Relationship of Firm Size, Initial Diversification, and Internationalization with Strategic Change

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What are the relationships among firm size, initial product diversity, international diversification, and abrupt change in product diversity? Data analysis using a sample of 555 firms in diverse industries from COMPUSTAT for the period 1978–90 characterizes these relationships in terms of fluidity (versus rigidity) effects. Specifically, we find that initial product diversity, international diversification, and firm size have significant linear, quadratic, and cubic effects, respectively. Significant interactive relationships among the variables reveal that increasing firm size at the extreme lower as well as higher levels enables internationally diversifying firms to change more (or less) abruptly when they have higher (or lower) initial product diversity. These effects of firm size are less pronounced at the medium levels of firm size or for firms with a low level of international diversification. These strategic choices may be explained by firm capabilities developed through experience and learning as a result of high initial product diversification and subsequent international diversification and reinforced by varying levels of resources and inertia associated with firm size.

Change and diversification have been dominant themes in the business world for decades and it is likely to be so into the next century. Most firms in their lifetime engage in diversification, downscoping, or other changes. Such changes may be essential for their very survival and success because they have implications for a firm’s assumed level of risk, access to opportunities, resources and capabilities, and efficiency and effectiveness. However, understanding of how organizations change under different conditions remains at a primitive level because research findings on strategic change have not evolved into a coherent body of knowledge (Ginsberg, 1988; Mintzberg and Westley, 1992; Rajagopalan and Spreitzer, 1997). Research on diversification also has often been characterized as mixed (Dess, Gupta, Hennart, and Hill, 1995; Ramanujam and Varadarajan, 1989; Ramaswamy, 1992). In a world filled with uncertainty and ambiguity, company executives must make their strategic decisions on the basis of personal experience, stereotypes, and intuition, but with little help from theories of change.

This state of research on strategic change is reflected when Rajagopalan and Spreitzer (1997) observe that “organization size has been found to have positive (e.g., Zajac and Kraatz, 1993) and negative (e.g., Fombrun and Ginsberg, 1990) effects on the likelihood of strategic change. The theoretical quandary of whether firm size is a source of inertia or a source of resources for strategic flexibility remains unanswered” (Rajagopalan and Spreitzer, 1997). Similarly, initial level of product diversity and international diversification can provide resources and capabilities for abrupt change in product diversification. Alternatively, they can increase bureaucratic costs, information-processing requirements, and diseconomies resulting in strategic inertia (Hannan and Freeman, 1977). Hill and Hansen (1991) reported negative relationships of initial diversification with product diversification. Researchers have generally neglected the association of international diversification to product diversification (Hitt, Hoskisson, and Ireland, 1994; Hitt, Hoskisson, and Kim, 1997). This association warrants attention because with increased numbers of companies going global, it may be essential for them to become involved in dramatic product diversification to be competitive at home and abroad (McNamee, Magnusson, Fins, and King, 1990).

In the field of organization and management theory, change theorists have addressed the question: How do (and should) organizations change? This question has evoked two conflicting responses. Some researchers have noted the benefits of abrupt change (e.g., Miller and Friesen, 1982, 1984), whereas others have advocated the virtues of gradual change (e.g., Quinn, 1980). Lamont, Williams, and Hoffman (1994) found equivocal evidence and reported that gradual transformations result in greater performance declines during the transition but they recover more quickly than dramatic changes.

The objective of this research is to test whether firm size, initial product diversity, and international diversification have enabling or disenabling effects on strategic change. I examine
them with respect to a frequently studied but still not clearly understood phenomenon: product diversification. In their widely cited review article, Ramamurthy and Varadarajan (1989) defined diversification as change in a firm’s diversity. Change in product diversity is distinguished from international geographic diversification in the sense that the former refers to resource deployment across industries, whereas the latter deals with the same across countries (Grant, Jammime, and Thomas, 1988).

**Theoretical Background**

Two contrasting models of strategic change currently dominate the literature. According to Meyer and colleagues (1990),

Almost everyone who spends much time thinking about change processes seems to conclude that the world changes in two fundamentally different modes. . . . Continuous, or first-order change, occurs within a stable system that itself remains unchanged. . . . Discontinuous, or second-order change transforms fundamental properties or states of the system.

Miller and Friesen (1982, 1984) examine and find support for distinguishing between these two models of momentum (evolutionary) and revolutionary change in organizations. Meyer and colleagues (1990) extend this perspective by applying it to both firm and industry levels. Huff, Huff, and Thomas (1992) continue its support, citing empirical as well as theoretical justification.

Several scholars from Lindblom (1959) and Cyert and March (1963) to Starbuck, Greve, and Hedberg (1978) have favored the evolutionary or gradual mode of change. They suggested that organizations should nurture small disruptions and gradual re-orientations due to sequential task interdependence as well as political, economic, cognitive, and other advantages including risk reduction and learning. More recently, researchers such as Quinn (1980) and Johnson (1988) have found a widespread role for gradual changes in organizations. Theorists in the organizational development tradition (Beckhard and Harris, 1987; Beer, Eisenhardt, and Spector, 1990) have also proposed carefully planned and orchestrated change as the preferred mode of transforming organizations. In contrast, the quantum change theorists view revolutionary or abrupt change as a way to break organizational inertia and allow organizations to quickly gain alignments among different sub-systems (Miller and Friesen, 1982, 1984).

More recently, Ginsberg (1988), Huff and colleagues (1992), and Zajac and Kraatz (1993) have proposed models, specifying conditions that propel organizations to adopt a particular strategy of change. They suggested a diametric model of pressures for change and status quo. The diametric view of strategic change posits that the extent and type of changes in strategy is the result of two opposing forces: resistance to change and the pressures for change. Resistance to change or inertia results from enduring internal forces for reliability, predictability, and convergence, and external environmental conditions described by the ecological (selection) as well as institutional theories of the organization (DiMaggio and Powell, 1983; Hannan and Freeman, 1984). Enduring organizational myths, routines, ideologies, heuristics, political coalitions’ vested interests in continuity, resistance to change, and social construction of realities contribute to inertia in organizations. Pressures for change or adaptation occur in terms of strategic demands, stakeholder and institutional pressures, and the cognitive stressors of net present value and declining performance that result from changing internal and external environmental conditions (Friesen and Miller, 1986; Huff et al., 1992; Kossek, Dass and DeMarr, 1994; Zajac and Kraatz, 1993). These stressors may favor abrupt change due to the problems or excesses of inertia and the disruptions caused by new realities or major decisions. They are likely to increase the mismatch of sub-systems internally and/or between the system and its environments externally, thereby reducing the effectiveness of current strategy.

Strategic managers continually struggle to minimize costs of being mismatched within the organization and with the external environment, and those of changing to avoid the mismatch (Ginsberg, 1988; Huff et al., 1992; Miller and Friesen, 1984). Hence, internal and external forces indicate the appropriateness of current strategy, the need for a new strategy, and the organizational capability to implement change. Whether organizations follow a gradual or abrupt model of change, thus, depends on the nature and balance of these forces which, in turn, hinges on firm size, level of product and international diversity, among other organizational characteristics. These insights and earlier research findings can be used in the study of product diversification by examining it in large sample multivariate studies in order to test the association of firm size, initial product diversity, and international diversification to abrupt change in product diversity.

**Hypotheses**

The dependent variable in the study is the degree to which organizations diversify in a gradual or in an abrupt manner. Change in product diversity may come in small increments or in big leaps. A company that changes its product line in small increments every year will be engaging in gradual change. A company that changes its products in fits and starts (e.g., major overhauls every four or five years) will be engaging in abrupt change (Dass, 1992; Dass and Moch, 1997). In the following section, I relate firm size, initial product diversity, and international diversification to present the “fluidity” and “rigidity” theses for each variable for testing in the study (Haveman, 1993; Staw, Sandelands, and Dutton, 1981).

**Firm Size**

Firm size is a frequently studied variable but its influences are controversial (Haveman, 1993; Kimberly, 1976). On the one hand, firm size can permit the organization to realize economies of size and scope. Size might allow an organization access to resources denied to smaller firms and thereby help the organiza-
tion take risks, withstand setbacks, and initiate changes (Kimberly and Evanisko, 1981). Increased size provides more market power to an organization to deal with its stakeholders in the technical as well as institutional environment (Pfeffer and Salancik, 1978). These arguments favor a fluidity of size explanation and are consistent with the adaptation theories of strategic change (Baum, 1990; Haveman, 1993; Singh, House, and Tucker, 1986; Tushman and Romanelli, 1985).

On the other hand, increased size may exert an inhibiting influence on the organization’s ability to change. Much research has shown that larger organizations tend to be more formalized and bureaucratic (Blau and Schoenherr, 1971), and formal rules and regulations can stifle innovation. Complicated structures associated with organizational size can constrain change (Huff et al., 1992). Organizations seek reliability and predictability achieved by bureaucratic procedures or organizational routines that increase inertia (Nelson and Winter, 1982; Singh et al., 1986). Large organizations may also have diverse groups of entrenched stakeholders and find it more difficult to build consensus for change (Freeman, 1984). Buffering from external influences may increase rigidity effects in large organizations as well.

Size, therefore, can be a burden as well as a boon. If economies and diseconomies of scale, scope, and specialization, and bureaucratic costs are a linear function of size, the relationship between size and diversification will be linear. If the economies/diseconomies and costs increase and decrease geometrically, then I would expect the relationship between size and diversification to follow a curvilinear path. The newly emerging inertial theories also suggest that inertial tendencies change in a complex non-monotonic relationship during the life cycle of an organization (Baum, 1990; Dass and Moch, 1998; Fichman and Levinthal, 1991). The view is consistent with Haveman’s (1993) findings of fluidity as well as rigidity effects of size that were curvilinear in nature. Therefore, according to the adaptation perspective, positive curvilinear effects of size will lead to an S-shaped curve between firm size and diversification. However, the selection perspective that focuses on negative curvilinear effects of size will lead to an inverse-S-shaped (i.e., logistic) curve between firm size and diversification. Both these curves may have minimum efficient scale or the optimal level of diversification as the inflection point, as suggested in product and international diversification by Grant and colleagues (1988) and Geringer, Beamish, and daCosta (1989), respectively. These two forms of the relationship between size and change are portrayed in Figure 1. Similar to Haveman (1993), I will competitively test both these effects. Accordingly, it is hypothesized that:

**H1a:** Firm size and abrupt change in product diversity will have a positive relationship consistent with the fluidity of size thesis.

**H1b:** Firm size and abrupt change in product diversity will have a negative relationship consistent with the rigidity of size thesis.

![Figure 1. Firm size and strategic change.](image-url)
Initial Product Diversity

Unlike size, there is little research on the role of initial diversity to subsequent diversification. However, it is plausible to assume that similar to firm size, a high level of initial diversity may have positive as well as negative influences on subsequent change in product diversity. On the positive side, high initial product diversity represents economies of scope, extensive opportunities for diversification, diverse learning avenues, and access to varied dominant logics, and other resources and capabilities for undertaking abrupt diversification. On the negative side, there are diminishing returns to diversification. Higher diversification may spread a firm too thin in its markets resulting in reduced incentives to diversify further. Diseconomies of scale, increased need for coordination, information overload, and increased information-processing requirements may increase bureaucratic costs that can wipe out positive effects and bring in inertial tendencies in organizations (Hill and Hansen, 1991).

It is expected that the effect of initial product diversity may vary, depending on its own level. For example, at some levels positive effects of initial diversity may outweigh negative effects, whereas at other levels bureaucratic costs may outstrip learning effects. Thus, I will competitively test its positive and negative curvilinear effects.

\[ H2a: \] Initial product diversity will have a positive relationship with subsequent abrupt change in product diversity consistent with the fluidity thesis.

\[ H2b: \] Initial product diversity will have a negative relationship with subsequent abrupt change in product diversity consistent with the rigidity thesis.

International Diversification

Numerous researchers have examined the role of international diversification in companies (e.g., Buhner, 1987; Geringer et al., 1989; Grant et al., 1988; Ramaswamy, 1992). However, international diversification is mostly investigated in an isolated way in simplistic models, relating it to the dependent variable of performance (Hoskisson and Hitt, 1990). Researchers have argued in favor of examining the interrelationship of international and product diversification (e.g., Hitt et al., 1994).

The relationship between international and product diversities can be positive or negative. Let us first consider the scenario for a positive relationship. Companies going to global markets are likely to face a broader diversity of customer needs and preferences. Customer expectations from global companies in the domestic and international markets are anticipated to be higher in terms of new product development. Companies in global markets need to invest in new products to be competitive at home and abroad (Prahalad, 1990). Global companies through strategic alliances or direct investment can take advantage of the human, as well as material, resources available in different countries to come up with ideas for new products. They can invest in needed research and development, and recoup their investments faster due to the economies of scale, scope, and learning resulting from global demand for products and services rendered by related and unrelated diversified firms (Kotabe, 1990). These advantages may provide further incentives to global companies by lowering their risk (Kim, Hwang, and Burgers, 1989). Lowering risk may enhance the organization’s capabilities for innovation and new product development (Hitt et al., 1994, 1997).

Global companies can use their existing competencies and build new ones for new product development by acquiring a higher level of less imitable resources and capabilities to take advantage of the global product life cycle (Hamel, 1991). Other contributions of international diversification may come in stabilizing returns or in helping to take advantage of information asymmetries (Buhner, 1987). Though firms may have limited funds and sometimes may have to choose between product and international diversification (Sambharya, 1995), international diversification is likely to reinforce the need and capabilities for product diversification over time. All these factors are likely to lead to a positive relationship between the extent of abrupt change in product and international diversification.

The opposite scenario may be less compelling but is plausible. Firms have limited financial and other resources to deal with product and market diversities in organizations. At any given time, projects in a firm compete for attention and resources. One type of diversification may be substituted with the other. Chandler’s (1962) study suggested that historically firms have become involved in product diversification before international diversification. However, currently, firms may undertake international diversification to take advantage of their specialized distinctive competencies before embarking on product diversification. This implies a negative relationship between international diversification and abrupt change in product diversity.

The most likely scenario is that international diversification and product diversification may compete at some levels, whereas both may reinforce each other at other levels. It implies that they may have a curvilinear relationship. Hence, I will competitively test for positive and negative curvilinear effects, as follows:

\[ H3a: \] International diversification will have a positive relationship with subsequent abrupt change in product diversity consistent with the fluidity thesis.

\[ H3b: \] International diversification will have a negative relationship with subsequent abrupt change in product diversity consistent with the rigidity thesis.

Interactions

Researchers have come across nonsignificant effects of some of the antecedents involved in this study. For instance, Kelly and Amburgery (1991) and Wiersema and Bantel (1993) reported null findings with respect to firm size. Consistent with
the models conceptualizing the dynamics of forces resisting
and favoring change—stressors and inertia (Ginsberg, 1988;
Huff et al., 1992; Zajac and Kraatz, 1993), the relationships
of firm size, initial product diversity, and international diversi-
fication may not only depend on their own levels (the curvilin-
ear effects already hypothesized above), they may also depend
on the level of one another. Therefore, I hypothesize the fol-
lowing interactions.

**FIRM SIZE × INITIAL PRODUCT DIVERSITY.** If firm size and initial
product diversity each can have fluidity or rigidity effects,
their combined effects are expected to be more than the sum
of their parts because they work in a synergistic way to provide
economies of scale and scope, resources and opportunities,
and capabilities to take advantage of them. Alternately, each
may reinforce the inertial tendencies of the other. Therefore,
I will test their moderating effects, as follows:

- **H4a:** Firm size will moderate the positive relationship be-
  tween initial product diversity and abrupt change in
  product diversity.
- **H4b:** Firm size will moderate the negative relationship be-
  tween initial product diversity and abrupt change in
  product diversity.

**FIRM SIZE × INTERNATIONAL DIVERSIFICATION.** Apart from
their main effects, it is expected that the effect of change in
international diversity will depend on firm size because of the
joint effects of the economies of firm size and the economies
of international diversification. The reverse will be true to
the diseconomies of size and bureaucratic cost involved in
international diversification. Hence,

- **H5a:** Firm size will moderate the positive relationship be-
  tween international diversification and abrupt change in
  product diversity.
- **H5b:** Firm size will moderate the negative relationship be-
  tween international diversification and abrupt change in
  product diversity.

**INITIAL PRODUCT DIVERSITY × INTERNATIONAL DIVERSIFICATION.**
The level of international diversification may moderate the
effect of initial product diversity because a firm with diverse
products can have much better access to varied markets. A
firm with fewer products will have only limited markets to
choose from. Alternately, a product diversified firm already
has the complexity and coordination requirements and may
have to come up with administrative or communication innov-
ations before it can embark on international diversification.
Hence,

- **H6a:** International diversification will moderate the posi-
  tive relationship between initial product diversity and
  abrupt change in product diversity.
- **H6b:** International diversification will moderate the nega-
  tive relationship between initial product diversity and
  abrupt change in product diversity.

**FIRM SIZE × INITIAL PRODUCT DIVERSITY × INTERNATIONAL DI-
VERSIFICATION.** Over and above the two-way interactions, it
is plausible to assume that these three variables have their
synergistic effects on the magnitude of change because they
all can provide incentives as well as disincentives for abrupt
change in product diversity. For example, a large highly diver-
sified firm such as General Electric, NEC, or Mitsubishi with
high international diversification can make a subsequent
abrupt change in product diversity because of its level of
capital, expertise, and access to diverse products and markets
in numerous countries of the world. Alternately, a large highly
diversified company such as ITT with high international div-
ersification can suffer from communication and coordination
problems that may hinder their subsequent abrupt product
diversification. Both effects are theoretically credible; hence,
are best left to the empirical analysis. Thus,

- **H7a:** There will be a positive three-way interaction among
  firm size, initial product diversity, and international
diversification with respect to abrupt change in prod-
  uct diversity.
- **H7b:** There will be a negative three-way interaction among
  firm size, initial product diversity, and international
diversification with respect to abrupt change in prod-
  uct diversity.

Figure 2 depicts the relationships hypothesized in the study.

**Methods**

**Sample**

Data used to assess the hypotheses were retrieved from the
COMPUSTAT II database. The sample constituted 555 compa-
nies registered on U.S. stock exchanges and reporting com-
plete data on the variables of interest. Represented industries
range from mining to manufacturing to service. Their Standard
Industrial Classification (SIC) codes were from 10 to 87, with
the inclusion of 99 (which represents the conglomerates). The
sample included a wide range of small, medium, and large
organizations. Size of the organizations, measured in terms
of number of employees, varied from 11 to 130,254, with an
average of 4839. The time span for variables in the study was
from 1978–90, similar to Grant and colleagues (1988). The
only exception was the international diversification variable,
which was measured from 1984–90 because of unavailability
of its data from 1978–84.

**Measures**

**DEPENDENT VARIABLE.** Product diversity was measured using
entropy measures (Palepu, 1985). Entropy measures, devel-
oped in industrial organization economics (Jacquemin and
Berry, 1979), are now commonly used in the strategic manage-
Figure 2. Hypothesized relationships (Industry performance, firm risk, and slack were used as controls. $H_1$ to $H_3$: main effects; $H_4$ to $H_6$: two-way interactions; $H_7$: three-way interaction.)

The constructs of change in product diversity and change in international diversity have been operationalized using entropy or Herfindahl measures previously (e.g., Grant et al., 1988; Hill and Hansen, 1991; Wiersema and Bantel, 1992, 1993). The degree of abrupt change in total product diversity was measured by calculating the total variance of annual changes in product diversity over the time period of the study, following Miller and Friesen (1982) who used standard deviation as a measure of gradual–abrupt change. Note that the gradual–abrupt change is defined in terms of fluctuations in annual changes of product and international diversity. Therefore, what is important is not the absolute amount of annual change, but the fluctuations in annual changes. Higher fluctuations lead to higher standard deviation or variance, and lower fluctuations lead to lower standard deviation or variance (Miller and Friesen, 1982, 1984). Mathematically, an organization making no changes or identical annual changes throughout the period would yield zero variance, representing extremely gradual change. Another company that changes in fits-and-starts (e.g., no changes for four years and large change in the fifth year) will reflect abrupt change. A similar variance measure is used by Finkelstein and Hambrick (1990) in studying firm-level change. Our measure is strongly correlated ($r = 0.73$) with another measure of abrupt change in product diversity at the firm level. The other measure is computed as standard error of the regression coefficient of product diversification from 1978 to 1990 when diversification is regressed on time (Dass and Moch, 1997; Keats and Hitt, 1988). It is the firm-level equivalent of Dess and Beard’s (1984) industry dynamism.

**EXOGENOUS VARIABLES.** Firm size was measured by calculating the log of the total number of employees in the company. The logarithmic transformation was used as it helped reduce the degree of skewness in the measure of size (Blau and Schoenherr, 1971; Kimberbly, 1976). I used the total number of employees instead of assets or sales, which were employed for computing performance (adjusted return on assets) and entropy measures of diversity (that consider proportion of sales in different industry segments) to avoid overlap among the exogenous variables and between the exogenous and dependent variables. Initial product diversity was the entropy measure in 1978. International diversity was also computed using entropy measures (Kim et al., 1989; Vachani, 1991; Hitt et al., 1997). Its average for the period 1984–90 varied from 0 to 1.42, with a mean of 0.12. International diversification was measured as change of international diversity from 1984–90 (Grant et al., 1988).

**Controls**

To isolate the relationships of the exogenous and endogenous variables in the study, it was deemed necessary to control for
Table 1. Means, Standard Deviations, and Correlations

<table>
<thead>
<tr>
<th>Variables</th>
<th>Means</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Change in product diversity</td>
<td>-0.05</td>
<td>0.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Industry performance</td>
<td>0.09</td>
<td>0.94</td>
<td>-0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Risk</td>
<td>-0.04</td>
<td>0.91</td>
<td>-0.03</td>
<td>0.03</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. Slack</td>
<td>-0.02</td>
<td>0.85</td>
<td>-0.05</td>
<td>0.02</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Firm size</td>
<td>-0.02</td>
<td>0.97</td>
<td>0.07</td>
<td>-0.06</td>
<td>-0.20</td>
<td>-0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Initial product diversity</td>
<td>-0.23</td>
<td>0.87</td>
<td>0.31</td>
<td>-0.01</td>
<td>-0.07</td>
<td>-0.07</td>
<td>0.31</td>
<td></td>
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<tr>
<td>7. International diversification</td>
<td>-0.02</td>
<td>1.01</td>
<td>0.04</td>
<td>0.03</td>
<td>-0.06</td>
<td>-0.04</td>
<td>0.01</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

*n = 555.

Correlations equal to or greater than 0.07 are significant at the 0.10 level; those equal to or greater than 0.08 are significant at the 0.05 level; those equal to or greater than 0.11 are significant at the 0.01 level, and those equal to or greater than 0.14 are significant at the 0.001 level (two-tail tests).

Analysis

The dependent variable of the degree of abrupt change was continuous and was subject to hierarchical regression analyses using ordinary least squares. Since the sample contained companies from different industries, the company-level independent and dependent variables were standardized with respect to their two-digit SIC code level industry means (computed from all companies of the particular industry in the sample) to render the measures comparable across industries.

Results

Table 1 presents the means, standard deviations, and correlation matrix. As can be noted from the means and standard deviations, the independent variables were standardized with mean = 0 and standard deviation = 1. Inspection of the correlations among the variables reveals that most variables have weak to moderate correlations among themselves. The quadratic and cubic terms were computed after standardizing the linear term to help reduce the variance inflation to acceptable levels.

The results of the hierarchical regression analyses are presented in Table 2. The first step was to enter the control variables. Hypothesized linear, quadratic, and cubic terms of the main effects were added to the control variables in steps 2 to 5. Steps 6 to 10 involved addition of two-way and three-way linear, quadratic, and cubic interaction terms in the usual order. The first column depicts standardized regression coefficients at the point of entry in the hierarchical regression. The second column reveals the same in the full multiple regression model. Cohen and Cohen (1983) recommend measuring significance at the point of entry and using coefficients in the full model for plotting the curves.

In the study, all regression equations of study variables (see Table 2) generated statistically significant F-ratios (*p* < 0.05). The control variables were not found to be statistically significant. The hypothesized variables explained a significant additional variance (R²) to the control model. The first hypothesis tested the effect of firm size. The results did not support a
Table 2. Results of Regression Analysis

<table>
<thead>
<tr>
<th>Exogenous Variables</th>
<th>β at Entry</th>
<th>β in Full Model</th>
<th>R²</th>
<th>Adj. R²</th>
<th>F</th>
<th>df</th>
<th>ΔR²</th>
<th>ΔF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Control variables</td>
<td></td>
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<tr>
<td>Industry performance</td>
<td>0.00</td>
<td>−0.01</td>
<td></td>
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<tr>
<td>Firm risk</td>
<td>−0.03</td>
<td>−0.02</td>
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<tr>
<td>Firm slack</td>
<td>−0.11†</td>
<td>−0.08</td>
<td></td>
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<tr>
<td>Firm slack</td>
<td>0.08</td>
<td>0.05</td>
<td>0.01</td>
<td>0.00</td>
<td>0.82</td>
<td>4,550</td>
<td>0.01</td>
<td>0.82</td>
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<tr>
<td>Step 2</td>
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<tr>
<td>Firm size</td>
<td>−0.03</td>
<td>−0.23***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial product diversity</td>
<td>0.32***</td>
<td>0.22***</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>International diversification</td>
<td>0.06</td>
<td>0.02</td>
<td>0.10</td>
<td>0.09</td>
<td>8.79***</td>
<td>7,547</td>
<td>0.10</td>
<td>19.29***</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
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<tr>
<td>Firm size²</td>
<td>0.08†</td>
<td>−0.02</td>
<td></td>
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<td>8.61***</td>
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<td>8.81***</td>
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<td>−0.21†</td>
<td>0.22</td>
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<td>0.51***</td>
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n = 555.

Standardized regression coefficients are reported and p-values are for two-tail tests. Variables in the hierarchical regression were entered in the following sequence: Control variables, linear main effects, quadratic main effects, cubic main effects, two-way interactions (product of linear, quadratic, and cubic terms), and three-way interactions (product of linear, quadratic, and cubic terms), as recommended (Cohen and Cohen, 1983).

Discussion

The objective of this research was to document the relationship of several well-known variables with gradual–abrupt change in product diversity, while controlling for other relevant vari-

linear relationship. There was marginal support for a quadratic one, whereas the cubic relationship was strongly supported. The curve shows a largely positive effect (Hypothesis 1a; Figure 3). Data supported linear positive effects of initial product diversity (Hypothesis 2a) but not its quadratic effects (not shown in Table 2). Hypothesis 3 examined the relationship between international diversification and abrupt change in product diversity. There was no support for the linear relationship. However, the quadratic relationship was supported. Its direction was positive, resulting in a U-shaped relationship.

I hypothesized two-way and three-way interactions of firm size, initial product diversity, and international diversification. Interactive relationships of firm size with initial product diversity and with international diversification were supported, with linear, quadratic, and cubic effects. I did not find any evidence of the two-way interaction between initial product diversity and international diversification (not shown in Table 2). Three-way interaction among the variables was significant, with initial product diversity moderating the effects of international diversification with the linear, quadratic, and cubic effects of firm size, as depicted in Figure 4. These curves reveal that increasing firm size inclines an internationally diversified firm to make more abrupt change in product diversity when it has high initial product diversity. However, increasing firm size influences an internationally diversified firm to make more gradual change in product diversity when it has low initial product diversity. These effects are more pronounced at extreme levels of firm size than at the average firm size in an industry. The effects of firm size in firms with low internationalization are far less pronounced.
Figure 3. Results of the relationship of firm size and abrupt change \[ Y = -0.21 \times \text{size} + 0.09 \times \text{size squared} + 0.22 \times \text{size cubed} \] (Multiple regression model at step 4).

Figure 4. Interaction of firm size, initial product diversity, and international diversification. (—— High international diversification and high initial product diversity; -- -- Low international diversification and high initial product diversity; - - - Low international diversification and low initial product diversity; - - - - High international diversification and low initial product diversity.)

Initial product diversity and international diversification had positive and U-shaped relationships with abrupt change in product diversity, respectively. Firm size was found to have a significant cubic effect. The slope of the curve was positive.
at the lower and higher levels, whereas it was almost flat for the medium-sized firms. The findings of this study largely support the fluidity thesis of firm size, initial diversity, and international diversification favored by the adaptation perspective in contrast with the rigidity thesis of the selection perspective.

I also found support for interactive effects of the study variables. Significant interactive effects imply that the relationships of these antecedents with change depend on the level of one another. Therefore, the main effects need to be interpreted cautiously. The results reveal the complex nature of the relationships of strategic change and its antecedents, as postulated in the emerging inertial theories (Baum, 1990), pointing toward the utility of combining the adaptation and inertial theories (Haveman, 1993; Singh et al., 1986). Overall, I conclude that increasing firm size at the extreme lower and higher levels enables internationally diversifying firms to change more abruptly when they had higher initial product diversity, whereas it motivates them to change more gradually when they had lower initial diversity. These effects of firm size are less pronounced at the medium levels or for firms with low levels of international diversification.

The results of this study should be interpreted in view of its limitations. The sample included all the companies for which data on the study variables were available for the time period of the study. This represents a convenient sample, although it is better than taking a random sample of the convenient sample, as is often done in studies based on archival data. The results of the study should be considered tentative unless they have been replicated in other contexts. In addition, data on almost all the independent and the dependent variables were from the same period. The use of the word “effect” or “influence” is derived from theory rather than directly from the data.

The present study did not include all antecedents of their multiple dimensions. The focus was to examine relationships of abrupt change in product diversification with a limited number of fairly well known antecedents. It also did not investigate the consequences of gradual-abrupt change. The study illustrates the benefit of analyzing a particular dimension of change with respect to its antecedents rather than a generic variable of change, which is often done in studies of strategic change. This study needs to be complemented by research examining dimensions such as related-unrelated change and convergent-divergent change to distinguish among multiple dimensions of change in order to specify different models of change, their antecedents, and consequences. Further research also needs to examine other antecedents of this dimension of change and their alternative operationalizations (Dass and Moch, 1997, 1998).

Although they compare favorably with the range of 0.0004 to 0.05 reported in a meta-analysis of comparable studies on organizational change (Robertson, Roberts, and Porras, 1993), the R² values are moderate. Another study of the effects of a similar set of variables including performance, size, and industry concentration reported an R² of 0.06 in their control model (Wiersema and Bantel, 1992). The R² of other studies that can be considered closest cannot be directly compared because they used logistic or generalized least squares regression and did not provide R² (Ginsberg and Buchholtz, 1990; Haveman, 1993; Hoskinson and Galbraith, 1985; Miller and Friesen, 1982). Further research can improve upon these results by considering other variables and additional measures of both exogenous and dependent variables. Considering multiple dimensions of performance, other variables and strategic change should improve the predictive utility of the sorts of models specified herein.

Conclusions

This study examined the relationships of firm size, initial product diversity, and international diversification with strategic change. These antecedents were found to have significant relationships with the degree of abrupt change in product diversity. This study makes a significant contribution to research on strategic change in several ways. First, the focus of the study was to examine the relationship of several well-known antecedents with a well-defined dimension of change in product diversity. I found strong support for the complex effects of firm size, initial product diversity, and international diversification, largely supporting the fluidity thesis instead of the rigidity thesis. Second, it answers a call by Dess and colleagues (1995) to decompose the aggregated variable of diversification and provides an illustration of how researchers can examine a dimension of change in a bid to go beyond earlier research on change or diversification. Third, the study investigated and found significant association of the pattern of change in product and international diversification, an area to which Hitt and colleagues (1994, 1997) have drawn particular attention. Last, the study integrated ideas from the change and diversification streams of literature informing each stream with research from the other area. The observed patterns of relationships advance understanding of the phenomenon of change in organizations and should stimulate theoretical speculation and further empirical testing.

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References


