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AS THE LEFT FOOT FOLLOWS THE RIGHT? THE DYNAMICS OF STRATEGIC AND STRUCTURAL CHANGE

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This study empirically tested the contingency relationship between strategy and structure proposed by Chandler and others with hypotheses linking the probability, timing, and magnitude of changes in one attribute to changes in the other attribute. A dynamic analysis of 262 large firms observed over 28 years generally supported the hypotheses, indicating a reciprocal relationship between strategy and structure. However, our results support the original conception of a hierarchical relationship between the two—strategy is a more important determinant of structure than structure is of strategy.

The relationship between strategy and structure has received a great deal of attention in the organizations literature. Although a significant body of conceptual and empirical work explicitly deals with this relationship, most of the research in the area has tended to search for covariance between the attributes, treating each as a categorical variable (Miller & Friesen, 1984). Recent work in this area has repeatedly called for the use of dynamic analyses (Greenwood & Hinings, 1988; Hoskisson & Johnson, 1992; Keats & Hitt, 1988; Ramanujam & Varadarajan, 1989). Concurring, we proposed to examine the strategy-structure relationship through an analysis of the dynamics of change. We questioned whether a particular type of change in one attribute produced pressure for a particular type of change in the other attribute, considering such an analysis a stronger test of a contingency relationship than simply examining covariance between the attributes would be.

The bulk of the work on the strategy-structure relationship has presumed a hierarchical link, with strategy determining structure. Arguments for a reciprocal relationship between organizational strategy and structure are a relatively recent addition to the literature, and they raise new issues. In particular, we suggest that the foundations of the reciprocal links between strategy and structure differ: the causal process underlying the link from strategy to structure is different from the process driving the structure-to-

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strategy link. These differences lead to implications that are empirically testable. For instance, both links involve a time decay; however, we suggest that the amounts of time involved will differ because very different causal processes drive the two links. The use of a dynamic approach allowed us to test these implications more fully than would have been possible with a simpler covariance approach.

Although dynamic analysis allows for tests of mutual causation, reciprocity does not in and of itself imply equally strong effects. Therefore, an additional advantage of our approach was that it allowed us to determine the relative magnitude of effects even when attributes were interdependent.

Although our hypotheses and subsequent analyses involved temporal aspects of organizational change, we were also concerned with the magnitude of those changes and the causal processes that drove them. We intended the primary contribution of this study to be a richer understanding of the relational configuration of strategy and structure.

THE STRATEGY-STRUCTURE RELATIONSHIP

One of the oldest, and arguably most studied, contingency relationships in organization theory is expressed by Chandler's (1962) dictum that structure follows strategy. Chandler's thesis has been so popular that many researchers have sought to substantiate it (cf. Channon, 1973; Dyas & Thanheiser, 1976; Grinyer & Yasai-Ardekani, 1981; Rumelt, 1974). Chandler argued that effective product-market diversification (strategy) requires a decentralized structure, in particular, a divisionalized structure. However, Chandler and his followers have done more than argue for a contingency relationship, proposing a hierarchical ordering between strategy and structure in which strategy precedes structure.

The notion that strategy is hierarchically related to structure is widespread and occurs in very disparate theories. Mintzberg (1990: 183) argued that what he called the design school of strategic management promotes strategy as preceding structure. In his critique of Mintzberg, Ansoff (1991: 452) made the same point about strategy preceding structure. On the other hand, proponents of organizational ecology, often regarded as the antithesis of strategic management, have made the same claim. Hannan and Freeman (1984) classified organizational strategy as a core feature and administrative structure as a peripheral feature. They argued that peripheral features are premised on and adapted to core features and that changes in core features require adjustment in peripheral features, but modifications of peripheral features need not require changes in core features (Hannan & Freeman, 1984: 157).

The authors of much of the theory and research on the contingency relationship between strategy and structure have proceeded by either hypothesizing covariance (Miller, 1986) or by empirically documenting such a relationship (Habib & Victor, 1991; Miller, 1987). It is clear, however, that Chandler's original formulation and subsequent theorizing also imply a tem-

poral ordering of changes in strategy and structure: organizations diversify and then they decentralize.

The hierarchical relationship between strategy and structure Chandler proposed dominated the approach of management theorists for years. However, a different view emerged in the 1970s and 1980s. This view, originally advanced by Bower (1970), proposed structure as a cause of strategy. Others have also conceptually and empirically examined this proposition (Grinyer & Yasai-Ardekani, 1981; Hall & Saias, 1980; Keats & Hitt, 1988; Mintzberg, 1979; Pitts, 1980; Rumelt, 1974; Williamson, 1985).

Rumelt (1974) argued that a high degree of decentralization, in the form of a divisionalized structure, or M-form, increases the time and objectivity of senior managers, which in turn make it likely that they will perceive opportunities outside their areas of expertise. As a consequence, decentralization will lead to greater diversification. Following the same lines, Williamson (1985: 288) argued that conglomerates are a logical outgrowth of the M-form mode for organizing complex economic affairs. Once the merits of the M-form structure for managing separate, related lines of business were recognized, its application to less closely related activities was natural (Williamson, 1985: 288).

Mintzberg made a similar argument, although he placed greater emphasis on the role played by middle managers. In his discussion of the divisionalized structure he pointed out that the ease with which a firm can add divisions in this structure encourages it to do so and that divisionalization generates a steady stream of general managers who look for more and larger divisions to run (1979: 394). More recently, Mintzberg made a broader and stronger claim for reciprocal causality between strategy and structure:

> No ongoing organization ever wipes the slate clean when it changes strategy. The past counts, just as does the environment and the structure is a significant part of that past . . . . We conclude, therefore, that structure follows strategy as the left foot follows the right in walking. In effect, strategy and structure both support the organization. None takes precedence; each always precedes the other, and follows it, except when they move together, as the organization jumps to a new position (1990: 183).

THEORETICAL FRAMEWORK AND HYPOTHESES

Structure Follows Strategy

Chandler and others following in his footsteps have proposed a contingency relationship between strategy and structure: small, undiversified firms have simple centralized structures; large or vertically integrated firms have centralized, functionally divided structures; very large or diversified firms have with decentralized, divisionalized structures. What causal processes link specific strategies with specific structures? Why should a change in strategy lead to a change in structure?

The simple answer is economic efficiency. Chandler focused upon ad-

ministrative efficiency. He argued that an expansion of a firm's activities produced new administrative needs; unless a new structure was developed to meet these new needs, the technological, financial, and personnel economies of growth and size could not be exploited (Chandler, 1962: 16).

A more complex answer was proposed in Williamson's transaction cost model. Williamson extended Chandler's centralized-decentralized approach to structure by placing additional emphasis on the existence of a general office staff, the nature of the strategic control system (especially the incentive system), and the method for making resource allocation decisions (Williamson, 1975: 133–151). Williamson argued that the choice of structural form has implications not only for efficiency with respect to a given goal but also for effectiveness with respect to the choice of goals (1975: 132). In addition to degrading internal efficiency, a mismatch between strategy and structure can distort the "character of the strategic decision-making process in ways that favor attending to other-than-profit objectives" (Williamson, 1975: 133).

The causal processes linking changes in strategy to changes in structure are explicit in the case studies of Chandler (1962) and the analytic work of Williamson (1975). Chandler's cases suggest that structural changes are produced by severe problems after increases in diversification, particularly expansion into activities that are unrelated to an organization's previous line of business (Chandler, 1962). Williamson (1975) argued that as firms increase in diversity or size, a centralized—for example, a functional—structure produces cumulative control loss and decision overload at the top of an organization. The causal process linking changes in strategy to changes in structure is managerial action stimulated by inefficiency and poor performance (Hoskisson, 1987). Hence, we propose the following link between changes in strategy and structure:

> *Hypothesis 1: A change in product-market strategy increases the probability of a subsequent change in administrative structure.*

Strategy Follows Structure

Hall and Saias (1980), Mintzberg (1979), Pitts (1980), Rumelt (1974), and others have argued that the causal relationship between strategy and structure is reciprocal, that structure also influences strategy. What causal processes link specific structures with specific strategies? Why should a change in structure lead to a change in strategy?

Some authors have argued that the link between structure and strategy is a function of managerial cognition and managerial skill sets. The literature in this area suggests that changes in structure produce changes in cognition and skills. A change from a centralized structure to a decentralized structure alters the cognitive processes of managers and their repertoire of skills in a way that encourages diversification (Hall & Saias, 1980: 153–161; Prahalad & Bettis, 1986: 491–494). Presumably, a change from a decentralized to a centralized structure would induce reduced diversification.

A number of authors have argued that cognitive maps (Walsh, 1990), and related constructs such as world views, schemata, dominant logics, knowledge structures, et cetera, provide the foundation for managerial action (Huff, 1982; Kiesler & Sproul, 1982; Norman, 1976; Prahalad & Bettis, 1986; Weick, 1979). Furthermore, most discussions of the origins or determinants of managerial cognition have emphasized the importance of context and experience (Prahalad & Bettis, 1986). One important context involves the organizational structure and systems within which managerial action takes place. For example, operant conditioning has been proposed as a determinant of managerial world views (Prahalad & Bettis, 1986: 491–492).

Williamson (1975: 145–148) pointed out that one reason internal organization matters is that various administrative structures involve different incentive systems; the implication is that, over time, a change in incentive system changes managerial cognitions. Williamson argued that the incentive system associated with the divisionalized structure reduces opportunism. Mintzberg's (1979) argument was similar with regard to the motivational effect of the divisionalized form; he stated that middle-level managers will likely follow a strategy that is encouraged by the structure. Since the performance appraisal and incentive system of a firm is the source of many rewards (and punishments), it provides the reinforcement regime for operant conditioning and can change cognition as well as behavior (Prahalad & Bettis, 1986: 492).

A similar argument can be made for differences in the information flows and decision structures of centralized and decentralized structures. Rumelt (1974) argued that the relief from tactical decision making that often results from decentralization in the divisionalized form could provide top managers with more time and objectivity, making it more likely that they would perceive opportunities that would be overlooked in a centralized structure.

Another link between structure and strategy concerns changes in managerial skills and competencies. The differences in the information flows and decision structures of centralized and decentralized structures should induce very different sets of skills and competencies for both middle managers and top managers. Divisional managers learn to run semiautonomous or autonomous business units. Acting as the head of a division with profit and loss responsibilities requires more general skills than acting as the head of a functional unit; thus, Mintzberg described divisional managers in decentralized structures as "mini-general managers" (1983: 218). But Mintzberg argued that the primary mechanism top managers in divisionalized firms use is examination of the outputs of a standardized control system imposed on the different businesses (1983: 217–218). Thus, top managers learn to evaluate a variety of different businesses using a common, standardized flow of information.

Therefore, low centralization encourages diversification, and increased centralization presumably discourages diversification. Proponents of the structure-to-strategy link argue that the different skills, competencies, and cognitive styles developed by top-level and divisional managers in central-

ized and decentralized structures have consequences for strategy—a change in structure should lead to a change in strategy.

> *Hypothesis 2: A change in administrative structure increases the probability of a subsequent change in product-market strategy.*

Timing of Effects

Very little of the theory or research on the contingency relationship between strategy and structure deals explicitly with how changes in one attribute lead to changes in the other, but even less deals explicitly with the timing of changes. Our reading of the literature suggests that temporal effects will be similar in form but different in magnitude for the two links in the reciprocal relationship between strategy and structure. The literature on the timing of changes suggests that both links will decay over time and that changes will tend to cluster together.

However, the link from strategy to structure is based on efficiency and effectiveness, and the link from structure to strategy is based on the evolution of managerial cognitions and skills. We argue that these distinct causal processes produce differences in timing: there should be a longer time lag between structure-to-strategy changes than between strategy-to-structure changes.

Miller (1982, 1986) argued for a quantum view of change with regard to the strategy-structure configuration, and Greenwood and Hinings (1988) further developed this view. One reason these theorists have argued that the time interval between a change in one attribute and a subsequent change in the other will be brief is the substantial disruption some kinds of organizational change produce. Organizations are driven to achieve internal stability or harmony and in doing so are motivated to pursue congruence among organizational elements.

Although many organizational changes are incremental, Miller (1986: 236–237) suggested that organizations make substantial changes, like strategic or structural changes, only when it is absolutely necessary or extremely advantageous for them to do so, because such transitions produce disruption. Thus, substantial changes occur infrequently. However, when substantial changes do occur, organizations rapidly seek to alter other elements in efforts to achieve harmony, or fit. Thus, a particular type of change in one attribute produces pressure for a particular type of change in another attribute. In other words, since change is disruptive, organizations will tend to cluster changes together in time in order to minimize or shorten the disruption. This pattern has been found in several empirical studies (Amburgey, Kelly, & Barnett, 1993; Hoskisson & Galbraith, 1985; Keck & Tushman, 1993). Thus, in the quantum view of change, inertia is punctuated by change when such change is deemed necessary or beneficial for an organization.

This argument is based on the logic of managerial responses to poor performance and therefore fits well with the argument linking a change in

strategy with a subsequent change in structure. Despite Chandler's (1962: 315) observation of a time lag between strategic change and structural change, the general argument is that when strategy changes, the probability of a subsequent change in structure is initially high and then declines over time.

> *Hypothesis 3: As the time elapsed since a change in product-market strategy increases, the probability of a change in administrative structure decreases.*

What sort of temporal pattern should we expect between a change in structure and a subsequent change in strategy? We argue that the general form will be similar to that for strategy-to-structure changes but that the time lag will be significantly longer. In regard to similarity in the two patterns, we would expect that changes in strategy produced by changes in structure would occur sooner rather than later: if structure changes today, a corresponding change in strategy should be more likely to occur in 5 years than in 10 and more likely in 10 years than in 20.

> *Hypothesis 4: As the time elapsed since a change in administrative structure increases, the probability of a change in product-market strategy decreases.*

On the other hand, in regard to dissimilarity between the two patterns, it seems likely that the time required for a new structure to alter the cognitive styles and skills of managers will be greater than the time required for the information and control systems of an organization to detect poor performance. Prahalad and Bettis (1986: 492) argued that operant conditioning requires a substantial period of time to change the dominant logic of managers. We argue that the different causal processes involved in the reciprocal relationship between strategy and structure imply very different temporal patterns of events.

> *Hypothesis 5: The time that will elapse between the occurrence of changes of strategy and subsequent changes of structure is shorter than the time that will elapse between changes of structure and subsequent changes of strategy.*

Magnitude of Change

To this point we have discussed changes in strategy and structure as if they were homogenous classes of events, but this is clearly not the case. Some changes in product-market strategy involve radical transformations of domain or position, and others involve only incremental changes. Similarly, some changes of structure involve fundamental alterations of the formal and informal systems of an organization, and others involve less dramatic modifications of these attributes. We argue that the magnitude of a change in one attribute affects the likelihood that the other attribute will be changed in response.

In the case of the strategy-to-structure link, a large change in diversification should produce a greater degradation of efficiency or performance for a given structure than a small change in diversification. For an organization operating in a single business, for example, a substantial increase in the number of markets engaged in should produce a larger mismatch with its current structure than the addition of a single additional business. Similarly, the addition of businesses that are unrelated to current activities is more likely to create a mismatch between strategy and structure than the addition of businesses related to current activities (Hoskisson, 1987; Hoskisson & Hitt, 1990). The greater mismatch should produce a greater decline in performance and increase the likelihood of a change in structure.

Hypothesis 6: The greater the magnitude of a change in strategy, the greater the likelihood of a subsequent change in structure.

An analogous argument can be made for the structure-to-strategy link. Much of the discussion about structure in the strategy and structure literature has focused upon two specific structures: the functional (U-form) design and the divisionalized (M-form) design. If these were the only structural designs available, treating all structural changes as equivalent might be reasonable. Recent work in this area, however, indicates the importance of other structural forms.

First, the functional-with-subsidiaries, or mixed, form has been argued to be a viable structure. Williamson (1975) proposed this form as a transitional structure, but Child (1982: 352) argued that it can be a viable and stable design, particularly where economies of scale play a significant role. Second, the holding company, or H-form, has been argued to be viable. Williamson stated that the holding company was an inferior design because it lacked strong internal control systems. More recent work in this area, however, has suggested that for unrelated diversification, the holding company structure, which uses a financial control system, is not only viable, but may be preferable to other structures (Hill, 1988; Hill & Hoskisson, 1987; Hoskisson, 1987; Hoskisson, Harrison, & Dubofsky, 1991).

We suggest that a large change in structure produces a greater alteration of the cognitive maps and skills of organizational managers than a small change. For example, in a firm that moves from a functional structure to a functional-with-subsidiaries structure, there will be some changes in the cognition and skills of managers, but they are not likely to be drastic changes; moreover, these changes are likely to be confined to the managers of the subsidiaries. On the other hand, a firm that moves from a functional form to a multidivisional form should experience substantial alterations in the cognition and skills of its managers.

Hypothesis 7: The greater the magnitude of a change in structure, the greater the likelihood of a subsequent change in strategy.

ALTERNATIVE PROCESSES

Although we propose that pressures to maintain congruence between strategy and structure account for many organizational changes, it is important to consider and control for other important processes. In this research, we attempted to control for two classes of other processes: those involving (1) organizational characteristics and (2) environmental characteristics. These characteristics are important because they may produce changes in strategy and structure and are related to the processes we were interested in exploring; not controlling for them could have confounded our analyses.

Three organizational characteristics offered potential confounds: a firm's current level of diversification and administrative decentralization, size, and history. The arguments outlined above indicate that, at any point in time, a mismatch between strategy and structure leads to a change in one of the attributes. In most cases a mismatch is likely to occur because an attribute has been changed. However, it is possible for a firm to be founded with mismatched characteristics—a diversified strategy and a centralized structure, for example. In this case, we would expect that a decentralizing change would occur without a preceding strategic change. Separating the effects of level from the effects of change required controlling for the level of the characteristics.

Organizational growth can also lead to changes in strategy and structure independent of pressures to maintain contingency. In his analysis of the divisional structure, Williamson argued that increases in size can produce pressures to decentralize. As size increases, cumulative control losses decrease efficiency and performance; a reorganization along divisional lines resolves the problems of control (Williamson, 1975: 133). The process of growth may also lead to changes in strategy. Antitrust considerations, industry and market position, and other market factors can limit the undiversified growth available to a firm (Montgomery, 1979). The firm is then faced with a choice of further growth through diversification, or stagnation (Simmonds, 1990). Since growth can produce pressures to diversify and decentralize, an observed sequence of changes in strategy and structure could result from a factor common to both rather than from a contingency relationship.

Finally, it is important to control for the prior history of a firm. Some theory and research indicate the existence of momentum in the process of organizational change (Amburgey & Miner, 1992; Kelly & Amburgey, 1991; Miller & Friesen, 1980). To the extent that momentum exists, a change in an attribute may result from a prior change in the same attribute rather than from a contingency relationship with another attribute. The literature on momentum suggests that when analyzing organizational changes, researchers should include the prior history of such changes. Along the same lines, it is important to control for the prior history of diversifying mergers. Although firms can diversify through internal investment, the primary means

of diversifying is merger or acquisition (Hitt, Hoskisson, & Ireland, 1990). Since both changes in strategy and structure and mergers are subject to momentum and are interrelated, omission of prior history could produce a confound.

There are theoretical and empirical reasons suggesting that both strategy and structure are subject to normative processes. The institutional approach is perhaps the most significant theory of normative processes. In a normative process of change, early adopters of an organizational innovation are driven by a desire to improve performance, but as the innovation spreads, a threshold is reached beyond which adoption provides organizations with legitimacy rather than improved performance (DiMaggio & Powell, 1983: 148). Two things are implicit in this argument. First is the notion that norms change over time; the characteristics and practices that provide accountability and legitimacy are different before and after the diffusion of an innovation. Second is the notion that accountability and legitimacy are relative: the legitimacy of an organization is not evaluated by comparing it to an absolute standard but by comparing it to other organizations.

Some theorists have suggested that the trend toward use of decentralized, divisionalized structures is an example of an institutionalized change process (Mintzberg, 1983; Rumelt, 1974). This trend has been consistent ever since Du Pont and General Motors first made the use of such structures fashionable. Rumelt (1974: 77) stated the institutional argument quite plainly and argued that during the 1950s and 1960s divisionalization became accepted as the norm and that managers reorganized along product-division lines in response to external norms rather than administrative pressure.

The institutional view on structure has an empirical foundation. In a longitudinal analysis of strategy, structure, and economic performance, Armour and Teece (1979) found that early adopters of the divisionalized structure were rewarded with improved performance, but the link between structure and performance disappeared as more firms adopted the structure. Fligstein (1985) used 60 years of data on large firms and directly tested a normative diffusion model of the adoption of the divisionalized structure. Fligstein found that strategy was an important factor, but he also found very substantial support for the normative diffusion model.

In later research Fligstein (1987, 1990) examined the rise of finance personnel in large U.S. firms. This research examined how organizational strategies and structures were in turn shaped by institutionalized industry views on who should lead firms. In this manner, Fligstein was able to explain both organizational change and stability. Other research has also supported the influence of institutional processes on organizational structure (Palmer, Friedland, Jennings, & Powers, 1987; Russo, 1991).

It can also be argued that diversification became legitimized during the postwar period (Mintzberg, 1983: 149). The rise of unrelated diversification during the 1950s and 1960s represented an innovation that challenged the legitimacy of undiversified firms. The glamour of the "conglomerate com-

motion" even led the chairman of Walter Kidde and Company to say that going conglomerate was the American way of business and would soon be obligatory for all U.S. businesses (*Fortune*, 1979: 95). Although this view now appears dated, it reflects the existence of institutional pressures for diversification during that time.

If secular trends in strategy and structure are driven by pressures to imitate the behavior of other firms, then attributing observed sequences of diversifying and decentralizing changes to pressures to maintain a contingency relationship is a serious error. Furthermore, an important implication of the institutional driving of changes for the strategy-structure contingency relationship is that internal factors, such as pressures for efficiency and alterations in managerial cognition and skills, can be attenuated by other, external considerations—such as pressures for legitimacy and accountability.

A number of theorists have argued that industry context plays an important role in changes of strategy and structure. Chandler (1962) argued that firms in some industries were more likely to diversify than those in other industries because the technologies involved naturally led to related products. His discussion of different industries with different levels of divisionalization provided indirect support for his argument. Miller (1987) examined the relationship between environmental characteristics and changes in strategy and found significant links. Although Miller's study did not examine industry context directly, the dimensions examined would presumably vary across industries.

The technological factors that make diversification into related products more likely can also influence choice of administrative structure. Williamson (1975: 141) pointed out that in industries producing undifferentiated commodities (such as metal refining), a decentralized structure is more difficult to implement than it is in industries with differentiated product and brand lines. Thus, firms could exhibit a sequence of diversifying and decentralizing changes not because of a contingency relationship between strategy and structure but because of industry context.

Obviously, many other factors, such as managerial incentives and formalization, also have an impact on strategic and structural change. Our goal, however, was not to develop a perfectly specified model but to control for important factors whose absence might cast doubt upon the validity of the analyses.

DATA AND METHODS

The sample for this study consisted of 262 large firms observed from 1949 to 1977. The firms studied are those Rumelt used in his strategy-structure database (Rumelt, 1989), which contains information on product-market strategy, administrative structure, and the timing of changes in strategy and structure. The 262 large mining and manufacturing firms were selected through a random sampling of *Fortune* 500 companies. Samples of

100 firms were drawn from the 500 U.S. mining and manufacturing firms that were the largest in 1949, 1959, and 1969. An additional sample of 50 firms was drawn from the 500 firms that were the largest in 1975. After duplicate firms and firms with missing data were dropped, 262 firms remained. We extended this database through 1977 using information from annual reports and *Moody's* manuals.

A merger history for each of the firms was constructed from the 1978 Federal Trade Commission report on large mergers in mining and manufacturing. This report contains information on the time of occurrence for mergers in excess of $10 million from 1948 through 1977. Each merger or acquisition was categorized by the Federal Trade Commission as being a horizontal, market extension, vertical integration, product extension, or conglomerate consolidation.

Strategic and Structural Change

Current product-market diversification was measured with the classification system developed by Rumelt (1974, 1989). This system uses computations of a firm's specialization ratio (the proportion of its revenue derived from its largest single business) and relatedness ratio (the proportion of revenues derived from its largest single group of related businesses) to categorize the firm's level of diversification. This categorization contains nine levels of diversification, ranging from a category for single-business firms to a category for unrelated firms that have diversified without regard to the relationships between new businesses and current activities (Rumelt, 1974: 30). We assigned a value of 0 to the undiversified firms and rated the remainder in order, up to a value of 8 for unrelated firms.

Administrative structure was measured with a collapsed version of Rumelt's categories. The database contains a scale ranging from a category containing functional firms in which the major subunits are defined in terms of business functions to a category for holding companies composed of autonomous subsidiaries or divisions, so that formal organization above the divisional level is virtually nonexistent (Rumelt, 1974: 40). We collapsed the geographic division and product division categories into a single category because they both represent the same level of decentralization and because there were too few instances of firms divisionalized by geography to make the distinction useful. We assigned functional firms a value of 1, functional-with-subsidiary firms, a value of 2, divisionalized firms, a value of 3, and holding companies, a value of 4.

The information in the database and the merger history were used to construct an event history for each firm. The database itself only provides the year of a change in strategy or structure. Whenever a large merger or acquisition occurred during the year of a change, we used the date of the acquisition as the date of the change. If no large merger or acquisition occurred during the year of the change, the midpoint of the year was used as the date of the change.

The vast majority of strategic changes were in the direction of increased diversification; similarly, the vast majority of structural changes were in the direction of increased decentralization. There were too few instances of changes involving decreased diversification or increased centralization to use them in the statistical analyses. Consequently, we considered only diversifying strategic changes and decentralizing structural changes in evaluating our hypotheses.

Since our measures of strategy and structure were mutually exclusive and exhaustive categories, our use of directional changes imposed a further constraint on the analyses. Firms in the most diversified category were not at risk for a change to a more diversified category; similarly, firms in the most decentralized category were not at risk for a change to a more decentralized category. Including these firms in the risk sets would have produced a downward bias in estimates of the rates. Consequently, we excluded firms not at risk for diversifying changes from the analysis of diversifying changes and excluded firms not at risk for decentralizing changes from the analysis of decentralizing changes.

Independent Variables

A cumulative count was generated for each type of strategic and structural change occurring throughout the observed history of a firm. Each firm began with a value of 0 for the cumulative counts. After the first change of a given type, the counter was set at 1; after the second change, the counter was at 2, and so on. We used only the cumulative counts for diversifying and decentralizing changes in the analyses, to test Hypotheses 1 and 2.

A clock recording the time elapsed since the last change of a given type was also constructed. Each elapsed time clock began with a value of 0. After the occurrence of the first change of a given type, the elapsed time clock recorded the number of years (in monthly increments) since the last change. After the occurrence of the second change, the elapsed time clock was reset to 0, and it then recorded the number of years since the second change. This process continued until the end of the observation period. Only the elapsed time clocks for diversifying and decentralizing changes were used in the analyses to test Hypotheses 3, 4, and 5.

Finally, we constructed two variables recording the number of categories moved in the most recent change of strategy and structure to capture the magnitude of change. These variables took a value of 0 until the first change. After the first change, the variables recorded the difference between the starting category and the ending category. For example, a firm moving from a structural category of 1 (functional) to a structural category of 4 (holding company) would produce a magnitude-of-change value of 3. The magnitude variables would keep this value until another change of the same type occurred, and they were then updated. These magnitude-of-change variables were used to test Hypotheses 6 and 7 and also provided an additional mechanism for evaluating Hypotheses 1 and 2.

Control Variables

A variety of control variables were used in the analyses. Current levels of diversification and decentralization were included to allow us to separate level effects from change effects.

The cumulative change variables were also included in analyses of changes of the same type; that is, the number of strategic changes was included as a predictor of strategic change. Previous research has provided some evidence that there is momentum in change processes. The inclusion of prior changes of the same type allowed us to separate the effects of momentum from the effects of a change in the other attribute.

To include organizational size in the analyses, we converted the annual sales figures (in millions of dollars) provided in the *Fortune* 500 rosters or in the *Moody*'s manuals to constant dollars and added the results to the event histories. The sales figures were lagged one year; as they are highly skewed, we used the natural logarithm in the analyses.

The cumulative numbers of prior product extension and conglomerate mergers were included as control variables. The strategic management literature suggests that it is important to distinguish mode of diversification (internal investment versus acquisition or merger) from level of diversification (Lamont & Anderson, 1985; Simmonds, 1990). The inclusion of prior diversifying mergers allowed us to separate effects of increased diversification through merger or acquisition from effects of internal investment.

To control for changes due to mimicry or to economywide factors affecting all firms, we constructed variables consisting of the number of other firms in the sample making changes of each type in a given year. For firms not making a change during a particular year, all changes were used. For firms making a change during a year, we subtracted that firm's change from the total and used the adjusted total. Only the adjusted totals for diversifying and decentralizing changes were used in the analyses.

The inclusion of industry context was important but difficult to implement, given the extensive diversification that occurred among the firms in the sample. We used the *Moody*'s manuals to assign a four-digit Standard Industrial Classification (SIC) code to each firm at the beginning of the observation period to capture variations in initial conditions. We grouped the industry codes into eight broad categories: extractive, processing, equipment manufacturing, electrical and electronic equipment, textiles and apparel, consumables, other manufacturing, and wholesale and retail trade.

We used effect coding rather than dummy variable coding with the industry groups (Kerlinger & Pedhauzer, 1973). The two types of coding are similar, but in effect coding cases in the excluded category receive a -1 instead of a 0 for all of the other category variables. The difference from the overall mean rather than contrast to the excluded category then defines the effect of group membership. Although dummy variable coding is more familiar, effect coding has an important advantage: the estimates obtained do not depend upon the choice of excluded category. Since we did not have an

a priori reason for choosing any specific industry group as a reference point, we preferred a procedure in which the estimated coefficients would be the same regardless of which industry was excluded.

Analyses

Our hypotheses required the dynamic analysis of longitudinal data; moreover, they required that we be able to model several types of events as well as possible multiple occurrences of events. We used a multivariate point process model (Amburgey, 1986), which allowed us to analyze such events over time, rather than other types of dynamic models, which are suitable only for nonrepeatable events.

The dependent variables were the instantaneous rates of change in strategy and structure, defined as the instantaneous conditional probability of a change at time t, given the state of an organization at time t. The independent variables were the factors proposed as affecting this conditional probability. More formally, our dependent variables were defined as $r_j(t) = \lim[\Pr_j\{T \in (t, t + \Delta t)/\Delta t\}]$ as $\Delta t \rightarrow 0$, where $\Pr_j$ is the discrete probability of a type j event in the time interval between t and $t + \Delta t$ conditional on being at risk for the event at time t.

The rates of strategic and structural change were specified as logarithmic linear functions of the independent variables, so $r_j(t) = \exp[\beta X(t)]$, where $X(t)$ represents the values at time t of the vector of independent variables and β represents a vector of parameters representing the effects of the independent variables on the rate. We estimated the parameters by the method of maximum likelihood using Tuma's (1982) RATE program. We evaluated the statistical significance of individual parameters by calculating Fs. The goodness of fit for different models was evaluated by the likelihood ratio chi-square test.

RESULTS

Table 1 provides means, standard deviations, and a correlation matrix for the continuous independent and control variables calculated over all spells. The table of descriptive statistics also provides the frequencies of the dependent events and the industry groups.

Table 2 provides the results of the analyses for decentralizing structural changes. Model 1 includes the logarithm of sales, the numbers of prior product extension and conglomerate mergers, the adjusted number of decentralizing changes in the rest of the sample, industry variables, and the current levels of decentralization and diversification. In model 1, our baseline model, most of the control variables have significant effects; only size and some of the industry categories are not significant.

Model 2 adds prior increases in decentralization and diversification, the times elapsed since the last changes, and the magnitude of the most recent strategic change. The effect of prior diversifying changes on the rate of decentralizing changes is positive and significant, as is the effect of the mag-

TABLE 1
Descriptive Statistics

Variables	Means	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1. Product-market diversification	3.28	1.90												
2. Administrative decentralization	4.56	2.87	.42											
3. Diversifying strategic changes	0.42	0.74	.23	.34										
4. Decentralizing structural changes	0.38	0.57	.18	.46	.46									
5. Time since last diversifying change	2.63	3.71	.26	.36	.85	.46								
6. Time since last decentralizing change	2.18	3.45	.19	.47	.46	.91	.46							
7. Logarithm of sales	7.37	2.69	−.06	−.17	−.18	−.21	−.20	−.23						
8. Cumulative product extension mergers	0.55	1.10	.14	.34	.31	.21	.30	.22	−.15					
9. Cumulative conglomerate mergers	0.17	0.51	.12	.28	.36	.18	.31	.17	−.11	.27				
10. Diversifying changes: Adjusted total	5.84	4.56	−.02	−.10	−.09	−.09	−.09	−.12	−.15	−.15	−.13			
11. Decentralizing changes: Adjusted total	6.55	4.53	−.00	−.02	−.03	−.03	−.03	−.05	−.21	−.10	−.10	.73		
12. Magnitude of last diversifying change	0.96	1.80	.14	.20	.60	.34	.56	.27	.13	.13	.16	−.00	.04	
13. Magnitude of last decentralizing change	0.59	0.82	.20	.44	.41	.74	.32	.68	−.23	.18	.18	−.05	.01	.35

[a] All correlations are significant at $p < .05$.

TABLE 2
Results of Regression Analysis for the Rate of Structural Decentralization

Variables	Model 1		Model 2	
	b	s.e.	*b*	s.e.
Logarithm of sales	−.055†	.031	−.058†	.031
Cumulative product extension mergers	.410***	.111	.523***	.111
Cumulative conglomerate mergers	1.496***	.267	1.419***	.280
Decentralizing changes in the sample	.078***	.018	.054***	.018
Extractive	−.140	.332	−.397	.340
Processing	−.177	.172	.045	.179
Equipment manufacturing	−.639***	.196	−.657***	.199
Electrical/electronic equipment	.269	.258	.271	.255
Textiles & apparel	−.196	.460	−.352	.459
Consumables	−.521*	.222	−.474*	.224
Other manufacturing	.664*	.277	.533*	.282
Current decentralization	−1.625***	.158	−1.655***	.169
Current diversification	.302***	.035	.258***	.038
Decentralizing changes			.657†	.372
Diversifying changes			.713***	.196
Time since last decentralizing change			−.007†	.004
Time since last diversifying change			−.019***	.005
Magnitude of last diversifying change			.213***	.050
χ^2	332.40		395.07	
df	11		18	
Number of events	159		159	

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

nitude of the most recent diversifying change. The effect of the time elapsed since the last diversifying change is negative and significant. These estimates support Hypotheses 1, 3, and 6.

The effect of the current level of diversification is positive and significant. Even in the absence of changes in the level of diversification, highly diversified firms are more likely to decentralize their structures than are less diversified firms. The effect of current level of decentralization is, not surprisingly, significant and negative. This result is likely to be in part an artifact of our using a scale with a fixed number of categories. However, this negative effect is also consistent with an institutional process favoring the divisionalized structure—firms with a product division structure were unlikely to shift to a more decentralized holding company structure.

Parameter estimates for the prior history of structural changes suggest that there is momentum in the process of structural change. The effect of prior decentralizing changes is positive and marginally significant; net of other factors, firms that have decentralized before are more likely to do so again than are firms that have never decentralized. The effect of the time elapsed since a last change is negative and marginally significant; momentum in the process of structural change decays over time.

The effects of both types of mergers are positive and significant, although the estimated coefficient for conglomerate mergers is significantly larger (a difference of means test is significant at $p < .05$). This result indicates that mode of diversification matters; diversification through mergers and acquisitions increases the likelihood of subsequent decentralization independent of the extent of change in the level of diversification.

The number of decentralizing changes in the rest of the sample has a positive and significant effect on the likelihood that a firm will decentralize. This effect may be the result of imitation or of other economywide factors that affected all the firms in the sample simultaneously. Three of the industry groups showed significant effects. Firms that began the observation period in the equipment manufacturing or consumables groups were less likely to decentralize their structures. Firms that began the observation period in the other manufacturing group were more likely to decentralize. Finally, the effect of sales is marginally significant and negative, suggesting that, with other factors controlled, large firms are slightly less likely to decentralize their structures than are other firms.

Table 3 contains the results of the analyses of diversifying changes. It contains two models constructed in the same fashion as the analyses of decentralizing changes. The estimates for the baseline model are similar to those for the baseline model for decentralizing changes. Size and the prior number of product extension mergers do not have significant effects, nor do several categories of industry group. The remainder of the control variables have significant effects.

Model 2 adds the strategy and structure variables, the current level of decentralization and diversification, prior increases in decentralization and diversification, the times elapsed since the last changes, and the magnitude of the most recent decentralizing change. The effect of prior decentralizing changes on the rate of diversifying changes is positive but not significant; Hypothesis 2 is not supported. However, the effect of the magnitude of the most recent decentralizing change is positive and significant, providing support for Hypothesis 7. The effect of the time elapsed since the last decentralizing change is negative and significant, providing support for Hypothesis 4.

Hypothesis 5 predicts that structural changes will follow strategy changes more closely in time than strategy changes will follow structural changes. If that is so, the effect of the time since a last strategy change on the rate of structural change will be significantly larger than the effect of the time since a last structural change on the rate of strategy change. We used a comparison of means test to determine if the elapsed time coefficient from model 2 of Table 2 was significantly larger than the elapsed time coefficient from model 2 of Table 3. This test indicated that there was a significant difference between the two coefficients in the direction predicted by Hypothesis 5.

The effect of the current level of decentralization is positive but not significant. The effect of the current level of diversification is significant and

TABLE 3
Results of Regression Analysis for the Rate of Product-Market Diversification

Variables	Model 1		Model 2	
	b	s.e.	*b*	s.e.
Logarithm of sales	−.041	.031	−.020	.032
Cumulative product extension mergers	.057	.086	.103	.090
Cumulative conglomerate mergers	.840***	.128	.875***	.133
Diversifying changes in the sample	.071***	.017	.055*	.017
Extractive	.304	.253	.427	.255
Processing	−.914***	.195	−.929***	.197
Equipment manufacturing	.243	.155	.188	.156
Electrical/electronic equipment	.189	.220	.296	.214
Textiles & apparel	−.597	.371	−.746*	.374
Consumables	−.432*	.203	−.499*	.206
Other manufacturing	.701***	.201	.680***	.204
Current decentralization	.185***	.049	.019	.062
Current diversification	−.235***	.035	−.230***	.038
Decentralizing changes			.243	.201
Diversifying changes			.104	.152
Time since last decentralizing change			−.010***	.002
Time since last diversifying change			.001	.002
Magnitude of last decentralizing change			.745***	.141
χ^2	126.62		173.12	
df	10		18	
Number of events	181		181	

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

negative. This result is likely to be in part an artifact of using a scale with a fixed number of categories. However, this negative effect is also consistent with an institutional process favoring related diversification over unrelated diversification—firms following a strategy of related diversification were unlikely to shift to an unrelated diversification strategy. Parameter estimates for the prior history of strategic changes provide no support for the existence of momentum in the process of strategic change. The effect of prior diversifying changes was positive but not significant. Similarly, the effect of the time elapsed since the last change was not significant.

The estimates for the baseline variables are essentially the same as they are in model 1. The effect of size is negative but nonsignificant. The prior number of conglomerate mergers has a significant and positive effect on the likelihood of diversifying changes in strategy. However, the prior number of product extension mergers does not have a significant effect. It may be that product extension mergers are primarily an activity of extensively diversified firms that cannot be seen as moving to a more diversified category of strategy, given the categories used here, and conglomerate mergers are used by firms to change to more diversified strategies.

Earlier research on product-market strategy and diversifying mergers supports this possibility (Amburgey & Miner, 1992). The number of diversifying changes in the rest of the sample is significant and positive. Three of the industry groups have significant effects in the baseline model. Firms beginning the observation period in the processing and consumables groups were less likely to diversify, and firms beginning in the other manufacturing group were more likely to diversify.

DISCUSSION AND CONCLUSIONS

The results of this study provide substantial support for the common conception of a contingency relationship between strategy and structure. The analysis of structural changes indicates that, independent of other effects, a diversifying change in strategy greatly increases the probability of a decentralizing change in structure. Moreover, the change in structure is more likely to take place relatively quickly. The analysis of diversifying changes reveals a similar pattern. A decentralizing change in structure increases the likelihood of a subsequent diversifying change in strategy (if the structural change was large), and the change in strategy is likely to occur sooner rather than later.

However, our research supports the existence of a hierarchical relationship between strategy and structure: strategy is a much more important determinant of structure than structure is of strategy. The coefficient measuring the cumulative impact of strategic changes on structural change is both large and statistically significant, but the cumulative effect of structural changes on strategic changes is nonsignificant.

The unstandardized coefficients for the magnitude-of-change variables in Tables 2 and 3 suggest that structural change has a more powerful effect than strategic change. However, to compare the two different scales we need to examine standardized coefficients, and the standardized coefficients are almost identical. The standardized coefficient for the magnitude of the last structural change is .052, and the corresponding coefficient for the last strategic change is .053.

The net result of the cumulative change and most recent change variables is that a change in strategy is more likely to produce a change in structure than a change in structure is to produce a change in strategy. Similarly, the coefficient measuring the effect of the time elapsed since a change in strategy is almost twice as large as the coefficient measuring the effect of the time elapsed since a change in structure. In other words, changes in structure follow more closely upon the heels of a change in strategy.

The results of our analyses also indicate the importance of external factors and are consistent with a pattern of imitation and mimicry—firms were more likely to diversify or decentralize when other firms were making such changes. These results are also consistent with other economywide factors, such as tax policies and overall economic activity. Although contingency effects were stronger than the external effects measured by the

activity of other firms, this finding suggests an important boundary condition for contingency arguments. It is important to recognize that other considerations, such as legitimacy, may sometimes be as important as internal efficiency or consistency.

The effect of industry context was substantial for both structural and strategic changes. For example, beginning the observation period in equipment manufacturing or consumables decreased a firm's likelihood of experiencing decentralizing changes, apparently because many firms in these industries had divisionalized prior to the beginning of our observation period (Chandler, 1962; Fligstein, 1985). The same would seem to be true for the industry effects on strategic change.

The positive effects of prior mergers on structural change were much stronger than we expected. Simmonds (1990) pointed out that the assimilation of different cultures and operating systems is a chronic problem with diversification through mergers and acquisitions. These problems apparently reinforce pressures toward the adoption of a congruent structure. The difference in the sizes of the two coefficients for prior mergers would seem to support this argument. The unrelated diversification inherent in a conglomerate merger is likely to produce greater problems with assimilation than the related diversification involved in product extension mergers, and the conglomerate coefficient is almost three times as large as the product extension coefficient.

The effects of size were marginally significant for decentralization and not significant for diversification. In much of the discussion about divisionalization, authors have proposed both size and diversity as important (Grinyer, 1982; Grinyer & Yasai-Ardekani, 1981; Williamson, 1975). Our findings suggest that diversity is much more potent than scale, supporting the arguments of Donaldson (1982). The sample of firms studied here was, however, drawn from the largest of companies. All the firms used in our analyses were well beyond the size threshold proposed by Grinyer (1982). Organizational size has also been proposed as an important determinant of diversification (Luffman & Reed, 1982). Our results do not support such a link and are consistent with the findings of Keats and Hitt (1988).

There is evidence of a process of momentum with decentralizing changes but no evidence of momentum in diversifying strategic changes. This finding is at odds with other research on strategic momentum (Amburgey & Miner, 1992; Kelly & Amburgey, 1991; Miller & Friesen, 1980). The discrepancy may be due to differences in how change was measured in the various studies.

As always, limitations on our research should be taken into account. The dimensions used to measure strategy and structure (diversification and vertical decentralization) are limited in scope, although they represent the dominant measures used in previous work. We also do not have direct measures of the causal processes proposed as linking strategy and structure. However, our results are consistent with the existence of such processes.

Finally, the observation period used, although relatively long, may have

idiosyncratic characteristics. Michel and Shaked (1984) pointed out that 1949–69 was a stable period with low inflation and low interest rates. Moreover, the data clearly show that this was a period with consistent trends towards greater diversification and decentralization, in contrast to more recent times, in which a considerable number of firms have refocused and restructured in the opposite direction (Hoskisson & Johnson, 1992; Markides, 1992). We would argue that the causal processes described in the literature are symmetric: reductions in diversity should produce reductions in decentralization, and vice versa. Future research could assess the validity of this proposition and provide further evidence to bear on the stability of the strategy-structure contingency relationship.

Nevertheless, we believe our research has several important implications. Although there has been a prodigious amount of theorizing about and empirical analysis of the relationship between strategy and structure, very little of it has explored the implications of the different causal processes proposed as foundations for the links. Hypothesizing a reciprocal relationship between strategy and structure is not novel, and a number of theorists have done so (e.g., Burgelman, 1983; Hall & Saias, 1980; Mintzberg, 1979, 1990; Rumelt, 1974; Williamson, 1985). The authors of this work have, however, typically ignored the important differences between the causal mechanisms linking changes in strategy and structure and have generally concluded that strategy and structure should be seen as equal partners. Our results indicate that reciprocity is not the same as equality; changes in strategy are more likely to produce changes in structure than the reverse, and changes in strategy produce changes in structure more quickly than the latter produce changes in strategy.

Another intriguing implication of the analyses has to do with cumulative effects. The effects of both strategic and structural changes depend upon the magnitude of the most recent change. However, strategic changes have a cumulative effect on the likelihood of structural change: only the most recent structural change has an effect on the likelihood of strategic change. This finding suggests that a series of incremental strategic changes can cumulatively produce a large effect on efficiency. On the other hand, a series of incremental structural changes does not seem to produce as large an effect on managers' skills or cognitive maps. This pattern seems, at least to us, to be more consistent with changes in cognition than with changes in skills or competencies. Thus, we would argue that changes in cognition are the primary causal process linking strategy to structure.

Another contribution of this study is the use of time-ordered data and dynamic analysis. Almost all recent work in this area has called for longitudinal data and analyses and for dynamic theories (Child, 1982; Greenwood & Hinings, 1988; Hoskisson & Johnson, 1992; Keats & Hitt, 1988; Prahalad & Bettis, 1986; Ramanujam & Varadarajan, 1989). We suggest that the study of contingency relationships in organizations must consider changes in organizational attributes and not merely their covariance. The importance of most theories of organizational contingencies or configurations is not just that

patterns of attributes covary in a systematic way but that change in one attribute leads to a change in other attributes in a particular way. Examination of the timing and sequence of changes allows evaluation of the direction of causality and the strength or magnitude of effects in reciprocal processes.

The literature on strategy and structure is a case in point. Initially, strategy and structure were paired, but with strategy as the dominant attribute. More recently, arguments were made that structure was an equal partner in a reciprocal relationship. Our results show that strategy and structure do influence one another over time, but not equally. To paraphrase Mintzberg, strategy and structure do follow one another as the left foot follows the right—but they do not have equal strides.

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