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EXIT BARRIERS AND VERTICAL INTEGRATION

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When exit barriers trap firms in an industry, the result is destructive competition and reduced profits (Harrigan, 1981; Porter, 1976). Mobility barriers often prevent firms from changing their strategic postures so as to serve new customers (Caves & Porter, 1976). For the purposes of this paper, the term exit barriers will refer to both mobility and exit barriers. High barriers of either type are likely to keep firms operating within an industry without changing their strategic posture even when they earn subnormal returns on their investments.

Vertical integration, the in-house production of goods and services that could be purchased from outsiders, has been regarded as a major source of exit barriers (Porter, 1980). No one has established the relationship between integration and exit barriers empirically, however, primarily because of an absence of appropriate variables in existing data bases (Caves & Porter, 1976; Harrigan, 1980). Moreover, a precise way of identifying and estimating the dimensions composing vertical strategies was lacking until recently (Harrigan,

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1983a). Consequently, only a partial model of the forces that raise exit barriers has been tested.

This paper brings together questions concerning exit and mobility barriers with those concerning vertical integration strategies in order to explore whether and when vertical integration constitutes an exit barrier. By identifying how the operative forces interact, it suggests how firms might cope with situations in which vertical integration can raise exit barriers. If firms can lower the height of exit barriers, they can reposition themselves to serve more attractive market segments or to exit with relative ease.

FORCES INFLUENCING EXIT BARRIERS

Previous studies have established that various economic, strategic, and managerial forces may influence the heights of exit barriers (Caves & Porter, 1976; Porter, 1976; Harrigan, 1980, 1981, 1982). The model tested later in this paper includes these forces as control variables; vertical integration strategy dimensions, described later in this paper, were added to the model for this study. A brief review of forces affecting the height of exit barriers and an explanation of new variables precede presentation of the model. Results testing the improved model are then presented and the implications of the results for managerial practice are discussed.

Economic Forces

Economic exit barriers are generally associated with technological factors such as capital intensity, asset durability and specificity, asset age, and technological or operating reinvestment requirements. Firms having the thinnest markets for disposal of their assets face the highest economic exit barriers, as many oil refiners did in 1982 (Harrigan & Porter, 1983). This research estimated the heights of economic exit barriers with a scale diseconomies measure—the magnitude of diseconomies incurred by operating 25 percent below engineered capacity. The earning power of plants with high diseconomies (.25 or more) will seem particularly poor if they are offered for sale during industry downturns (Harrigan, 1982), and consequently, firms' economic exit barriers will seem especially high when demand is declining. Table 1 describes the scale diseconomies measure and others and gives their expected signs.

Strategic Forces

Previous research has also established that the very characteristics that define a firm's strategic postures—attributes such as product differentiation, proprietary knowledge, goodwill-generating expenditures, and other investments once made to overcome entry barriers—often create strategic exit barriers. The value of these investments makes firms unwilling to exit, even when they suffer losses (Caves & Porter, 1976). Confronting high strategic exit barriers, the result of their having waited too long before revising their positions, these firms cannot recover the value of their past competitive efforts. This study used an estimate of relative product differentiation to

TABLE 1
Definition of Independent Variables Associated with Exit Barriers

Variable Names	Means	Standard Deviations	Expected Signs	Explanations	Hypotheses
Economic forces					
Diseconomies of scale	.1796	.1235	+	Percentage cost diseconomies incurred when facilities operate 25% below engineered capacity.	Manufacturing facilities subject to substantial cost diseconomies will be more difficult to divest.
Strategic forces					
Relative product differentiation	.3987	.2865	+	Scale of relative differentiation in which commodities are .01 and customized products are .99.	Highly differentiated products represent an intangible asset that raises the height of exit barriers.
Expectations					
Sales growth	−.0031	.0766	−	Average sales growth over five years, 1976-81.	Rapid growth reduces exit barriers.
Vertical integration variables					
Number of integrated stages	.8604	.4486	+	Relative (index) number of steps in transformation process the firm undertook.	Being involved in several stages of production increases the height of exit barriers.

TABLE 1 (continued)

Variable Names	Means	Standard Deviations	Expected Signs	Explanations	Hypotheses
Form of integrated venture	.8694	.2636	+	Percentage of ownership in the venture.	Compared to partially owned ventures, wholly-owned vertical links represent larger investments to be recovered when divesting; hence, higher exit barriers.
Degree of backward integration	.3471	.3421	+	Percentage of requirements the business unit obtains from upstream sister unit.	High degrees of backward integration increase pressures to buy in-house and are difficult to disrupt.
Degree of forward integration	.3669	.3872	−	Percentage of outputs the business unit sold to—or through—downstream sister unit.	High degrees of forward integration give firms greater control over exit because relatively few important customers will be alienated by their departure.
Synergies with upstream businesses	.1756	.2701	+	Percentage of resources shared with sister business unit upstream.	High degrees of shared resources increase exit barriers for the business unit in question.

represent firms' strategic exit barriers because it is an example of the benefits created by past image-building efforts that firms are often unwilling to abandon.

Expectations

Expectations concerning future demand greatly affect the market for assets to be sold as firms reposition themselves strategically or exit. When sales are growing, the height of exit barriers will be lower than when demand is declining. This study therefore used average sales growth to represent demand expectations.

VERTICAL INTEGRATION VARIABLES

This section introduces the attributes of vertical integration that were hypothesized to affect exit barrier heights. These attributes differ substantially from those associated with the old image of vertical integration, according to which operations are 100-percent owned, physically interconnected, and the source of all of a firm's needs (Frank, 1925; Jewkes, 1930; Lavington, 1925; Livesay & Porter, 1969). Vertical integration strategies can vary as to *stages, degree,* and *form* (Harrigan, 1985). The concept of stages represents the number and value of steps in the chain of processing from ultra raw materials to final consumers in which a firm's strategic business units(SBUs) are engaged. Degree of integration indicates what percentage of a particular upstream or downstream need an SBU satisfies through product or service transfers from or to sister SBUs. Form refers to a firm's proportion of equity in an SBU (Harrigan, 1985). Firms can use contracts, joint ventures, cooperative agreements, or other forms of quasi integration to control upstream or downstream units if they have sufficient relative bargaining power (Blois, 1972, 1980).

The effects of these dimensions of vertical integration upon exit barrier heights were tested with an ordinary least-squares regression model. Firms engaged in several stages of processing were expected to face high exit barriers with respect to the SBUs studied. Wholly owned vertical links were also expected to increase exit barrier heights, because they represent larger investments to dispose of than do links that are not wholly owned. High degrees of backward integration with sister SBUs were hypothesized to be more difficult to disrupt than high degress of forward integration, because of the dependency of upstream units upon the downstream SBUs' purchases.[1] There may be pressures from downstream SBUs for continuing supplies of an input, and firms are unlikely to sever downstream linkages unless they see a need for exit. Such a decision is most likely when customers no longer demand a substantial proportion of the downstream SBUs' outputs; successful firms

[1] I expect this effect because most upstream stages of processing (with the exception of crude oil exploration and production) face higher minimum efficient scale (MES) plant sizes than do corresponding stages downstream (Harrigan, 1983a.) The throughput volumes involved in the deintegration decision will seem more substantial than when downstream linkages must be severed.

that dismantle vertically integrated structures would be expected to close downstream facilities first (Harrigan, 1981).

In brief, high degrees of backward integration were expected to produce negative signs in the regression model tested later in this paper, but high degrees of forward integration were not. These hypotheses are consistent with findings from an earlier study of exit from declining businesses (Harrigan, 1981), in which strong customers, who could penalize a firm through other businesses if they were cut off, were the biggest single contributors to the height of exit barriers. In that study, successful firms were those that solved the problem of providing for laggard customers—the ones still using the outputs of a declining industry—before they exited.

Finally, access to new information concerning firms' vertical linkages facilitated a test of whether synergies raise exit barrier heights. Earlier studies (Caves & Porter, 1976; Harrigan, 1981) have found that shared resources—a measure of synergies—increased exit barrier heights. This study used resources shared with upstream SBUs to approximate synergies in the model tested.

In summary, this study develops measures of vertical integration not tested in previous studies of exit barriers and tests them with control variables representing forces that have previously been tested. The next sections sketch the sample, the model, and the results of this inquiry. Findings suggest how an improved understanding of the relationship between vertical integration and exit barriers can affect strategic flexibility and repositioning behavior.

METHODS

The Sample and Variable Construction

A sample of 192 SBUs from 16 industries was the focus of analysis. Firms were distributed as follows: residential solar heating, 6.8%; coal gasification, 4.2%; genetic engineering, 10.4%; personal computers, 7.8%; ethical pharmaceuticals, 10.4%; whiskey distilling, 6.3%; petroleum refining, 16.0%; electronic receiving tubes, 2.6%; baby foods, 3.1%; electric percolator coffee-makers, 4.2%; cigars, 3.6%; leather tanning, 4.7%; synthetic soda ash, 3.1%; acetylene, 6.3%; and rayon, 4.2%. Although most SBUs were from different firms, there were a few instances in which more than one SBU belonged to the same firm. Because the industries of the target SBUs were highly diverse, different individuals scaled each industry using delphi procedures.[2]

A hybrid research program that combined field interviews, published documents, and a three-round delphi study yielded information concerning

[2] Delphi procedures (Delbecq, Van deVen, & Gustafson, 1975; Holmer, 1967) provide refined values for measures that have been gathered from several respondents who all estimated the value of the same phenomenom or attribute. By providing respondents (1) with information concerning results or average values obtained from other panelists in the previous round of estimation and (2) the opportunity to revise their estimates in light of others' evaluations of the same attribute in the next round of data gathering, improved measures of variables not in the public domain may be developed.

the relationships between the SBUs and adjacent business units.[3] Briefly, the judges for the delphi study included managers familiar with the target industries and with vertically related business units; outside suppliers; outside customers; trade association executives; industry analysts; and industry observers. They were very familiar with relationships within the vertical chain of processing that they were asked to score and revised their estimates for the variables defined in Table 1 three times in the light of the average value from the previous round. As in most delphi studies, there was a high decay rate as the rounds progressed (Delbecq, Van de Ven, & Gustafson, 1975; Holmer, 1967). The 276 judges who participated in the first round became 92 by round three. All judges scaled only SBUs in their area of expertise.

As the judges reassessed each variable, they discussed their reasoning, thereby providing additional insights concerning vertical integration relationships. To reduce problems arising from heteroscadasticity, variable estimates were scaled to values between .01 to .99 for most variables.

The dependent variable, exit barrier heights in 1981, indicates the judges' assessments of the difficulties firms would encounter in changing their strategic postures, closing plants, or exiting completely from the target industries. The mean value of the exit barrier variable was .495, with a standard deviation of .245. Independent variables (described in Table 1) were scaled similarly using the procedure described in the preceding paragraphs.

Limitations of the Study

The many differences among industries in structural and strategy variables call for conservatism in the degree of confidence that can be place in these data. Although great care was taken in conducting the study, delphi is an inherently subjective research methodology, and the findings should therefore be interpreted with caution.

The Models

The relationships of expectations, economic and strategic forces, and vertical integration variables with the height of exit barriers were tested in a regression model. In this ordinary least-squares specification, the sign and the magnitude of the coefficients (b_i) indicate contributions to the height of exit barriers, and standardized coefficients represent relative contributions to the coefficient of multiple determination. The model is stated by:

$$y = a + b_i x_i + e ,$$

where y equals the estimate of exit barrier height, and b_i (with $i = 1, 2, \ldots 8$) is the coefficient of each economic, strategic, expectations, or vertical integration variable, respectively.

[3] Details of the research methodology, variable construction, and sample design are reported in Harrigan (1983b, 1985a).

RESULTS

Control Variables

Economic forces. The results in Table 2 indicate that the scale diseconomies variable is positively signed and statistically significant, as expected. This finding suggests that keeping both plants and critically skilled laborers fully employed is substantially important in allowing firms to maintain the flexibility to reposition or sell out with ease. From field interviews, it appeared that in the oil refining industry, where plants of minimally efficient scale processed large volumes of throughput (175,000 barrels per day), firms incurred high operating costs when refineries ran at low levels of capacity. Such unfavorable economics exacerbated the difficulties oil firms faced when they tried to dispose of excess facilities.

TABLE 2
Results[a] for Regressions on Height of Exit Barriers

Variables	Natural Coefficient Estimates	Standardized Regression Coefficients
Economic forces		
Diseconomies of scale	1.0829***	.5449
Strategic forces		
Relative product differentiation	.3640***	.4249
Expectations		
Growth in sales	−.3472	−.1083
Vertical integration variables		
Number of integrated stages	.1034***	.1890
Form of integrated venture	.0884*	.0949
Degree of backward integration	.1327**	.1849
Degree of forward integration	.0667*	.1028
Synergies with upstream businesses	−.1388***	−.1527
Intercept	−.0087	
Coefficient of multiple determination (R^2)	.4550	
F-statistic (183 df)	19.10***	

*p = .10
**p = .05
***p = .01

Strategic forces. Product differentiation, used as a proxy for the strategic forces hypothesized to create exit barriers, was positive and statistically significant, as expected. This finding suggested that those firms that had the largest stakes invested in R&D and other intangible assets—that is, firms that differentiated their products effectively—would face the greatest impediments in changing their competitive postures, closing plants, or exiting completely. In brief, intangible sunk costs act like economic sunk costs when firms let them increase the height of exit barriers.

Expectations. The sales growth variable was negatively signed and statistically significant, as expected. This suggests that firms' exit barriers increase substantially when demand is declining. In earlier studies, firms that recognized this change and acted upon it quickly suffered fewer difficulties in exiting (Harrigan, 1980). Expectations also affect the ability of firms in embryonic and emerging industries to change strategic postures by influencing opportunities to raise capital or dispose of obsolete assets.

Vertical Integration Variables

Number of stages undertaken. The number-of-vertical-stages variable was positively signed and statistically significant, as expected; it appears that being engaged in several stages of processing creates inflexibilities that can be avoided by using outsiders for some steps. In doing so, firms remain more able to adapt to changes in technology and demand.

Form of ownership. The percentage-of-ownership variable was positive and statistically significant, as expected. Firms with relatively low-equity investments in a venture, like importers and bottlers in the whiskey distilling business, could reposition themselves or exit with greater ease.

The experiences of firms in the acetylene industry provided examples suggesting that the relationship between percentage of ownership and height of exit barriers might be curvilinear, however. In that industry, one significant advantage of owning downstream SBUs completely was that wholly owned operations were easier to shut down than jointly owned physically interconnected facilities were in the joint ventures, parties had to agree upon the timing and other conditions surrounding a business unit's shutdown. In the acetylene industry case, writing contracts that extended for the life of supply contracts seemed a preferred means of avoiding the unwieldiness of operations that could not be fully owned.

Degree of backward integration. The backward integration variable was positively signed and statistically significant, as expected. High degrees of internal transfers from upstream sister SBUs increase the height of exit barriers by exacerbating pressure caused by excess capacity in upstream plants. This condition creates higher barriers than do relationships with downstream sister SBUs because upstream plants' minimum efficient scales (MES) are larger than are downstream plants'. If few outlets exist for dumping the excess outputs created by imbalances between vertically related SBUs, firms with high degrees of backward integration are more likely to start price wars to dispose of excess outputs and inventories. Exit barriers were highest among coal gasification firms, for example, when transmission and distribution companies lacked other supplies of natural gas and had been highly dependent upon upstream SBUs for the bulk of their raw material requirements. These firms experienced the greatest difficulties in repositioning themselves when the energy crisis of the 1970s was relieved and need for their products dwindled (Harrigan, 1983).

Degree of forward integration. The sign of the variable for degree of forward integration and internal transfers was negative and statistically significant, as expected. Selling much of an SBU's outputs to in-house customers does not raise the height of exit barriers. Also, downstream intrafirm linkages are easier to overcome than upstream intrafirm linkages.

High degrees of forward integration were not a significant exit barrier in the electronic receiving tubes industry, for example, because firms had made arrangements to protect crucial outside customer relationships without incurring high asset inflexibility (Harrigan, 1980). In other industries where firms contemplated exit from vertically integrated businesses—or strategic repositioning—they often began implementation by terminating or divesting their low-margin, downstream operations first, in order to ease their way out of unattractive investments.

Downstream SBUs often had a better sense of the true nature of demand, and effective firms exploited this market intelligence. For example, two gas distribution firms created parallel entities to operate their regulated and unregulated businesses in order to monitor the effects of regulation more closely than they had previously.[4] Following redefinition of SBU boundaries, one of the firms spun off its local gas distribution company and thereafter sold it natural gas from the pipeline company in transactions that recognized market prices, as though they were dealing with a third party and not a member of the family.

Synergies with upstream businesses. The variable for synergies with upstream businesses was statistically significant and had a negative sign, an unexpected result. Previous studies (Caves and Porter, 1976; Harrigan, 1981) have found that shared facilities raise the heights of exit barriers. In the present sample, cross-tabulation analysis revealed that 79 percent of the target SBUs shared few resources less than 30 percent—with upstream sister SBUs. Sixty-two percent of SBUs in this sample shared no resources. Chi-square tests showed no significant pattern of relationships between backward integration synergies and the height of exit barriers.

Three industry examples may explain this puzzling and unexpected statistical result. Although synergies with upstream sister SBUs were high in genetic engineering and personal computer SBUs, exit barriers were trivial because the shared resources in question were primarily scientific personnel, or engineers and programmers, who could be transferred without great cost; physical assets were primarily general purpose laboratory or electronic equipment that could easily be used elsewhere. In the third example, SBUs producing residential solar heating panels, the physical assets used to make the product were primarily screwdrivers and other inexpensive tools found in general purpose shops, and SBUs consumed a very small part of their parents' total copper outputs, if their metals needs were supplied in-house.

[4] Local rules concerning noncurtailment of residential service were sapping profitability in this example.

All of these examples are from young industries; it appears that businesses can share resources with upstream sister SBUs in young industries without facing high exit barriers. This result perhaps suggests that using vertical integration to exploit synergies may be less risky for pioneering entrants than is generally recognized.

CONCLUSIONS AND IMPLICATIONS

Results suggest that a high degree of internal transfers from upstream sister SBUs raises the heights of exit barriers. They also suggest that exit barriers will be higher for firms engaged in many stages of vertically related proessing—particularly where the business unit in question is fully owned—than for firms that are not so engaged. These dimensions of vertical integration strategies can be added to the roster of forces that create high exit barriers.

Even firms in young industries must take care to sustain strategic flexibility. When products must be modified frequently, or when technology changes rapidly, high degrees of backward integration—intrafirm transfers—could hamstring SBUs at the precise time when they need to change inputs and processes quickly. Vertical arrangements need updating as do other dimensions of competitive strategy. If firms want their SBUs to supply or buy from each other, they should frequently reexamine their premises for such arrangements, because the strategic window that favored vertical integration can close.

Firms can act early and purposefully to lower exit barriers by limiting the degree, stages, and percentage of ownership that characterize their vertical relationships. An orderly and incremental withdrawal of investments from SBUs that once served as suppliers or distributors for other SBUs can reduce exit barrier heights, particularly if outsiders can be persuaded to undertake these tasks. Strategists must scan the effects of vertical integration on strategic flexibility just as they scan other forces that erect exit barriers.

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RELATIONSHIPS BETWEEN CONCESSION BARGAINING AND LABOR-MANAGEMENT COOPERATION

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In the last few years, much attention has been focused on collective bargaining's adaptation to severe economic adversity. The recent recession has prompted union-negotiated concessions of unprecedented degree and scope (Capelli, 1983; Mitchell, 1982; Rubenfeld, 1983). Research indicates