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PROFIT / VARIANCE TRADE OFF AND INTERNATIONAL DIVERSIFICATION

*Peter Hwang**
黃劍虹

ABSTRACT

This research examines the joint risk-return performance of globally diversified firms. Diversification here encompasses both the product and the international market dimensions. Industry effects were removed to avoid the possible spurious conclusions that may arise due to the important influence of industry membership on firm profit performance. Based on a sample of 125 multinationals, this paper investigates differences in the strategic diversification postures of groups of firms with distinct risk-return performance profiles.

Key Words: International diversification, Product diversification, Related/Unrelated diversification.

* Department of Business Administration, National Taiwan University.

I. INTRODUCTION

Stimulated by Bowman's (1980) risk-return paradox found at the industry level, a growing body of studies headed by Bettis and Hall (1982) and Bettis and Mahajan (1985) have examined the risk-return tradeoff at the firm level for diversified companies. While this stream of research has added value to the literature by addressing the issue of the joint management of risk-return performance for diversified firms, empirical results about the linkage between corporate diversification and joint risk-return performance are presently confusing. To illustrate, some studies (e.g., Bettis and Mahajan, 1985) have suggested that firms with certain diversification postures are able to reduce risk and increase return simultaneously, while others (e.g., Amit and Livnat, 1988) have reported that the risk-return tradeoff exists in individual firms irrespective of their diversification postures.

This paper attempts to clarify some of the existing confusion and further enhance our understanding on this topic by systematically drawing on two major refinements in diversification research relevant to, but not yet incorporated in, the previous studies of this stream. One is the development of a diversification measure which captures not only the product but the international market dimensions of diversification (e.g., Kim, 1989); incorporating this latter dimension seems important since it has been shown to impact corporate profit performance(e.g., Kim, Hwang and Burgers,1989) and is predictably in line with today's corporate reality wherein a majority of firms has expanded across borders to some degree or another. The other is the removal of industry effects in assessing the corporate profit performance impact of diversification (e.g., Chang and Thomas, 1989); this avoids possible spurious conclusions that may arise due to the important influence of industry membership on firm profit performance (e.g., Christensen and Montgomery,1981; Montgomery, 1985; Schmalensee, 1985; Grant, Jammine and Thomas, 1988). Using the collective strengths of these two research refinements along with Bettis and Mahajan's (1985) creative way of partitioning the risk-return variance, this study examines the joint risk-return performance of globally diversified firms. As suggested by Ramanujam and Varadarajan (1989), this approach of building and cross-utilizing the collective strengths among the literature is likely to reconcile past with future work. The ultimate aim here is to augment our understanding on the joint management of multinationals' risk-return performance.

Based on a sample of 125 multinationals, this paper investigates differences in the strategic diversification postures of groups of firms with distinct risk-return performance profiles. As stated, diversification here encompasses both the product and the international market dimensions. The paper is organized as follows. The first section provides a brief review of the relevant literature on the linkage between the two strategic dimensions of diversification and joint risk-return performance and of the measurement of diversification. In the subsequent sections, the research methods and data are discussed. The empirical analysis and results are presented in the fourth section. In the final section we discuss the implications, limitations, and further extensions of the study.

II. LITERATURE REVIEW

A. Product Diversification and Joint Risk-Return Performance

In a pioneering work on the nature of the linkage between risk-return performance and corporate diversification strategy, Bettis and Hall (1982) found a negative risk-return relationship in related-constrained diversifiers, a positive relationship in unrelated diversifiers and no relationship in related-constrained diversifiers. Their results suggest that the nature of the risk-return tradeoff varies across distinct product diversification postures. Bettis and Mahajan (1985) further developed the study of Bettis and Hall (1982). They showed that while a favorable risk-return performance was very difficult to achieve with unrelated diversification and related diversification was no guarantee of a favorable risk-return performance, some related diversifiers managed to simultaneously reduce risk and increase return.

While the above sets of research provided some degree of support for Bowman's (1980) risk-return paradox at the individual firm level, a recent study of Amit and Livnat (1988) found otherwise. Amit and Livnat (1988) presented evidence of the risk-return performance tradeoff in individual firms irrespective of their diversification postures; they found that related diversification characterized high risk-high return firms and unrelated diversification low risk-low return firms. They further argued that their results were sustainable with both accounting and market-based measures of risk and return.

In light of the series of studies demonstrating the important role industry effects play in determining the diversification/performance relationship (e.g., Christensen and Montgomery, 1981; Montgomery, 1985; Grant, Jammine and Thomas, 1988; Chang and Thomas, 1989), one can reasonably conjecture that the risk-return tradeoff relationship in diversified firms found in the aforementioned studies could well be confounded by industry effects not controlled for in their analyses. Furthermore, it should be noted that these aforementioned studies have confined their risk-return tradeoff analyses solely to the product dimension of firm diversification.

B. International Market Diversification And Joint Risk-Return Performance

As the international product life cycle theory of Vernon (1966) suggests, variations exist in the goods and factor markets across international market areas. Differences in the goods markets arise from demand-supply variations across international market areas; differences in factor markets across borders result from variations in factor prices, variations in rates of return and costs of foreign capital, and variations in the activities of trade unions. In his international market diversification research, Caves (1974,1982) concurred with Vernon's observations and further argued that underlying economic conditions and major political climates tend to be uncorrelated across different internatioal areas, thus providing multinationals with bounteous arbitrage opportunities for the improvement of their profit growth and stability. Several other studies on international market diversification (e.g., Wolf, 1975; Rugman, 1979) have also presented the positive impact of firms' international market diversification on their profit growth and stability. What is interesting here is that no risk-return tradeoff in international market diversification has been observed.

Recently, Grant, Jammine and Thomas (1988), examining 304 large British manufacturing companies, provide evidence that multinational diversification offers greater potential for exploitation of economies of scope and scale than does product diversification, suggesting that a firm's competitive advantages or core competences can be more effectively exploited through cross-border diversification than through cross-product diversification. Several recent studies (e.g., Buhner, 1987; Geringer, Beamish and daCosta, 1989) have also found the importance of a firm's multinationalization in achieving favorable profit performance. Moreover, in a global diversification study, Kim, Hwang and Burgers (1989) have further argued for the possibility that global market diversification may generate a favorable risk return performance; notice, however, that this study did not control for the possible confounding effects of industry.

Altogether, one can conclude that while the above works did not study the risk-return tradeoff (or joint risk-return performance) per se, they do appear to suggest that cross-border diversification may provide greater potential for profit growth without sacrificing its stability. If this is the case, the results of risk-return trade-off analyses confined to the product dimension of diversification might be distorted due to the hidden impact of international market diversification.

C. The Measurement of Diversification

Grant, Jammine and thomas (1988) found the Rumelt categorization of diversification strategies to be of little value in understanding the diversification/performance relationship. They further suggested a promising approach is a continuous, objective, SIC-based measure of diversification such as the Jacquemin and Berry entropy diversification measure (1979), offering further support the montgomery's (1982) contention; this suggestion is in line with palepu's (1985).

In a recent study, Kim (1989) argued that in dealing with today's corporate reality the existing diversification measures which focus on either the product (Rumely, 1974; Jacquemin and Berry, 1979; Montgomery, 1982) or the international market (Rugman, 1979; Wolf, 1975; Leftwich, 1974) dimension of diversification are not appropriate as firms increasingly diversify across product space with varying degrees of international market diversification. Accordingly, Kim (1989) proposed an entropy measure of global diversification, which is able to incorporate both of these two dimensions; this measure is an extension of the Jacqremin and Berry entropy diversification measure to the global context. In light of the reality that a growing proportion of modern firms has expanded across borders to some degree of another and has used the international market as important strategic dimension of diversification (e.g., Pearce, 1983), this global diversification measure appears to represent a major refinement over existing diversification measures. Kim, Hwang and Burgers (1989) employed this entropy measure of global diversification in examining the corporate profit performance impact of global diversification and found that the two strategic dimensions of diversification have a distinct yet joint effect on corporate profit performance.

It is worth noting that those past (e.g., Rugman, 1979; Wolf, 1975, 1977) and recent studies (e.g., Grant, Jammine and Thomas. 1988; Geringer, Beamish and daCosta, 1989) that have recognized the strategic importance of multinational diversification have generally acknowledged only two distinct geographic market domains, domestic and foreign. Such a geographic view of the globe, however, appears to be unsatisfactory in capturing the essential strategic element of multinational diversification: the multiplicity of international markets served by a multinational. In Kim's (1989) entropy measure of global diversification, this multiplicity can be captured; the measure is designed to reflect the extent of a firm's business distribution across the multiple heterogenous areas of the global market.

III. RESEARCH METHOD

As shown in Bettis and Mahajan(1985), a potentially powerful approach to examine the linkage between diversification and joint risk-return performance is to identify groups of firms with similar risk-return performance profiles and then analyze the groups of their distinctive diversification postures. Following this approach, the present study investigates the linkage between the diversification strategies of multinationals and their joint risk-return performance. Our approach, however, diverges from Bettis and Mahajan's in its construction of a risk-return taxonomy of diversified firms; while Bettis and Mahajan partitioned the risk-return variance without adjusting for industry effects in forming groups of firms with different risk-return variance without adjusting for industry effects in forming groups of firms with different risk-return profiles, our approach uses risk-return performance net of industry effects to construct the risk-return groups. Specifically, sample firms' risk-return performance is regressed on their weighted industry risk-return performance to obtain the regression residuals of individual firms. We then use these regression residuals, representing the risk-return performance net of industry effects, to form risk-return groups. This way of partitioning the risk-return variance has a significant advantage in that industry effects are removed in an outright manner for the subsequent analyses. Under the previous approaches (e,g., Bettis and Mahajan, 1985; Amit and Livnat, 1988) , on the other hand, the confounding effect of industry persists, making their results on the diversification/risk-return relationship not of the unquestionable sort. Moreover, while the previous studies examined only the linkage between the product dimension of diversification and firms' risk-return performance, our study goes one step further by expressly examining,in addition, the impact of the international market dimension of diversification. The grouping procedure is conducted through K-mean clustering analysis. The K-mean clustering algorithm assigns firms into group heterogeneity (Green, 1978).

Next, Multivariate Analyses of Variance (MANOVA) is used to investigate whether multinationals' diversification strategies do vary across the distinctive risk-return groups. The MANOVA technique serves our purpose well as it is able to reflect the multivariate nature of a multinational's diversification strategy, which encompasses both the product and international market dimensions. The different diversification postures of multinationals are reflected in the three strategic components of diversification-the related, unrelated and global market components. An entropy measure of global diversification (Kim, 1989 ;Kim, Hwang and Burgers, 1989), shown to exhibit continuity, objectivity, and strategic meaningfulness, is used to capture these three strategic components. The MANOVA results would provide a picture of the existence/non-existence of an overall linkage between multinationals' diversification postures and their risk-return profiles.

Beyond the overall test that MANOVA offers, other informative multivariate data dissection procedures (Stevens, 1972) are needed to draw further information on the linkage. For this purpose, two analytical procedures are pursued here. First we conduct pairwise MANOVA to contrast between risk-return groups with respect to their overall diversification profiles. In performing this task, we set up simple contrasts in one way MANOVA by alternatively choosing each risk-return groups under contrast (Barker and Barker, 1984; Finn, 1974). The contrast results are interpreted as the differences between the control group and the respective treatments. The results of the pairwise MANOVA contrasts would provide an understanding of the overall linkage between diversification strategies and the risk-return groups with respect to each strategic component of diversification. Here, we aim to assess the impact of each strategic component of diversification on the risk-return performance while controlling for the effects of the other two strategic components of diversification. Analysis of covariance (ANCOVA)and pairwise ANCOVA contrasts are used for this purpose. As opposed to the ANOVA (Analysis of Variance) technique, which has been frequently employed in the previous analyses of the diversification/risk-return relationship (e.g., Bettis and Mahajan, 1985; Amit and Livant, 1988), the use of the ANCOVA technique here reflects our concern that the two strategic dimensions of global diversification-product and international market might possibly have a joint effect on risk return performance.

In sum, this research is designed to systematically build on the major research refinements in the area. Specifically, our research approach adopts a creative way of constructing a risk-return taxonomy, which enables us to untangle the possible confounding effects of industry. Moreover, the approach explicitly recognizes the two distinct strategic dimensions of diversification -product and international market- and captures them with a continuous and integrated measure of global diversification.

IV. DATA

A. Sample

Four principal data sources were used in this research. Firm performance data were retrieved from COMPUSTAT tapes. Industry performance data were obtained from Forbes annual surveys with corporate industry weights, needed for computing sample firms' weighted industry performance, attained from 10-K annual reports. The corporate diversification indices were computed based on Dun and Bradstreet's 'America's Corporate Families and International Affiliates'. On occasions, personal inquiries were made to individual sample firms for data clarifications or missing data points for the study period of 1982-1986. The years 1982-1986 were used in this work because they were the only years for which the kind of data needed for computing our diversification indices were publicly available at the time of the research.

We started with 152 multinationals randomly selected from Forbes annual survey of 1982. Forbes was used for this purpose since the other three data sources used in this study - Dun and Bradstreet's data bank, COMPUSTAT tapes and 10-K annual reports - embrace a much larger base of firms than Forbes, ensuring the availability of information across all four data sets needed for our analyses. We then eliminated 27 firms from further analyses. Attrition occurred due to unavailability of comprehensive corporate performance data for one firm; post-1982 discontinuation of independent business operations as a result of mergers and acquisitions for nine firms; unavailability of dependable data on the global diversification of firms' operations for six firms; and severe discontinuities in diversification posture for eleven firms that changer either their core businesses or a noticeable extent of their international involvement during the study period.

B. Performance Measure

This study employed the 5-year average (1982-1986) return on assets (ROA = net income after taxes divided by total assets)as a firm return measure. ROA, which controls for differences in the financial structure across firms, has been widely used by both managers and researchers and serves well the purpose of a diversification study of this kind (e.g., Montgomery, 1985; Bettis and Mahajan, 1985). The use of a 5-year average ROA aims to capture a relatively long-term performance measure, avoiding possible temporary return fluctuations. Firm risk was measured by the standard deviation of ROA (SDROA) over the 5-year study period; SDROA is a widely accepted standard measure of firm risk in diversification research. It is worth noting that the accounting measure of return and risk used herein has been shown to correspond to market measures (Amit and Livnat,1988). The two principal data sources used for measuring the weighted industry performance of our sample firms were Forbes annual surveys and 10-k annual reports of 1982-1986. Forbes annual surveys provide our industry return data; though these surveys admittedly contain an aggregate level of information, they have been recognized the be acceptable ones (see Bettis and Mahajan, 1985 :791). Since no return on assets data for industries were available, this study chose two profit ratios from the surveys as

ROA surrogates. The chosen two profit ratios were: return on total capital (ROTC =net income after taxes, expressed as a percentage of stockholders' equity plus capital from long term debt) and net profit margin (NPM = net income after taxes divided by total sales). The first ratio controls for the effect of financial leverage; the latter ratio is mathematically related to ROA in that ROA is the product of NPM and asset turnover ratio (sales divided by assets). Both ratios and ROA hence are likely to be highly correlated. It is worth noting that since the survey stopped producing industry ROTC figures since 1985, industry ROTC figures for 1985-1986 were computed based on the ROTC figures provided by 10-K reports for all of those firms listed under the same industry segment in Forbes' annual surveys of 1985-1986.

In addition to this industry return data, we used 10-K reports of sample firms, which provided company industry segment sales data on an annual basis to gether with each industry segment' definition. Based on these reports, we calculated annual 'weights'- the ratios of firms' industry segment sales to their total sales - for each industry segment of sample firms. These weights along with our annual industry returns were then used to generate our sample firms' weighted annual industry returns for the study period of 1982-1986. The 5-year averages of these annual weighted returns were our final analysis. Note here that compatibility between our two principal data source, Forbes and 10-K reports, in their industry segment classification is relatively high. However, in those instances when partial incompatibility of ambiguity did exist, personal inquiries were made to individual sample firms for data clarifications. Akin to firm risk, industry risks of our sample firms wrere measured based on the standard deviations of their annual weighted industry returns over the study period of 1982-1986. Here, however, we added the industry level debt to equity (DTE) ratio, an indicatior of an industry's financial leverage position provided by Forbes, as a direct measure of industry risk. The weighted DTE ratios of our sample firms used herein were calculated using a method similar to that used in computing thier weighted industry returns. This study thus employed the standard deviations of both weighted ROTC and weighted NPM over the study period along with the 5-year average weighted DTE to measure our sample firms' insrstry risk. Note that for expositional simlicity, hereafter we no longer include the term 'weighted' when we refer to our industry risk-return indicators. Table 1 presents a summary of the firm and industry return-risk indicators used in this study.

The use of multiple indicators for industry risk and return in our regression analyses may entail a multicollinearity problem. Table 2 reports product-moment correlation coefficients for industry risk and return indicators. As shown in Table 2, significant correlation coefficients were observed; this suggests the existence of the multicollinearity problem. We employed principal component analysis to ameliorate this multicollinearity problem by transforming the original set of indicators to a mutually uncorrelated set of linear combinations (Green, 1978).

Table 1 Firm and Industry Return-Risk Indicators Used

Firm return-risk indicators:	
1. ROA*	Return on assets
2. SDROA	Standard deviation of return on assets
Industry return-risk indicators:	
1. ROTC*	Return on total capital
2. NPM*	Net profit margin
3. SDROTC	Standard deviation of return on total capital
4. SDNPM	Standard deviation of net profit margin
5. DTE*	Debt to equity ratio

*5-year averages.

Table 2 Correlation Coefficients of Industry Risk and Return Indicators

	Industry Risk Indicators			Industry Return Indicators	
	SDROTC	SDNPM	DTE	ROTC	NPM
SDROTC	1				
SDNPM	0.6292*	1			
DTE	0.2561	0.3504*	1		
ROTC	-	-	-	1	
NPM	-	-	-	0.2912*	1

*P < 0.01

The results of our principal component analyses which reveal the data structure are provided in Table 3. As presented in Table 3, principal component analyses for industry risk and return indicators yielded three and two principal components, respectively. Notice, however, that only the first principal component for industry risk and the first principal component for industry return exhibited an eigenvalue greater than 1. These two principal components with an eigenvalue greater than 1 were then retained for further analyses (Green, 1978); they were named INDRISK and INDRTN representing industry risk and industry return, respectively. Both the values of INDRISK and INDRTN were derived as weighted averages by using the coefficients of their constituent indicators (in bold face in Table 3) as weights.

Table 3 Principal Component Analyses for Industry Risk and Return Indicators

	Principal Components of Industry Risk Indicators				Principal Components of Industry Return Indicators	
SDROTC	0.6669	-0.7451	0.0062	ROTC	0.8034	-0.5955
SDNPM	0.8531	0.2978	0.4291	NPM	0.8034	0.5955
D/E	0.8554	0.2842	-0.4326			
Eigenvalue	1.9042	0.7246	0.3713		1.2909	0.7092
Variance Explained	63.47%	24.15%	12.38%		64.54%	35.46%

C. Diversification Measure

The entropy measure of global diversification, which is employed in this study, is designed to distinguish among three managerially meaningful components of corporate global diversification, namely: unrelated diversification (UD), which reflects the extent of diversification across industry segments; global market diversification (GMD), which reflects the extent of the global market dispersion of a firm's operations ; and global related diversification (GRD), which reflects the extent of global diversification across business segments within the industry segments of a firm. Here, industry segments correspond to two-digit SIC codes and business segments correspond to four-digit SIC codes. Each firm has four indices : (1) UD index; (2) GMD index; (3) GRD index; and (4) total diversification (DT) index which is equal to the sum of (1), (2) and (3). The distinctive merits this measure vis-a-vis other existing diversification measures as well as the conceptual and methodological development of the measure are detailed in Kim (1989). The definition of the measure can be found in the Appendix.

Following the tradition of previous research (Hirsch and Lev,1971; Miller and Pras, 1980; Kim, Hwang and Burgers, 1989), this study identified six relatively heterogenous global market areas based on their economic and political conditions. These are : North America (U.S. and Canada); the European Community and its associates; Japan and other developed countries; developing (industrializing) countries; underdeveloped countries; and centrally planned economies. While admittedly some degree of subjectivity exists here, this approach seems to better reflect the essence of global market diversification than does an approach based on either the count of individual countries (e.g., Cohen, 1972; Caves, 1982) or a two-market view, domestic versus foreign(e.g, Rugman, 1979; Wolf, 1975,1977). In obtaining our diversification indices, we closely followed Kim, Hwang and Burger's (1989: 49-50) procedure of data handling and computation.

V. EMPIRICAL ANALYSIS AND RESULTS

To obtain the risk-return performance net of industry effects, firm return and risk were regressed on industry return and risk, respectively. As shown in Table 4, the b coefficients for both return and risk have positive signs and are highly significant. This suggests that industry performance is significantly associated with the firm's risk-return performance; specifically, profitable firms tend to operate in industries with higher returns and low risk firms tend to operate in more stable industries. This finding that the industry effect on firms' risk-return profile is significant is in line with previous findings (e.g., Chang and Thomas, 1989) and adds support to the importance of controlling for industry effects in examining the diversification/risk-return performance linkage. With the estimated coefficients of the return and risk regression lines, the regression residuals of individual firms for both return and risk were obtained.

Table 4 Results of Regression Analyses

Dependent Variable	Independent Variable	b	Standard Error	R*
ROA	INDRTN	0.1381*	0.0316	0.1340
SDROA	INDRISK	0.1854*	0.0395	0.1522

*P < 0.001

The regression residuals, the unexplained portion of firms' risk-return performance independent of industry effect were used to develop the risk-return taxonomy of diversified multinationals. The K-mean clustering algorithm was used to group the sample firms into clusters with similar risk-return characteristics. Since it is an empirical question as to how many clusters to retain, we experimented with several cluster specifications. Within-cluster variance was reduced only marginally with more than four clusters, suggesting the within- cluster variance stabilized with four clusters. Hence, we adopted a four cluster solution. Table 5 provides a summary of the four clusters including the number of firms in each cluster, the cluster means and the results of an ANOVA which intended to assure the chosen four clusters have no identical means. The

Table 5. A Summary of the Four Clusters: Residuals of Firm Risk and Return

	Cluster 1		Cluster 2		Cluster 3		Cluster 4		
Variables	mean	N*	mean	N	mean	N	mean	N	ANOVA F-values
Residuals of firm risk	-0.0232	20	0.0208	24	0.0091	49	-0.0150	32	6.98**
Residuals of firm return	0.0601	20	-0.0118	24	0.0212	49	-0.0612	32	3.96*

*N = the number of firms
*P < 0.01
**P < 0.001

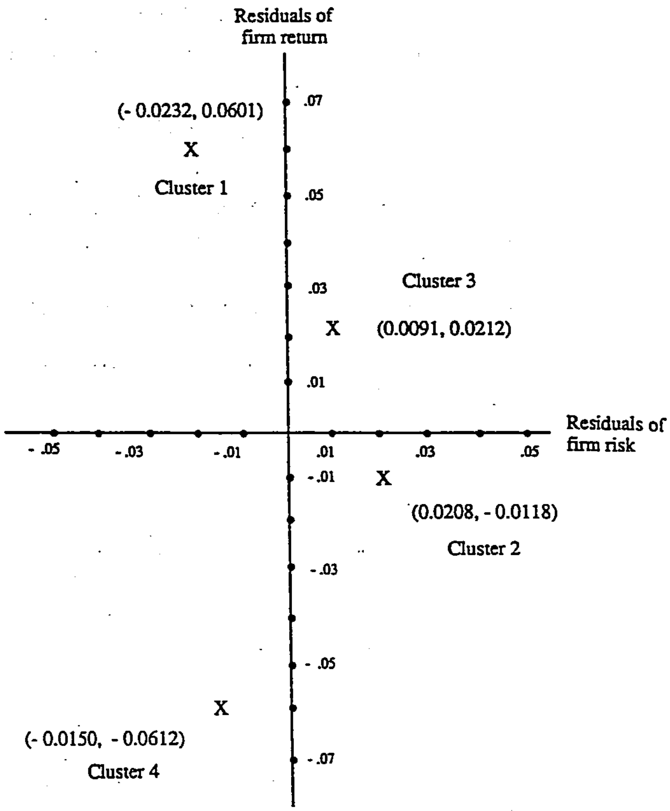

Figure 1. A Plot of Cluster Centroids

ANOVA results shown in the last column of Table 5 confirm that the chosen four clusters do not have identical means.

Further, post-hoc comparison based on Duncan's multiple range test (p<.05) revealed that except for clusters 1 and 4 for risk residuals and clusters 2 and 3 for return residuals, all other paired clusters showed significant differences. Figure 1 presents a plot of cluster centroids. Based on the relative positions of cluster centroids shown in Figure 1 and our results of Duncan's multiple range test, we named cluster 1 or group 1 low risk-high return, cluster 2 or group 2 high risk-medium return, cluster 3 of group 3 medium risk-medium return, and cluster 4 or group 4 low risk-low return, respectively. The most efficient group controlling for industry effects, the firms in the first group have high mean profits as well as low risk, representing the most efficient group.

Our MANOVA results on the overall difference across the groups in their diversification postures showed that Wilk's lambda for the overall model is 0.8344 with p<.009. Statistically, this indicates that the means of the three diversification indices of GMD, GRD, and UD are not identical across the four groups of firms.Our results thus provide evidence that the overall diversification postures captured in the three diversification indices differ across the groups of firms in the different risk-return categories, suggesting the existence of an overall linkage between diversification strategies and the risk-return profiles of multinationals. Table 6 presents group means on the three diversification indices on which the MANOVA test is based.

Table 6 Group Means on the Three Diversification Indices

	Group 1*	Group 2	Group 3	Group 4
GMD	0.480	0.273	0.380	0.301
GRD	0.637	0.751	0.607	0.469
UD	1.193	1.294	1.405	1.543
N*	20	24	49	32

*G (Group) 1: Low risk-High return
G (group) 2: High risk-Medium return
G (group) 3: Medium risk-Medium return
G (group) 4: Low risk-Low return
*N = the number of firms

The results of pairwise MANOVA contrasts are provided in Table 7. As shown in Table 7, among the six possible pairwise contrasts obtained, the three contrasts proved to be statistically significant; one was significant at the .10 level and the other two were significant at the .01 level. While the firms in group 1 (low risk-high return), 2 (high risk-medium return) and 4 (low risk-low return) were characterized by mutually different overall diversification profiles, the firms in group 3 (medium risk-medium return) did not differ significantly in their overall diversification strategies from the other three groups. These results indicate that only the groups that exhibit a distinctive mutual difference in their risk or return performance (low vs. high) could be identified as having different diversification strategies, providing further information on the preceding overall MANOVA results.

Table 7 Results of Pairwise MANOVA Contrasts

Contrasts	wilk's Λ	F-values
G1 & G2	0.948	2.19*
G1 & G3	0.966	1.41
G1 & G4	0.900	4.39**
G2 & G3	0.954	1.90
G2 & G4	0.906	4.14**
G3 & G4	0.955	1.87

*p < 0.10
**p < 0.01

ANCOVA and pairwise ANCOVA contrasts lended further transparency to the MANOVA results. In our ANCOVA, the three strategic elements of diversification (GMD, GRD, UD) alternatively served as the dependent variable with the remaining two elements being treated as covariates in each case. In conducting ANCOVA, however, we needed to first test the assumption of parallelism - homogeneity of slopes - among our risk-return groups with respect to each covariate. This amounted to testing the interaction effects between the covariates and the four risk-return groups. In our case, the covariates with a significant interaction effect, i.e., an interaction term with p<.05, were found and the needed adjustments were made. Instead of using a common slope for the covariates with a significant interaction effect, we allowed for the fitting of separate regression lines to partial out the covariate impact of the specific element of diversification strategy under investigation (Wildt and Ahtola, 1978 : 27-28; Kleinbaum and Kupper, 1978: 213-214). Our covariate-adjusted group means and the partial F values were then obtained. These results of ANCOVA along with the results of pairwise ANCOVA contrasts are presented in Table 8. As shown in Table 8, the ANCOVA results of significant partial F values suggest that the overall difference in each strategic element of diversification, while holding other elements constant, exists across the firms belonging to different risk-return groups.

The results of pairwise ANCOVA contrasts shown in Table 8 along with the pairwise MANOVA contrast results shown in Table 7 consistently suggest that firms belonging to groups 1 (low risk-high return group), 2 (high risk-medium return group) and 4 (low risk- low return group) have mutually distinctive diversification profiles. As shown in Table 8, the distinctive difference in the diversification strategies of firms in group 1 versus group 2 strategies resides mainly in their pursuit of global market diversification; while no diversification strategy, group 1 firms on the average showed a signficantly higher level of global market diversification than group 2 firms. Given that group 1 achieved more favorable risk-return performance - both lower risk and higher return - than group 2, we may tentatively state that global market diversification plays an important role in both reducing risk and increasing return.

Table 8 also suggests that though the firms in groups 1 and 4 showed no difference in their related diversification they did show signficant distinction in their global market and unrelated diversification; while group 1 firms vis-a-vis group 4 firms on the average achieved a significantly higher level of global market diversification, group 4 firms vis-ā-vis group 1 firms on the average were signficantly more unrelated in their product diversification. Recall that while group 1 firms showed a superior performance in both risk and return(low risk-high return), group 4 firms showed a superior performance in risk (low risk) but an inferior performance in return (low return). We may then reason that while both global market and unrelated diversification may help to achieve a superior risk performance, global market diversification appears to be able to do so while simultaneously increasing return; unrelated diversification, in contrast, appears to achieve the superior risk performance but at the expense of return performance.

Table 8 Results of ANCOVA and Pairwise ANCOVA Contrasts

	Covariate-adjusted Group Menas				Partial	Actual	
	G1	G2	G3	G4	F-values	Significant Pairwise Difference	
GMD	0.475	0.268	0.381	0.307	2.10*	G 1 & G 2**	G1 & G4**
GRD	0.641	0.757	0.605	0.464	2.87**	G2 & G4***	
UD	1.198	1.278	1.406	1.551	2.49*	G2 & G4*	G1 & G4**

*p < 0.10
**p < 0.05
***p < 0.01

As shown in Table 8, groups 2 (high risk-medium return group) and 4 (low risk-low return group) showed no difference in their global market diversification but showed signficant distinction in their product dimension - related and unrelated - of diversification; while group 2 firms on the average were more unrelated than group 2 firms. In the light of the fact that group 2 exhibited a better return performance than group 4 with the reverse true for risk risk performance, we may tentatively conclude that while related diversification can help to increase return at the expense of risk performance, unrelated diversification ans help to decrease risk at the expense of return performance.

It should be noted, however, that we failed to draw any intersting interpretation on the firms in group 3 vis-ā-vis those in the other three groups with regard to their diverdification/risk-return linkage. This may partially stem from the marginal distinction of group 3 firms (medium risk-medium return group) from the others in their risk-return performance characteristics.

VI. DISCUSSION AND CONCLUSIONS

In examining the joint risk-return performance on multinationals, this paper adopts Bettis and Mahajan's creative way of partioning the risk-return variance yet in a manner that controls for industry effects. At the same time, the role that global market diversification plays in determining joint risk-return performance is expressly traced. Our key findings are the following. First, while industry membership is critical in determining corporate risk-return performance, an overall linkage between a firm's diversification strategy and its risk- return performance exists even after controlling for the industry effect. Second, the risk- return tradeoff behavior varies across the product and international market dimensions of corporate diversification; while the risk-return teadeoff exists in the product dimension of diversification, a favorable risk-return performance can be achieved with global market diversification. Finally, as for the nature of the risk-return relationship in the product dimension of diversification while controlling for the global market dimension, related product diversification achieves a favorable return performance but at the expense of risk performance, while unrelated product diversification achieves a favorable risk performance but at the expense of return performance.

Our findings partly agree with, and partly dissent from, those of previous studies. Our finding that the industry effect on firm's risk-return profile is crucial, is in line with previous findings (e.g., Chang and Thomas, 1989) and adds support to the importance of controlling for industry effects in examining the linkage between diversification and joint risk-return performance. Our findings that related diversification is generally associated with a favorable corporate return performance is consistent with the findings of Rumelt and some subsequent replications of his work. Our finding that unrelated diversification is generally associated with a favorable corporate risk performance is also consistent with the findings of previous research (e.g., Westerfield, 1970). However, we found that a favorable risk-return performance is extremely hard to achieve with product diversification alone be it related or unrelated. Hence, in search of superior diversification strategy, it may well be myopic to confine the risk-return analysis solely to the product dimension. As our findings suggest, by explicitly treating the global market dimension in risk-return tradeoff analyses, not only is it hard to identify firms with low risk-high return performance, but it could well have confused the results of prior studies, which confined their analyses to the product dimension, due to the hidden impact of global market diversification on their sample firms' risk-return performance.

Our findings reveal the strikingly important role international market diversification plays in achieving a superior risk-return performance. Yet this important strategic dimension of diversification has been understudied in the literature and underutilized in the joint management of corporate risk and return; most diversification studies have been under the dominant influence of Rumelt's product based approach. Even those studies (e.g., Grant, Jammine and Thomas, 1988; Geringer, Beamish and daCosta, 1989) that recongized two different geographic market units, domestic and foreign, failed to capture the essential strategic element of international market diversification: the multiplicity of international markets served by a multinational. The need to correct the deficiency of either omitting the international market dimension altogether or capturing it with a two geographic unit view of the globe has become evident as modern firms have increasingly diversified across multiple international borders. Using an entropy measure of global diversification, this study attempted to overcome this deficiency and provide evidence that a favorable risk-return performance can be achieved with international market diversification. The evidence presented herein further supports and extends Bowman's (1980) statement that "more profitable firms are very active in international markets, which as a form of diversification may reduce the variance exposure as well as offer a wider variety of investment opportunities."

This study suggests that global market dimension needs to be expressly incorporated in future studies on joint risk-return performance of diversified firms. As witnesses in this study, with an improved measure, we may find a quite different picture of the nature of the diversification/risk-return linkage than we have observed in the existing literature. Such improvement should further enhance our understanding of the joint management of corporate risk and return.

A future extension of this work is to integrate the linkages among corporate risk-return performance and individual firm attributes such as market power, operational efficiency and organizational fit. As earlier studies have suggested, corporate risk-return performance is strongly linked with not only industry effects but also firm attributes. This means that in evaluating the corporate diversification/risk-return linkage, possible spurious effects due to firm attributes as well as industry effects need to be controlled for. A structural modelling approach may be effective to deal with such task in that would help to untangle the multiple direct and indirect links between the involved constructs which, in turn, may help to further resolve some ambiguities and inconsistencies existing in the literature.

A second possible extension of this work is to expand our understanding on the casual linkages between diversification strategy and joint risk-return performance. As suggested in industrial organization's instury structure - firm conduct - firm performance paradigm (Mason, 1939; Bain, 1959; Scherer, 1970), a partial analysis focusing on the firm conduct/firm performance linkage without figuring industry structure in the casual chain may be a futile effort; such a partial approach may cloud rather clarify our understanding on this topic irrespective of how sophisticated the model employed. Hence, a better understanding of the casual flows among the three constructs of industry structure, firm conduct and firm performance appears necessary. It is our tentative hypothesis that when the effects of firm attributes are controlled for, the past industry structure in which a firm operated may well be seen to affect the firm's current strategic posture toward diversification; this and the firm's current industry structure may, in turn, explain the firm's risk-return performance. Such study may begin to answer the question of what shapes a firm's diversification posture and how a firm's diversification posture is linked with its risk-return performance. A causal modelling such as the LISREL technique might be a possible approach to deal with this issue.

Admittedly, the industry risk-return data used here are not ideal; while industry effects are controlled for, firm attributes are not figures in our analyses. As with all studies of this type, this deficiency mainly stems from our failure in obtaining an acceptable data set on firm attributes of our sample companies (e.g., weighted market share measures as a surrogate of firms' market power for our sample multinationals were not available). As always, although we ended this paper by suggestsing more future improvements than solutions, it is hoped that the findings, drawn from the collective strengths of the relevant studies, have built a more common thread among these diversification works, invoking further research in this important area strategic management.

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APPENDIX : DEFINITION OF THE DIVERSIFICATION MEASURE USED

Suppose a firm operates in N geographic market areas (a), the entrpoy measure of total diversification (DT) can be defined as follows:

$$DT = \sum_{a=1}^{N} \sum_{i \varepsilon a} P_{ia} \ln(1/P_{ia}).$$

Where P_{ia} is the proportion of the size of the i^{th} industry segment in the a^{th} market area to a firm's total size of operations.

Unrelated diversification (UD) assesses the extent of a firm's diversification across industry segments. Suppose a firm operates in M industry segments (j), the entropy measure of UD is defined as follows:

$$UD = \sum_{j=1}^{M} P_j \ln(1/P_j).$$

Where P_j is the proportion of the j^{th} industry segment to a firm's total size.

Global market diversification (GMD) assesses the dispersion of a firm's operations across global market areas (a). Suppose a firm operates in M industry segments, the entropy measure of GMD is defined as follows:

$$GMD = \sum_{j=1}^{M} P_j \sum_{a \varepsilon j} P_{aj}^{j} \ln(1/P_{aj}^{j}).$$

Where P_{aj} is the proportion of the j^{th} industry segment in the a^{th} market area to the total size of a firm and $P_{aj}^{j} = P_{aj} / P_j$.

Global related diversification (GRD) assesses the extent of diversification across business segments within industry segments within global market areas. Suppose a firm operates in M industry segments, the entropy measure of GRD is defined as follows:

$$GRD = \sum_{j=1}^{M} P_j \sum_{a \varepsilon j}^{M} P_{aj}^{j} \sum_{i \varepsilon a} P_{iaj}^{aj} \ln(1/P_{iaj}^{aj}).$$

Where P_{iaj} is the proportion of the i^{th} business segment within the j^{th} industry segment in the a^{th} market area to the total size of a firm and $P_{iaj}^{aj} = P_{iaj} / P_{aj}$.

Under the above definitions the sum of the UD, GMD, and GRD components should be equal to total diversification. The demonstration of this mathematical proof can be found in Kim (1989:382).