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Curvilinear Relationship between Diversification and Performance: A Replication and Extension of Previous Research

Phil Stetz
Stephen F Austin State University

Elton Scifres
Stephen F Austin State University, escifres@sfasu.edu

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As argued in most strategic management textbooks, the relationship between diversification and performance is curvilinear and firms pursuing a related diversification strategy outperform those firms pursuing a dominant or an unrelated diversification strategy. Using SAS modeling techniques and controlling for industry, corporate and business unit effects new insights were gleaned with regards to the relationship between diversification and performance. The implications to performance (statistical significance), given the type and extent of diversification strategies, are discussed resulting in a deeper understanding of how the complex relationships between performance and diversification play out across the entire diversification spectrum.

INTRODUCTION

Paradoxically, as the speed and globalization of the new competitive landscape (Hitt, Keats, & DeMarie, 1998) increases and the charge by shareholders and institutional investors to continually create or sustain value, questions still remain as to the viability of corporate level strategies, or for that matter, what are the drivers of firm performance, industry or firm level factors, as evidenced in the debate of the High Church and Low Church (Leventhal, 1995). Bowman and Helfat (2001) suggest as much in an article entitled, "Does Corporate Strategy Matter?" and drawing from an emerging research stream termed "corporate effects", concludes that Corporate effects, defined as the impact on profitability of factors associated with membership of multi-businesses with individual corporations, do in fact, add value to a corporation. However, it is underdetermined which factors, such as systems of planning and control (Miller & Cardinal, 1994), corporate management (Bowman & Helfat, 2001), or diversification strategies and the like, actually contribute to this non-trivial effect on firm performance.

Diversification, defined as a corporate level strategy that involves the management of a mix of businesses competing in several industries or product markets (Ramanujan & Varadarajan, 1989), after thirty years of research, lacks also a consensus as to the value added of a type and/or level of diversification. In fact, Grant (1995) concludes that because of the inconsistency of the empirical evidence on diversification it is impossible to generalize about the performance outcomes of diversification. In a seminal meta analysis of over 30 years of diversification research Palich, Cardinal, & Miller (2000) suggest a curvilinear relationship exists between diversification and performance; however, the authors point out that the majority of the empirical works did not control for assets, business unit

intensities, and/or industry effects and argue that using such controls would help to clarify the diversification-performance relationship.

Our study answers their call and attempts to replicate their findings by investigation the relationship between diversification and performance within the manufacturing sector through the use of a general linear mixed model while controlling for assets, business unit intensities, industry effects, as well as corporate effects, in addition to using a large sample (19,749 obs.) over seven years. In this endeavor, we also will extend this research by trying to delineate which type/s and level/s of diversification are the drivers for the proposed inverted-U relationship. Furthermore, the level of analysis for this study is at the business unit so we can better assess the effects on business unit performance of (1) corporate strategy; i.e., strategic choices concerning the domain and scope of the business unit, and (2) a business unit competing with other business units across the spectrum of diversified corporations (Barney, 1997).

DIVERSIFICATION PERSPECTIVES

A multitude of theoretical perspectives address the reasons for diversification and the implications of the type and/or level of diversification to performance. Some perspectives suggest that diversification is implemented to create value over and above that which may be attained by a single stand-alone business — economies of scope through operational synergies or financial economies; others suggest that diversification is a means through which to gain market power, while others suggest that diversification is implemented to reduce management employment risk or increase managerial compensation.

Economies of scope suggest that value may be created at the corporate level through the selection and management of a particular group of businesses that are worth more under the ownership of the company than as a single stand-alone business unit (Collis & Montgomery, 1998a, 1988b). Multi-business corporations may create value either by exploiting synergies or financial economies of scope between business units; however, the level of diversification through which a firm may achieve optimum performance varies as to the theoretical perspective. Synergy Theories argue that benefits may accrue to multi-business units through the sharing of activities or the leveraging of core competencies that are not available to single stand-alone businesses. Thus, synergy exists when the value created by business units working together exceeds the value those same units create when working independently. The concept, sharing of activities (Porter, 1985, 1987), is based on value chain analysis. Through such an evaluation, a firm may identify ways in which activities can be shared across several different businesses within a diversified corporation. Porter (1985), Rumelt (1974), and Ansoff (1965) suggest ways in which activities can be linked between and among business units embedded within a multi-business corporate structure. As Barney (1997) notes, shared activities may reduce costs or enhance revenues and are quite common in corporations that are low to moderately diversified.

Leveraging of core competencies has genesis in the resource-based view of the firm (Wernerfelt, 1984; Dierickx & Cool, 1989; Barney, 1991; Conner, 1991; Peteraf, 1993) and suggests that revenue enhancements or cost savings may be achieved through the sharing of less tangible resources, such as knowledge, experience, or brand name (Grant, 1988). As Argyres (1996) points out, because the expense of developing a core competence is a sunk cost, and competencies based on intangible resources are less visible and more difficult for competitors to understand and imitate, transferring these types of competencies from an original business unit to another may reduce costs and enhance an entire firm's strategic competitiveness.

Although research has shown that sharing resources and activities contributed to post-acquisition performance increases and higher returns to shareholders (in the banking industry) (Brush, 1996; Zhang, 1995), we argue that there are limits to the degree to which the sharing of activities or the leveraging of resources can create value. Davis, Robinson, Pearce, and Park (1992) as well as Chandler (1962, 1977, 1991) suggest that the coordination and managing the sharing of activities can lead to excess bureaucracy, inefficiency, and organization gridlock as well as the loss of flexibility because of the interdependencies between and among business units. Barney (1997) suggests that the leveraging of core competencies may be limited by the way the firm is structured as well as by the ability to transfer intangible assets (i.e., tacit

knowledge) to other business units. In sum, synergy theories suggest that a firm may achieve benefits from low to moderate levels of diversification through the sharing of activities or leveraging of competencies among its business units — up to a point, and then would be faced with higher marginal costs respective to increased marginal benefits (Markides, 1992).

An internal capital market (ICM), implemented to manage less closely related activities (Williamson, 1975, 1979, 1985), suggests efficiency gains are derived from the amount and quality of information that corporate headquarters possesses concerning the operations and performance of business units embedded within its corporate structure. In such firms, business units are treated primarily as profit centers: the prime criteria for their continuation and support are their current or future profitability, and corporate headquarters functions primarily as an internal capital market by which cash flows are directed to high-yield uses (Scott, 1995). In sum, this perspective suggests an unrelated strategy at high levels of diversification to achieve efficiency gains.

In a different vein from the above efficiency theories, the market power perspective (Caves & Porter, 1977; Caves, Porter, & Spence, 1980) suggests that firms may create value through anticompetitive economies of scope. The phenomenon of market power in the diversification process is characterized by multi-business firms leveraging their size and diversity to exert market power and, in turn, gain a strategic advantage. Market power exists when a firm is able to sell its products above the existing competitive level or reduce the costs of its primary and support activities below the competitive level, or both (Shepherd, 1986). Two common mechanisms through which firms may exert market power are through cross subsidization or mutual forbearance in multipoint competition (Grant, 1995). However, multi-market competition may be a double-edged sword in that a firm may wish to expand into familiar market segments but may forgo the implementation because of the perceived retaliation from its rivals. Instead, the firm may diversify into an industry somewhat unrelated to their current product market. Multi-market competition may play out within any type of diversification as well as any level of diversification; however, it would seem cross-subsidation would be the most viable at high levels of diversification with the type of diversification, indeterminate.

Other theoretical perspectives within the diversification literature suggest means through which firms may sustain their value or gain legitimacy. Risk spreading, grounded in the finance literature, suggests that the risk of engaging in two businesses will be lower as long as the returns from the two businesses are not perfectly and positively correlated. Through diversification into different product markets, a downturn in one market may be buffered by an upturn in another. A fundamental premise of this perspective is that firms can reduce their overall risk by engaging in multiple businesses with imperfectly correlated returns over time (Copeland & Weston, 1983). Institutional theory (DiMaggio & Powell, 1983; Fligstein, 1985, 1990) suggests that organizations are likely to come to resemble one another due to pressures from their environment and, when organizations face uncertainty in their environment, they may mimic other, more successful organizations. By so doing, firms may gain legitimacy, but the adoption of a type or level of diversification does not necessarily ensure performance gains. In sum, these perspectives may sustain the viability of firm's performance without necessarily creating value as the firm becomes more diversified.

Still other theoretical perspectives suggest that firms may diversify for reasons other than profit maximization or survival. One such theory is the power perspective (Pfeffer & Salancik, 1974; Perrow, 1970; & Pfeffer, 1981) and argues that organizations must allocate scarce resources, and it is not always apparent as to what might be the optimal mechanism for such allocation. Since diversification can be viewed as a mechanism that allows for growth, its implementation would be favored by those who stood the most to gain. Therefore, managerial motives for diversification, such as managerial risk reduction and a desire for increased compensation (Cannella & Monroe, 1997; Finkelstein & Hambrick, 1996) may exist independent of other incentives and resources.

In this brief and broad review of the literature, each framework suggests different mechanisms and levels of diversification through which a firm may obtain a higher return or sustain firm value, with the exception of the power perspective. Given the breadth of theories on diversification, it may be concluded,

that on the basis of theory alone, it is difficult to come to a definitive conclusion regarding the performance superiority of one diversification strategy over another (Seth, 1990).

DIVERSIFICATION: EMPIRICAL STUDIES

Palich, Cardinal, and Miller (2000) suggest that the threat of fragmentation of findings on the relationship between diversification and performance is great owing to the myriad approaches and frame works from which this research has been generated. Seth (1990) concurs and suggests that on the basis of theory alone, it is difficult to come to a definitive conclusion regarding the performance superiority of one diversification strategy over another. Thus, we turned to the empirical research that has investigated diversification-performance linkages to determine if some consensus has been reached about the performance outcomes of diversification.

Diversification studies may be categorized into three types, those that study the performance differences between 1) diversified and non-diversified firms, 2) related and unrelated diversified firms, and 3) stand-alone, related, and unrelated diversified firms. (See Table 1 for a summary of empirical results.)

The findings, as suggested in Table 1, support Grant's (1995) conclusion that the inconsistency of the empirical evidence on diversification points to the impossibility of generalizing about the performance outcomes of diversification. Palich et al., 2000 also concur by suggesting that after 30 years of research, although the research domain -while large - has not reached maturity in that there is a lack of consensus regarding the linkage between diversification and performance.

EFFECTS LITERATURE

To address many of the criticisms of past research efforts, this study draws from the emerging research stream on corporate effects (Schmalensee, 1985; Wernfelt and Montgomery, 1988; Rumelt, 1991; Roquebert, Phillips, and Westfall, 1996; McGahan and Porter, 1997; Brush, Bromiley, & Hendrickx, 1999; Chang & Singh, 2000; Bowan & Helfat, 2001). Although this research addresses similar research questions as the diversification literature, such as, "Does Corporate Strategy Matter?" it appears these bodies of research have developed somewhat independently of each other. For example, few, if any, of studies that are focal to the corporate effects literature were examined in the meta analysis of 55 studies on diversification (Palich et. al., 2000). A possible explanation for this finding is that the effects research takes into account entire classes of effects such as industry, corporate, and business unit effects in investigating the determinants of firm performance. To aid in the understanding of what modeling entire classes means, the characteristics — size, firm leverage; and advertising, capital, and R&D intensities — would be considered factors of an entire class of effects that comprise the business unit effect. In similar vein, diversification, corporate planning and control, culture, and organizational structure would be considered factors of an entire class of effects that comprise corporate effects, and industry effects pertains to the characteristics of the industry, entry barriers, power of buyers and suppliers, and the like, in which firms are operating.

The importance of modeling entire classes of effects was demonstrated by Scott and Pascoe (1986) by showing that a class, representing multiple factors, accounted for the majority of the variance in profitability in their model over that explained by the operationalization of specific constructs. Additionally, in their review of the corporate effects literature, Bowman and Helfat (2001) conclude that not only is industry an important determinant of firm profitability but also business unit and corporate effects are also just as important.

TABLE 1
DIVERSIFICATION-PERFORMANCE STUDIES: BRIEF OVERVIEW

Diversification vs. No Diversification	
Weston & Mansinghka, 1971	Performance, measured by the ratio of net income to net worth, is somewhat higher for conglomerate firms, but the difference is not statistically significant.
Lang & Stulz, 1994:	Strong evidence that highly diversified firms are consistently valued less than specialized firms. "Evidence supports that diversification is not a successful path to higher performance"
Levit, 1975	Diversification outperforms no diversification
Jose, Nichols, & Stevens, 1986	Diversification has a statistically significant and positive influence on the value of the firm.
Lamont & Polk, 2002	Diversification destroys value, consistent with the inefficient internal capital market hypothesis
Stetz & Phillips, 2000	Diversification outperforms no diversification. Differences are highly significant. Controlled for industry, corporate, and firm effects.
Villalonga, 2004	Loss of value occurred before diversification. Diversification does not destroy value.
Miller, 2004	Firm increases economic value in smaller increments as it continues to diversify.
Chakrabarti, Singh, & Mahmood, 2007	Diversification negatively impacts performance in more developed institutional environments while improving performance only in the least developed environments. Outcomes of diversification are influenced by institutional environments, economic stability and affiliation with business groups
Juan & Becerra, 2008	Diversified firms perform better in industries with a small number of nondiversified competitors or, equivalently, when specialized firms have a small combined market share, but worse as the presence of specialized firms increases in the industries in which they compete.
Marinelli, 2011	Business relatedness is negatively related with firm performance
Related and Unrelated Diversification	
Grant & Jammin, 1988	Related diversification does not outperform unrelated. Controlled for industry effects.
Grant, Jammine, & Thomas 1988	Among large British manufacturing firms, profitability is positively related to both product diversification and multinational diversification. The principle direction of causation runs from profitability to diversification. No significant differences exist between related and unrelated diversification strategies.
Simmods, 1990	Related diversification does not outperform unrelated
Michel & Shaked, 1984	Unrelated diversification outperforms related
Galbraith et al., 1986	Unrelated diversification most valuable in uncertain settings
Michel & Shaked, 1984	Firms diversifying into unrelated areas are able to generate statistically superior performance over those with businesses that are predominately related.
Amihud & Lev, 1981	Managers engage in conglomerate mergers in order to reduce their unemployment risk

Hoskisson, 1987	The implementation of the M-form structure increases the rate of return of firms that diversify through an unrelated business strategy, but decreases the rate of return of firms that adopt vertically integrated and related business approaches to diversification. Risk or variability of firm rate of return generally decreases after the M-form restructuring regardless of the diversification strategy a firm has implemented.
Chenhall, 1984	For Australian manufacturing enterprises, a multivariate relationship is uncovered between the extent of a firm's diversification and a host of environmental, market structure, organizational, and managerial variables.
St. John & Harrison, 1999	Transferring expertise in manufacturing-based businesses often does not result in improved performance (No benefit to related diversification)
Zhou, 2011	Increasing coordination costs counterbalance the potential synergistic benefits associated with related diversification
Ng, 2007	Unrelated diversification can be beneficial
Tanriverdi & Lee 2008	Related diversification across operating system platforms and related diversification across software product-markets complement each other and mutually affect each other's marginal returns.
Park & Jang 2012	Profitability decreases up to a certain level of related diversification, but beyond that level profitability increases. Up to a certain level of unrelated diversification, profitability increases, but beyond that level profitability decreases. This study also found that when restaurant firms are involved in both related and unrelated businesses, the optimal mixed ratio of diversification is approximately half and half
Stand-alone, Related, and Unrelated Diversification	
Palich, Miller, and Cardinal, 2000	Meta Analysis that found inverted-U relationship with related diversifiers outperforming both single and unrelated diversified corporations. Could not control for firm-size nor industry effects
Rumelt, 1974	Performance differences between single, dominant, related, and unrelated product firms, with dominate and related strategies particularly profitable.
Bettis and Hall, 1982	Investigated performance differences in Rumelt's study. Upon accounting for the influence of industry (pharmaceutical), the authors found no statistical significant difference in profitability.
Adapted in part from Barney, 1997; Ramanujam &Varadarajan, 1989.	

HYPOTHESES:

To replicate the study of Palich, Cardinal, and Miller (2000), we restate the general conclusion the authors drew form their meta-analysis, which is that a curvilinear relationship (inverted-U) exists between diversification and performance. As an efficient means for testing this curvilinearity, an entropy measure was operationalized as a continuous variable and then tested for the significance of the polynomial terms.

Ho1: *Within the manufacturing sector, a curvilinear relationship between diversification and performance does not exist for business units across the spectrum of diversified corporations, while controlling for assets, industry, corporate, and business unit effect.*

$$Y \neq \beta_o + \beta_1 \text{Log(Assets)} + \beta_2 \text{TDS} \cdots \beta_m \text{TDS}^m + \varepsilon;$$

where: TDS is the total diversification score and m is the degree of the polynomial

Although it is common for researchers to operationalize diversification through a continuous measure, one is not able to identify the strategic intent of a firm's diversification strategy, which requires, at a minimum, the identification of firm's related and unrelated diversification (Hoskisson, Hitt, Johnson, & Moesel, 1993). To delineate the total diversification score into its constituent related and unrelated components, we follow a procedure similar to that used by Markides (1992) and first parsed the range of total diversification scores into quintiles using Proc Univariate (SAS). The five levels were identified as level one through five, with each level having a higher diversification score, respectively. We calculated separately, a related and unrelated diversification score for each firm within each quintile and then coded firms as pursuing a related, unrelated, or a portfolio of UR & R diversification strategies. Acknowledging the endogeneity and exogeneity of "both" performance and diversification, that is, performance may drive a firm's decision to diversify rather than diversification driving performance, we choose to test the differences in mean ROAs of firms pursuing different types and levels of diversification. These tests were not only among BUs, but also between BUs and single stand-alone firms to determine if BUs embedded within multi-business corporations were "better off".

Ho2: *Within the manufacturing sector, no differences in performance exist among business units of diversified corporations or between single stand-alone firms, while controlling for assets, industry, corporate, and business unit effects.*

$$\text{Ho: } \mu_1 - \mu_2 , \mu_1 - \mu_3 , \mu_1 - \mu_3 , \ldots\ldots \mu_{k-1} - \mu_k = 0;$$

where: μ equals the mean ROA of a business unit that may be a single stand-alone business or is nested within a multibusiness corporation, and k equals the total number of groups of corporations that are categorized according to their type and level of diversification.

RESEARCH DESIGN

This study's purpose is to replicate and extend a prior study, and thus the hypotheses were simple and straightforward. However, in this endeavor, we give particular attention to concepts surrounding the Theory of Measurement (measurement of constructs) and the Theory of Testing (controls and inferential techniques); Stage 2 and Stage 3, respectively, in the classical approach to hypothesis construction and verification (Boal & Willis, 1983.) To address the epistemic relationships (Stage 2), this study utilizes an entropy measure of diversification that has established psychological properties of objectivity, reliability, and validity (Hoskisson et. al., 1993). Concerning Theory of Measurement, scholars have voiced their concern, not so much on the techniques used in the testing of relationships, but in the lack of controlling for variables that have a demonstrated effect on business unit performance. To this end, we not only controlled for key variables as mentioned in the literature but also controlled for corporate effects, a determinant of firm performance as important as industry and business unit effects (Bowman & Helfat, 2001).

Data

Our sample draws from the 1991-1997 Business Information COMPUSTAT® Industry Segment File[1] and was restricted to corporations identified within the manufacturing sector (SIC codes 2000-3999) and screened in the following ways commensurate with past research. First, we standardized the business segment ROA (calculated by dividing operating profit by identifiable assets) and any observations greater than 4 standard deviations from the mean were deleted. Second, if the average of the assets or sales over time of the business segment was less than ten million, these observations were also deleted. The resulting sample resulted in 19, 794 usable observations that contained 2,342 unique corporations, 3,849 unique business units, and 590 unique industry codes. The mean ROA of all business segments was 9.69%. A business unit (BU) is defined as a unique business segment that is identified both by an SIC code and a title and may be a stand-alone business or may be part of a set of business units aligned under

a corporate umbrella. This definition is, in effect, the same as that for a business segment, a reporting criteria required by the FASB; however, Grant (1995) notes that "segment" usually refers to product markets within an industry. Therefore, to avoid confusion in using the term segment, we used the term business unit.

Measures

To distinguish firms that are diversified across as well as within industries, we used the entropy measure as refined by Raghunathan (1995). The Total Diversification Score was operationalized as a continuous variable and the related and unrelated diversification scores were used to identify a firm's strategic intent as to a generic strategy or a portfolio of diversification strategies.

Total Diversification score[2]: $= \{[\sum_{j=1}^{M}\sum_{i=1}^{N} P_{ij} * \ln(1/P_{ij})]/[\ln(M) + \sum_{j=1}^{M} P_j * \ln(N_j)]\} * (\bar{N} * M)$

Related Diversification Score: $= [(\sum_{j=1}^{M} P_j * \sum_{i=1}^{N} P_{ij}/P_j * \ln(P_i/P_{ij}))/\sum_{j=1}^{M} P_j * \ln(N_j)] * \bar{N}$

Unrelated Diversification score $= [(\sum_{j=1}^{M} P_j * \ln(1/P_j))/\ln(M) * M$

Common measures of performance are market share, revenue growth, and the like (McGahan, 1999), with the two most commonly used in the corporate literature being accounting measures and measures of financial market premiums. However, Hoskisson et al. (1993) did not find a statistically significant path between the entropy measure and Tobin's q. and McGahan (1999) suggests this measure can fluctuate with shifts in investor expectations that are not fundamentally related to the operations of the business. A case in point maybe argued concerning the plummeting value that happened to many dot coms. In sum, this study uses an accounting based measure, ROA, because it does capture a broad array of operating qualities of a business and is one of the few measures that are available at the business unit level of analysis, which is the focus of this study.

Model

To test our hypotheses while simultaneously accounting for population level factors (industry, corporate, and business unit effects) and controlling for assets, we used a general linear mixed model (Searle, Casella, and McCulloch, 1991; Littell, Milliken, Stroup, and Wolfinger, 1996) that may be expressed in the general form: $Y_{ijklm} = La_k + \mu_l + I_i + C_j + B_k + \varepsilon_{ijklm}$; where Y= ROA of an individual business unit[3] and the fixed and random effects are as follows: La_k = Log of identifiable assets, μ_l = Scope[4] as fixed effects with l levels (13[b]), all else random. Random effects are I_i= Industry effects, $N(0,\sigma^2_I)$ i industry levels (590 levels), C_j= Corporate effects, $N(0, \sigma^2_C)$ with j level of corporations (2342), B_k = Business unit effects, $N(0, \sigma^2_B)$ with k level of unique business units (3849 levels), and ε_{ijklm} =Error, $N(0, \sigma^2_\varepsilon)$ with m = Year (1991 through 1997). [Assumptions of the model: All I_i, C_j, B_k, and ε_{ijklm} are independent of each other.]

We utilized this mixed modeling technique (SAS/STAT® software; SAS, 2013) because it allows the flexibility to model not only fixed effects[5] and random effects[6], but also to estimate parameters, standard errors, and means simultaneously. Additionally, mixed models can represent very complex, multilevel phenomenon parsimoniously, with only a few variance components, rather than hundreds or thousands of regression coefficients (e.g., in this study, we would have used 6,781 dummy variables). Other advantages to using the mixed model are the ability to specify the use of maximum likelihood estimation procedures which is the preferred method in unbalanced panel designs. Furthermore, through the use of generalized least square estimates (GLS), which takes into account that observations may be correlated over time, the model is more efficient with higher reliability in the estimation of means and standard errors.

Controls

In the replication and extension of prior research, we controlled for industry effects and corporate effects as random effects in the model. As a proxy for business unit intensities, business units were also

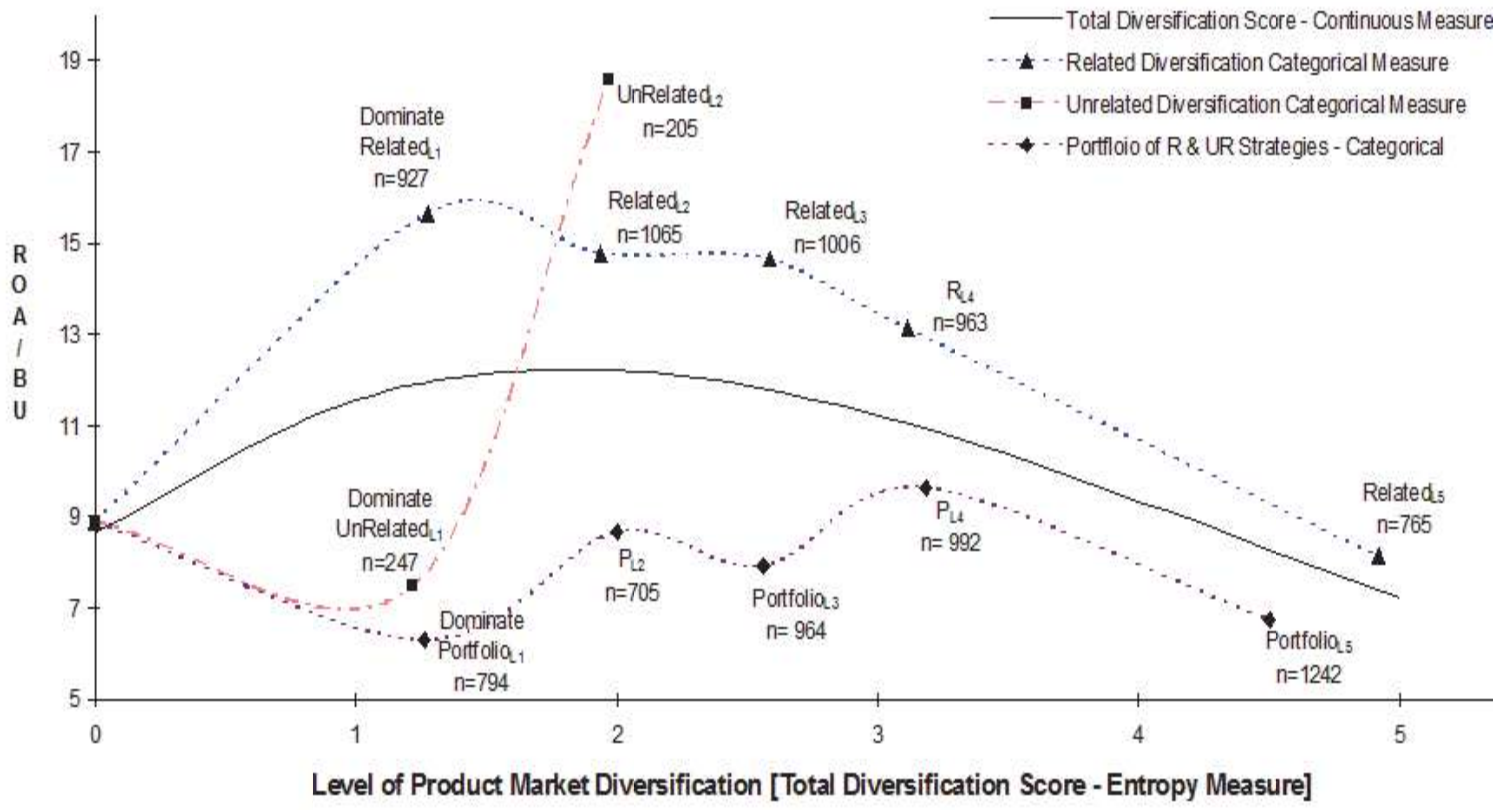
operationalized as a random effect. We feel this is an appropriate proxy for BU intensities for Scott and Pascoe (1986) demonstrated how the modeling of entire classes, representing multiple factors, accounted for the majority of the variance in profitability in their model over that explained by the operationalization of specific constructs. As a final control, we used the log of identifiable assets as a fixed effect. Interesting, in a-priori testing, assets were not found to be significant due to the very high dispersion of values in assets of the business segments. However, the log of assets was very significant.

RESULTS AND DISCUSSION

In testing for a curvilinear relationship between performance and diversification (measured with a total diversification score (TDS)), we found support for a polynomial equation ROA = intercept + log(assets) + TDS + TDS^2 + TDS^3 with the cubic term being highly significant ($p>.003$, $\alpha=.05$). The plot of the equation using the estimated parameter estimates is shown in Figure 1. In our estimation the plot suggests an inverted-U shaped relationship between performance and diversification. This replication, albeit within the manufacturing sector, is rigorous in that the model controlled for firm assets, industry effects, corporate effects, and business units effects and leads us to suggest that the findings of Palich et. al. (2000) are fairly robust. However, it is important to note that a total diversification score was operationalized as a continuous measure and that it implicitly assumes that as the score increases, the more likely the firm is pursuing an unrelated diversification strategy.

In the delineation of the total diversification score into its constituent related and unrelated components, we found that firms were pursuing not only a generic related or unrelated strategies, but also were implementing a portfolio of diversification strategies (Galunic & Eisenhardt, 1994) by having both related and unrelated business units within their corporate umbrella. Secondly, we found that related firms may have as high a diversification score as those pursuing an unrelated strategy, a finding noted by Raghunathan, when he states, "… two identical total diversification values may result from very different diversification profiles of firms.: (1995: 990). Thirdly, in the delineation of the continuous measure, we found the curvilinearity of the total diversification score, operationalized as a continuous measure, was driven by firms pursuing a related diversification strategy (Figure 1). For these firms, the plot of the GLMM estimated means of ROA, suggest an inverted-U shaped relationship between diversification and performance while, for those firms pursuing a portfolio of strategies, the plot was relatively flat. Fourthly, we did not find a large number of firms pursuing a generic unrelated strategy. Fourteen firms had a diversification level of 2 and only 1 firm had a diversification level of 3, which was Playboy Inc. No other firms had unrelated diversification scores above this level. Because of the low number of observations and taking a conservative approach, we felt there was not enough data to make an argument pro or con for these firms.

FIGURE 1
RELATIONSHIP BETWEEN DIVERSIFICATION & PERFORMANCE
CONTINUOUS AND CATEGORICAL MEASURES OF DIVERSIFICATION



In the testing of means of firms categorized by type and level of diversification, we found no significant differences in the mean ROA of firms pursuing a portfolio of related and unrelated diversification strategies across all levels (Table 2). Additionally, the ROA of the business units of these firms were not significantly different from the mean ROA of single stand-alone firms, on average. In short, these diversified firms did not pass the "better off" test. However, we did find significant differences in mean ROAs for firms pursuing a related diversification strategy. For those firms with diversification levels[7] 1 through 4, i.e., low to moderately high levels of diversification, all earned a significantly higher ROA over that of single firms as well as over those firms pursuing a portfolio diversification strategy. Additionally, these firms earned a significantly higher ROA than related firms that were highly diversified (level 5) suggesting a decreasing return to related diversification as a firm continues to diversify past a certain point. Finally, for all firms that were highly diversified, i.e., diversification level of 5, whether they were pursuing a related or a portfolio diversification strategy, did not earn a significantly higher return relative to each other nor did they earned a return that was significantly different than that earned by single stand-alone firms.

In sum, we find that the driver of the curvilinear relationship found for the continuous measure of diversification is actually underpinned by those firms pursuing a related type diversification strategy with low to moderately high levels of diversification. Conservatively, this translates into a 36% higher return, on average, in ROA. In a very broad sense, one may infer that as a firm begins to and becomes more diversified, the paths may be very different, but when a firm approaches a very high level of diversification, no matter what the strategy, firms, on average, do not earn a significantly higher ROA than that of single stand alone firms. Given the level of analysis is the business unit, our results suggest that, 1) highly diversified firms do not enable business units, within the corporate portfolio, to be "better off" and 2) there is an optimum level of diversification for those firms that are pursuing a related diversification strategy.

As our results provide insights into the "what" of the manufacturing sector, we acknowledge that we are not able to investigate the "how" and "why" firms are pursuing a particular type and level of diversification. For instance, it would be very interesting to investigate, at a finer level of analysis, the means through which firms became more diversified and the dynamics surrounding the firms' individual choices. For instance, for a firm pursuing a related strategy, was the growth internal through an extension of existing resources, capabilities, or competencies as suggested by Penrose (1959) or was growth pursued through a merger or acquisition. Likewise, for those firms pursuing a portfolio diversification strategy, it would be interesting to note if the fundamental driver in the choice of product markets was due to multi-market competition or if it was the lack of superior performance? Nevertheless, our sample of over 2,342 unique corporations gives insights into an overall pattern within the USA manufacturing sector and supports as well as extends the research and findings of Palich et al meta-analysis of a curvilinear relationship between diversification and performance, albeit driven by firms pursuing a related diversification strategy.

TABLE 2
FIXED EFFECTS: DIFFERENCES OF LEAST SQUARE MEANS

Type & Range of Product Market Diversification		GLMM est. of ROA	Diff. in LS MEAN	Std. Error	t	Pr > |t| DF: = 16E3
Related_L = 1[a] ROA=15.65	(R) Related_L 2,3,4	1st col.	no sign. diff. [lowest p value] p = .22			
	Related_L = 5	8.14	7.51	2.19	3.42	.0006
	(P) Portfolio_L = 1	6.29	9.36	2.12	-4.41	<.0001
	Portfolio_L = 4	9.63	6.02	3.03	2.97	.0030
	(UR) Unrelated L = 1	7.48	8.02	3.05	2.68	.0073
	Unrelated_L = 2	18.59	-2.95	3.34	-.88	.3775
Related_L = 2 ROA=14.77	Related_L = 3,4	1st col.	no sign. diff. [lowest p value] p = .41			
	Related_L = 5	8.14	6.63	2.15	3.09	.0020
	Portfolio_L = 2	8.66	6.11	2.13	-2.88	.0040
	Portfolio_L = 3	7.92	6.86	1.99	3.44	0.0006
	Portfolio_L = 4	9.63	5.14	1.98	2.59	.0096
	Unrelated_L = 2	18.59	-3.82	3.31	-1.15	.25
Related_L = 3 ROA=14.65	Related_L = 4	13.14	no sign. diff.			
	Related_L = 5	8.14	6.51	2.17	3.00	.0027
	Portfolio_L = 2	8.66	5.99	2.16	-2.78	.0055
	Portfolio_L = 3	7.92	6.73	2.02	-3.34	0.0008
	Portfolio_L = 4	9.63	5.02	2.00	2.5	.0124
	Portfolio_L = 5	6.75	7.90	1.94	4.06	<.0001
	Unrelated_L = 2	18.59	-3.94	3.33	1.18	.2369
Related_L = 4 ROA=13.14	Related_L = 5	8.14	5.00	2.22	2.25	.0243
	Portfolio_L = 4	9.63	3.51	2.07	-1.07	.0896
	Portfolio_L = 5	6.75	6.40	2.01	3.19	.0015
	Unrelated_L = 2	18.59	-5.45	3.38	1.61	.1063
Related_L = 5 ROA=8.14	Portfolio_L = 5	6.75	1.40	2.15	-.65	.5172
Portfolio_L = 2 ROA=8.66	Portfolio_L = 4	9.63	-.97	2.19	-.44	.6598
	Portfolio_L = 5	6.75	1.92	2.14	.90	.3704
	Unrelated_L = 2	18.59	-9.93	3.43	-2.90	.0038
Single Firms ROA=8.90	No sign. Diff. Between UR&P (L1); R (L5); P (L2-5). All others were significant.					

L. : Level of Product Market Diversification, **Portfolio**: Corporations pursuing BOTH a Related & Unrelated Diversification Strategy;
a) All firms at L1 had a specialization ratio > .8 (Wrigley, 1969) and are equivalent to Rumelt's (1974) Dominant type firms.

ENDNOTES

1. Although not perfect, this database has been used in many studies on diversification within the field of Strategic Management as well as in Finance.
2. where: Pij = proportion of firm's total operations within the ith business of jth industry, Pij □ 0; Pj = proportion of firm's operations within jth industry; M = total number of industries; N = total number of business; Nj = total # of business within jth industry; = av. of businesses within industries = ; and *M = # of segments.
3. ROA = (operating profit/identifiable assets)*100
4. Possible states of a BU classified as to the level and type of diversification of their corporate parent or as a single, stand-alone BU. In testing the continuous variable, a polynomial equal was inserted in place of μl
5. An effect is fixed if the levels in the study represent all possible levels of the factor, or at least all levels about which inference is to be made.
6. Factor effects are random if the levels of the factor that are used in the study represent only a random sample of a larger set of potential levels. The factor effects corresponding to the larger set of levels constitute a population of effects with a probability distribution (Littell et al., 1996). Therefore modeling industry, corporate, and business unit effects as random effects makes good sense in that our data set contained approximately 6000 manufacturing firms (publicly traded) out of a total population of 220,000 firms (includes many small and private firms).
7. We computed Wrigley's specialization ratio for firms at a diversification level of 1 and all scored higher than .81 which makes this category of firms analogous to Dominant type firms as espoused in Rumelt's Typology (1974).

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