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ENVIRONMENTAL UNCERTAINTIES**

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**August 12, 1993**

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## **DIVERSIFICATION RESPONSES TO ENVIRONMENTAL UNCERTAINTIES**

This study develops and tests a behavioral model of diversification responses to environmental uncertainties. Regression results using an international data set provide strong support for the general proposition that uncertainties associated with different environmental components--political, government policy, macroeconomic, competitive, input, and product demand uncertainties--have different implications for firm product and international market diversification.

Strategy research on diversification has emphasized the return and risk implications of alternative product diversification patterns (e.g., Bettis & Hall, 1982; Bettis & Mahajan, 1985; Montgomery & Singh, 1984; Rumelt, 1974). Risk reductions derive from holding a broad portfolio of products with returns that are less than perfectly correlated. Diversification also reduces risk by creating options to shift corporate resources among various markets. A presence in multiple markets can be viewed as holding a set of call options to expand production in the various product lines (Myers, 1977). Management exercises such options when shifts in demand, competition, or other environmental factors make expansion in a particular market profitable. Focusing on the option characteristics of investing in multiple markets highlights the contribution of diversification to corporate flexibility.

In addition to product diversification, firms also diversify by changing the scope of geographic markets served. International management research has documented the risk-reduction associated with corporate international market diversification (e.g., Kim, Hwang, & Burgers, 1989; Miller & Pras, 1980; Rugman, 1979). Applying the concept of option value to international expansion, Kogut (1983; 1985) proposed multinational firms have a competitive advantage over purely domestic firms due to the flexibilities associated with being present in diverse international markets. Kim, Hwang, and Burgers (1993) argue international diversification results in increased flexibility in responding to competitors, changes in relative prices across countries, and country-specific fluctuations in supply and demand.

Both product and international market diversification create options resulting in increased corporate flexibility. Such options have no value in a static environment. However, option pricing theory (Black & Scholes, 1973) indicates option value increases with the uncertainty of the price of the underlying asset. That is, the larger the variance in the underlying stock or commodity price, the greater the option value. Similarly, the strategic options associated with diversification increase in value as environmental uncertainty increases. Strategy writers acknowledge this proposition in normative discussions of the desirability of product and geographic market flexibility under conditions of environmental uncertainty (e.g., Baldwin, 1986; Kogut, 1985; Lessard & Lightstone, 1986).

It is unlikely that the environmental uncertainties driving product diversification would be the same as

those driving international market expansion. Just as corporations use interest rate, foreign exchange, and commodity price options to hedge risks associated with specific environmental contingencies, they can also design strategic risk management responses to specific environmental contingencies. For example, product diversification may do little to hedge domestic interest rate or foreign exchange rate exposure. On the other hand, international market diversification through export or foreign direct investment may provide the options necessary to hedge these home country macroeconomic risks.

This research addresses the question of whether firms undertake product and international market diversification when faced with environmental uncertainties. Furthermore, the study seeks to differentiate those uncertainties motivating product diversification from those motivating international diversification. A basic contention driving this research is that the chosen strategic responses to environmental uncertainties vary with the types of uncertainties managers perceive. In order to address this issue, the study evaluates a unique international data set rather than focusing solely on firms in a single country. Using an international sample allows us to examine the strategic implications of the uncertainties recognized in international management research--political, government policy, and macroeconomic uncertainties--as well as the uncertainties generally acknowledged by strategy researchers--competitive, input supply, and market demand uncertainties.

The study begins with a background discussion of the role of diversification in strategic flexibility. The subsequent section develops hypotheses linking uncertainty regarding specific environmental components to changes in product and international market diversification. The hypotheses are then tested empirically and the results discussed.

## **STRATEGIC FLEXIBILITY AND CORPORATE RISK MANAGEMENT**

### **Strategic Flexibility**

The emphasis on investment in entry and mobility barriers as sources of competitive advantage in early industrial organization economics and strategy research grew out of a theoretical framework focusing on static analysis rather than competitive dynamics (Bain, 1956; Porter, 1980). In a static context, flexibility has no inherent value and competitive advantage is achieved through sunk cost investments (Baumol, Panzar, & Willig, 1988). Flexibility involves duplication of tasks, skills, equipment, suppliers, and buyers, as well as inefficient

diversification of corporate activities. Such redundancies are unnecessary inefficiencies in a static environment. From a static analytic perspective, flexibility results in suboptimal use of firm resources and leaves the firm vulnerable to competitors with cost focus or differentiation focus strategies (Allaire & Firsirotu, 1989; Porter, 1985; Wernerfelt & Kamani, 1987).

Flexibility can, however, stabilize firm performance and increase the probability of firm survival when environments are changing and uncertain (Fiegenbaum & Kamani, 1991; Hannan & Freeman, 1977). Low sunk costs (i.e., high liquidation value of assets) are associated with increased flexibility to redeploy assets in response to changes in other firms' competitive strategies (Aggarwal & Soenen, 1989). Flexibility increases when firms decrease the cost and increase the speed of organizational adaptation to uncertain environmental factors (Eppink, 1978; Hall, 1983; Porter, 1985).

According to Aaker and Mascarenhas, "Strategic flexibility may be defined as the ability of the organization to adapt to substantial, uncertain, and fast-occurring (relative to required reaction time) environmental changes that have a meaningful impact on the organization's performance" (1984: 74). By contrast, Harrigan states, "Firms face strategic inflexibility when they cannot redeploy their assets without friction" (1985: 125).

The most widely cited examples of flexibility in the strategy literature are product and geographic market diversification (Aaker & Mascarenhas, 1984; Allaire & Firsirotu, 1989; Ansoff, 1988; Eppink, 1978; Krijnen, 1979; Mascarenhas, 1982; Milliken, 1987; Vernon, 1983). Diversification reduces firm risk through involvement in various product lines and/or geographic markets with returns that are less than perfectly correlated. Diversification also enhances flexibility by increasing the variety of available marketing channels (Aaker & Mascarenhas, 1984). As noted earlier, product and international market diversification can be seen as investments in real options. The flexibility associated with these options result in enhanced corporate risk management capabilities above and beyond simple portfolio investment.

In addition to product and international market diversification, the other common concept of flexibility in strategy discussions is operational flexibility. Operational flexibility includes the capability to rapidly change suppliers (Aaker & Mascarenhas, 1984), adjust production quantity and design (Buzacott & Yao, 1986; De

Meyer, et al., 1989; Krijnen, 1979; Swamidass & Newell, 1987; Wheelwright, 1984), and relocate production to different sites (Kogut, 1983).

### **Why Manage Corporate Risk Through Diversification?**

While it is possible to argue that flexibility reduces corporate risk, we need to consider why product and international market diversification should be undertaken within the firm rather than through diversification of investors' portfolio holdings. The asset pricing literature (e.g., Lintner, 1965; Ross, 1976; Sharpe, 1964) predicts that firms should be risk neutral in their financial and strategic behavior due to the availability of diversification opportunities for individual investors through financial markets. As a rebuttal to this conclusion, a number of authors have addressed the motives for managing corporate risk (Amihud, Dodd, & Weinstein, 1986; Amihud & Lev, 1981; Amit & Wernerfelt, 1990; Barnea, Haugen, & Senbet, 1985; Bettis, 1983; Dufey & Srinivasulu, 1985; Jensen & Smith, 1985; Marcus, 1982; Shapiro & Titman, 1986). One of the key arguments for managing risk is that financial market failures (or corporate restrictions on the sale of stock held by managers) may not allow managers and employees to diversify their firm-specific human capital investment. From this perspective, managerialism results in risk averse strategic and financial decisions.

It could also be the case, however, that even well diversified owners have an interest in reducing firm-specific risk. This is the case to the extent that performance volatility decreases firm performance. That is, to the extent that there exists a negative risk-return relation, managers and owners share a common interest in risk reduction. Amit and Wernerfelt (1990), Bowman (1982), Cornell and Shapiro (1987), Fiegenbaum and Thomas (1986, 1988), and Shapiro and Titman (1986) provide a variety of theoretical arguments supporting negative risk-return relations. The empirical studies of risk-return relations exhibit conflicting results with some researchers finding negative relations and others positive (Fiegenbaum & Thomas, 1988; Miller & Bromiley, 1990).

In the international context, the lack of equity market development in many countries provides a basis for arguing that both owners and managers have strong incentives to diversify into product and international markets that are inaccessible through arms-length portfolio transactions. Given the inefficiencies (or nonexistence) of capital markets in many countries, international diversification through export or foreign direct investment may result in diversification opportunities beyond those possible through portfolio investments.



## THEORY AND HYPOTHESES

In order to explain diversification changes resulting in increased flexibility, this research draws on the behavioral theory of the firm (BTOF) developed by Cyert and March (1963). Cyert and March highlighted three concepts explaining organizational change. First, the BTOF proposed that firms avoid uncertainty. According to Cyert and March, firms exhibit uncertainty avoidance in attempts to stabilize performance through negotiating favorable external environments or adjusting internal operating procedures. Second, the discrepancy between organizational performance and aspiration levels, i.e., attainment discrepancy (Lant & Montgomery, 1987), induces search procedures, which upon generating a satisficing alternative result in organizational change. Third, the BTOF emphasized the role of organizational slack as a moderator of firm responsiveness to attainment discrepancies and uncertainties.

Following the BTOF, the model tested here incorporates measures of attainment discrepancy, organizational slack, and multiple uncertainties. The ensuing discussion develops specific hypotheses relating uncertainties to changes in product and international market diversification. This is followed by a discussion of the roles of attainment discrepancy and slack in diversification changes.

### **Strategic Responses to Uncertainties**

The general proposition underlying the hypotheses in this section is that perceived environmental uncertainties should be positively related to diversification changes increasing strategic flexibility. As noted in the earlier discussion of strategic flexibility, both organization theory and strategy researchers have affirmed the reasoning behind this proposition.

Aaker and Mascarenhas (1984), Mascarenhas (1982), and Wernerfelt and Karnani (1987) each argue that the choice of an appropriate strategy depends on the particular uncertainties encountered by the firm. The notion that firms respond to specific environmental uncertainties is consistent with Miles and Snow's (1978) argument that managers, in attempting to deal with environmental uncertainties, allocate intraorganizational resources to subunits charged with responding to uncertain environmental contingencies. The budgetary priority given to subunits dealing with uncertain contingencies results in strategic responses to specific uncertainties.

The hypotheses consider the relations of six categories of environmental uncertainties--political, policy,

macroeconomic, competitive, input supply, and product demand--to changes in product and international diversification. Miller (1992) provided the theoretical basis for this classification of managerially-relevant uncertainties. While international management research has given extensive attention to political, government policy, and macroeconomic uncertainties, these considerations have not been widely integrated with strategic management's emphases on competitive, input supply, and product demand uncertainties.

Wherever possible, the existing literature motivates the hypotheses. However, given its frequent failure to distinguish different types of environmental uncertainties as well as the paucity of theoretical and empirical research linking uncertainties to changes in strategies, the existing literature offers limited guidance to motivate specific hypotheses. As such, the hypotheses put forward in this section should be viewed as tentative starting points for examining the relations. While they are grounded in the theoretical discussions found elsewhere, the precise specification of many of the hypotheses deals at a level of detail not addressed in previous research.

Table 1 summarizes the hypothesized relations between the perceived environmental uncertainties and the two diversification responses. The hypotheses point out the particular uncertainties most likely to be relevant in explaining specific flexibility changes. Positive and negative signs in Table 1 indicate the direction of the hypothesized relations. A zero indicates no significant relation is expected. The table also indicates the signs of the hypothesized relations with attainment discrepancy. The discussion of the rationales for the attainment discrepancy hypotheses follows the specification of the hypotheses linking diversification responses to environmental uncertainties.

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Insert Table 1 about here  
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**Product Diversification.** A fundamental rationale for product diversification is reduction in the proportion of a firm's income stream susceptible to product-specific competitive and market demand uncertainties. If managers are risk averse, they may seek to reduce their exposure to product-specific uncertain factors through product diversification. As such, changes in product diversification are hypothesized to be positively related to both competitive and product demand uncertainties. Theoretical support for the proposition that investment in product diversification results in an improved risk-return profile can be found in the portfolio theory finance studies

begun by Markowitz (1959). Similarly, Salter and Weinhold (1979) discuss risk-reduction as a motive for product diversification. Investment in positioning the firm in multiple product markets also serves as a foothold for taking advantage of emerging consumer trends. The establishment of such footholds may be particularly relevant in emerging markets where the eventual level of consumer demand is unclear.

To the extent that firms diversify into related product lines requiring similar inputs, product diversification will not diversify firms' exposures to input market uncertainties. However, the measure of product diversification used in this study incorporates both related and unrelated diversification (which, as discussed in the measurement section, were positively correlated). Unrelated diversification will reduce firm input risk to the extent that it involves expansion into product lines that require distinct inputs from those used in existing production. Thus, a positive relation should exist between input uncertainty and product diversification.

There is no clear a priori reason to expect product diversification to be significantly related to policy, political, or macroeconomic uncertainties. That is, unlike international market diversification, product diversification does not appear to reduce corporate exposure to a particular political or macroeconomic regime. Unrelated product diversification could, however, be a relevant means of coping with policy uncertainty if the impact of government policy changes differs across industry groups. Nevertheless, this effect is probably small relative to the impact of input, product demand, and competitive uncertainties in explaining changes in product diversification. As such, Table 1 indicates no significant relations between policy, political, and macroeconomic uncertainties and changes in product diversification.

**International Market Diversification.** While it is certainly possible to diversify geographically within a given country, this research looks at geographic flexibility in terms of expansion into foreign markets. The composite foreign market diversification proxy sums indicators of changes in participation in foreign markets through exports as well as investment in foreign marketing, sales subsidiaries, and production. While these are sometimes considered alternative foreign market entry strategies, changes in these four foreign market strategies are positively correlated in the data.

As is the case with product diversification, the managerial motive for diversifying into foreign markets is the potential for reducing the volatility of a firm's aggregate income stream. Diversification into foreign

markets is hypothesized to be primarily a function of national-level uncertainties. The phenomenon of capital flight out of highly uncertain less developed countries indicates that both individuals and firms seek safe havens for their assets when faced with uncertainty in their home country. Vernon (1983) suggests that investment in foreign markets is positively related to domestic political uncertainty. Aaker and Mascarenhas (1984) contend that diversification into foreign markets reduces a firm's income stream sensitivity to country-specific economic and political factors. If these contentions are correct, positive relations should be observed between international geographic diversification and home country policy, political, and macroeconomic uncertainties.

In addition to the positive impacts of political and macroeconomic uncertainties on geographic diversification, Eppink (1978) posits that geographic dispersion of activities is a response to demand uncertainty. That is, to the extent that the level of product demand in different national markets is less than perfectly correlated, performance volatility is reduced through multinational expansion.

Furthermore, geographic diversification may be a way to source inputs with uncertain availability in the home market. This suggests a positive relation between input uncertainty and foreign diversification. Yet, only one of the four items that make up the international expansion proxy involves foreign production. The other three indicators are related to foreign sales of domestically produced goods. As such, the relation between input uncertainty and geographic diversification is likely to be insignificant.

It is unclear whether expansion into foreign markets would be viewed by managers as advantageous in the context of domestic competitive uncertainty. Firms may concentrate on stabilizing their competitive position in their home market as a necessary antecedent to foreign expansion. That is, competitive uncertainty in the domestic market may indicate the lack of a competitive advantage necessary to compete in foreign markets. Alternatively, firms facing domestic competitive uncertainty may diversify into foreign markets as a risk management strategy. Since neither of these two effects may be dominant, no significant relation between domestic competitive uncertainty and international geographic diversification is hypothesized.

#### **Attainment Discrepancy**

According to the BTOF, firms have explicit or implicit goals along multiple dimensions. Perceptions that the organization is not (or will not) attain the performance level to which management aspires trigger search

processes. A search process results in organizational change if a satisficing alternative is generated. By contrast, if a satisfactory level of performance is achieved and expected to persist, firms have little motivation to deviate from their current set of routines (March & Simon, 1958). Hence, a positive attainment discrepancy (performance exceeding aspirations) should decrease the innovativeness of firm strategy.

Previous empirical research provides support for the contention that innovations in firm strategy are negatively related to performance discrepancy. Lant and Montgomery (1987) found a negative relation between attainment discrepancy and innovativeness of search among teams playing the Markstrat marketing-strategy game. Singh (1986) found a negative relation between organizational performance and "risk-taking," where risk-taking was measured using a six-item scale including reliance on innovation and R&D.

Applying the rationale of the BTOF to product diversification, a positive attainment discrepancy should decrease the search for new products. That is, firms that are performing well with their current product lines should be less inclined to search for new products than poorly performing firms. Thus, it is reasonable to hypothesize a negative relation between attainment discrepancy and product diversification, as indicated in Table 1.

The role of attainment discrepancy in international diversification is distinct. Geographic diversification is generally seen as an attempt by firms to leverage their existing competencies in additional markets. As such, if current operations are performing above management's aspirations, the firm is more likely to try to duplicate this success in other markets. Thus, attainment discrepancy should have a positive impact on geographic diversification.

This opportunity-driven motive for international diversification is distinct from the problemistic (i.e., problem-driven) search process described by Cyert and March (1963). In contrast to the original formulation of the BTOF, Carter (1971) argued that while some search may be problem-stimulated, opportunity-oriented search may also be quite common in organizations. The signs of the attainment discrepancy coefficients will give some indication as to whether opportunity-oriented or problem-driven search gives rise to changes in product and international diversification. A negative coefficient on attainment discrepancy would indicate a problem-driven increase in diversification. A positive coefficient would be consistent with opportunities motivating diversification.

## Slack

Ansoff (1988) divided flexibility into two categories. His term "external flexibility" refers to diversification of products, markets, and technologies. "Internal flexibility" refers to resource liquidity that facilitates responses to environmental changes. That is, resource availability moderates the responsiveness of organizations to their environment. Eppink (1978) cited the ability to finance severance payments to employees who are laid off and expenditures on R&D as evidence that a strong financial position enables a company to make costly adjustments financially poor organizations cannot undertake.

Ansoff's "internal flexibility" is synonymous with the concept of organizational slack. Cyert and March's BTOF proposed organizational slack moderates the relation between performance discrepancy and organizational change. Furthermore, organizational slack moderates the relations between perceived environmental uncertainties and strategic change. In particular, the extent to which firms adopt operational flexibility responses to perceived environmental uncertainties should depend on the level of slack organizational resources.

The role of slack as a moderator of the relation between attainment discrepancy and organizational change has been a point of controversy. On the one hand, the BTOF (Cyert & March, 1963) and Ansoff (1988) provide a basis for arguing that high levels of slack enhance the flexibility responses of firms to performance discrepancies. On the other hand, the absorption of slack may allow firms to buffer themselves against environmental fluctuations without making internal changes (Sharfman, et al., 1988). These theorists differ as to whether slack acts to facilitate or deter organizational change.

Reconciliation of these contradictory perspectives on slack may be possible through differentiating the role of slack in organizational responses to perceived uncertainties from its moderating effect on the relation of attainment discrepancy to changes in strategy. The previous research suggests slack enhances organizational responsiveness to attainment discrepancies but acts as a buffer to environmental uncertainties.

This study hypothesizes organizational slack facilitates responsiveness to attainment discrepancies. That is, product diversification will be greater for high slack firms performing below aspirations than for low slack firms. International diversification will increase for high slack firms in response to positive attainment

discrepancies beyond that of low slack firms. These hypotheses are consistent with Ansoff's (1988) theoretical argument.

By contrast, slack is expected to play a very different role when moderating the relations between perceived environmental uncertainties and changes in diversification. In those cases where the hypothesized relations between uncertainties and flexibility changes are positive, slack is expected to have an attenuating (i.e., buffering) role. That is, firms with high slack resources will be less inclined to adopt strategic flexibility responses than low slack firms.

The rationale for hypothesizing slack attenuates the positive effects of PEUs on changes in diversification results from the greater capacity of high slack firms to accept risk. Slack performs a buffering role reducing the need to adopt strategic flexibility responses when managers perceive components of the organizational environment to be uncertain. Performance volatility is more threatening and costly for low slack firms than for high slack firms (Shapiro & Titman, 1986; Cornell & Shapiro, 1987). As such, when faced with uncertainties, low slack firms would tend to increase their diversification relative to high slack firms in order to decrease performance volatility.

## **METHODOLOGY**

### **Sample**

This study departed from previous uncertainty research by creating and analyzing an international data set rather than focusing on firms in a single country. Questionnaire data were collected from business managers in six Latin American countries (the five Central American countries and Panama) in the latter half of 1990 and early 1991. The sample involved one to three top management team respondents from each firm. The use of multiple respondents provided data for analyzing the reliability of responses across managers within firms (Miller, forthcoming). A total of 497 managers from 211 firms provided usable responses.

The firms in the sample had been in business an average of 32 years and had a mean work force of 289 employees. Relative to other firms in their industry and country, 94.7 percent of the firms reported being of average or large size. Firms were drawn from a wide range of industries.

The firms in the sample frequently had substantial ownership by a single family. The practice of owner

management, common in Latin America, reduces portfolio diversification by concentrating investment of both financial and human capital assets in the firm. As such, it was expected that the likelihood of finding risk averse behavior in Central American and Panamanian firms is greater than may be exhibited in a sample of firms from countries with wider trading of equities.

### **Measures**

The appendix indicates the questionnaire items used to measure environmental uncertainties, attainment discrepancy, slack, and changes in product and international diversification. Headings which did not appear in the original survey instrument have been added to clarify for the reader the construct sought with each item. The study used a Spanish version of the survey instrument prepared by the author and three other bilingual individuals. This committee approach to translation is one of the methods recommended by Brislin (1980). The appendix is a back translation from the Spanish questionnaire.

Product flexibility refers to related and unrelated product diversification. The two product diversification indicators were positively correlated ( $r = 0.418$ ,  $p < .001$ ). This finding indicates firms in the sample that are increasing the number of related products tend to also increase their number of unrelated product lines.

International market flexibility refers to the extent to which firms expand into foreign markets through various market entry modes. These questions look at market diversification in terms of expansion into foreign markets through either exports or foreign investment in marketing, sales subsidiaries, and production. Data from the sampled firms indicated positive correlations among changes in exports, foreign marketing expenses, and investments in foreign marketing and distribution subsidiaries (Cronbach coefficient alpha = 0.798). While these are sometimes viewed as alternative foreign market entry modes (Root, 1987), the data indicate changes in these foreign involvement strategies tend to move in the same direction. Rather than being substitute strategies for entering foreign markets, firms that are increasing their exports also tend to be increasing their foreign marketing and direct investment.

Attainment discrepancy consists of a measure of performance and a reference point with which to compare performance. Managers ranked their evaluations of their firms' expected performances relative to other



firms in the same industry and their own goals.

The specification of slack measures relied on a subset of the variables indicated by Bourgeois (1981) and Bourgeois and Singh (1983). Following Bourgeois (1981), managers ranked each slack item relative to their firms' financial situations two years earlier.

The environmental uncertainty items measured managers' perceptions of the predictability of distinct elements of their organizations' environments. The environmental uncertainties items include political, government policy, macroeconomic, input, product demand, and competitive uncertainties. Rankings were recorded on Likert-type scales ranging from 1 (easy to predict) to 7 (not predictable). Miller (1992; forthcoming) provides theoretical background on these items and reliability assessments.

Each of the items included in the appendix demonstrated adequate reliability across multiple respondents within the top management teams of the sampled firms. Following Ebel (1951), the approach used to assess reliability consisted of one-way ANOVA tests for firm effects on managers' responses to the questionnaire items. The listed items demonstrated significant firm effects at the .05 level. After verifying item reliability, the responses of all managers within each firm were averaged to obtain mean responses for each top management team.

Total scores for each of the variables were derived by calculating an unweighted sum of the indicators for each variable. The top portion of Table 2 indicates descriptive statistics for each of the aggregate variables. The final column reports the Cronbach (1951) coefficient alphas for the component items of each variable. Nunnally (1967) suggests a 0.5 cutoff for the lower bound on scale reliability. For eight of the nine composite variables, the Cronbach coefficient alpha exceeded the 0.5 cutoff. The calculated coefficient alpha for the political uncertainty indicators, 0.480, was very close to Nunnally's suggested criterion value for scale reliability. Hence, the political uncertainty variable was retained in the regression model. The lower portion of Table 2 reports correlations among the variables.

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Insert Table 2 about here  
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#### **Model Estimation and Hypotheses Tests**

The tests of the behavioral model used ordinary least squares regression. The earlier discussion detailed the dependent variables--changes in product and international diversification. The explanatory variables included attainment discrepancy, policy uncertainty, political uncertainty, macroeconomic uncertainty, input uncertainty, product demand uncertainty, and competitive uncertainty.

Slack enters the model as both a direct effect and in multiplicative terms with each of the other explanatory variables. Slack is not, however, hypothesized to have a significant direct effect on the dependent variables. Rather, the interaction terms in which slack enters are expected to be significant. Despite the expected lack of significance for the slack term, partialing the slack effect from the product terms is essential when testing for interaction effects (Arnold, 1982; Cohen, 1978; Cohen & Cohen, 1975).

Examination of the initial regressions for each of the five dependent variables indicated a small number of outliers in each regression. Identification of outliers involved examination of the studentized residuals and the diagonal elements of the least-squares projection matrix,  $X(X'X)^{-1}X'$ , also known as the hat matrix. All observations with studentized residuals having absolute values greater than 3.0 were deleted. In addition, following the criteria provided by Belsley, Kuh, and Welsch (1980), all observations with both leverage greater than  $2q/n = 0.16$  (where  $q = 16$  is the number of explanatory variables, including the intercept, and  $n=200$  is the approximate sample size for each regression) and studentized residuals with absolute values greater than 2.0 were eliminated. These two decision rules resulted in elimination of five outlier observations from the product diversification regression and six observations from the international diversification regression.

Tables 3 and 4 report the regression results for the two dependent variables. Differences in the sample sizes from those reported in Table 2 were due to missing data and elimination of outliers. The first column lists the explanatory variables included in the regression. The second column indicates the OLS estimated parameters. For each of the interaction terms, this column gives the standard errors in parentheses and t value significance levels. The t statistics on each individual product term offers a test for slack moderating effects on attainment discrepancy and each of the uncertainties (see Cohen & Cohen, 1975).

Neither standard errors nor significance levels are provided for the direct effects and the intercept. This is done in order to avoid unwarranted interpretations of the coefficients of these variables. The t values for the

direct effect terms are not interpretable in the same manner as the coefficients on regression variables that do not appear in product terms (Cohen, 1978). The appropriate test for significance of the attainment discrepancy or uncertainty variables is an F test involving both the main effect and the corresponding interaction term (Kmenta, 1986: 508-510). The alternative hypothesis is that the coefficients of both the direct effect and the interaction term(s) are jointly zero.

The F test for slack moderating effects on the set of six uncertainties involves a hierarchical regression procedure in which the slack-uncertainty interaction terms are treated as the last variables added (Arnold, 1982; Cohen, 1978). Tables 3 and 4 report the results of F tests for the joint hypothesis that slack significantly moderates the effects of the uncertainties (versus the alternative of no effect). This F value is reported in the F test column in the Policy x Slack row. A bracket indicates the six terms that were deleted from the model to calculate the F test statistic.

Despite the lack of interpretability of the main effect t values, the estimated coefficients on these terms are not without information. The sign on the direct effect coefficient and the coefficient magnitude relative to that of the corresponding product term coefficient are meaningful. The partial derivative of the regression equation with respect to attainment discrepancy or any of the uncertainties is an expression of the form  $B_i + B_j \text{Slack}$ , where  $B_i$  and  $B_j$  are the coefficients on the main effect and corresponding interaction term, respectively. If the signs on  $B_i$  and  $B_j$  are the same, slack can be said to accentuate the direct effect. Opposite signs on  $B_i$  and  $B_j$  indicate slack attenuates the direct effect. For an attenuating effect, at the slack level  $-B_i/B_j$ , the slack moderating effect completely neutralizes the direct effect. Slack levels greater than  $-B_i/B_j$  result in a sign reversal for the composite effect.

The regression result tables (3 and 4) report the slack levels at which the slack moderating effect completely offsets the attainment discrepancy or uncertainty main effect. These slack values are reported under the first attenuation column, labeled "Slack." Slack nullifying values are only reported when: (1) the signs on the main and interaction terms are opposite, (2) the t value on the interaction term is significant, and (3) the F value for the composite effect of the main effect and interaction effect is positive. The attenuation percentile column indicates the percent of firms with slack values less than the nullifying value, that is, those firms where

the main effect dominates the interaction effect.

## **REGRESSION RESULTS**

### **Product Diversification**

The product diversification regression results in Table 3 indicate some surprising findings. The results challenge the product diversification hypotheses developed earlier. The finding that firms increase their range of related and unrelated products in response to political and policy uncertainties was unexpected. The policy uncertainty effect is only moderately significant with a p value of 0.075. The political uncertainty effect is positive for most firms in the sample with complete attenuation near the eighty-fifth percentile of the slack distribution. The policy x slack interaction is not significant.

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Insert Table 3 about here  
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Demand uncertainty was hypothesized to have a positive impact on product diversification. The demand effect, with a p value of 0.055, indicates a negative relation. Firms in the upper fifty-five percent of the slack distribution demonstrate a net positive response to demand uncertainty due to an offsetting demand uncertainty x slack interaction. When faced with demand uncertainty, high slack firms act in a manner consistent with the hypothesis, increasing product diversification. On the other hand, firms below the forty-fifth percentile in the slack distribution decrease product diversification in response to demand uncertainty. The results do not support the hypothesized positive relations of input uncertainty and competitive uncertainty with product diversification nor is the attainment discrepancy coefficient significant.

### **International Diversification**

The results in Table 4 highlight two interesting relations between uncertainties and international diversification. Demand uncertainty shows a significant negative relation with international diversification. This result clearly contradicts the notion that firms faced with high domestic market uncertainty are more likely to expand into foreign markets as they attempt to geographically diversify their income streams. Rather, the results suggest that firms with well established, stable home market positions are more likely to expand into foreign markets through exports and foreign investment. This would support the position that firms with particular

distinctive competencies that reduce the uncertainty in their home markets will leverage their capabilities in foreign markets. While this argument was applied to the attainment discrepancy variable earlier, it appears to be a better explanation for the demand uncertainty relation to product diversification. The attainment discrepancy effect was insignificant.

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Insert Table 4 about here  
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The positive macroeconomic uncertainty effect lends support to the hypothesis that firms respond to domestic macroeconomic instability by positioning themselves in other countries. Since the linkages between industry-specific business cycles may be weak across national boundaries, international expansion can reduce overall firm risk. The significant macroeconomic uncertainty x slack interaction indicates, however, that the relation between domestic macroeconomic uncertainty and international diversification is not a simple positive relation. For the majority of the firms (over seventy percent), the positive relation between demand uncertainty and international diversification is dominated by the offsetting negative slack interaction effect. This indicates high slack firms are less likely to expand exports and foreign investment in response to macroeconomic uncertainty than low slack firms. Slack appears to buffer firms from macroeconomic uncertainties. That is, slack reduces firms' international diversification responsiveness to macroeconomic uncertainty.

The hypothesized positive relations of policy uncertainty and political uncertainty were not supported. Foreign investment and export activities do not appear to be explained as capital flight responses to political and policy uncertainties.

#### **Stability Tests**

The sample included firms from a broad range of industries and both domestic and foreign owned companies. It is quite possible that product and international diversification changes adopted in response to perceived environmental uncertainties differ across industries and ownership categories. Different diversification responses across industries and ownership categories may help to explain the low overall explanatory power of the international diversification regression ( $F = 0.0598$ ;  $R\text{-Square} = 0.1242$ ).

Manufacturing firms may respond differently than service firms. Chow tests (Kennedy, 1985) for

regression coefficient stability across industries involved the two single-digit international standard industrial classification (ISIC) codes with the largest sample sizes. Manufacturing (ISIC 3) had 79 firms in both the product and international diversification equations. Wholesale and retailing, restaurants and hotels (ISIC 6) had 52 firms in the product diversification regression and 51 firms in the international diversification regression. Chow test F values for the two industry comparison indicated significant differences (at the .05 level) in the estimated coefficients of the international diversification equation. Differences across the two industries for the product diversification equation were not found to be significant.

The second stability analysis considered possible differences between domestic and foreign owned firms in the adoption of diversification changes. Foreign owned subsidiaries of multinational corporations are distinct from purely domestic firms in some important respects. Being part of a larger multinational organization creates risk management opportunities that domestic firms have greater difficulty implementing. Specifically, a multinational enterprise is able to diversify country risks through establishing a presence in a number of different international markets. Such positioning allows the firm to reduce its susceptibility to detrimental country-specific political, policy, or macroeconomic occurrences. The set of available strategic options for dealing with environmental uncertainties may be very different for multinational firms than purely domestic firms.

The procedure for testing for differences between domestic and foreign owned firms was similar to that for the two-industry comparison. Firms were divided between those with 100% domestic ownership and those with some share of foreign ownership. After eliminating a firm missing ownership data, the number of domestic firms was 130, and foreign firms numbered 62 for both the product and international diversification regressions. Neither Chow test F value comparing the two ownership categories was significant at the .05 level. The empirical evidence does not demonstrate statistically significant differences across ownership categories.

## **DISCUSSION**

Tests of the behavioral model indicated a number of significant relations between perceived environmental uncertainties and changes in product and international diversification. The finding that political uncertainty is associated with product diversification was unexpected and deserves further inquiry. Whereas slack decreases product diversification responses to political uncertainty, slack increases responsiveness to

macroeconomic and demand uncertainties.

Demand uncertainty showed a strong negative relation with international diversification. This finding suggests firms with stable home markets are most likely to move into foreign markets through exports and foreign investment. Macroeconomic uncertainty exhibited a positive relation with international diversification, however high slack firms demonstrated a negative relation. That is, high slack firms are less likely than low slack firms to respond to macroeconomic uncertainty by expanding into foreign markets. In contrast to the moderating effect of slack on product diversification, this suggests slack resources buffer firms from macroeconomic uncertainty.

While many of the specific hypotheses were unsupported or contradicted by the empirical evidence, the regression results support the general contention that product diversification and international diversification are responses to distinct environmental uncertainties. In contrast to previous strategy and organization theory research treating environmental uncertainty as a single unidimensional construct, the findings indicate the value of disaggregating organizational environments into their major components when studying responses to environmental uncertainties. The empirical results also point out how the uncertainties which have traditionally been of interest to international management research and outside the domain of mainstream strategy research (e.g., political, government policy, and macroeconomic uncertainties) can inform fundamental issues of corporate strategy. Further theory development is needed to refine our understanding of the relations between specific uncertainties and organizational flexibility responses.

The behavioral model provided a better fit to the product diversification data than the international diversification data. Comparisons of the regression coefficients across two broad industry categories indicates stability in the product diversification equation coefficients but not in the international diversification equation coefficients. Future research could explore the reasons for differences across industries in international expansion responses to environmental uncertainties.

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## APPENDIX

### Questionnaire Items

#### I. Diversification

Below are several areas where your company may be making or planning to make changes. Indicate if your company is decreasing or increasing the indicated areas. If your company is not making nor plans to make changes in some area, choose number 4.

1 = Decreasing substantially, 4 = Not changing, 7 = Increasing substantially.

Decreasing      Not      Increasing  
substantially      changing      substantially

##### Product Diversification

- |  |   |   |   |   |   |   |   |
|--|---|---|---|---|---|---|---|
| a. Number of products in your primary industry.      | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Number of products outside your primary industry. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

##### International Diversification

- |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| a. Exports to foreign markets.  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. Investment in marketing in foreign countries.                        | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| c. Investments in foreign subsidiaries to manage sales or distribution. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| d. Investment in foreign production.                                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

#### II. Attainment Discrepancy

Evaluate the results that you expect from your company this year compared with the results of other companies in your industry.

1 = Much worse, 4 = Average, 7 = Much better.

- |                         | Much<br>worse | Average | Much<br>better |   |   |   |   |
|-------------------------|---------------|---------|----------------|---|---|---|---|
| a. Total sales growth   | 1             | 2       | 3              | 4 | 5 | 6 | 7 |
| b. Return on investment | 1             | 2       | 3              | 4 | 5 | 6 | 7 |
| c. General performance  | 1             | 2       | 3              | 4 | 5 | 6 | 7 |

Evaluate the results that you expect from your company this year compared with your companies goals.

1 = Much worse, 4 = Equal to goal, 7 = Much better.

- |                         | Much<br>worse | Average | Much<br>better |   |   |   |   |
|-------------------------|---------------|---------|----------------|---|---|---|---|
| a. Total sales growth   | 1             | 2       | 3              | 4 | 5 | 6 | 7 |
| b. Return on investment | 1             | 2       | 3              | 4 | 5 | 6 | 7 |
| c. General performance  | 1             | 2       | 3              | 4 | 5 | 6 | 7 |

### III. Slack

The following items refer to changes in the financial situation of your company in the last two years. Circle the appropriate response.

1 = decreased substantially, 4 = no change, 7 = increased substantially.

	Decreased Substantially			No Change			Increased Substantially
a. The real net worth of the company.	1	2	3	4	5	6	7
b. The level of working capital generated by the company.	1	2	3	4	5	6	7
c. Liquidity.	1	2	3	4	5	6	7
d. Access to loans and other financing.	1	2	3	4	5	6	7

### IV. Environmental Uncertainties

In this section, we would like you to describe the environment in which your company operates. In the primary industry and country where you work, evaluate the aspects of your environment. Indicate if the factors are easy or difficult to predict.

1 = Easy to predict, 7 = Unpredictable.

	Predictable				Unpredictable			
1. Government policy								
a. Tax policies.	1	2	3	4	5	6	7	
b. Monetary policy.	1	2	3	4	5	6	7	
c. Legal regulations affecting the business sector.	1	2	3	4	5	6	7	
2. Political								
a. Threat of armed conflict.	1	2	3	4	5	6	7	
b. Enforcement of existing laws.	1	2	3	4	5	6	7	
c. Public service provision.	1	2	3	4	5	6	7	
3. Macroeconomic								
a. Inflation rate.	1	2	3	4	5	6	7	
b. Exchange rate with dollar.	1	2	3	4	5	6	7	
c. Results of economic restructuring.	1	2	3	4	5	6	7	
4. Resources and services used by your company.								
a. Labor and union problems.	1	2	3	4	5	6	7	
b. Quality of inputs, raw materials, and components.	1	2	3	4	5	6	7	
c. Availability of inputs, raw materials, and components.	1	2	3	4	5	6	7	
d. Prices of inputs, raw materials, and components.	1	2	3	4	5	6	7	
e. Transportation system within the country.	1	2	3	4	5	6	7	
5. Product market and demand.								
a. Product demand.	1	2	3	4	5	6	7	
6. Competition.								
a. Changes in competitors' strategies.	1	2	3	4	5	6	7	
b. Entry of new firms into the market.	1	2	3	4	5	6	7	
c. Domestic competitors.	1	2	3	4	5	6	7	
d. Foreign competitors.	1	2	3	4	5	6	7	

**TABLE 1**  
**Hypothesized Relations between Environmental Uncertainties**  
**and Diversification Responses**

	Product diversification	International diversification
Attainment Discrepancy	-	+
<u>Uncertainties</u>		
Policy	0	+
Political	0	+
Macroeconomic	0	+
Input	+	0
Product Demand	+	+
Competitive	+	0

**TABLE 2**  
**Descriptive Statistics and Correlations for Aggregate Measures**

<u>Variable</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>Min.</u>	<u>Max.</u>	<u>Alpha</u>
1. Product Diversification	211	9.44	1.67	2.00	13.50	0.585
2. International Diversification	211	16.59	2.83	4.00	25.00	0.798
3. Attainment Discrepancy	206	31.00	5.98	9.00	42.00	0.919
4. Slack	207	19.20	4.53	4.67	28.00	0.819
5. Political Uncertainty	211	10.86	3.21	3.00	19.67	0.480
6. Policy Uncertainty	210	12.25	3.72	3.00	21.00	0.722
7. Macroeconomic Uncertainty	211	13.42	3.72	3.00	21.00	0.708
8. Input Uncertainty	210	14.74	5.01	5.00	30.33	0.755
9. Competitive Uncertainty	210	13.29	4.28	4.00	28.00	0.721
10. Demand Uncertainty	211	2.55	1.15	1.00	7.00	*

\*Single indicator.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Product Diversification									
2. International Diversification	0.099								
3. Attainment Discrepancy	0.185**	-0.134†							
4. Slack	0.294***	0.006	0.490***						
5. Political Uncertainty	0.088	0.032	0.015	-0.081					
6. Policy Uncertainty	-0.080	0.041	-0.142*	0.068	0.278***				
7. Macroeconomic Uncertainty	-0.038	0.038	0.022	0.064	0.302***	0.519***			
8. Input Uncertainty	-0.004	0.053	-0.050	-0.171*	0.354***	0.126†	0.220**		
9. Competitive Uncertainty	-0.044	-0.036	-0.128†	-0.005	0.159*	0.235***	0.011	0.191**	
10. Demand Uncertainty	-0.059	-0.110	-0.159*	-0.106	0.151*	0.113	0.122†	0.196**	0.242***

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



**TABLE 3**  
**Product Diversification Regression**

F Value = 2.585    Prob > F = 0.0016  
R-Square = 0.1797    N = 193

<u>Variable</u>	<u>Parameter</u>	<u>F Test</u>	<u>Attenuation</u>	
			<u>Slack</u>	<u>Percent</u>
Intercept	6.1159			
Attainment Discrepancy	0.0157	0.1888		
Policy Uncertainty	0.1441	2.6334†		
Political Uncertainty	0.4640	4.5227*	23.55	84.58
Macroeconomic Uncertainty	-0.3324	2.1155		
Input Uncertainty	0.0999	0.5238		
Demand Uncertainty	-1.0390	2.9461†	19.83	45.27
Competitive Uncertainty	-0.0224	0.1028		
Slack	0.1636			
Attainment Disc. x Slack	-0.0001 (0.0038)			
Policy x Slack	-0.0110 (0.0089)	2.1033†		
Political x Slack	-0.0197* (0.0090)			
Macroeconomic x Slack	0.0171* (0.0084)			
Input x Slack	-0.0052 (0.0052)			
Demand x Slack	0.0524* (0.0222)			
Competitive x Slack	0.0005 (0.0059)			

† p < .10, \* p < .05, \*\* p < .01, \*\*\* p < .001

**TABLE 4**  
**International Diversification Regression**

F Value = 1.673    Prob > F = 0.0598  
R-Square = 0.1242    N = 193

<u>Variable</u>	<u>Parameter</u>	<u>F Test</u>	<u>Attenuation</u>	
			<u>Slack</u>	<u>Percent</u>
Intercept	15.5363			
Attainment Discrepancy	-0.0544	0.5365		
Policy Uncertainty	-0.4102	2.1845		
Political Uncertainty	-0.0554	1.0416		
Macroeconomic Uncertainty	0.5798	4.1127*	17.31	28.36
Input Uncertainty	-0.0376	2.2285		
Demand Uncertainty	-0.3544	5.1936**		
Competitive Uncertainty	0.1498	0.5701		
Slack	0.1098			
Attainment Disc. x Slack	0.0011 (0.0057)			
Policy x Slack	0.0240† (0.0133)	1.5508		
Political x Slack	0.0068 (0.0122)			
Macroeconomic x Slack	-0.0335** (0.0120)			
Input x Slack	0.0061 (0.0073)			
Demand x Slack	-0.0078 (0.0314)			
Competitive x Slack	-0.0090 (0.0093)			

† p < .10, \* p < .05, \*\* p < .01, \*\*\* p < .001

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