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Diversification Strategy and Performance

Donald J. Lecraw

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DIVERSIFICATION ~~AND~~ STRATEGY AND PERFORMANCE

by

Donald J. Lecraw

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DIVERSIFICATION STRATEGY AND PERFORMANCE

I
Introduction

The motivation and consequences of diversification by firms out of their base industries has been studied extensively by both economists and business researchers. Until recently, however, these two groups of researchers have approached the phenomenon quite differently. Economists have treated the extent of a firm's diversification as determined by structural variables in the industries in which the firm operated and the economics of the organization of activity within the firm compared to via the market.[1] Business researchers have focused on the human and physical assets of the firm (its internal strengths and weaknesses) in relation to the goals of the firm as determinants of the firm's diversification strategy.[2] This latter group of researchers has often used discrete categories of strategies (and discrete organizational structures), while the former group has emphasized the continuous nature of diversification.[3] Recently, research by Caves et al (1980) has joined these two approaches in analyzing the performance of samples of 125 and 67 large firms in Canada and yielded significant insights on the causes and effects of diversification by firms[4].

The research in this paper was designed to expand and extend the work of Caves et al. by: 1) using a larger data base covering more firms, i.e., the 200 largest publically-held, non-financial firms in Canada instead of 67 firms; 2) by using more theoretically sound definitions of the four diversification strategies followed by the firms in the sample, at least for the purposes of analysis of the determinants of strategic choice and its effects on profitability; 3) using multiple discriminant analysis to classify the firms into four (not three) strategic groups. This last feature is permitted by the expanded sample, whereas Caves et al had to drop one group for statistical reasons. Nevertheless, the work of Caves et al remains the touchstone of this study.

This paper seeks to provide answers for three questions concerning the diversification strategies of large firms in Canada: 1) To what extent did the structural characteristics of the base industry of a firm and the firm's own characteristics influence the diversification strategy it followed? 2) What penalty, if any, was imposed on a firm for following a strategy that differed from the one suggested by the structural characteristics of its base industry and its own characteristics? 3. What were the relative influences on a firm's performance of the structure of the industries in which the firm operated and the firm's strategy? Put another way, under what strategies did a firm's profitability differ from the weighted average profitability of the industries in which it operated?

The model developed to analyze these three questions walks the middle ground between the fields industrial organization and business policy. On the one hand, it depends heavily on the findings of industrial organization that industry structural variables influence the diversification strategy and the profitability of the firms within the industry. On the other hand, it allows for the possibility that different firms in the same industry may follow different diversification strategies based on management's formulation of the firm's goals and assessment of its strengths and weaknesses (i.e., the analysis allows for intra-industry variation of firm diversification strategy and performance), and that the success (profitability) of a firm may depend on the strategy it chooses as well as the profitability of the industries in which it is operating.

II

Theory

For the purposes of this paper, a firm's "strategy" will have a quite restricted meaning. A "strategy" will be defined as the distribution of the firm's resources, and hence the distribution of its output, among industries, i.e., its diversification strategy. The analysis follows in the tradition of Wrigley (1970) and Rumelt (1974) in

that it identifies discrete diversification strategies based on the relationship in production and marketing between the industries in which the firm operated and the proportion of its activities that were located in each industry.

The firms in the sample were the 200 largest (in terms of sales) firms in the manufacturing sector in Canada 1975. The firms in the sample typically started operations producing output in a single industry, for example the production of cigarettes. Over time, conditions in their base industry, their strengths and weaknesses, the goals of the firm itself, and opportunities in other industries gave some firms both the motivation to enter other related industries and the underutilized resources in some functional area to make entry profitable. Put another way, some firms developed or acquired tangible and intangible assets which were either underutilized in their operations in the base industry or could earn a higher return in another related industry than in the base industry. For example, a cigarette firm may have increased its return by using its ability to market small-ticket, branded, consumer products by entering the candy business, or by using its production expertise to enter the cigar business. Such firms followed diversification strategies into industries that were related by common production technology or marketing expertise.

Other firms which initially operated in a single base industry diversified into other vertically related industries (or expanded via internal growth or acquisition in their base industry) in order to create, entrench or extend market power or to reduce the risk of business in the base industry. To extend the example, the cigarette company might have integrated backward into tobacco production or forward into retail sales to reduce its uncertainty in supply and demand or to foreclose sources of supply or sales outlets to its competitors. (It might also have sought to expand its market share in its base industry, cigarettes, to increase its market power, although this strategy might have been hindered by government or competitive reaction).

Other firms operating in a single industry have developed assets (particularly management) that became underutilized, or have generated excess cash flow from operations that if returned to its stockholders as dividends, would be highly taxed. Yet the characteristics of the firms' production, marketing, distribution, product and process technology did not generate underutilized assets that could have led to related product diversification or vertical integration. In order to utilize their cash flow, some firms faced with this situation have engaged in unrelated diversification into industries that were unrelated to their base industry.

Based on this description of the diversification process, the firms in the sample were placed into four strategic groups based on the type and extent of their diversification: Single Business (SB), Vertically Integrated Business (VIB), Related Business (RB), and Unrelated Business (UB) depending on the relationship between the industries in which the firm operated and the distribution of its operations among those industries. (The operational definition of the characteristics of the firm by which they were assigned to each strategic group is described in the next section.)

The "Dominant Business" category of Wrigley-Rumelt and Caves et al was not used. Instead, firms that might have been placed in this category were classified into VIB, RB or UB categories depending on the type and extent of their diversification. The Dominant Business strategy (i.e., a strategy of a dominant share of a firm's output in one industry with a minor amount in vertically integrated, related, or unrelated industries) was seen as a transition stage from a SB to one of the other strategic groups that was motivated by the same base industry conditions and that would have had the same effects on performance as did membership in one of the strategic groups: SB, VIB, RB, UB. For example, Caves et al (1980, pp 398-399) classified Redpath Industries and the Steel Company of Canada as following "Dominant Product" strategies. Redpath's base industry was sugar refining and it had diversified into wines, engineering services and plastic drainage tile. Stelco was an integrated steel producer. In the

analysis in this paper, Redpath Industries was classified as following a strategy of "unrelated business" diversification, since that was the direction of its strategy. Stelco was placed in the "vertically integrated business" category[5]. This definition of the strategies followed by the firms in the sample is a significant departure from previous work and helps to improve the quality of the analysis and conclusions.

With these definitions of the four diversification strategies open to firms, we can turn to the first research question of the paper: What factors in the base industries of the firms in the sample and what characteristics of the firms themselves influenced their diversification strategy? Why do firms follow SD, VIB, RB or VB diversification strategies? It is useful to analyze this question in terms of the opportunities and threats faced by the firms in each industry. Assuming that firms and their managers have goals of profitability and growth, each firm is faced with a set of opportunities by which they can achieve these goals and threats to their achievement. These threats and opportunities arise partly from the structure of the base industry in which the firm operates and partly from the characteristics of the firm itself including the skills of its employees. A firm's reaction to these threats and opportunities will in part be influenced by the skills of its management and owners and their style of doing business.

More specifically, if a firm was in a fast growing industry with above average profitability and below average risk, it may have been able to satisfy its profit and growth goals without diversifying out of its base industry. Even in slow growth industries, small firms with relatively small market shares may have been able to satisfy their goals by above average growth in sales through internal growth or acquisitions to gain market share without precipitating strong competitive reaction or government intervention.

SB firms might also be found in industries relatively insulated from the threats and challenges of international trade. Since SB firms were likely to be relatively small, they would be likely to operate in industries in which economies of scale were not important, and by extension labor intensity might have been high. On the opportunities side, SB firms might not have diversified because they lacked opportunities to enter into related diversification rising from high levels of R&D that produced related products or high levels of advertising that could have produced transferable brand names, expertise at branding products, or underutilized capacity in the distribution system. In sum, the firms that followed an SB strategy should be relatively small with small market share in their industry and be found in a relatively profitable, high growth, low risk, industries with high barriers to entry (but low economies of scale and capital intensity) and low exposure to international trade, but ones with relatively low opportunities to engage in related diversification through R&D or transferable marketing expertise, brands, or common channels of distribution.

If the technology of an industry were such that there were economies of large scale operation and the cost penalties for subscale operation were high, a concentrated market structure has often evolved with large firms dominating the industry. In concentrated industries whose production technology was capital intensive and required a large proportion of raw materials inputs, firms may have had the incentive to integrate backward to secure raw materials supplies in order to prevent capacity underutilization due to raw materials shortages and lack of coordination of supply with demand, and in order to erect barriers to entry by other non-integrated firms. The base industries of vertically integrated business (VIB) firms may have presented few opportunities for the R&D or advertising that would have led them to diversify into other industries. Given Canada's comparative advantage in many raw materials, VIB firms should have required low tariff barriers in the base industries to survive and should have exported a large percentage of their output. On the other hand, growth of VIB firms should have been low compared to other firms given the income inelastic nature of

resource intensive basic industries in industrialized countries. The profits of industries populated by VIB firms may have either been higher or lower than average. On the one hand, high concentration and barriers to entry might have led to high profits. On the other, VIB firms may have been both exposed to import competition and have had to engage in competition on export markets which may have lowered profitability. Moreover, since these firms should have tended to be more capital intensive, their profits would have been more sensitive to swings in demand and possibly more vulnerable to price wars (despite efforts by firms in these concentrated industries to avoid "destructive competition"). These price wars may have been precipitated by the large-scale technology required in the production process that led to frequent overcapacity in these industries and depressed profits.

VIB firms should have been large scale and had large market shares, have been capital-intensive with relatively high inputs of raw materials and low levels of R&D and advertising and have operated in concentrated industries that were both exposed to imports and relied on export markets. Their profits may have been about the average for all firms, but their workers may have been able to extract higher than average wages, not necessarily due to their higher skill, levels, but due to the concentrated nature of the base industry of the VIB firms and to the substantial cost penalties these firms would have incurred if production had been interrupted by strikes.

Firms may have followed a strategy of diversification into related businesses (RB) for several reasons related to characteristics in their base industries. If a firm had a high level of R&D for product or process technology in its base industry, this research may have led it to develop products in new, but related, industries or processes that would have given it a competitive advantage in related industries. Similarly, high advertising expenditures may have allowed a firm to develop a brand name that could have been transferred to new products in a related industry at low cost as well as techniques in marketing and distribution that could be transferred to related industries. These firms might also have had the incentive to diversify into related

industries if their base industries were threatened, i.e., if competition within the industry were high, the industry unconcentrated with relatively low barriers to entry and openness to foreign trade. If these conditions existed, the base industries of the firms would be relatively competitive but for these very reasons, the firms would have been relatively efficient compared to firms in the same industry in the U.S..

Finally, firms may have followed a strategy of diversification into unrelated industries (followed a UB strategy) for several reasons. If their base industries were concentrated and their market share were high, but industry growth were low, firms would have had to diversify into other industries if they desired to increase their growth rate above the industry average. If R&D or advertising intensities were low, there may not have been an opportunity for diversification into products related by a common product or process technology or related marketing techniques. Instead of remitting the cash flow generated from their operations to their stockholders, the firms may have followed a strategy of unrelated diversification in order to earn a return on their underutilized managerial assets and possibly to earn their investors a higher return via more valued capital gains rather than dividends. This motivation might have been particularly strong if operations in the base industry were relatively profitable with a high cash flow, but low growth prospects.

There has been considerable controversy over the effect of foreign ownership on the diversity of output of firms and plants in Canada. Caves (1975, p.28) found that "a firm's diversity in the U.S. is not a very good predictor of its diversity in Canada", although these were positively related. At the plant level Caves (1975, p.38) found that with size held constant, the output of plants of Canadian-owned firms were "about 50 percent more diversified than the U.S. plants of American multinational companies, but no more than two-thirds as diversified as the plants of Canadian subsidiaries (of U.S. MNCs)". Based on these conclusions, Caves et al (1980) in their analysis of diversification of firms in Canada (Chapter 8, Table 9.4), Chapter 11,

Table 11.4) and strategic choice in diversifications (Chapter 12, Table 12.2) did not differentiate between foreign-owned and domestically-owned firms in Canada. Gorecki (1980) has taken exception to this procedure on theoretical grounds and supported his conclusions with statistical analysis based on data from the food processing industry. Gorecki concluded (p.338):

> ...the pattern of enterprise diversification in the Canadian food-processing sector depends importantly upon origin of ownership. Domestic enterprise diversification, in contrast to foreign, is related to local Canadian market conditions... in future research on the determinants of the diversified enterprise in Canada, the distinction between foreign and domestic ownership should be made.

For the purposes of the analysis in this paper, there are two ways of handling this problem, one less satisfactory (but easier) than the other. One way is to include a variable representing foreign ownership (percent foreign ownership) of the firms in the sample. This method implicitly assumes that "foreign-ownership" influences diversification strategy independently and does not affect the influences of the other variables. Gorecki's results (Table 1) belie this assumption. The preferable method would be to split the sample into two based on some (arbitrary) level of foreign ownership. As described below, this method leads to some statistical problems in the number of firms in each strategic category when the sample is split.

In any event, the effect of foreign ownership on diversification strategy must be incorporated into the analysis. Ceteris paribus, foreign-owned firms with easier access to product and process technology and brand names, might be expected to have followed strategies of related and unrelated diversification to a greater extent than did Canadian owned firms and followed a strategy of single business operations (and possible vertically integrated business operations) to a lesser extent.

Characteristics of the firm and its base industry - cash flow, profitability, risk, growth, size distribution of firms, market share,

exposure to trade, country of ownership, etc - might have motivated a firm to diversify out of the base industry. Industry and firm specific characteristics - R&D intensity, advertising intensity, excess capacity in plant and channels of distribution, excess cash flow, foreign ownership, etc - might both have given the firm the competitive advantage (via low marginal costs of diversification) to operate in other industries, and influenced the type of diversification: backward and foreward integration, related diversification, or unrelated diversification.

Table 1 displays these hypotheses about the characteristics of the base industries of firms that may have influenced each of the diversification strategies.

III
Data and Methodology

The data used to test the hypotheses presented in the previous section came from a wide variety of sources. The majority of the data came from data tapes assembled by Caves et al in their work for the Canadian Royal Commission on Corporate Concentration (1975-1978) augmented by more recent data. Some data was assembled by the author as part of his research activities for the same Royal Commission. Other data, particularly that used to classify the firms in the sample to one of the four diversification strategies and the market share data were obtained directly from the firms themselves.

The firms in the sample comprised the two hundred largest publically-owned manufacturing firms in Canada. The sample included firms that were wholely-owned and partly-owned subsidiaries of foreign firms. Caves et al used two samples: a sample of 125 firms data for which were on the FRI tapes and a subsample of 67 firms for which more complete data were available. Their full sample included at least 26 firms with some degree of foreign ownership. 87 of 125 firms in their study are included in the 200 firms in this study. The composition of their smaller sample was not published.

The distribution of the 200 firms in this study among the four strategic groups in 1978 is shown in Table 2. (A list of these firms with their strategy in 1975 is in Lecraw and Thompson, 1977, Appendix B.)

The theoretical basis of the classification of a firm into a strategic group has already been described. Operationally a firm was classified as a single business (SB) if 95% of the firm's revenues came from sales in a single three digit SIC industry. A firm was classified as a vertically integrated business (VIB) if less than 95% of its revenues came from a single industry and if more than 70% of its revenues arose from by-products, intermediate products, and end products of a vertically integrated sequence of processing activities. A firm was classified as following a strategy of related business (RB) diversification if less than 95% of its revenues came from a single industry, but greater than 70% of its revenues came from businesses related via their product or process technology or their marketing characteristics. Finally, a firm was classified as following a strategy of unrelated business (UB) diversification if less than 70% of its revenues came from businesses related by their product or process technology or their marketing characteristics.[6] Firms were classified as foreign-owned if 50% or more of their equity was held outside Canada.

The degree and type of "relatedness" of a firm's products were often difficult to determine based on publically available information. This problem was particularly acute for subsidiaries of foreign firms that often did not issue public annual reports. Interviews with firm managers concerning the composition of their firm's product line and the relationships between the industries in which it operated were sometimes necessary in order to classify the firm to a strategic category.

Once the strategy of each firm had been determined, the means and standard deviations of each of the base industry and firms-specific variables (as listed in Table 1) were calculated for firms in each group. As can be seen in Table 2, when the firms in the sample were grouped into Canadian-owned and foreign-owned firms, the number of firms in

each group in the four strategic categories fell dramatically, in some cases by over a factor of three. Given the number of independent variables and the four categories, this sample size was not sufficient. To use this methodology with this sample, either the number of strategic categories or the number of explanatory variables had to be reduced, neither one an attractive alternative. Instead, the level of foreign ownership was entered as one of the explanatory variables. As already mentioned, this methodology is not very satisfactory, but was the best that could be devised given the data limitations.

Multiple discriminant analysis was used to uncover the interrelationships between the characteristics of the base industries and the firms for firms in the four strategic categories. Use of multiple discriminant analysis allowed tests for the significance of differences among the profiles of the base industries and firm-specific variables of firms that were in the four strategic categories, determination of the linear combinations of independent variables that discriminated best among the four categories, and determination of which variables accounted for most of the observed intergroup differences.

Essentially the multiple discriminant analysis assigned each firm to one of the four strategic groups based on the characteristics of the firm and its base industry so as to minimize the probability that the firm was assigned by the discriminant function to a category to which it in fact did not belong. (The discriminant analysis also generated the probability of the firm belonging to each of the other three strategic groups.) The better the discriminant function, the lower the number of misclassified firms.

If the discriminant functions were successful in classifying firms to the strategic groups to which they in fact did belong, the hypothesis that base industry and firm characteristics had a significant influence on the firms' choice of diversification strategy would be supported. Put another way, if discriminant functions could be used to assign the firms to the strategic groups they in fact occupied, the discriminant functions could be used to predict which strategy a firm would follow

given the characteristics of its base industries and the firm itself. Such a relationship between base industry structure, firm characteristics and firm diversification strategy if it existed does not necessarily have normative implications for what diversification strategy a firm should have followed, however.

The results of the discriminant analysis are reported in Table 3. The means for the base industry and firm specific variables differed among the strategic groups in the hypothesized direction and these differences were significant, usually at the .01 level as shown by the F statistic. Three discriminant functions were estimated, the first accounting for 68% of the variation explained. All three discriminant functions were statistically significant at the .01 level as indicated by a Wilk's g of .87, .95 and .97 respectively.

The "confusion matrix" generated by using these discriminant functions to predict the diversification strategy of the firms given the characteristics of their base industry and firms (Table 4) indicates that the discriminant functions were successful in correctly classifying 76% of the firms to the strategic categories they in fact chose. This figure compares with 25% and 27% correctly classified if the firms had been classified randomly to each group or were all classified to the most populous group, the related business group. The 76% correctly classified is significantly different at the .01 level from the percentage correct if the maximum chance criterion had been selected.

The group means for the first discriminant function shown in Table 3 suggest that this discriminant function discriminated primarily between SB-VIB and RB-UB. Interpreting the absolute values of the standardized discriminant coefficients as relative importance weights, the main contributors to group separation along the first discriminant function were industry profitability, risk and growth, market share and foreign ownership. The second discriminant function differentiated between VIB and all other strategies largely based on usage of raw materials, trade exposure, market share, concentration, R&D and advertising intensity, and foreign ownership. The third discriminant

function differentiated mostly between related and unrelated business strategies based on R&D and advertising intensities, profits, risk in the base industries, and firm market share, foreign ownership and profits.

These results lend strong support to two of the major hypotheses of this paper: the characteristics of the base industry of the firm and its own characteristics had a strong influence on the strategy followed by the firm, but this influence was not deterministic in that firms could and did follow diversification strategies that differed from the one predicted using a linear combination of the characteristics of their base industries and the firms themselves to construct the discriminant functions. This analysis goes beyond that reported in Caves et al since it explicitly shows not only which variables were significant in discriminating between strategic groups, but it also shows how well these variables could be used to discriminate between the four strategic groups. It also incorporates (albeit imperfectly) the effect of foreign ownership on diversification strategy.

Based on the discriminant analysis, 24% of the firms were classified to strategic categories which were not the ones they had followed, i.e., 24% of the firms in the sample may have followed an "inappropriate" strategy based on the predictions of the discriminant analysis. In what sense, however, were the strategies of the 24% of the firms that did not follow their predicted strategy "inappropriate"? In fact, they may not have been inappropriate at all, but rather the problem could well be that the variables in the discriminant functions, the method of linear estimation, and the definition of the four strategic categories themselves may be inappropriate or misspecified. Moreover, unless a firm were penalized in terms of lower profits for following an "inappropriate" strategy, an inappropriate strategy might not be an "incorrect" one from the firm's point of view.

This question was partially resolved by testing to determine whether firms that had followed diversification strategies other than those predicted by the model were penalized for this decision in terms of lower profits in relationship to firms that had followed the

predicted strategy. Two comparisons can be made that speak to this question. The profitability of firms that did not follow the predicted strategy can be compared to firms within the strategic group they actually occupied and to firms within the strategic group predicted by the discriminant functions. To clarify this distinction with an example, if a firm were predicted to be in the UB strategic group but actually followed a VIB strategy, its profitability was compared to both firms that actually followed a VIB strategy and to firms that were predicted to follow a UB strategy and did in fact follow that strategy.

As shown in Table 5, within common strategic groups, both among the four strategic groups and for the sample as a whole, the mean profit for the firms that followed the strategy predicted by the discriminant analysis was significantly higher than that of the firms that did not follow the predicted strategy. For example, as shown in Table 5, column 1, for firms which actually followed a single business strategy, the profits (as a percent return on equity) of firms that were predicted to follow that strategy were 1.4% higher than for firms that were predicted to follow some other strategy. The second comparison, i.e., of firms that were predicted to be within the same strategic group but were or were not actually within that group, yielded somewhat different results. Firms that were predicted to follow a UB strategy but followed some other strategy did not have significantly lower profits than firms that were predicted to follow a UB strategy and actually did follow that strategy. On the other hand, firms that were predicted to follow a RB strategy but did not, had significantly lower profits than firms that were predicted to follow a RB strategy and followed that strategy. For firms that did not follow VIB and SB strategies as was predicted, profits were slightly lower than for firms that did follow the predicted VIB or SB strategy (but the difference was still significant).

These results show that although a UB strategy was not attractive in terms of low return on equity, firms whose base industry structure and firm characteristics indicated such a strategy were not able to avoid those low returns by following another strategy. Firms whose base industry structure and firm characteristics indicated that

they would follow a RB strategy (a relatively profitable strategy) but did not, paid for that choice by significantly lower profits. A similar conclusion was supported, but with less force, for firms classified in SB and VIB strategic groups but which followed other diversification strategies. For these three groups of firms, (but perhaps not for UB firms) it would then seem to be correct to speak of "appropriate" and "inappropriate" strategies since firms that did not follow the predicted strategy were penalized in terms of lower profitability.

So far it has been established that discriminant analysis based on the characteristics of the firm's base industry could be used to predict the diversification strategy followed by the firms in the sample and that if a firm followed a strategy that differed from the one predicted, an "inappropriate" strategy, it was often penalized for this decision, although the penalty was only on average a lower profitability of about 1.4%. There would then seem to have been a latitude in the choice of diversification strategy, although an inappropriate choice may have led to a penalty of lower return on equity depending on the opportunities open to the firm and the choice it made.

This point sets up the final area of analysis in the paper concerning the effects on a firm's profitability of its diversification strategy. Based on the previous analysis, if a firm chose a different strategy from that predicted by the discriminant analysis, its profitability was often reduced compared to firms that followed the strategy predicted by variables associated with its base industry and firm characteristics. (This generation did not hold for firms that followed a UB strategy). As can be seen in Table 3, however, firms in different strategic groups had different average profitabilities. In particular, following a strategy of "unrelated business" diversification yielded returns below those in other strategic groups. If the firm tried to avoid these low profits by following some other strategy, however, it was also often penalized (Table 5). These conclusions may need to be qualified further, however. It would be interesting to discover whether the firm's diversification strategy itself had influenced the firm's profits or whether its profits were simply a function of the profitability of the industries in which it operated (i.e., its base industry and the industries into which it had diversified).

The business units that composed a diversified business could have been related through marketing, production, R&D, etc. The more closely they were related, the greater might the opportunity have been for the firm to have realized economies of scale in production, marketing, R&D, and management. Diversification into unrelated industries, conglomerate diversification, may have led to increased firm efficiency and increased profits via economies of scale in management, information and data processing and control. It would seem reasonable, however, that these effects would have been smaller than if the firm had engaged in related diversification. At the same time, for unrelated diversification, the potential negative effects might have been more pronounced - loss of performance incentives for mangement, loss of control and unfamiliarity of top mangement with the industries in which the firm competed and with the factors that led to success and failure in those industries.

This hypothesis concerning the effects of diversification strategy on performance can be stated in testable form as: Firms that followed a strategy of unrelated diversification would have had a lower return on investment compared to the weighted average of return on investment of the industries in which they operated compared to firms that had followed a strategy of related diversification. This relationship should hold regardless of the extent of the diversification, i.e., firms following a strategy of unrelated diversification should have had a lower performance than firms following a strategy of related diversification regardless of the relative size of the strategic business units. If this hypothesis is correct, classifying diversification strategies according to the type of relationship between the units - "vertical integration," "related business," "unrelated business," and "single business" - would be a useful classification scheme for the purposes of the analysis of the determinants of firm profitability.

The last major hypothesis of this paper is that diversification strategy in fact did affect profitability, and in particular that a strategy of related diversification yielded a profit above the weighted

average of the returns in the industries in which the firm operated, while a strategy of unrelated diversification yielded a return below the weighted average return of the industries in which the firm operated. It should be remembered, however, that firms may have had little choice in the strategy they followed given the characteristics of their base industries and their firm characteristics.

To test the relationship between profitability and diversification strategy, the following equation was estimated by multiple regression analysis.

$$PDR = a_0 + \sum_i a_i X_i$$

where:

PDR = the firm's return on equity plus retained earnings minus the weighted average return of the industries in which the firm operated divided by the firm's return on equity plus retained earnings. This variable essentially measures how well the firm performed relative to the industires in which it operated.

X_1 = a dummy variable equal to the percent of the firm's activities that were outside its base industry if the firm followed a VIB strategy.

X_2 = a dummy variable equal to the percent of the firm's activities that were outside its base industry if the firm followed a RB strategy.

X_3 = a dummy variable equal to the percent of the firm's activities that were outside its base industry if it followed a UB strategy.

X_4 = the probability the firm was following the strategy it actually followed as given by the discriminant functions constructed from its base industry variables and its firm chacteristics.

X_5 = the firm's weighted average market share in the industries in which it operated.

X_6 = the weighted average of the firm's growth rate relative to the growth rates of the industries in which it operated.

X_7 = the firm's debt to equity ratio.

X_8 = X_7^2

The variables X_1 X_2 and X_3 are dummy variables in the sense that they are 0 when the firm is not following a VIB, RB or VB strategy respectively. They are weighted by the percent of the firm's activities that were outside its base industry. This procedure allowed for the testing of the hypothesis that the strategy a firm followed directly affected its profitability relative to the profitability of the industries in which it operated and that this effect increased as activities outside its base industry increased, e.g., the more vertically integrated a firm became, the greater was the effect of this strategy on its relative profitability. As the probability that the firm was following the strategy it actually did follow (X_4) increased, PDR should also increase since this probability was essentially a measure of how appropriate the firm's strategy was given its characteristics and those of its base industry. X_5, the firm's weighted average market share in the industries in which it operated, was included as a control variable since market share and profitability are often directly related. The relative growth rate of the firm's market share in the industries in which it operated (X_6) could have had two effects on its relative profitability. First, there may have been a trade-off between growth in market share and profitability if the firm were following a strategy of buying market share. In this case the coefficient of X_6 would be negative. Second, as suggested by Caves et al, the relative growth in market share may reflect the possession by the firm of proprietary assets which were valued by the market and could not be duplicated by other firms. In this case, the coefficient of X_6 would be positive. X_7 and X_8 were included in the regression to test the hypothesis (as did Caves et al) that the firm's financial structure did in fact influence its profitability, i.e., that there was an optimal capital structure.

This regression equation goes beyond Caves et al in that it contains an independent test of the effect of a firm's choice of strategic group and of the effect of the appropriateness of this choice. The

equation is based on data from 200 firms compared to the 67 firms in the reduced sample of Caves et al, and since it is expressed in deviations from industry weighted averages, it can hold constant the effects of industry variables (barriers to entry, trade exposure, etc.)

$$PDR \times 10^4 = \underset{}{12.1} + \underset{(.57)}{5.9X_1} + \underset{(1.55)}{11.2X_2} - \underset{(3.15)}{8.7X_3} + \underset{(2.90)}{191.4X_4} - \underset{(2.75)}{56.3X_5} + \underset{(1.97)}{2.1X_7} - \underset{(1.72)}{3.7X_8} \quad \bar{R}^2 = .58 \quad N=200 \quad D.W. = 1.72 \quad (1.65)$$

These results support the hypotheses presented above: a firm's performance improved relative to that of the weighted average of the industries in which it operated if it followed a strategy of related diversification, if it followed a strategy that was appropriate to the characteristics of its base industry and the firms, and as its relative market share increased. There was weak evidence that there was optimal capital structure since the coefficient of X_7 was positive and X_8 was negative. Contrary to the results of Caves et al, growth in market share was associated with lower relative profits, supporting the hypothesis that there was a trade-off between growth in market share and profitability.

V

Summary

The analysis in this paper has found support for the following hypotheses based on a sample of the two hundred largest manufacturing firms in Canada:

1. The characteristics of the base industry of a firm and the firm's characteristics influenced the diversification strategy it followed.

2. There were often penalties for not following an appropriate diversification strategy, i.e., the strategy that reflected the influences of the characteristics of the firm and its base industry.

3. A firm's return on equity increased relative to the weighted average return on equity of the industries in which it operated if it followed a strategy of related diversification, if it followed an appropriate strategy, if its market share in the industries in which it operated was large relative to other firms in these industries, if it were growing slower than the industries in which it operated, and if it chose an optimal capital structure.

Table 1

Base Industry and Firm Characteristics of Firms Following Different Diversification Strategies

Base Industry Characteristics	SB	VIB	RB	UB
Concentration	low	high	low	high
Growth	high	low	average	low
Profits	high	average	average	low
Risk	low	high	average	high
Exposure to trade	low	high	average	high
R&D intensity	average	low	high	low
Advertising intensity	low	low	high	low
Relative efficiency	low	high	average	low
Use of raw materials	average	high	average	average
Economies of Scale	low	high	average	high
Market Share	low	high	average	high
Foreign ownership	low	average	high	high

SB = single business, VIB = vertically integrated business, RB = related business, UB = unrelated business.

Table 2

Number of Firms Following the Four Diversification Strategies in the Largest 200 Firms, 1978.

	Total	Foreign[1] Owned	Canadian[1] Owned
Single Business	52	22	30
Vertically Integrated Business	42	24	18
Related Business	54	31	33
Unrelated Business	52	35	17
TOTAL	200	122	78

Table 3

Strategic Group Discriminant Analysis

Base Industry Variable	Mean Scores (centroids) SB	VIB	RB	UB	F Score	Standardized Discriminant Weights Function 1	Function 2	Function 3
Concentration	30.9	69.2	41.2	75.4	19.1[a]	.24	.48	.17
Growth	14.5	7.8	12.6	5.7	14.0[a]	.25	-.15	.22
Profits	13.9	10.2	13.8	9.0	11.3[a]	.60	.07	.35
Risk	.46	.57	.33	.53	12.5[a]	-.27	.28	-.29
Trade Exposure	.55	.90	.31	.28	9.4	-.15	.63	-.17
R&D Intensity	1.82	.84	2.56	.50	21.3[a]	+.13	-.33	.50
Advertising/intensity	1.25	.74	3.30	.93	17.8[a]	-.13	-.47	.43
Relative Efficiency	.75	1.14	.82	.67	15.6[a]	-.14	.61	.14
Use of Raw Materials	7.5	30.6	8.0	5.1	13.7[a]	-.34	.84	-.15
Economies of Scale	4.31	7.2	5.1	6.9	14.2[a]	+.03	.52	.12
Firm Variables								
Market Share	10.2	38.3	21.5	30.1	19.1[a]	+.31	+.37	-.12
Foreign Ownership	33.1	38.1	52.1	62.5	17.8[a]	+.63	-.23	+.21
Group Means								
Function 1	.34	.27	-.15	-.25	--	--	--	
Function 2	-.07	+.35	-.23	-.20	--	--	--	
Function 3	.02	.04	-.35	+.37	--	--	--	

a = significant at the .01 level

Concentration = C_4, the percentage of shipments accounted for by the largest four firms.
Growth = Average industry growth 1961-1975.
Profits = Net profit after taxes divided by total equity.
Risk = Standard deviation of profitability about the average 1961-1975.
Trade Exposure = Imports divided by value of shipments.
R&D Intensity = Sum of internal and external R&D divided by total industry sales.
Advertising Intensity = Ratio of reported total advertising costs to industry shipments.
Use of Raw Materials = Percent of industry inputs spent on raw materials.
Market Share = Market share of the firm in its base industry.
Foreign Ownership = percent foreign ownership
Economies of Scale =
Relative efficiency =

Table 4

"Confusion Matrix" for the Nine Variables used in Classifying Firms to the Strategic Groups

Actual Group Membership	Predicted Group Membership[a]				
	SB	VIB	RB	UB	Total
SB	41	4	1	6	52
VIB	3	34	0	5	42
RB	2	2	45	5	54
UB	8	4	6	34	52
TOTAL	54	44	52	50	200

[a]Predicted group membership is based on the discriminant functions reported in Table 3, adjusted for the prior probabilities of group membership.

Table 5

Profitability for Firms that Followed the Strategy Predicted by the Discriminant Analysis and Compared to Firms that Did Not.

	Difference in return on equity between firms[a]	
	1	2
Single Business	.011[b]	.013[b]
Vertically Integrated Business	.005[b]	.017[b]
Related Business	.027[a]	.052[a]
Unrelated Business	.008[b]	.005
Total	.012[b]	.012[a]

a) differences in profitability were significant at the .01 level.

b) the differences in profitability were significant at the .05 level.

Comparison #1 is between the firms actually in the same strategic group that were or were not predicted to be within that group.

Comparison #2 is between the firms that were predicted to be within a strategic group that were or were not actually within that group.

Footnotes

1. See, for example, Alchian and Demsetz (1972), Berry (1974), Caves (1975) Williamson (1975) and, on a more fundamental level, Penrose (1959) and Coase (1937).

2. See, for example, Andrews (1971), Chander (1977), and Lawrence and Lorch (1967).

3. See Rumelt (1974) and Wrigley (1970) for an analysis using descrete strategies for the United States, Hassid (1975) and Channon (1973) for England, Dyas and Thanheiser (1976) for France and Germany, Pavan (1972) for Italy, and Wrigley (1976) and Lecraw and Thompson (1977) and for Canada. Also see Caves (1975), Lemelin (1978) and the Report of the Royal Commission on Corporate Concentration (1978) for analyses of firm's diversification strategies in Canada.

4. In most of their analysis Caves et al (1980) used a sample of 125 firms, but for the analysis of the determinants of a firms choice of strategy and the effect of this strategic choice on performance, their sample was reduced to 67.

5. The close relationship between many of the financial performance characteristics of the firms in Rumelt's sample (p.92) that had followed "related" and "unrelated" diversification strategies supports this point.

6. See Baumol (1977) for a theoretical (and empirical) analysis of the problem and possibilities of economies of scale for diversified firms.

7. Compare this classification with that of Rumelt (1974), pp. 9-46. Rumelt also discusses the methodological problems in classifying firms to strategic categories on both a theoretical and operation grounds.

8. See Green and Tull, 1975, pp. 442-4, and Cooley and Lohnes, 1971, p. 24 for a description of discrimenent analysis.

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