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WHAT IS AN ATTRACTIVE INDUSTRY?*

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Business Portfolio Planning techniques often suggest that firms should invest in industries with high profitability, high growth, or other attractive characteristics. Critiquing this view, we suggest that the same factors which lead to high profitability in an industry may cause its inefficient participants to earn lower profits. Higher growth, on the other hand, may benefit inefficient firms while reducing the gains of efficient competitors. The paper offers theory and evidence to support this view of performance dependencies for the special case of diversified firms.
(STRATEGIC PLANNING; DIVERSIFICATION; FIRM PERFORMANCE)

1. Introduction

Business Portfolio Planning (BPP) has had a major impact on the theory and practice of strategic planning. Many courses and texts on strategic planning devote considerable space to BPP techniques, and Haspeslagh (1982) has estimated that the majority of the Fortune-500 use some sort of BPP.

A basic idea in these techniques is that business unit performance results from a combination of business "strength" and industry "attractiveness." In most of the early BPP techniques such as the Boston Consulting Group matrix (Allan and Hammond 1975; Abell and Hammond 1979) it is further assumed that these two dimensions are independent.

Although much of the success of BPP no doubt derives from its simplicity, it eventually became apparent that the attractiveness of an industry depended upon the nature of a firm's resources (Andrews 1971). Accordingly, some recent commentaries on BPP have taken this into account. Hofer and Schendel (1978) talk about weighing the elements of attractiveness to reflect firm objectives. Hax and Majluf (1983) explicitly include factors that affect the firm and its competitors differently. A corollary stream of literature has begun to address conditions under which apparently weak firms or firms in apparently unattractive industries can prosper in spite of the predictions of simple-minded generalities (Hall 1980; Hamermesh, Anderson, and Harris 1978; Woo and Cooper 1982). The present paper continues in this vein.

Here we argue against viewing industry attractiveness as a universal dimension; instead, what is attractive depends on a firm's relative advantages. In particular, we argue that two very common measures of attractiveness, industry growth and average industry profitability (Hofer and Schendel 1978, p. 73) have contrary implications for different types of firms. In fact, if followed as universal guidelines, these conditions may result in decreasing profitability for some firms. A brief synopsis of the argument follows.

To begin, we discuss the determinants of industry profitability, contending that greater differences in participant firms' costs result in greater average industry profitability. Intuitively, if a few firms in an industry have distinctly lower costs, they can price (at least) at the level of their average competitors' costs, thus making handsome profits. In such cases average industry profitability is high. On the other hand, if

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participants in an industry have relatively similar costs, this option is limited. Here average industry profits, ceteris paribus, will be lower. From the perspective of an individual firm, whether the former, more profitable industry is preferable to the latter depends on the individual firm's relative cost position. For firms with distinctly lower costs, we show that the first industry will be attractive, because it offers the prospect of sharing the spoils of the low-cost producers. However, less efficient producers may fare better as average competitors in less profitable industries rather than as losers in more profitable industries. Therefore, industry profitability is not a universal indicator of industry attractiveness—its meaning varies with the specific firms in question.

We next consider the ability of inefficient firms to survive under varying conditions. Here we find that the survival of inefficient firms is greater if (1) consumers are willing to buy more at only slightly lower prices, and (2) if many other inefficient firms compete in the same market. Intuitively, cost disadvantages are less damaging when demand is less elastic and many firms share the high-cost position. Conditions (1) and (2) are most likely to hold in high-growth markets where demand is stronger than supply and competitive pressures are weak. This analysis suggests that firms which lack distinct competitive advantages would find high growth markets particularly attractive.

In §3 we link these theories of competitive advantage to firms' diversification strategies and the factors which support their expansion profiles. Three hypotheses emerge. §4 reports on an empirical test of these hypotheses on a sample of Fortune 500 firms.

2. Industry Profitability, Market Growth, and Interfirm Differences in Efficiency

In standard neoclassical economics, competitive advantages (efficiency differences between firms) cannot persist over a longer time period. Techniques are imitated and the prices of effective factors are bid up. Only if factor markets are imperfect can economists conceive of persistent interfirm differences in efficiency. Following several authors (e.g., Demsetz 1973; Lippman and Rumelt 1982; Nelson and Winter 1982; Williamson 1979), we will argue that uniqueness and ambiguity may make factor markets imperfect. While it is straightforward that a firm may have a sustainable competitive advantage from ownership of a unique factor (such as an advantageous location or a patent), ambiguity in a market is more difficult to specify. For instance, as Demsetz argued, it may be infeasible to identify the factors responsible for the superior performance of complex entities such as GM or IBM. As long as these factors cannot be identified, they cannot be marketed or imitated by others, and ambiguity rents will continue to accrue to the firms in question.

Given this logic, inefficient and efficient firms could coexist in an industry for a considerable length of time. We will now investigate the determination of firm profitability in such industries. To maximize expositional clarity we will perform our analysis in the context of the simplest possible model. The reader will, however, find the intuition behind our results quite robust.

We look at an industry with n firms, each of whom produces a homogeneous product which has an inverse demand curve of the form $P = 1 - bQ$, $b > 0$. Here P is the resulting industry price and Q is the sum of firms' outputs. (This means that the market clearing price decreases at the rate b as more output is sold.) All firms in the industry incur fixed costs f and αn $(0 < \alpha < 1)$ "inefficient" firms have unit costs c, and $(1 - \alpha)n$ "efficient" firms have unit costs $c - d$. Following standard practice in the oligopoly literature, we will assume that the firms use output as a decision variable. (See Kreps and Scheinkman 1983, for an interpretation of this as resulting from capacity competition followed by price competition.)

Using Nash equilibrium as our solution concept, we consider the case where each firm makes its output decision under the assumption that no other firm will react. (See Shubik 1982, for more on this.) Other equilibrium concepts will, of course, give different specifics, but we suspect that the qualitative properties of the results will remain the same under most reasonable assumptions. If capital-output ratios are constant, the firms' return on investment are proportional to their unit profits. Finding the Nash equilibrium values of these (from the individual first order conditions) gives

$$\pi_e = [1 - c + (\alpha n + 1)d](n + 1)^{-1} - fb(n + 1)[1 - c + (\alpha n + 1)d]^{-1} \qquad (1)$$

for the efficient firms, and

$$\pi_i = [1 - c - (1 - \alpha)nd](n + 1)^{-1} - fb(n + 1)[1 - c - (1 - \alpha)nd]^{-1} \qquad (2)$$

for the inefficient firms. We assume that (b, c, d, f, n, α) are such that these profit rates are nonnegative. Furthermore, the industry profit rate is given by

$$\pi = \frac{\alpha n[1 - c - (1 - \alpha)nd]^2 + (1 - \alpha)n[1 - c + (\alpha n + 1)d]^2 - nf}{(n + 1)n[1 - c + d(1 - \alpha)]}. \qquad (3)$$

Straightforward differentiation of (1), (2) and (3), verifies that higher d's (greater efficiency differences) correspond to higher profitability for the efficient firms, lower profitability for the inefficient firms, and higher industry profitability. Therefore, high levels of industry profitability indicate the presence of hard-to-replicate efficiency levels, making the industry less attractive for inefficient firms. (See also Lippman and Rumelt 1982, p. 425.) Conversely, for efficient firms, the industry is more attractive if industry profitability is high. While our result is derived for homogeneous products, it is equally valid for differentiated firms since such firms also benefit from lower cost positions.

Next, consider the effect of industry growth. Standard economic reasoning (Porter 1980) argues that industries with high growth contain many inefficient firms and support high prices relative to volume. Therefore, in markets with high growth we can expect a "high" value of α and a "low" value of b. Differentiating $\pi_e - \pi_i$ with respect to each of these parameters verifies that values indicating high market growth make the industry relatively more attractive for inefficient firms than for efficient firms. Therefore, it is more crucial that an efficient firm participates in high growth markets.

Summarizing, the profitability of efficient and inefficient firms depends on d, the differences in efficiency; α, the fraction of firms which are inefficient; and b, the inverse price sensitivity of the market. Both average industry profitability and the profitability of the efficient firms increase as efficiency differences increase. On the other hand, the same mechanism causes the profitability of inefficient firms to decrease. The amount by which efficient firms outperform inefficient firms is smaller (1) if there are relatively more inefficient firms, and (2) if industry prices are less volume sensitive—conditions typically associated with high rates of industry growth.

We here wish to apply the above theory to the special case of diversified firms. In doing so, we will argue that some types of diversifiers, ceteris paribus, are more likely to be inefficient.

3. Diversification Strategy and Fungible Factors

Economies of scope between two productive activities exist where a single firm can carry out activities at lower costs than two independent firms (Panzar and Willig 1981). Such economies of scope, sometimes called synergies, form the economic justification for the existence of diversified firms. Neoclassical economists found economies of scope difficult to explain in the following sense: suppose two products are produced at a lower cost on a single machine rather than on two machines. This condition alone does not necessarily lead to multiproduct firms because the owner could lease part of the machine time to another single-product firm, thus reaping the efficiency benefit while avoiding the organization of a two-product firm.

Only by making the additional assumption that the services of the machine (more generally the factor) cannot be sold without added transaction costs has it recently become possible for economists to understand diversification (Teece 1983). Economies of scope thus occur where a factor is subject to market failure and cannot economically be exhausted in a single market. Know-how residing in a complex organizational network may be such a factor. Selling such know-how would be very difficult and yet it may be sufficiently fungible that it applies (at very low marginal cost) to several markets.

Based on the above logic, we can associate a diversified firm with the set of fungible factors on which it has diversified. Following Rumelt (1982), we denote these as core factors. Combining the idea of core factors with the logic from §2. It is evident that the relative efficiency and thus the profitability of a diversified firm depends critically on the nature of its core factors. In particular, the value of a core factor is, ceteris paribus, decreasing in the number of firms which have it. From this we would expect that factors of very general applicability (e.g., administrative skills or financial economies) would be less valuable than relatively more specific factors (e.g., consumer advertising skills).

Given this, we would expect that the efficiencies of firms carrying idiosyncratic factors from market to market will be greater than those of firms employing nonspecific factors in many markets. Studies which have found a positive association between relatedness of diversification and firm profitability (Christensen and Montgomery 1981; Rumelt 1974, 1982) are consistent with this view.

Adding the linkage developed in §2 between specific skills and efficiency, and associating "efficient" diversifiers with relatively efficient firms and "inefficient" diversifiers with relatively inefficient firms, we can state our hypotheses:

(H.I) Efficient diversifiers are better off the more profitable their industries.

(H.II) Inefficient diversifiers are worse off the more profitable their industries.

And, because high industry growth indicates circumstances which shield inefficient firms:

(H.III) High industry growth benefits inefficient diversifiers more than efficient diversifiers.

Let us now proceed to an empirical test of these hypotheses.

4. Data and Measures

The sample is a subset of Rumelt's (1974) random selection of Fortune-500 firms, and consists of 128 firms with widely varying levels of diversification. Vertically integrated firms were not included, because our theory has nothing to say about these. Firm's revenue data (at the 4-digit SIC level) are taken from the *EIS Establishment Database,* while industry data are from the *Annual Survey of Manufacturers,* the *Census of Manufacturers* and the *News Front Data on the 30,000 Leading U.S. Corporations.*

To operationalize the concepts of efficient and inefficient diversification in an objective way, we use the Herfindahl index (Berry 1975):

$$\text{DIVERS4}_i = 1 - \frac{\sum_j m_{ij4}^2}{(\sum_j m_{ij4})^2}$$

where m_{ij4} is the fraction of firm i's sales in (4-digit SIC) market j. (The denominator is added to this measure to accommodate firm sales data where percentage totals do not sum to one. In the EIS database this is the case whenever any of a firm's sales are in foreign markets.)

Montgomery (1982) showed a strong correlation between the Herfindahl index and Rumelt's taxonomy of diversification. Firms pursuing more related types of diversification (focusing on specific, related skills) were found to have significantly lower Herfindahl scores than firms pursuing less related types of diversification (p. 304). We therefore consider firms with low Herfindahl scores efficient diversifiers, and firms with high Herfindahl scores inefficient diversifiers. Our theory does not suggest a distinct break between high and low efficiency, so the median Herfindahl score (DIVERS4 = 0.7862) is used to divide the sample.

Profitability at the firm level is measured by (average 1975–77) return on invested capital, defined as net income after tax plus interest divided by equity and long term debt. This measure has a long history in the literature (e.g., Bass 1979; Christensen and Montgomery 1981; Federal Trade Commission 1969; Peck 1961; Rumelt 1974, 1982), and represents the return to all employed resources.

Industry profitability and industry growth are weighted-average variables.

$$\text{Industry Profitability} = \frac{\sum_j m_{ij3}\text{ROA}_j}{\sum_j m_{ij3}},$$

$$\text{Industry Growth} = \frac{\sum_j m_{ij4}\text{GR}_j}{\sum_j m_{ij4}}, \qquad \text{where:}$$

m_{ij3} = the percentage of firm i's total sales that are in 3-digit market j.

ROA_j = Return on assets in 3-digit market j, 1975.

GR_j = annuity measure of shipment growth (in dollars) in 4-digit market, 1972–76.

Note that data limitations forced us to use return on assets instead of return on invested capital on the industry level. Since these two profitably measures typically correlate very strongly, this is not likely to be a major source of noise in the data.

5. Results

As a first and indirect check on our ideas, note that our hypotheses and profit maximization would suggest that inefficient diversifiers compete in industries with lower profitability and higher growth than efficient diversifiers.

As seen in Table 1, this is borne out for industry profitability, but not for industry growth. The reason for the discrepancy could be that the ceteris paribus condition does not hold because more profitable industries also tend to grow faster. To properly control for these interactions and fully test our hypotheses we thus need a multivariate regression model. (See Table 2.) In addition to industry profitability and growth, these models control for market share, firm size and industry concentration, variables which

TABLE 1

Estimated Category Means

	Industry Profitability*	Industry Growth
Efficient Diversifiers	0.067	0.124
Inefficient Diversifiers	0.059	0.118

* Difference between rows significant at the 1% level.

TABLE 2

Regression Models

	Industry Profitability	Industry Growth	Firm Market Share	p	R^2
No Control Variables:[a]					
Efficient Diversifiers	0.87°	−.16*	0.11	0.002	0.208
Inefficient Diversifiers	−0.92°	0.89*	0.24	0.003	0.223
Include 4 Firm Concentration:[a]					
Efficient Diversifiers	0.77°°	−0.14**	0.15	0.003	0.232
Inefficient Diversifiers	−0.91°	0.89**	0.23	0.004	0.223
Include Firm Assets (Log):[a]					
Efficient Diversifiers	0.83°°	−0.17**	0.09	0.007	0.211
Inefficient Diversifiers	−0.93°	0.85**	0.16	0.003	0.232
Include Both Controls:[a]					
Efficient Diversifiers	0.64°	−0.15**	0.11	0.005	0.247
Inefficient Diversifiers	−0.95°	0.85**	0.18	0.008	0.232

° Significant at 5% level.
°° Significant at 1% level.
* Difference between rows significant at 5% level.
** Difference between rows significant at 1% level.
[a] Industry growth was significant for inefficient diversifiers and market share was significant in the first three regressions. Neither concentration, nor firm size was ever significant.

may influence firm level profitability. (These were also computed with the 4-digit weighting procedure.)

Note first that the regressions are significant and that the overall performance of the models is quite good. Further, the coefficient on market share suggests that this sample behaves like the samples typically used to study the determinants of firm performance.

According to (H.I), we would expect efficient diversifiers to be more profitable when participating in industries with higher average profitability. As can be seen from Table 2, all four models support this argument. Also (H.II), predicting a negative relationship between firm and industry profitability for inefficient diversifiers, is supported in all four models, although less strongly. Pushing the linear model to its limits, we suggest some logic for this result: although conglomerates should not enter money-losing industries, on the other hand our theory strongly suggests that they should avoid the most profitable industries (industry profitability ranges from 0.02 to 0.11 in our sample).

From (H.III) the regression coefficient on "Industry Growth" should be larger in the equations for inefficient diversifiers than in the equations for efficient diversifiers. All four specifications show this result, including coefficients of opposite signs. Again here, we will wish to stress the limitations of the linear model specification. While efficient diversifiers ceteris paribus should do better in more mature industries, it does not seem reasonable to suggest that they pursue declining industries. The linear model cannot be expected to hold for all possible values of the variables.

6. Discussion

This paper addresses a key issue in the use of Business Portfolio Planning techniques, namely the characterization of industry attractiveness. By using theoretical arguments from the modern theory of firm scope, we predicted that efficient diversifiers would do better the more profitable their industries while inefficient diversifiers would prosper in less profitable environments. We were further able to suggest that inefficient diversifiers would benefit relatively more from high market growth. A straightforward empirical test on a well-known sample (subset of the Fortune 500) strongly supported these predictions. It is worth noting that Caves, Porter and Spence (1980) found that conglomerates tend to avoid tight-knit oligopolies, a fact which can be interpreted as consistent with this theory. Also Gale's (1972) results about the value of market share under differing growth rates also seem to concur with our work.

Here our hypotheses were derived from the transaction cost theory of the firm, following the tradition from Coase (1937). It might also be possible to derive the results from an entry barrier perspective, but as a referee has pointed out to us, such an enterprise must be carried out with considerable caution. We thus defer this task to future research.

Several further issues surrounding the study deserve mention. First, just as selection bias is likely to affect the mean market shares in Table 1, it may also influence some of our other results, although we have been unable to detect any consistent patterns in this regard. Secondly, while some of our results could be explained by the conjecture that firms from more profitable primary industries diversify less, this would be in conflict with some results from the literature (Rhoades 1973). Thirdly, our logic is extremely stylized in the sense that we consider each firm either efficient or inefficient. In practice firms can, of course, be of several intermediate types and our conclusions should be modified accordingly. Fourthly, as in any large sample study, we looked at average effects. It is entirely conceivable that a firm can go squarely against our recommendations and still do very well.[1]

[1] This manuscript has benefitted greatly from the very detailed comments of two anonymous referees. All errors are, of course, our responsibility.

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