor, and since it is not necessary that the observations for the factor analysis be statistically independent since no significance tests are performed at this stage the factor analysis was based on data from all eight panels. (The nine underlying dimensions and their expected relationship to heterogeneity are presented in Table 2; the results of this analysis are presented below.)

Heterogeneity's effect on performance is hypothesized to be moderated by two other variables: competition and change. Instead of using the

structural determinants of competition (such as concentration ratios) as an indicator of competition, its effects were measured. It was felt that even when the concentration ratio is low, competition can still be low if each firm accepts its market share 'lot'. Real competition exists only when a firm attempts to increase sales or market share at the expense of competitors. During these periods market shares are likely to be less stable than during periods when competition is mild. Thus, absolute changes in market shares summed across the members of an industry—rivalry—should indicate how competitive the industry has been during the period over which the changes were observed.

As just defined this measure assumes that each firm's impact on the competitiveness of the industry is the same. This is usually not the case. Change in market share among the dominant firms in the industry has greater implications for industry competitiveness than does rivalry among minor participants. One way to correct for this difference is to divide the sum of absolute changes in market share by the concentration ratio for the industry. When an industry is dominated by a few firms the concentration ratio is high and the level of rivalry across all industry members is most heavily discounted when the concentration ratio is divided into it.

In this study rivalry was measured by first gathering the sales of all the oil companies and all the food companies separately for 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981. The totals were then divided into the individual firms' sales to obtain market shares. Next, market share for the preceding period was subtracted from current market share, and the absolute value of the result was taken. These were then summed to give rivalry within the industry for each year—uncorrected for the amount of concentration within the industry. Finally, two indicators of rivalry for each of the industries were obtained by dividing uncorrected rivalry by either the four-firm or eight-firm concentration ratio associated with the appropriate industry/year combination.<sup>3</sup>

<sup>3</sup> This measure of rivalry is predicated on two assumptions. First, that the combined sales of the firms included in the sample closely approximates total industry sales. Both of these industries are highly concentrated so this condition is met. Even if it were not met, however, rivalry would remain

In Hypothesis 3 it was proposed that heterogeneity's effect on performance may be moderated by the amount of change the firm experiences. Indicators of the amount of change were obtained from the *Wall Street Journal* and the *New York Times* indexes. For each of the years of interest a count was made of the number of articles published by the *Wall Street Journal* during the year and indexed within the food or oil industry sections. Because the *New York Times* index has a different format a measure was taken of the amount of space allocated to each of the two industries in the index for the year of interest. (The resulting measures are presented in Table 1.) This unconventional measure of change was used in order to emphasize those changes which may prompt firms to fundamentally re-evaluate their strategies. Initially a number of categories of such changes were constructed and coders independently coded the index entries into these categories. This was done to avoid stories that applied to specific firms—merger stories, for example. However, it quickly became obvious that the bulk of stories fell into one or the other of these categories, firm-specific stories were indexed under the firm's name not under the industry, hence the move to the apparently crude technique of counting entries or measuring column inches was made.<sup>4</sup>

In this study the ratios of earnings to sales, to total capital, to net worth, and to equity are used as multiple indicators of efficiency or short-term

<sup>3</sup> Continued.

a good indicator of competition since the variable is used in a relative sense. That is, rivalry in one year relative is compared to rivalry in other years. Given this use it is more important that the measure be consistent across cross-sections than that it be valid in any absolute sense. Put differently, error common across years will be 'washed out'. Second, the measure—rivalry—assumes that each firm derives all its sales from the industry in question—be it oil or food. Oil companies have historically sought vertical integration and geographic diversification, so in their case the assumption is justified. Food companies, on the other hand, are more diversified. Again, since rivalry is used relatively diversification will only contaminate the measure to the extent that the degree of diversification alters for specific companies across years. Some significant non-food acquisitions did occur over the period, but the sales they added were minuscule either in relation to the total sales of their parent or to total food industry sales.

<sup>4</sup> The sum across categories of articles thus coded correlated 0.96 with a raw count of all the articles indexed under the industry.

Table 1. Indicators of change

	Food industry		Oil industry	
	WSJ <sup>a</sup>	NYT <sup>b</sup>	WSJ <sup>a</sup>	NYT <sup>b</sup>
1967	82	259	478	560
1969	99	421	528	982
1971	108	330	587	756
1973	181	1078	1078	5286
1975	165	880	1842	5686
1977	83	195	1173	1455
1979	106	287	1330	4014
1981	82	272	990	1406

<sup>a</sup> Units are number of articles indexed under industry heading.

<sup>b</sup> Units are number of centimeters of column allocated to industry in index.

performance. Measures of long-term performance include the ratios of the stock price to earnings and stock price to book value. To obtain the two performance measures from these six indicators, principal components factor analysis was applied, and the solution was rotated in order to increase the association between subsets of indicators and specific factors. Data for the performance measures were obtained from the Value Line computer tapes for firms still independently operated in 1982. Data for firms that had either declared bankruptcy or been acquired were obtained directly from annual reports or from summaries of the annual reports published in *Moody's Industrial Manuals*.

### Analysis of the data

An analysis of variance and covariance approach was adopted to test the hypotheses developed above. The coefficients in each of the two equations presented below were estimated using each of two data sets, one using the inclusive definition of the top management group, the other using the exclusive definition. Since the data set pools cross-sectional and time-series data, ordinary linear squares techniques could not be directly applied. In this type of data set, correlation among the errors of each of the observations is common, invalidating one of the assumptions upon which ordinary least-squares procedures depend. Two techniques have been developed to overcome this problem (Hausman, 1978). Here the fixed-effects approach was

adopted. It assumes that each subject has an effect on the dependent variables independent of the other variables but it makes no assumptions about the nature of this effect. Also, it does not assume that each subject's unique, unmeasured effects on the dependent variable are independent of the other, measured effects. The parameter estimates produced are inefficient but unbiased; thus it is a conservative test of the hypotheses. Each equation, then, included a dummy variable representing each subject in the sample. For analytical and interpretive simplicity these effects were suppressed prior to estimation of the parameters of interest (see Freund and Littell, 1981).

### Effects of oil and food industry idiosyncrasies on analysis and interpretation

Once the data were analysed it became clear that a number of unique and idiosyncratic characteristics of both the food and oil industries would complicate and confound the interpretation of the results.

First, it became clear that the factors that brought success to firms throughout most of the period 1967-81 differed tremendously across the two industries. In the oil industry geographic and vertical balance appeared to be the key. The mechanisms used to achieve balance included acquisition of other oil companies, the purchase of leases for future exploration, and the allocation of resources across current exploration projects. In the food industry success came to firms who had built strong brand loyalty and large market shares. These goals could not be achieved overnight but, rather, required ongoing efforts by the marketing and sales departments.

In the oil industry the key success factors depended on the top management group; in the food industry they depended on the marketing department. This suggests that managements' contributions to performance may be considerably greater in the oil industry than in the food industry. To accommodate this possibility a dummy variable was introduced into the regression equations representing the differences between the two industries. Interactions between this dummy variable and the other variables were added so that the regression coefficients of interest could vary across the two industries. A main effect for the industry dummy variable was

not included, as it is a linear combination of the firm-specific effects.

Second, the factors which contributed to success in each of these industries did not remain constant throughout the period. While this was, of course, desirable given the aims of the study, it also produced a number of confounding consequences. In both industries there was a period (the early 1970s for the food industry and the second half of the 1970s for the oil industry) in which price regulation undermined the traditional strategies for achieving high performance. During these periods the crude-shy domestic refiners in the oil industry and the commodity producers in the food industry both rose from the bottom of the performance yardsticks to the top, only to fall back again once prices were decontrolled. This meant that the firm-specific effects, assumed to have a constant impact on performance throughout the period, in fact did not. This problem could not be overcome statistically, and was therefore taken into account during interpretation.

## RESULTS

### Results of principal components analysis of the indicators of homogeneity and performance

Recall that each of the variables of interest, heterogeneity, change, competition and performance, were represented by multiple indicators. In order to reduce these to one index in the case of heterogeneity and two in the case of performance, principal components factor analysis was applied. (There being only two indicators of both change and competition, the standardized indicators were simply added to obtain overall indicators. This appeared to be appropriate as the two measures of change were correlated 0.86, while the measures of rivalry were correlated 0.95 and 0.93 for the food and oil industries, respectively.)

The relationship between the nine indicators of heterogeneity and the theoretical construct, heterogeneity, are presented in Table 2. While these relationships make sense theoretically they will not necessarily be observed empirically. In fact, the factor analyses of these nine indicators, derived from data on both the exclusive and inclusive groups, failed to produce a pattern of results consistent with that drawn in Table 2.

Since all the indicators failed to load convincingly on a single factor, the factor loading matrix was rotated using the varimax method in an effort to obtain interpretable factors which loaded highly on at least some subset of the nine indicators. The results of these rotations are presented in Table 3. These factors produced two interpretable factors with substantial eigenvalues for both the inclusive and exclusive groups (2.33 and 2.21 for the inclusive group and 2.14 and 1.98 for the inclusive and exclusive groups respectively). In each case the two factors that were retained explained about half the variance in the original nine indicators and the factor loadings matrix was consistent with the theoretical construct—top management group heterogeneity—presented above.

In the case of both groups the first factor loaded mostly on the two indicators of occupational diversity. The inclusive group's first factor had considerable loadings on the two indicators of educational diversity also. The second factor in both cases loaded in a manner consistent with Table 2 on variation in age, tenure with the firm, variation in tenure with the firm, and tenure with the top management group. This factor is hereafter referred to as temporal heterogeneity.

Factoring the performance indicators was more straightforward. Two factors were expected from analysis of the six performance indicators: one representing efficiency or current performance, the other representing adaptability or expected long-term performance. (Table 4 presents the results of a principal components factor analysis of the six indicators of performance.) Apart from high loadings of earnings/sales on both factors, the results were as predicted. The first factor loaded very highly on earnings/sales, earnings/net worth, earnings/equity, and earnings/total capital. The second factor had high loadings on the price/book value indicator, the price/earnings ratio, and a less substantial loading on the earnings/sales ratio. The first factor was labeled short-term performance and the second, expected long-term performance.

### Correlations among variables

Table 5 presents the correlations among the variables for both the inclusive and exclusive groups. In both cases temporal heterogeneity was negatively related to short-term performance, as

Table 2. Components of top management group heterogeneity

	+	Heterogeneity
Variance in age	→	
Average tenure with firm	+	
Variance in tenure with firm	→	
Average tenure with TMG	→	
Variance in tenure with TMG	+	
Occupational diversity (Blau)	→	
Occupational diversity (Shannon)	→	
Educational diversity (Blau)	→	
Educational diversity (Shannon)	→	

Table 3. Rotated factor pattern of top management group composition

	Factor 1	Factor 2
<i>Inclusive group</i>		
Variance in age	0.21	0.66
Mean tenure with firm	-0.03	-0.87
Variance in tenure with firm	-0.01	0.87
Mean tenure with TMG	-0.27	-0.37
Variance in tenure with TMG	-0.12	0.25
Educational diversity (Blau)	0.55	-0.04
Educational diversity (Shannon)	0.69	-0.04
Occupational diversity (Blau)	0.84	-0.16
Occupational diversity (Shannon)	0.83	-0.12
Variance explained	0.26	0.25
Eigenvalue	2.33	2.21
<i>Exclusive group</i>		
Variance in age	0.21	0.40
Mean tenure with firm	-0.32	-0.55
Variance in tenure with firm	-0.12	0.89
Mean tenure with TMG	-0.01	-0.16
Variance in tenure with TMG	-0.06	0.77
Educational diversity (Blau)	-0.01	-0.31
Educational diversity (Shannon)	0.26	-0.14
Occupational diversity (Blau)	0.98	-0.10
Occupational diversity (Shannon)	0.98	0.09
Variance explained	0.24	0.22
Eigenvalue	2.14	1.98

Table 4. Rotated factor pattern of performance indicators

	Factor 1	Factor 2
Price/earnings ratio	-0.11	0.81
Price/bookvalue ratio	0.18	0.79
Earnings/sales	0.62	0.40
Earnings/equity	0.95	-0.01
Earnings/capital	0.91	0.03
Variance explained	0.52	0.24
Eigenvalue	3.10	1.44

predicted. No clear link to long-term performance emerged. Occupational heterogeneity was negatively related to long-term performance (the opposite of the relationship predicted) and had no clear relationship to short-term performance. Change was negatively related to heterogeneity, but only temporal heterogeneity, which suggests that top management groups may adjust to the changing environment by changing their internal composition. The stronger relationship for the inclusive group suggests that this adjustment is made primarily through changes among the more

Table 5. Correlations among variables

Variable	1	2	3	4	5
<i>Inclusive group (n=523)</i>					
1 Short-term performance	—				
2 Expected long-term performance	0.00	—			
3 Temporal heterogeneity	-0.22**	0.02	—		
4 Occupational heterogeneity	0.02	-0.10**	0.00	—	
5 Rivalry	-0.04	0.24***	-0.08*	-0.12**	—
6 Change	0.15***	-0.06	-0.23***	-0.07	0.00
<i>Exclusive group (n=411)</i>					
1 Short-term performance	—				
2 Expected long-term performance	0.00	—			
3 Temporal heterogeneity	-0.15**	0.05	—		
4 Occupational heterogeneity	0.01	-0.11**	0.00	—	
5 Rivalry	-0.04	0.28***	-0.11*	-0.18***	—
6 Change	-0.15**	-0.14**	-0.10*	-0.03	0.00

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

NB: Exclusive groups containing less than three members were excluded from this and subsequent analyses.

junior members of top management, which makes intuitive sense.

#### Tests of hypotheses

Tables 6A and 6B present the parameter estimates upon which tests of the hypotheses were based. The regression equation which tested Hypothesis 1A included not just measures of heterogeneity but also measures of rivalry, change, the interaction of heterogeneity with these variables, and dummy variables representing the unmeasured, suppressed, firm-specific effects on short-term performance. The  $R^2$  values for these equations were modest (0.2478 and 0.3580 for the inclusive and exclusive groups respectively) and once the firm specific effects were removed the  $R^2$  values fell to insignificant levels. Occupational heterogeneity was significantly related to short-term performance, but only for exclusive groups drawn from the oil industry; however, the effect was as predicted.

The lack of other significant relationships implies, first, that short-term performance is very difficult to predict. Second, these results imply that since the firm-specific effects accounted for most of the explained variance, the influence that firms do have on short-term performance is relatively inert; it is a function mostly of their position in the industry and the degree to which their strategic configuration reflects the demands for success of the industry. Third, the findings

here are consistent with studies by Lieberson and O'Connor (1972), Salancik and Pfeffer (1977), and Weiner and Mahoney (1981), which found that management contributions to short-term performance tended to be dominated by those of external circumstances.

The form of the equations testing Hypothesis 1B was the same as those used to test Hypothesis 1A. Here the  $R^2$  values were considerably larger (0.5611 and 0.6528 for the inclusive and exclusive groups respectively). This makes sense considering that the measures of expected long-term performance were based upon market expectations. Market expectations are based on knowledge of the industry and knowledge of the companies' positions within their industry. The impact of environmental perturbations cannot be known until they occur, and therefore do not affect performance projections as they do actual performance.

Even when the firm-specific influences were removed the contribution of many of the remaining variables remained significant, especially for the oil industry. This finding supports the speculation made above that management's impact on performance in the oil industry is greater than in the food industry. In contrast to its effect on short-term performance, the effects of heterogeneity on long-term performance were restricted to temporal heterogeneity. The effect was restricted to the oil industry but was significant for both the inclusive and exclusive

Table 6A. Regression of heterogeneity and control variables on short-term performance<sup>a</sup>

Independent variables	Oil companies		Food companies	
	Inclusive group	Exclusive group	Inclusive group	Exclusive group
Temporal heterogeneity	-0.2974 (0.1871)	0.0661 (0.2064)	0.0174 (0.2665)	0.0527 (0.3120)
Occupational heterogeneity	0.0477 (0.2381)	-0.5104* (0.2715)	0.0349 (0.2752)	-0.1248 (0.3254)
Rivalry	-0.7149 (0.4998)	-0.4997 (0.5043)	-0.0207 (0.5056)	0.0140 (0.5143)
Change	-0.0101 (0.0914)	-0.0227 (0.0944)	-0.2595 (0.2631)	-0.4258 (0.3288)
Temporal heterogeneity × rivalry	-0.1870 (0.3822)	-0.4232 (0.3846)	-0.0180 (0.3928)	0.0382 (0.3988)
Temporal heterogeneity × change	-0.0229 (0.2751)	-0.0552 (0.1055)	0.0202 (0.2544)	-0.1585 (0.2946)
Occupational heterogeneity × rivalry	-0.2157 (0.4216)	-0.7958* (0.4739)	-0.0643 (0.4268)	0.0352 (0.4796)
Occupational heterogeneity × change	-0.1114 (0.0952)	0.0784 (0.1007)	0.1924 (0.2220)	0.0352 (0.2594)
<i>R</i> <sup>2</sup>	0.2478	0.3580	0.2478	0.3580
<i>F</i> ratio	1.49	1.91	1.49	1.91
Corrected <i>F</i> ratio <sup>b</sup>	0.78	1.11	0.78	1.11

\*  $p < 0.05$  (one tailed test).

<sup>a</sup> Constants suppressed.

<sup>b</sup> After contribution of constants removed.

Numbers in parentheses are standard errors of coefficients,  $n=520$  for inclusive groups,  $n=412$  for exclusive groups.

groups. The effects were in the predicted direction and, as it is unlikely the estimate is contaminated by the confounds discussed above, constitute support for Hypothesis 1B.

As with most of the other significant effects the impact of the heterogeneity by rivalry interaction was restricted to the oil industry. Within the oil industry only two significant predictors of short-term performance were found—background heterogeneity and its interaction with rivalry—and these effects were restricted to exclusive groups. While the effect of background heterogeneity by rivalry on short-term performance was negative, as predicted, the fact that temporal heterogeneity had no comparable effect and that effects were restricted to the oil industry suggests that an explanation other than that hypothesized may be more appropriate.

The original hypothesis was based on an efficiency argument. Homogeneous top management groups were expected to be more efficient as they would communicate more effectively and

coordinate their actions better. In the oil industry efficiency derives primarily from the streamlining of operations. Streamlining operations is the task of engineers, and in the oil industry the more homogeneous top management groups tended to be dominated by engineers. A more likely explanation for this result, then, is that either homogeneous groups (dominated by engineers) stress efficiency considerations more than other groups, or firms for which efficiency is perceived to be a critical contingency, promote more engineers. In other words the effect may be due not merely to the fact that the groups are homogeneous, but to the fact that they are homogeneous groups of engineers.

The effect of temporal heterogeneity by change on expected long-term performance was strongly negative in the oil industry, the opposite of the effect predicted. The reason for this probably lies in the fact that, like background heterogeneity, the level of temporal heterogeneity differs between the domestics and the international oil

Table 6B. Regression of heterogeneity and control variables on long-term performance<sup>a</sup>

Independent variables	Oil companies		Food companies	
	Inclusive group	Exclusive group	Inclusive group	Exclusive group
Temporal heterogeneity	0.2826** (0.1390)	0.3255*** (0.1105)	0.0664 (0.1980)	-0.0829 (0.1670)
Occupational heterogeneity	0.0116 (0.1769)	-0.0237 (0.1453)	0.0315 (0.2044)	0.0527 (0.1742)
Rivalry	1.3861*** (0.3713)	1.7270*** (0.2701)	0.1881 (0.3756)	0.1587 (0.2753)
Change	-0.5472*** (0.0678)	-0.3374*** (0.0506)	0.5545*** (0.1955)	0.5891*** (0.0506)
Temporal heterogeneity × rivalry	0.4170 (0.2838)	0.3351 (0.2060)	-0.0113 (0.2918)	-0.0058 (0.2135)
Temporal heterogeneity × change	-0.2304*** (0.0643)	-0.2230*** (0.0565)	-0.1336 (0.1900)	-0.0122 (0.1577)
Occupational heterogeneity × rivalry	1.022*** (0.3132)	0.3233 (0.2537)	-0.0033 (0.3171)	-0.0740 (0.2567)
Occupational heterogeneity × change	-0.0179 (0.0706)	0.0040 (0.0539)	0.0906 (0.1649)	0.1835 (0.1389)
<i>R</i> <sup>2</sup>	0.5611	0.6528	0.5611	0.6528
<i>F</i> ratio	5.79	6.45	5.79	6.45
Corrected <i>F</i> ratio <sup>b</sup>	11.30	13.46	11.30	13.46

\*  $p < 0.05$  (one tailed test); \*\*  $p < 0.01$  (one tailed test); \*\*\*  $p < 0.001$  (one tailed test).

<sup>a</sup> Constants suppressed.

<sup>b</sup> After contribution of constants removed.

Numbers in parentheses are standard errors of coefficients,  $n=520$  for inclusive groups,  $n=412$  for exclusive groups.

companies (see Figure 2).<sup>5</sup> Because high levels of change in the oil industry were associated with larger drops in the long-term performance of the domestics than of the internationals, and because the domestics were more temporally heterogeneous than the internationals, the temporal heterogeneity by change interaction has a significant negative relationship to long-term performance for the oil industry.

## CONCLUSIONS

### Efficiency, adaptability, and the composition of top management groups

In this paper it has been argued that the

composition of the top management group would affect firm performance, and that this effect would depend on environmental conditions. The argument was based on what appeared to be a fundamental incompatibility between characteristics that produce efficiency or short-term fit, and those which provide long-term adaptability upon which sustained performance depends. This trade-off was noted by Weick (1977) and was demonstrated by Burns and Stalker (1961) for organization structures. This study attempted to show that the same trade-off occurs for the composition of top management groups.

In this endeavor the study met with considerable success, given the numerous methodological constraints and the tenuousness of the causal link being examined. That any statistically significant linkages at all were found between specific aspects of, in some cases, less than one-tenth of 1 percent of the members of the organizations studied and those organizations' performance is remarkable, and constitutes strong support for

<sup>5</sup> In Figure 2 'internationals' includes: Exxon, Gulf, Mobil, Shell, Standard Oil of California, and Texaco; 'domestics' includes Amerada Hess, Ashland Oil, Belco Petroleum, Cities Service, Clark Oil & Refining, Commonwealth Oil, Marathon Oil, Murphy Oil, and Superior Oil.

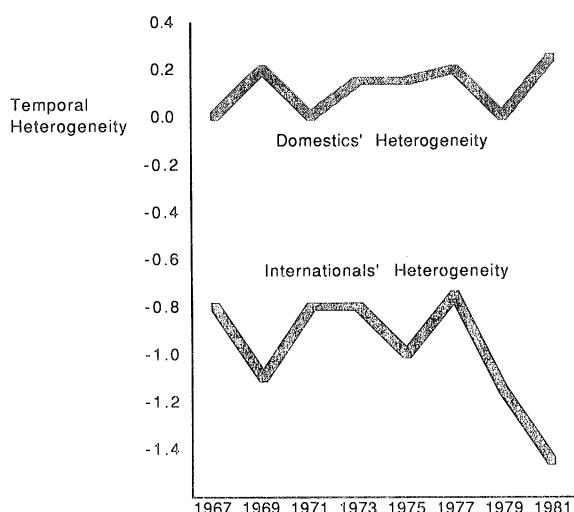


Figure 2. Temporal heterogeneity in the oil industry.

those who advocate further study of top management groups.

Most of the significant results were restricted to the oil industry. Within this industry eight main effects were of interest (those of the temporal heterogeneity and background heterogeneity, of the inclusive and exclusive groups, for both short-term and long-term performance). Three of the eight regression coefficients differed significantly from zero, and all deviated in the predicted direction. More may have been significant had a less conservative approach to the analysis been taken. Recall that before the parameter estimates were calculated firm-specific effects were first removed. To the extent, then, that heterogeneity is correlated with these effects, its own effect is underestimated.

To assess how much this may have affected the results, supplementary analyses were run using a random-effects model instead of a fixed-effects model (see Hausman, 1978). Using this model temporal heterogeneity was found to have a significant positive effect on short-term performance for both inclusive and exclusive groups as well as the negative effects on long-term performance found with the fixed-effects model. It would be wrong to attach too much importance to these results since it has already been argued that the assumptions upon which it depends are probably violated in this case. However, it does reinforce conclusions drawn from the fixed-effects model that a trade-off must be made between short-term and long-term performance.

Top management group heterogeneity can impact adaptation and therefore long-term performance in two ways. First, the relatively weaker socialization process operating in groups whose members have been together for shorter periods, or who are from different cohorts, may permit greater exploration of strategic alternatives. Second, a greater range of backgrounds would increase the probability that an appropriate new strategy would be identified, and that the skills would be present to implement it. The separation of heterogeneity into temporal—mean and variance of age, tenure with the firm and with the top management group—and background—both educational and occupational—components proved fortuitous as it provided insight into which of these two processes was dominant. The fact that only temporal heterogeneity was consistently related to the dependent variables suggests that socialization processes within the group have a greater impact on group capabilities than does the sum of the capabilities of individual members.

It was argued that heterogeneity should be negatively related to short-term performance because of efficiency losses, and that it should be positively related to long-term performance due to the increased adaptiveness it provides. To ensure that these reasons lay behind the relationships, interaction hypotheses were also included. If efficiency produced the first relationship then the relationship should be especially strong under conditions of competition. If the reason for the second relationship is increased adaptiveness then the relationship should be strongest when adaptiveness is most necessary—under conditions of change.

Unfortunately, the interaction hypotheses were not supported. In both cases this may have been due to the differential impact of the unique events which occurred in these industries in the period of the study. More generally, it was assumed that strategic adaptation was essential if the firm was to capitalize on environmental changes. In practice many maladapted firms benefited from changes without having to adapt to them in any major way.

#### Managers make a difference

All the previous studies of managers' impact on performance assumed that the effect would be constant across different firms and industries.

This study adopted these assumptions until it became clear that the pattern of results differed markedly for the two industries. Top management characteristics within the oil industry were much more closely related to performance than in the food industry. As with other unexpected results closer attention to the characteristics of the two industries showed that the criteria for success were quite different in the two industries, and that they were mediated by different groups within the organization. In the oil industry the top management group was responsible for these critical contingencies. In the food industry they appeared to be more within the purview of the marketing department.

Apart from highlighting the differences in managers' contributions to performance across industries this study's results were similar to those of others examining the effect managers have on performance, at least short-term performance. Even when firm-specific effects were included only about 25 percent of the variance in short-term performance could be explained. The rest was due to unmeasured factors external to the organization. But, perhaps previous studies have taken too much of a short-term view. Strategies are devised and implemented by top management, and remain appropriate so long as the economic imperatives driving them remain in place. The lag between cause (the top management group and the broad strategies they devise) and effect (financial performance) is variable, as is the effect's duration. This poses serious methodological problems for any researcher investigating links between management and performance, and may explain the greater variance between popular beliefs about managers' efficacy and the empirical evidence. A more accurate estimate of management's contribution will not be found until 'strategic eras' determined by stable environmental conditions are identified and included in the analysis of the sort of variables considered here.

Finally, unlike short-term performance, well over 50 percent of the variance in long-term performance was explained by the firm-specific effects and by the measured variables. Even when the influence of the firm-specific effects was removed the explained variance remained significant ( $F=3.5785$  and  $1.1757$  for background heterogeneity and  $2.0590$  and  $2.8373$  for temporal heterogeneity for the inclusive and exclusive

groups respectively,  $F (0.05, 6,\infty)=2.10$ ). It is not surprising that explained variance for this model was higher, since investors focus on what is known, and obviously cannot incorporate in their evaluations of firms' relevant events that are yet to occur.

In summary, the contribution of management to performance is not constant, as previous studies have assumed. It is affected by the industry studied, the assumed lag between cause and effect, and the measure of performance chosen.

## APPENDIX: COMPANIES INCLUDED IN SAMPLE

- Agway Inc.
- Amerada Hess
- American Bakeries
- American Petrofina
- Amstar Corp.
- Anderson, Clayton and Co. (Inc.)
- Archer-Daniels-Midland Company (Inc.)
- Ashland Oil Inc.
- Atlantic Richfield (formerly Atlantic Refining Company)
- Beatrice Foods
- Belco Petroleum Corp.
- Bluebird Incorporated
- Borden Inc.
- Campbell Soup Company (Inc.)
- Campbell Taggart Inc.
- Carnation Company Inc.
- Castle & Cooke Inc.
- Central Soya Company Inc.
- Cities Services Oil Company
- Clark Oil and Refining Corp.
- Commonwealth Oil Refining Corp.
- ConAgra Inc.
- Consolidated Foods Corp.
- Continental Oil Company Inc.
- Cook Industries Inc.
- CPC International (formerly Corn Products Corporation)
- Dart Industries Inc.
- Del Monte Corporation
- Esmark Inc.
- Exxon (formerly Standard Oil of New Jersey)
- Fairmont Foods Company
- The Federal Company (Inc.)
- Flavorland Industries Inc.
- General Foods Corporation
- General Host Corporation
- General Mills Inc.
- Gerber Products Company Inc.
- Getty Oil Company (Inc.)
- Green Giant Company (Inc.)
- The Greyhound Corporation

- Gulf Oil Corporation  
 Hershey Foods Corporation  
 Geo. A. Hormel and Company (Inc.)  
 Hygrade Food Products Company  
 International Multifoods Corporation  
 Interstate Brands Corporation  
 Iowa Beef Processors Inc.  
 Kane-Miller Corp.  
 Kellogg Company Inc.  
 Kerr-McGee Corporation  
 Kraftco Corporation  
 Libby, McNeill & Libby  
 Thomas J. Lipton Inc.  
 The LTV Corporation (formerly Ling-Temco-Vought Corp.)  
 Marathon Oil Company Inc.  
 Mobil Oil Corporation  
 Murphy Oil Corporation  
 Nabisco Inc. (formerly National Biscuit Corp.)  
 Norton Simon Inc.  
 Occidental Petroleum Corporation  
 Pet Incorporated  
 Phillips Petroleum Company (Inc.)  
 The Pillsbury Company (Inc.)  
 The Quaker Oats Company (Inc.)  
 Ralston Purina Company  
 The Rath Packing Company (Inc.)  
 Riviana Foods Inc.  
 Savannah Foods & Industries Inc.  
 Shell Oil Company  
 A.E. Staley Manufacturing Company  
 Standard Brands Incorporated  
 Standard Oil Company (Indiana) (Inc.)  
 Standard Oil Company (Ohio Corp.)  
 Stokely-Van Camp Inc.  
 Sucrest Corporation  
 Sun Oil Company (Inc.)  
 The Superior Oil Company (Inc.)  
 Tenneco Corporation  
 Texaco Inc.  
 Union Oil Company of California Inc.  
 United Brands Company (Inc.)  
 Ward Foods Inc.  
 Wm. Wrigley Jr Company (Inc.)
- Blau, P. M. *Inequality and Heterogeneity*, Free Press, Glencoe, IL, 1977.  
 Bovard, E. W., Jr. 'Group structure and perception', *Journal of Abnormal and Social Psychology*, **46**, 1951, pp. 398-405.  
 Brealey, R. and S. Myers. *Principles of Corporate Finance*, McGraw-Hill, New York, 1981.  
 Burns, T. and G. M. Stalker. *The Management of Innovation*, Tavistock, London, 1961.  
 Deutsch, M. 'Conflicts: productive and destructive', *Journal of Social Issues*, **25**(1), 1969, pp. 7-41.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1968.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1970.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1972.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1973.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1974.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1976.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1978.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1980.  
 Dun and Bradstreet. *Reference Book of Corporate Managements*, Dun and Bradstreet, New York, 1982.  
 Eisenstadt, S. N. *From Generation to Generation: Age Groups and Social Structure*, Free Press, Glencoe, IL, 1956.  
 Elder, G. H., Jr. 'Age differentiation and the life course'. In Inkeles, A., J. Coleman and N. Smelser (eds), *Annual Review of Sociology*. Annual Reviews, Palo Alto, CA, 1975.  
 Fama, E. F. 'Efficient capital markets: A review of theory and empirical work', *Journal of Finance*, **25**, 1970, pp. 383-417.  
 French, J. R. P., Jr. 'The disruption and cohesion of groups', *Journal of Abnormal and Social Psychology*, **36**, 1941, pp. 361-371.  
 Freund, R. J. and R. C. Littell. *S.A.S. for Linear Models: A Guide to the ANOVA and GLM Procedures*. SAS Institute, Cary, NC, 1981.  
 Glassman, R. B. 'Persistence and loose-coupling in living systems', *Behavioral Science*, **18**, 1973, pp. 83-98.  
 Goodacre, D. M. 'Group characteristics of good and poor performing combat units', *Sociometry*, **16**, 1953, pp. 168-178.  
 Hambrick, D. C. and P. A. Mason. 'Upper echelons: the organization as a reflection of its top managers',

## REFERENCES

- Arrow, K. J. *The Limits of Organization*, W. W. Norton, New York, 1974.  
 Back, K. W. 'Influence through social communication', *Journal of Abnormal and Social Psychology*, **46**, 1951, pp. 9-23.  
 Beaver, W., R. Lambert and D. Morse. 'The information content of security prices', *Journal of Accounting and Economics*, 1980, pp. 3-28.  
 Berger, P. L. and T. Luckman. *The Social Construction of Reality*, Doubleday, New York, 1967.  
 Berkowitz, L. 'Group standards, cohesiveness, and productivity', *Human Relations*, **7**, 1954, 509-519.

- Academy of Management Review*, 9(2), 1984, pp. 193–206.
- Hausman, J. A. 'Specification tests in econometrics', *Econometrica*, 46(6), November 1978, pp. 1251–1271.
- Katz, R. 'The effects of group longevity on project communication and performance', *Administrative Science Quarterly*, 27, 1982, pp. 81–104.
- Lenz, R. T. 'Determinants of organizational performance: An interdisciplinary review', *Strategic Management Journal*, 2, 1981, pp. 131–154.
- Lieberson, S. and J. O'Connor. 'Leadership and organizational performance: a study of large corporations', *American Sociological Review*, 37, 1972, pp. 117–130.
- Lott, A. J. and B. E. Lott. 'Group cohesiveness, communication level, and conformity', *Journal of Abnormal and Social Psychology*, 62, 1961, pp. 408–412.
- March, J. G. 'The technology of foolishness'. In March, J. G. and J. Olsen (eds), *Ambiguity and Choice in Organizations*, Universitetsforlaget, Bergen, 1976.
- Ouchi, W. G. 'Markets, bureaucracies and clans', *Administrative Science Quarterly*, 25, 1980, pp. 129–141.
- Ouchi, W. G. *Theory Z: How American Business Can Meet the Japanese Challenge*, Addison-Wesley, Reading, MA, 1981.
- Ouchi, W. G. and J. B. Johnson. 'Types of organizational control and their relationship to emotional well-being', *Administrative Science Quarterly*, 23, 1978, pp. 293–317.
- Ouchi, W. G. and R. L. Price. 'Hierarchies, clans and theory Z: a new perspective on organization development', *Organizational Dynamics*, 7, 1978, pp. 25–44.
- Porter, M. E. *Competitive Strategy*. Free Press, New York, 1980.
- Salancik, G. R. and J. Pfeffer. 'Constraints on administrator discretion: the limited influence of mayors on city budgets', *Urban Affairs Quarterly*, 12(4), June 1977, pp. 475–498.
- Schachter, S., N. Ellertson, D. McBride and D. Gregory. 'An experimental study of cohesiveness and productivity', *Human Relations*, 4, 1951, pp. 229–238.
- Shaefer, R. G. and A. R. Janger. 'Who is top management?', *Conference Board Report No. 821*, 1982.
- Shannon, C. E. *The Mathematical Theory of Communication*, University of Illinois Press, Urbana, IL, 1949.
- Shaw, M. E. and L. M. Shaw. 'Some effects of sociometric grouping upon learning in a second grade classroom', *Journal of Social Psychology*, 57, 1962, pp. 453–458.
- Tuckman, B. W. 'Developmental sequence in small groups', *Psychological Bulletin*, 63, 1965, pp. 384–399.
- Tuma, N. B. and M. T. Hannan. 'Approaches to the censoring problem in analysis of event histories'. In Schuessler, K. (ed.), *Sociological Methodology*, Jossey-Bass, San Francisco, CA, 1979.
- Van Zelst, R. H. 'An interpersonal relations technique for industry', *Personnel Psychology*, 29, 1952a, pp. 68–76.
- Van Zelst, R. H. 'Sociometrically selected work teams increase production', *Personnel Psychology*, 5, 1952b, pp. 175–186.
- Vernon, T. *Market Structure and Industrial Performance: A Review of Statistical Findings*, Allyn & Bacon, Boston, MA, 1972.
- Wagner, W. G., J. Pfeffer and C. A. O'Reilly, III. 'Organizational demography and turnover in top management groups', *Administrative Science Quarterly*, 29, 1984, pp. 74–92.
- Weick, K. E. 'Repunctuating the problem'. In Goodman, P. S. and J. M. Pennings (eds), *New Perspectives on Organizational Effectiveness*, Jossey-Bass, San Francisco, CA, 1977.
- Weiner, N. and T. A. Mahoney. 'A model of corporate performance as a function of environmental, organizational, and leadership influences', *Academy of Management Journal*, 24(3), 1981, pp. 453–470.
- Weiss, L. 'Quantitative studies of industrial organization'. In Intriligator, M. (ed.), *Frontiers of Quantitative Economics*, North-Holland, London, 1971.
- Wilkins, A. L. and W. G. Ouchi. 'Efficient cultures: Exploring the relationship between culture and organizational performance', *Administrative Science Quarterly*, 28, 1983, pp. 468–481.
- Williamson, O. *Markets and Hierarchies: Analysis and Anti-Trust Implications*, Free Press, New York, 1975.
- Wyer, R. S., Jr. 'Effects of incentive to perform well, group attraction and group acceptance on conformity in a judgmental task', *Journal of Personality and Social Psychology*, 4(1), 1966, pp. 21–26.