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VERTICAL INTEGRATION AND CORPORATE STRATEGY

KATHRYN RUDIE HARRIGAN
Columbia University

Proposing a new look at vertical integration and the dimensions that comprise it, this study develops a framework for predicting when firms use make-or-buy decisions. The strategic business units (SBUs) studied made fewer products and services in-house and firms were engaged in fewer stages of processing when demand was highly uncertain than they did when demand was more certain. Internal transfers from upstream or to downstream business units were more numerous when synergies with adjacent SBUs were substantial than when they were not. Some competitive imitation of vertical integration strategies occurred, and firms with high market shares sought higher ownership stakes in stages of processing adjacent to those markets.

Vertical integration involves a variety of decisions concerning whether corporations, through their business units, should provide certain goods or services in-house or purchase them from outsiders instead. Corporations considering vertical integration — one of the first diversification strategies firms consider as they progress from being single-business companies — must make decisions regarding the autonomy of these business units. Most research concerning vertical integration has assumed that savings in the costs of transactions that integration accomplishes supersede autonomy needs of strategic business units (SBUs). According to such an assumption, integrated firms will transfer all of their relevant goods and services to adjacent, in-house business units. However, this paper argues for a dynamic concept of vertical integration in which the key to effective management is understanding when corporate needs for intrafirm cooperation might take precedence over the concerns of autonomous business units, and when the opposite might be true. The theory developed in this study incorporates the forces of competitive settings and corporate (as well as business-level) strategy needs in a suggested framework for appropriate use of vertical integration. Developing this strategy framework introduces several new dimensions that characterize all vertical integration strategies. My intent is to bridge the gap between economic treatments of vertical integration and activities observed in the histories of several industries; the next section briefly sketches the dimensions of this gap.

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REVIEW OF LITERATURE CONCERNING VERTICAL INTEGRATION

Past economic treatments of the complex strategy of vertical integration have not recognized the many ways firms might use make-or-buy decisions effectively. Scholarly treatments of diversification have often skimmed on discussions of vertical integration, and nowhere have trade-offs in using it as a strategy been articulated adequately for managers.¹ Firms should screen vertical expansions with performance criteria as fine as those applied to their other diversification investments. Their ability to do so depends on growth in understanding this strategy.

Vertical integration is a way of increasing a firm's value-added margins for a particular chain of processing from ultraraw materials to ultimate consumers. Past studies (Arrow, 1975; Coase, 1937; Williamson, 1969, 1971, & 1975) have noted integration economies gained from shared facilities, information, or other resources, but not the risks of strategic inflexibility. Adelman (1949), Bork (1954), and Kaserman (1978) recognized the market power conveyed by this strategy, but the analyses they employed in studying it were static. The nature of competition evolves — and as competitive settings change, so will the need for vertical integration. Finally, the distinction drawn in this study between business-level strategy and corporate strategy is one that has not previously been applied to the study of vertical integration. Instead, empirical studies have relied upon industry-level samples (Laffer, 1969; Maddigan, 1979; Pfeffer & Salancik, 1978) rather than on looking at firms and their business units. The conclusions Tucker and Wilder (1977) reached in verifying Stigler's (1951) hypotheses richly illustrated the dangers of relying on highly aggregated samples in analyzing vertical integration. Using COMPUSTAT® data (from multibusiness firms categorized by SIC classifications), they found that industries begin integrated, become less so as they mature, and again become integrated in the end. I believe the opposite progression will emerge from examining the strategies of vertically related SBUs.

The sections that follow put forth a dynamic, contingency approach to vertical integration — a new framework that incorporates the dimensions embodying this strategy and the effects of competition upon them. I suggest that the proper use of vertical integration changes as industries evolve and as firms' emphases upon business sectors change, and argue that the presence (or absence) of certain environmental characteristics should mitigate (or enhance) the use of vertical integration.

A NEW CONCEPT OF VERTICAL INTEGRATION

The terminology developed in this section explicitly recognizes that firms may (1) control vertical relationships without fully owning adjacent

¹A comprehensive bibliography and criticism of these studies may be obtained from the author.

business units, (2) may enjoy benefits of vertical integration without transferring all of their output internally, (3) may (or may not) perform a variety of integrated activities at a particular stage of processing, or (4) may engage in many (or few) stages of processing in the chain of production from ultraraw materials to the final consumer. These possibilities were not aspects of the old image of vertically integrated business units, according to which units were assumed to be 100 percent owned, to be (probably) physically interconnected, and to supply 100 percent of a firm's needs for a particular good or service. This paper suggests instead that firms may adjust the dimensions of their vertical integration strategies to suit competitive or corporate needs; vertical integration need not be the same under all circumstances in order to be effective. Managers can fine-tune their uses of vertical integration in accordance with changes in the forces that this study outlines.

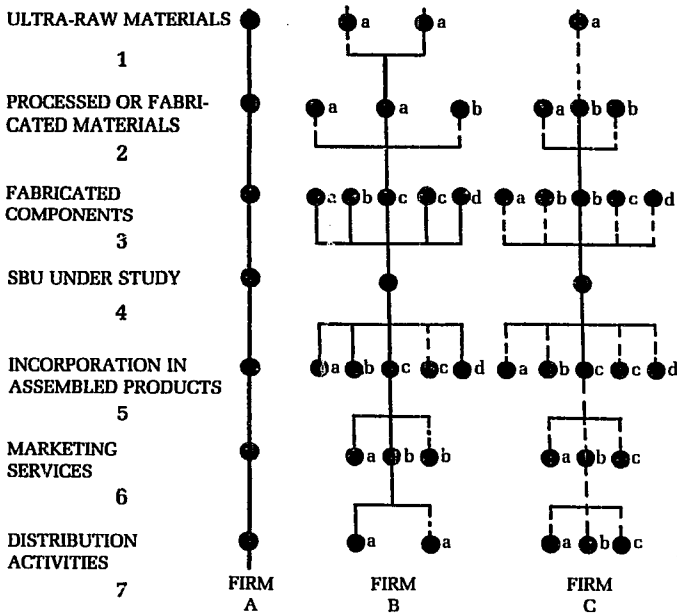
Dimensions of Integration

Stages of integration. The number of steps in the chain of processing which a firm engages in—from ultraraw materials to the final consumer—determines the number of stages of integration, as Figure 1 illustrates. In it, firms A and B both engage in seven integrated stages. SBU 4 is the unit under study, and firms A and B each engage in three stages that are *upstream* of SBU 4 as well as three stages that are *downstream*. Firm C engages in four integrated stages: two stages are upstream from SBU 4, and one stage is downstream. When firms integrate upstream, economists call this backward integration; when they integrate downstream, they call it forward integration.

Within electronics, some firms engage in several integrated stages connected to the microcomputer business; these firms produce not only microcomputers, but also microprocessor chips and semiconductor memories, photomasks for etching electronic circuits, silicon wafers on which circuits are inscribed, and other substrate materials. Other firms, engaged in only microcomputer assembly operations, participate in just one stage of processing. Within the oil industry, some firms engage in many sequentially adjacent stages of operations, such as seismic exploration, land leasing, pipeline services and refining, as well as in production and in wholesale and retail distribution of gasoline, heating oil, and petrochemical products. Other firms only refine crude oil and ship it to wholesalers or other processors. Under the loose definitions used in previous studies, all of the firms described above would simply have been called vertically integrated; previous studies did not, for instance draw fine distinctions between the lengths of the chains in which processing firms were engaged.

The number of integrated stages matters if firms do not manage complexity well. Thus, firms must address decisions as to stages and breadth (discussed in the following subsection) when they contemplate vertically linked strategies, for each technologically distinct activity may involve several stages of processing. Firms' SBUs may elect to perform some activities in-house, but corporate strategists, who decide whether upstream or downstream investments are warranted, define SBUs' boundaries.

FIGURE 1
Diagram^a of the Dimensions Characterizing
Vertical Integration Strategies



Key: ——— Solid lines indicate intrafirm transfers.
 - - - - - Dashed lines indicate external purchases or sales.
 a, b, c Small letters indicate inputs each respective stage of processing adds.

Firm A

The firm is engaged in many stages of integrated activity but adds only one input per stage of processing (it is narrowly integrated). Firm A transfers all of its outputs from stage 1 to stage 2 (from stage 2 to stage 3, etc.) in-house and does not purchase any inputs from (nor sell any outputs to) outsiders. Firm A is fully integrated from stage 1 to stage 7.

Firm B

The firm makes four inputs (a, b, c, and d) at stages 3 and 5, respectively. Firm B purchases some 3c from (and sells some 5c to) outsiders. Firm B is more broadly integrated at stages 3 and 5 than at stages 2 and 6 (because it performs more activities there). Firm B is engaged in many stages of integrated activity, but because the firm purchases some of its requirements from outsiders, its degree of integration for some activities is lower than Firm A's. Firm B is taper integrated.

Firm C

The firm makes only b at stages 3 and 2 and c at stage 5. Firm C is narrowly integrated and engaged in few stages of integrated activity. It purchases some 2b from (and sells some 5c to) outsiders, making it taper integrated.

Breadth of integration. The way that firms define their SBUs' boundaries vary. The number of activities firms perform in-house at any particular level of the vertical chain determines the breadth of integration of the SBU at that level, as Figure 1 indicates; broadly integrated SBUs (like B3, B5, C3, and C5) perform more activities in-house than others do. Broadly integrated SBUs increase a firm's value-added margin substantially at their stage of processing because they make more goods and services in-house, and vertically integrated firms could be broadly integrated at several stages of processing. The old image of vertical integration included no distinction between strategies involving broad (firms B and C) versus narrow (firm A) integration; for example, there would have been no distinction between oil refineries making a multitude of petrochemical products and those making one product from petroleum feedstocks.

Breadth of integration matters because plants that try to produce too many diverse components for a product line may lose opportunities to enjoy scale economies. Overly broad manufacturing policies could also mean that SBUs lose cost advantages of purchasing components or services from more efficient outsiders. Sometimes, corporate strategy needs will impinge on SBUs' freedoms to adjust their breadth or degree of integration (discussed in the next subsection). The managers of an SBU often try to reduce the number of internal transfers it makes from sister units and to enlarge its own sphere of responsibility by making many components it could purchase from others.

Degree of integration. Degree of integration determines the proportion of total output (of a particular component or service) an SBU purchases from (or sells to) its sister SBUs. Fully integrated SBUs transfer 95 percent or more of their requirements for a particular resource in-house. Taper integrated firms purchase more than 5 percent of their requirements for that resource from outsiders (Crandall, 1968a, 1968b). The degree of internal transfers matters because as economic studies have noted, the minimum efficient plant sizes of upstream and downstream activities are rarely the same. Usually, the upstream plant's minimum efficient scale is larger than the downstream plant's. Some portion of the vertical chain is likely to be out of balance due to such differences of scale, so one SBU will either have to engage in transactions with outsiders or let its excess capacity lie fallow. Corporate reward systems encourage (or discourage) efforts to dispose of excess outputs; and there could be reasons (explained later in this paper) for corporate strategy to prefer taper integration over more fully integrated arrangements, particularly when questions of technology are involved.

Excess capacity is costly, yet some firms have concluded that the costs of allowing some portion of one SBU's plant capacity to be idle are justified by the advantages they perceive from fully integrated strategies: economies can be substantial if all of one SBU's capacity can be fully utilized. Reliance upon outsiders for residual supply or demand may be acceptable to these firms. Corporate strategies will suggest which degree of internal transfers is most appropriate at a given time. Depending upon the outside sources available (and other factors discussed in the next major section of this paper),

strategists can encourage the transfer of some, all, or none of the services and materials a business unit might provide its sister, and can change the degree of integration upstream or downstream to suit changing needs to control uncertainty.

Form of integration. Although many firms prefer to own vertically integrated units entirely, they need not own a business unit to control it and enjoy the benefits of vertical relationships, for a variety of other control arrangements are possible. Quasi-integrated firms, for example, share ownership with others, underwrite part of the vertically related firm's capital structure, or possess other stakes in the business unit short of full ownership (Blois, 1972). Hayes and Abernathy (1980) note that Japanese firms use non-equity forms of controlling adjacent firms through long-term contracts — *kanban* ("just-in-time"), for example — and do so with success.

In many environments, firms can obtain leverage over other's assets without owning them fully. Often firms can secure knowledge, services, and materials in this manner with only a small ownership stake. For example, fledgling or undercapitalized firms can hurdle entry barriers by forming joint ventures with established firms (Harrigan, 1985). In brief, firms that exercise control over adjacent business units, but do not own them, are practicing a form of vertical integration as surely as firms that do own their adjacent units, because both firms can treat the outputs or services of these adjacent firms as though they were their own.

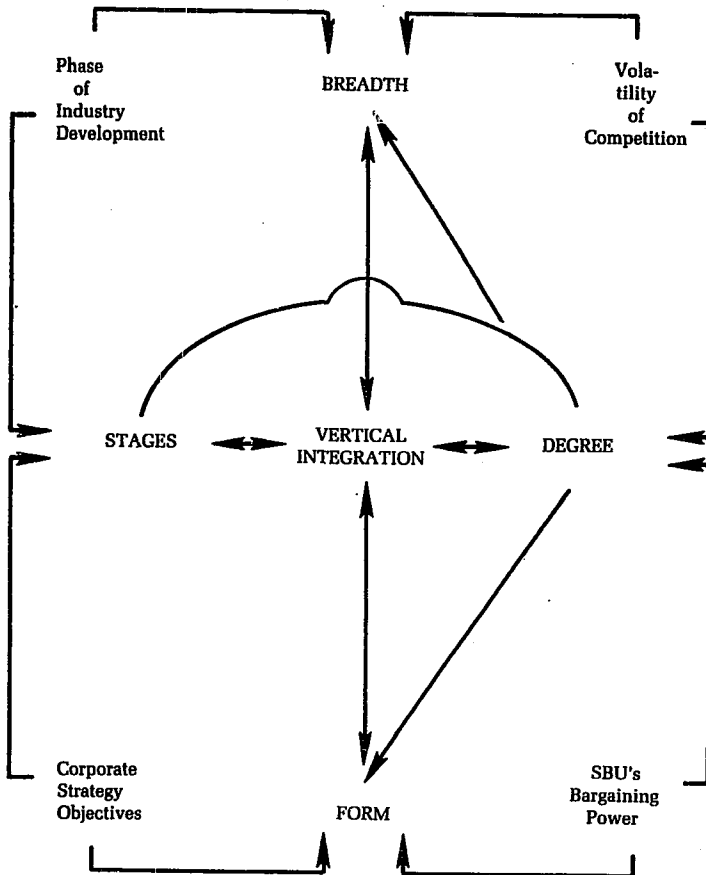
All vertical integration strategies encompass degree, stages, breadth, and form; some combinations of these dimensions occur more frequently than others. The decision to alter one dimension of the strategy will affect the values of the other dimensions. For example, it is likely that firms whose SBUs transfer large proportions of their total outputs internally will be involved in more stages of processing than those with few internal transfers. Forces likely to influence vertical integration will affect all of the strategy's dimensions, although some dimensions will be affected indirectly.

FORCES AFFECTING THE CHOICE OF VERTICAL INTEGRATION STRATEGIES

Firms will adapt the dimensions of vertical integration outlined in the preceding section according to (1) the phase of industry development (sales growth, changes in growth rates), (2) industry volatility (concentration and heights of exit barriers), (3) asymmetries in bargaining position (*vis-à-vis* suppliers, distributors, and customers' or competitors' integration strategies), and (4) firms' strategy objectives. These objectives, which could include desires for technological or market intelligence, as well as for higher value-added margins, might increase the degree, breadth, stages, and form of integration firms undertake. Other conditions (explained in the following sections) might reduce vertical integration along these dimensions.

Figure 2 illustrates the relationship hypothesized to exist between the dimensions of vertical integration strategy and the forces affecting that

FIGURE 2
Forces Tempering Vertical Integration Strategies



strategy. Briefly, although I expect all of these forces to be important to a firm's choosing an appropriate mix of vertical integration, some forces are more important to some dimensions than are others. A firm's corporate strategy objectives and its industry's phase of development will most significantly influence decisions concerning the number of stages to be engaged in. Volatility of competition and an SBU's bargaining power vis-à-vis suppliers or distributors (or customers) will most significantly influence decisions

concerning the degree of internal transfers. Form of ownership used to join adjacent stages will be influenced most significantly by a firm's corporate objectives and an SBU's bargaining power over adjacent parties. Breadth of integration within an SBU will be influenced most significantly by the phase of an industry's development and by the nature of competition therein. The next sections of this paper explain these relationships.

Phase of Industry Development

This study approximated the effects of the phase of an industry's development—whether it was an embryonic or an established industry—by studying sales growth and the degree of uncertainty surrounding sales. Looking at phase of industry development and a firm's corporate strategy objectives together facilitates predicting whether the firm will pioneer the development of new industries or piggy-back on the investments of others who enter early. A major factor influencing this decision is the perceived riskiness of early entry. In particular, uncertainty increases the riskiness of committing to high degrees of internal integration prematurely because highly integrated production processes require most of the outputs from each stage to be absorbed internally (Pfeffer & Salancik, 1978; Thompson, 1967). Uncertainty may be due to sales growth patterns or technological change at some stage in the vertical chain of processing. Demand uncertainty would be particularly great when an industry is young and customers are highly reluctant to try a new product. Demand would also be uncertain if a product's sales were declining for systemic reasons (Harrigan, 1980).

If demand for an SBU's outputs is highly uncertain, the likelihood of insufficient sales volumes (resulting in costly excess capacity) is increased. Therefore, I expect uncertainty to discourage the use of vertical integration, and, in particular, expect variability in demand to increase the riskiness of vertical integration when two or more SBUs have become dependent on each other for product transfers. Thus, the number of integrated stages will be low when growth in industry sales is uncertain. High degrees of vertical integration will also seem especially risky within embryonic industries, or whenever infrastructures are still developing, customer acceptance has been slow, and technology could change demand rapidly as a new industry develops. More integrated activities and stages will appear where demand is increasing at a steady rate, and fewer will appear where demand fluctuates erratically. In particular, the number of stages of integration will be low in the early and late stages of an industry's evolution, particularly if sales change rapidly. Erratic, dramatically deteriorating demand will prove especially costly for integrated firms, and only those firms whose corporate strategies provide for subsidization of multiple, integrated stages of production will support investments in such settings.

Volatility of Competition

If competition is volatile, firms will be reluctant to let SBUs rely heavily upon each other for purchases or sales. Volatile industries increase the risk-

ness of vertical integration because competitors are more likely to use price cutting to fill their plants' capacities in such settings. An industry's volatility, which stems from the presence of certain structural traits and competitive practices (Harrigan, 1983a; Porter, 1980), make the costly overhead associated with vertical integration more difficult to bear. While competition is volatile, SBUs will make less in-house and purchase more from outsiders, thereby shifting some risk to them. When returns are stable, SBUs can safely gear up to produce more in-house or purchase products from sister units.

Analysts often use the height of exit barriers to approximate the stability of an industry's returns because competitors who cannot overcome their exit barriers are unwilling to retire excess capacity, divest facilities, or maintain pricing discipline. This study used exit barriers as proxies for volatile competition, and used a traditional measure of stable industry returns — the concentration ratio — to approximate the force of competitive volatility.

Also, I expect more vertical integration where competition is not fierce and less integration where competition is cutthroat, and expect competition to be more volatile when technology changes rapidly, products are redesigned frequently, and SBUs steal market share from each other in continual rounds of price cutting. Such conditions make vertical integration more costly for firms to sustain, particularly when their SBUs make several customized product models rather than a few standardized product models. Other conditions could increase volatility as well. Competition could erupt into price wars in which suppliers could force component attributes to change (because accelerated product obsolescence may prevent firms from recovering their product development costs). Rivals from dissimilar strategic groups fighting for the same customer segments could make competition fiercer if they ignored the market signals each group was trying to send. (Rivals from diverse strategic groups are most likely to converge upon each others' traditional customers if they face stagnant sales growth in their usual markets and insurmountable exit barriers.) Because turbulent settings will require SBUs to change tactics frequently to remain competitive, I expect lower degrees of internal transfers between SBUs and narrower breadths of integration than would exist in stable industries. Vertically integrated structures will create encumbrances that reduce SBUs' abilities to maneuver.

Bargaining Power

It seems unlikely that firms possessing bargaining power vis-à-vis suppliers or distributors (or customers) will transfer as much of their outputs internally, or that such firms will risk as much ownership equity in adjacent business units to control risky activities as will firms lacking such power. SBUs with bargaining power can often exert it to persuade outsiders to perform low value-added tasks for them (Porter, 1974, 1976). Bargaining power is also important in reducing firms' asset inflexibilities because it shifts uncertainty to outsiders.²

²This is the essence of the Japanese *kanban* or "just in time" system of cooperation with suppliers that is used in automobile manufacturing and other industries.

Three ways to approximate the bargaining power of SBUs are by estimating (1) the height of cost barriers to customers' switching suppliers, (2) the availability of alternate suppliers (or customers), and (3) the competitors' degrees of backward and forward integration. I expect less vertical integration when such cost barriers are not high than when they are high, because in the first case SBUs would lack the ability to control demand for their products effectively or to hold customers without investing in other forms of value-adding activity. Other conditions that would affect SBU's bargaining power include product or asset specificity (the inability to use resources in other activities), the ability to self-manufacture, and the dependence of a supplier (customer) upon the SBU for a large proportion of sales. Less ownership control is required when SBUs possess relative bargaining power over outsiders than when they do not.

Corporate Strategy Objectives

Up to this point, I have argued that less, rather than more, vertical integration is often advantageous from the perspective of a strategic business unit. Thus, the framework presented earlier in this study could encompass intrabusiness unit relations as well as relations with outsiders. Considering the importance of vertical relationships in the context of firms' corporate strategies, however, alters the framework's apparent rationale. Corporate strategy needs may increase the number of stages of integration undertaken or the proportion of ownership held beyond the levels of vertical integration other variables suggested. Thus, firms seeking to penetrate mature markets with new products will integrate forward to prove their product's superiority to risk-averse customers, maintaining full ownership of activities they deem of strategic importance.

Firms expect synergies to accrue when two or more SBUs share resources. This study used synergies with upstream (or downstream) SBUs to approximate the effect of corporate strategy needs upon vertical integration decisions. High market shares also appeared to indicate opportunities for firms to exploit integration economies (because of high levels of throughput). Other corporate requirements that could increase the perceived attractiveness of vertical integration include opportunities to capture a wider value-added margin, and the need to protect product quality, proprietary knowledge, or manufacturing integrity. The premium prices such products can command often offset high costs incurred by excess capacity in the vertical chain of processing. Extra safeguards vertical integration could provide for meeting these needs could include careful and detailed explanations to ultimate consumers, selling assistance, or critical coordination of component engineering. Where such image concerns are important, firms would be expected to exert substantial control over adjacent activities through more vertical integration—a hypothesis consistent with Bowman's (1978) finding of a V-shaped relationship between vertical integration and return on investment. Briefly, he found that highly integrated firms in the minicomputer industry prospered by doing most of their work themselves—R & D, production and service, as well as

other activities; minicomputer firms that merely assembled their products also prospered, but there was no middle ground.

The economic advantages of vertical integration will be transitory because industry structures (and relationships among firms) are not static. Since most industries become settings for volatile competition at some point in their evolutions, strategists must recognize that the long-term benefits of vertical integration are often primarily those of intelligence gathering or quality control. Moreover, vertical integration will not allay transaction costs so long as SBUs negotiate with each other (or with outsiders) for some portion of their supplies or distribution services. Only when a corporate-level decision has been made to force SBUs to deal with each other will the transaction costs Williamson (1975) described be avoided.

The following set of structural equations describes the hypothesized relationships, also illustrated in Figure 2:

STAGES	= f (corporate strategy, phase of industry development),
DEGREE	= f (number of stages, volatility of competition, SBU's bargaining power vis-à-vis outsiders),
FORM	= f (degree of internal transfers, SBU's bargaining power vis-à-vis outsiders, corporate strategy)
BREADTH	= f (degree of internal transfers, phase of industry development, volatility of competition).

The forces outlined in the preceding section affect all of the dimensions composing a firm's vertical integration, although (as the structural equations indicate) some of these forces will be affected directly, others indirectly. Moreover, if these were dynamic tests of vertical integration strategies, the mix of dimensions embraced at a particular time would influence the rate and nature of industries' developments, the volatility of competition therein, and a particular firm's future bargaining power vis-à-vis outsiders, as well as its future corporate strategy objectives.³ In the models tested, I expect the dimensions of vertical integration strategies to vary across firms because the environments in which some firms compete are more hospitable than others, and also expect vertical integration strategy dimensions to differ within particular industries because SBUs differ in their bargaining power vis-à-vis adjacent parties, and firms vary in their strategy objectives.

Table 1 summarizes the variables used as proxies for the relationships hypothesized to affect the dimensions of vertical integration strategies. I expect the most favorable environments for vertical integration to be those where, for example, demand was increasing steadily and few process innovations destroyed accrued cost advantages, but where switching-cost barriers prevented customers from deserting vendors, and competitors behaved like

³Tests of dynamic models are beyond the scope of this paper.

a symmetrical and stable oligopoly. Because of corporate strategy concerns, however, some firms will be vertically integrated even in less favorable settings because they cannot control the quality of suppliers' inputs or distributors' presentations adequately through their intrinsic market power. I expect vertical integration in volatile environments or where demand is highly uncertain to prove risky because opportunity costs incurred from excess capacity and strategic inflexibility will exceed the benefits firms could hope to achieve through integration.

METHODS

Information concerning the relationships between the target SBUs and adjacent business units was obtained in three stages: (1) construction of

TABLE 1
Relationships Hypothesized to Affect Dimensions
of Vertical Integration Strategies

Independent Variables	Hypothesized Relationship with Dependent Variables ^a
Phase of industry development	Positive and rapid sales growth encourages more stages and greater breadth of activities. Positive changes in sales growth (demand uncertainty), particularly those associated with obsolescence from rapid technological change, discourage integration.
Corporate strategy	Large market shares and synergies created by shared facilities with upstream and downstream SBUs encourage firms to engage in more stages of activity and to own greater percentages of vertical business units.
Volatility of competition	High exit barriers—proxies for other forces making industry competition volatile—discourage a broad range of SBU activities and high degrees of internal transfers or vertical integration because intensified competition makes returns unstable. Highly concentrated industries, by contrast, are less likely to be volatile. Such industries encourage high degrees of integration and a broad range of SBU activities.
Relative bargaining power	If the percentage of the three largest outside suppliers' sales represented by SBU's purchases is large, high degrees of internal purchases need not occur. If many outside distributors or customers are available, SBUs do not possess relative bargaining power and high internal sales are encouraged.

^aDependent variables include stages of integration, degree of backward and forward integration, breadth of SBU's activities, and form of integrated relationship.

background papers on each industry using archival data; (2) validation using field interviews; and (3) a three-round delphi-method questionnaire. The framework sketched above concerning the dimensions of vertical integration strategies was tested by studying the make-or-buy decisions of 192 firms competing in 16 industries during the years 1960–1981. Those SBUs operating within the target industries described in Table 2 were the units of analysis, although I also gathered measures for upstream and downstream sister units.

Sample Design

Table 2 identifies the industries of the target SBUs and the sample's total distribution among the 16 industries. Table 3 provides summary statistics describing the vertical integration strategy dimensions for the total sample. The column headings of Table 2 represent a taxonomy that was developed from *observable* traits, including both consumer and producer goods industries as well as those of varying ages. This taxonomy was used to insure that various features which make industries relatively attractive or unattractive environments for vertical integration would be represented in my sample of SBUs. The sample was also stratified to allow comparisons of industries having low demand uncertainty with those having high uncertainty, and also comparisons of industries characterized by stable competitive conditions with those characterized by volatile competition (Harrigan, 1983a).

Data Collection

Field studies used to gather data progressed in several stages, and employed a variety of corroborating sources. First, I generated preliminary hypotheses from a literature search concerning the use of vertical integration. The hypotheses were pretested and refined by interviewing strategists in a variety of firms; some of these firms were included in the subsequent delphi sample (explained in the next section). Background papers on each industry

TABLE 2
Distribution of Target SBUs in Industries Studied

Producer Goods Sold to Relatively Sophisticated Purchasing Agents		Mass Market Products Sold to Unsophisticated Buyers	
Acetylene	6.3%	Baby foods	3.1%
Coal gasification	4.2%	Cigars	3.6%
Genetic engineering	10.4%	Percolators	4.2%
Leather tanning	4.7%	Personal computers	7.8%
Petroleum refining	16.0%	Rayon and acetate	4.2%
Pharmaceuticals	10.4%	Solar heating	6.8%
Soda ash	3.1%	Tailored suits	6.3%
Receiving tubes	2.6%	Whiskey	6.3%
Total	57.7%	Total	42.3%

TABLE 3
Distribution of Sample Firms by Various Dimensions
of Vertical Integration Strategies

Degree of Backward Integration	
Non-integrated (no intrafirm transfers)	33%
Taper-integrated (between 0% and 80% intrafirm transfers)	52%
Fully-integrated (more than 80% intrafirm transfers)	15%
Degree of Forward Integration	
Non-integrated (no intrafirm transfers)	37%
Taper-integrated (between 0% and 80% intrafirm transfers)	38%
Fully-integrated (more than 80% intrafirm transfers)	25%
Breadth of Integrated Activities	
Not broad (fewer than 50% of all activities)	32%
Average breadth (50% to 75% of all activities)	34%
Broadly-integrated (more than 75% of all activities)	34%
Stages of Integration	
One stage (less than 75%)	29%
Few stages (between 75% and 150%)	58%
Many stages (index values greater than 150%)	13%
Form of Venture	
Contracts only (0% ownership)	39%
Quasi integration (less than 95% ownership)	23%
Wholly-owned (95% or more ownership)	38%

were then constructed from archival sources that included annual reports, other financial disclosure documents, trade journals and publications, and government documents. These background papers were later refined through field interviews, telephone conversations, follow-up letters, and revisions suggested by managers who participated in the study.

The Delphi Procedure. Estimates of the variables described in Table 4 were attained and refined from interviews and questionnaires using an iterative, delphi-like procedure. Initial estimates were developed as a starting point for the interviews from materials in the public domain and were scaled relative to competitors. Initial interviews were primarily face-to-face

because plant tours were often necessary to understand many issues concerning technologies and their relationships to vertical integration. Interviews, telephone conversations, follow-up letters, transcripts, and comments on preliminary drafts of each industry vignette provided revised estimates of these factors until estimates for the 192 competitors' contexts were developed.

TABLE 4
Operational Definitions of Variables Hypothesized
to Affect Vertical Integration Strategies

Variables	Operational Definition
Dependent	
Firm's number of stages in transformation process	Relative (index) number of steps in transformation process firm undertook.
SBU's degree of backward integration	Percentage of requirements the business unit obtains from upstream sister unit.
SBU's degree of forward integration	Percentage of requirements the business unit obtains from downstream sister unit.
SBU's breadth of integrated activities	Number of activities SBU engaged in divided by the number of activities it was possible to engage in.
Firm's form or percentage ownership of the vertical venture.	Percentage of equity ownership in the vertical business unit.
Independent	
Phase of industry development	
Sales growth	Percentage growth in SBU's industry sales
Demand uncertainty	Average dispersion of SBU's sales growth over five years, 1976 to 1981
Corporate strategy	
Synergy — upstream and downstream	Sum of percentage of resources shared with sister business units upstream and downstream
Market share	Business unit's percentage of industry sales
Volatility of competition	
Concentration ratio	Four-firm concentration ratio for target SBU's industry
Height of exit barriers	Scale for which exit barriers associated with plant and equipment estimated for 1981 strategic posture
Relative bargaining power	
Dependence of outside suppliers	Percentage of three largest outside suppliers' sales represented by the SBU's purchases.
Availability of alternate distributors (or customers)	Reciprocal of number of alternate distributors (or customers) where few distributors represents downstream bargaining power.
Competitors' degrees of backward and forward integration	An interactive variable created by multiplying the competitors' degrees of backward integration by their degree of forward integration to indicate the degree of integration in competitors' chains of activities.

Informants also provided information concerning the strengths and flexibilities of suppliers and customers, technologies, and other competitive factors affecting their industries. Newspaper accounts of price wars, divestitures, and acquisitions documented the changes in vertical integration that had occurred over time; interviews with industry participants corroborated my interpretations of the meanings of these events and estimates of these forces.

The delphi procedure allowed me to obtain estimates for variables that are not in the public domain and that firms might not collect routinely. By incorporating the opinions of expert judges, it also allowed me to refine estimates based upon imperfect information. In this case, the judges included executives familiar with the target industries (and adjacent business units), outside suppliers, outside customers, trade association executives, industry analysts, and industry observers.

Preliminary estimates of each variable for each SBU were revised by the appropriate judges three times. Each time, they were informed of the average value obtained from judges on the previous round. As the judges reassessed each variable, they discussed their reasoning (thereby providing additional insights concerning vertical integration relationships). Since the scales and measures developed were revised in the delphi rounds several times, respondents often converged in their estimates of the relative rankings of firms along various attributes. The resulting estimates for each SBU are scaled relative to competitors. Since the scalings were constrained to values between .01 and .99 for most variables, problems with heteroscedasticity have been reduced and observations can be pooled across industries.

Estimates of the variables presented in Table 4 were obtained from informants at 111 of the target firms, plus suppliers, customers, industry analysts, former employees, and other qualified industry observers. Since a delphi procedure was employed, it was not necessary to talk with all of the participants within an industry in order to develop estimates of their variables. By piecing together information provided from these many sources, who all dealt with nonresponding firms, it was possible to verify and fill in profiles of competitors that had been constructed from archival data. In this manner, interviews with 58 percent of the firms comprising the total sample facilitated estimates of variables for the firms that were not interviewed.

Dependent Variable Construction

A description of measurements for the dimensions of vertical integration follows. (1) The relative *breadth* of an SBU's activities was estimated by the number of adjacent activities it was engaged in—design, product or process R&D, production, testing, distribution, or other activities—divided by the maximum number of activities SBUs in that industry might reasonably engage in. Breadth was measured within the boundaries of the target SBUs identified in Table 2. (2) A comparison of firms' integrated stages was constructed by summing number of stages multiplied by the value-added for each respective stage. The stages of interest for this study have been described in detail elsewhere (Harrigan, 1983a, 1983b), and since the target SBUs formed the

basis for comparison, index values exceeded 1.00 for those firms engaged in long chains of vertically related activities. (3) Estimates of SBUs' degrees of integration were based on the percentage of internal transfers of key goods and services between sister SBUs operating within the stages under study, and separate estimates were constructed for upstream and downstream transfers. (4) The form of a particular integrated relationship was estimated by firms' percentages of ownership in the vertically-related business units under study.

In each case, the industries described in Table 2 provided the SBUs that served as reference points for construction of these estimates. The sample is profiled by these dimensions—breadth, stages, degree, and form—in Table 3, which indicates that the firms examined varied substantially in their mixes of strategy dimensions.

Independent Variables: Measurement and Rationale

Independent variables were constructed as follows:

Phase of industry development was estimated using sales growth and the dispersion of sales growth, measures that indicated whether demand was increasing rapidly or slowly and whether demand was characterized by large variations in volume.

Volatility of competition was estimated using the height of economic exit barriers and the four-firm concentration ratio. Although I constructed many other measures of industry structure, high multicollinearity prevented their use in the models specified below (Johnston, 1972).⁴

Relative bargaining power was estimated by using the percentage of total sales an SBU's purchases represented to its three largest outside vendors (a measure of supplier power). The PIMS data base and Porter (1974, 1976) use this measure to approximate suppliers' bargaining power over customers.

Customer bargaining power was estimated by using the reciprocal of the number of available distributors (or customers); when this index was high, distributors were relatively strong. A positive relationship seemed likely between this measure and an SBU's degree of forward integration.

A measure of competitors' integration strategies was also used because an SBU's bargaining power will be mitigated if customers (who may also be competitors) are themselves highly integrated. The presence of integrated competitors will reduce the availability of outside customers, thereby increasing a firm's need to become more integrated itself.

Corporate strategy needs were estimated using SBUs' market shares; I expected firms to desire more ownership control over business units when they held large market shares.

Corporate strategy objectives also came from estimates of synergy based upon the value and percentages of resources shared with the target SBU by upstream or downstream SBUs. I expected a positive relationship between

⁴Other estimates of industry structure may be obtained from the author.

synergies and the number of vertically related stages in which firms were engaged.

Replicating studies that did not question the same managers whom this study interviewed might obtain different estimates of these variables; however, similar values would be likely to result if the study were repeated with other subjects because managers were advised of their own previous estimates (as well as the range of estimates supplied by other respondents in their respective industries) as each round of the delphi inquiry progressed. If different industries were used, different estimates might result, but I would expect the relationships between these forces and the strategy dimensions to be similar.

THE MODELS

A regression model was chosen to estimate the effects of the environmental and corporate effects outlined above because the individual contributions of each class of predictor variable were of interest. An alternative treatment of these data could encompass a factor analysis procedure producing scalings that could be used in subsequent regression models (Hambrick, 1983). A factor analysis procedure, which might create interpretive difficulties, did not seem a superior analytical approach. Since I had already advanced a theory concerning the effects that affect choices of vertical integration strategy and did not need a method of generating underlying factors that might affect these strategies, regression models seemed the most appropriate analytical tool.

This study's central hypotheses were that vertical integration strategies will vary in *breadth*, *stages*, *degree*, and *form* depending upon (1) the demand conditions firms face, (2) competitive behavior within their industries, (3) their needs to control supplies (or distribution) more closely, and (4) corporate level strategy needs augmenting the amount of vertical integration that might otherwise occur. As noted earlier in this paper, some dimensions of vertical integration depend, in part, upon the values of other strategy dimensions, and I believe these relationships are recursive — that is, each of the endogenous variables can be determined sequentially. Moreover, the right-hand endogenous variables need not be correlated with the error terms. Consequently, ordinary least squares is an appropriate estimation procedure; I used two-stage least squares techniques to solve the models for degree, breadth, and form of integration. In the ordinary least squares specification of these relationships, the standardized coefficients of the independent variables (b_1) may be interpreted as their relative contributions to the corrected coefficient of multiple determination. The magnitude of the regular coefficients represent contributions to the relative likelihood that (1) a firm will engage in many integrated stages, (2) an SBU will transfer much of its output in-house (upstream or downstream), (3) an SBU will undertake many activities in-house, or (4) a firm will own a large proportion of its adjacent business units. The model could be stated in the following form:

$$\begin{aligned}
 y_1 &= a_1 + b_1x_{11} + b_2x_{13} + e_1, \\
 y_2 &= a_2 + b_1y_1 + b_2x_{25} + b_3x_{27} + e_2, \\
 y_3 &= a_3 + b_1y_1 + b_2x_{36} + b_3x_{38} + e_3, \\
 y_4 &= a_4 + b_1y_2 + b_2y_3 + b_3x_{42} + b_4x_{46} + e_4, \\
 y_5 &= a_5 + b_1y_2 + b_2y_3 + b_3x_{54} + b_4x_{59} + e_5,
 \end{aligned}$$

where y_j equals the dependent variables—the stages, upstream degree, downstream degree, breadth, and form, respectively, of the firm and SBU's vertical integration strategy. The independent variables, x_{ij} , correspond to a coding scheme where i (equals 1, 2, . . . , 5) represents the structural equation's number, and j (equals 1, 2, . . . , 9) corresponds to the independent variables as numbered in Tables 4 and 5.

Table 5 shows the correlations of the variables tested. In the interests of specification parsimony (and in keeping with the relationships outlined in Figure 2), the models are limited to one variable per category of force hypothesized to affect vertical integration strategy (plus the prespecified strategy dimensions). Including multiple measures of each force per equation would have produced imprecise regression coefficients. When the strategy dimensions were used for second stage analyses, the sample possessed a high degree of multicollinearity.

RESULTS

Results from the ordinary least squares and two-stage ordinary least squares models are presented in Table 6 and discussed in the following sections.

Number of Stages in the Integrated Chain

Positive sales growth and large synergies from shared facilities increased the number of stages in which firms were engaged. Declining sales decreased the number of stages, and both variables were statistically significant in the expected direction. Also as expected, the firms' number of stages was positive and statistically significant when used to generate second-stage estimators of the degree of backward and forward internal transfers by SBUs. This result suggests that firms are more likely to transfer goods and services internally if their SBUs operate in adjacent stages of processing than if they do not. If this were the case, it would call into question the efficacy of some firms' defining SBUs as the appropriate level for their resource allocation and strategic analysis activities. The intrafirm negotiation behavior that accompanies the setting of transfer prices and allegedly acts as a check on vertical integration would not seem to operate in these cases. Instead, corporate-level needs dominate the make-or-buy decision.

Degree of Backward Internal Transfers

Stable competitive conditions (represented in this specification by the four-firm concentration ratio) encouraged higher degrees of purchases from

TABLE 5
Basic Statistics and Correlation Matrix of Independent Variables

	Means (s.d.)	1	2	3	4	5	6	7	8	9
1. Sales growth	-.0031 (.0766)	1.00								
2. Demand (sales growth) uncertainty	.0631 (.0564)	-.18	1.00							
3. Synergy—upstream and downstream	.0880 (.1868)	.13	-.07	1.00						
4. Market share	.1371 (.1722)	-.11	.04	.05	1.00					
5. Concentration ratio	.3646 (.2106)	-.31*	.04	.06	.31*	1.00				
6. Height of economic exit barriers	.4950 (.2455)	-.02	-.06	.08	.14	.17	1.00			
7. Dependency of outside suppliers	.1312 (.2133)	-.04	-.07	-.10	.07	.13	-.02	1.00		
8. Availability of outside customers	.1015 (.1663)	-.35*	.04	.08	-.14	-.17	-.12	-.11	1.00	
9. Competitors' degrees of vertical integration	1.0904 (.8693)	-.06	.07	.36*	.02	.08	.33*	-.03	.01	1.00

* $p = .01$

in-house suppliers than did unstable conditions. Where an SBU possessed bargaining power over outsiders (by virtue of their dependence upon the SBU), it did not purchase as many of its requirements from in-house sources as did SBUs lacking such power. The coefficient for the stages variable (determined by industry sales growth and opportunities for synergies) was positive, suggesting that as industries develop and demand stabilizes, SBUs will increase their degree of backward integration.

The relationships found in Table 6 are both as expected and statistically significant, but results of my past studies of industry histories and firms' performances suggest caution (Harrigan, 1983a). Over time, being highly integrated backward cuts firms off from access to materials and processes that may prove to be less expensive than what they use. The more goods and services their SBUs transfer in-house, the less firms are exposed to the stimulus of outsiders' innovations, and the more they risk subsequent strategic inflexibility. In contradiction to the finding of MacMillan and his colleagues (1983) that instability encourages backward integration, I found indirect effects suggesting that demand instability reduces the degree of backward internal transfers, given the relationship this study found between industry development and firms' stages of integration.

Thus, this study's results suggest that where SBUs possess relatively high bargaining power over outside suppliers and can wrangle better prices and terms from them, less backward integration will occur than when they lack such power. The need to exploit synergies between SBUs is an example of a corporate intervention decision that, these results suggest, will mitigate this force.

Degree of Forward Internal Transfers

The results shown in Table 6 suggest that high exit barriers (representing an environment of volatile competition) discourage high degrees of internal sales. When competitors instigate rounds of price cutting, sales to sister SBUs are not assured if SBUs possess purchasing autonomy. The presence of high exit barriers increases the likelihood that marginal competitors who cannot exit will slash prices to fill their plants to break even on volumes. Again, the positive, statistically significant relationship with the number of stages variable suggests that corporate-level intervention to encourage sister SBUs to trade will mitigate these forces.

The positive and statistical significant result for relative bargaining power suggests that SBUs must rely more heavily upon in-house conduits to their markets when they face strong outside distributors (or customers) than when they do not. This relationship fits my resource-dependency framework that embodies the argument that high demand uncertainty encourages vertical integration. The relative lack of bargaining power such SBUs face would make them price-takers, who also lack bargaining power over sister units. SBUs that depend upon in-house customers face another competitive disadvantage: if SBUs are heavily forward-integrated, they lack a good feeling for their markets. My field studies of industry histories indicated that

TABLE 6
Results^a for Regression Model for the Total Sample

Independent Variables	Dependent Variables				
	Firm's Number of Stages	SBU's Degree of Backward Integration	SBU's Degree of Forward Integration	SBU's Breadth of Integrated Activities	Firm's Form of the Vertical Venture
Phase of industry development					
Sales growth	1.12*** (.19)	—	—	—	—
Demand uncertainty	—	—	—	-.15 (.03)	—
Corporate strategy					
Synergy—upstream and downstream	.33** (.14)	—	—	—	—
Market share	—	—	—	—	.08 (.05)
Volatility of competition					
Concentration ratio	—	.19** (.12)	—	—	—
Height of economic exit barriers	—	—	-.33** (-.21)	-.16* (-.13)	—
Relative Bargaining Power					
Dependence of outside suppliers	—	-.46*** (-.28)	—	—	—
Availability of outside customers	—	—	.92*** (.41)	—	—
Competitor's degrees of backward and forward integration	—	—	—	—	.06** (.20)

TABLE 6 (continued)

Independent Variables	Dependent Variables				
	Firm's Number of Stages	SBU's Degree of Backward Integration	SBU's Degree of Forward Integration	SBU's Breadth of Integrated Activities	Firm's Form of the Vertical Venture
Prespecified vertical integration strategy dimensions					
Firms' number of stages in transformation process	—	.38** (.18)	.61*** (.31)	—	—
SBU's degree of backward internal transfers	—	—	—	-.56*** (-.42)	.21* (.17)
SBU's degree of forward internal transfers	—	—	—	-.37*** (-.27)	-.39*** (-.29)
Intercept	.83	.01	-.09	.24	.86
Mean (standard deviation)	.86 (.36)	.35 (.34)	.69 (.27)	.88 (.27)	.87 (.27)
Corrected coefficient of multiple determination R ²	.05	.16	.20	.35	.08
F-statistic (degrees of freedom)	4.72*** (189)	11.88*** (188)	15.37*** (188)	25.13*** (187)	4.14*** (187)

^aFigures in parentheses are standardized regression coefficients indicating their relative contributions to the coefficient of multiple determination, given unequal standard deviations.

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

when firms finally "bit the bullet" and separated their intrafirm stages of processing, those that uncoupled the downstream stages first obtained a better understanding of the true nature of demand for outputs produced by upstream stages and a clearer understanding of the superiority of competitors' offerings than did firms that uncoupled upstream stages first (Harrigan, 1983a).

Firms often transfer large proportions of their outputs downstream through in-house units when there are cost advantages in doing so. The positive relationship obtained with the stages variable suggests that this corporate desire to capture more value-added may influence forward integration decisions, but caution in interpreting this result is warranted. Investigations of forward integration decisions (such as those this study explored) are relatively novel in the literature treating vertical integration. In the past, vertical integration has meant primarily that firms make their own components or acquire their own sources of raw materials. More attention has been devoted to upstream relationships than to the downstream, a side of the vertical chain that deserves more investigation in the future.

Breadth of SBUs' Activities

The results in Table 6 suggest that high demand uncertainty reduces the breadth of activities SBUs will undertake in-house. Similarly, high exit barriers—representing an environment of volatile competition—discourage SBUs from undertaking a broad range of activities in-house. These results are as expected, although the demand uncertainty variable is not statistically significant: firms were unwilling to increase their strategic inflexibility if demand and competitive conditions appeared to be adverse.

The negative, statistically significant relationships of breadth of SBUs' activities with their degrees of backward and forward integration is not surprising. The wider the boundaries defining SBUs, the broader the range of activities they perform in-house, and the less need they will have for purchases from or sales to adjacent SBUs.

Form of Percent Ownership of the Venture

The results shown in Table 6 suggest that a firm's having a high market share increases the likelihood that it will wholly own vertical business units. This coefficient is not statistically significant, but its sign is consistent with the relationship shown in Figure 2. Low bargaining power also increases the likelihood that vertical units will be wholly owned; this statistically significant relationship suggests that when firms cannot use the market power of their SBUs to control outsiders, they will instead use ownership to control uncertainties.

The relationship obtained between ownership and the degree of internal transfer variables indicates that firms are more likely to own their upstream business units fully than their downstream ones, a result that may be due to the large capital requirements and scale economies associated with most upstream technologies. Furthermore, the greater strategic stakes associated with

upstream business units than with downstream ones may make full ownership attractive. Preliminary findings concerning the use of joint ventures (described in Harrigan, 1985) suggest that firms will often consent to partial ownership in order to gain market access and distribution channels. Finally, firms need not own distributors in order to influence their behaviors if their SBUs' market positions are strong enough.

DISCUSSION

Firms use vertical integration, which varies along several dimensions, differently when competitive conditions and demand are hospitable than they do when they are not hospitable. Certain combinations of vertical-integration strategy dimensions appear with certain environmental forces more frequently than with others. The pattern of internal transfers and number of stages undertaken over time obtained in this study is different from that posited by Stigler (1951). This result suggests the value of a contingency approach to the use of vertical integration whereby firms use their inherent market power—when they possess such power—to spread risks and maintain strategic flexibility.

SBUs made less in-house, and firms were engaged in fewer stages of processing, where demand was highly uncertain than where it was certain. More internal transfers occurred where SBUs lacked the bargaining power to urge outsiders to undertake risky ventures than where they had such power, and this lack of bargaining power may have exacerbated firms' strategic inflexibilities. Although this paper does not contrast the vertical integration strategies of unprofitable firms with those of profitable ones, the results from my field studies suggested that going against the patterns that emerged in this research could prove disastrous. In particular, the findings regarding volatility of competition suggest that firms would be ill-advised to embrace high degrees of vertical transfers when the structures of their industries are not conducive to vertical integration.

The results also suggest that where firms possess bargaining power, they need not own a vertically related unit in order to enjoy the advantages vertical control provides. Firms might better seek quasi-integration, joint ventures, cooperative agreements, and contracts than full ownership in such situations. This suggestion could prove especially important when competition in one market is volatile and firms' SBUs in adjacent industries possess adequate bargaining power to exploit firms within the troubled industries. Firms might entrust some tasks to outsiders without forfeiting competitive advantages; their corporate strategies would suggest which tasks those might be. Once such tasks were identified, corporate intervention might be required to dissuade SBUs from undertaking activities that might endanger the well-being of the firm. Although empire-building tendencies of SBU managers may increase their desires to undertake a broad range of activities in-house, high demand uncertainty and volatile competition often mitigate advantages of doing so. SBUs would be better advised to play off outsiders for the best

terms and prices on some components and services, particularly if their bargaining power were high enough to exploit their advantage. A similar argument is appropriate at the corporate level regarding the number of integrated stages firms undertake. Long chains of processing exacerbate firms' exposure to the volatility of demand in multiple industries and increase the risks of imbalances and excess capacity at one or more stages of processing.

This study's results indicate that there may have been conditions that led firms to disregard competitive forces in subsidizing one SBU for the benefit of another. I found that some firms transferred more of their outputs internally at times when competitive conditions suggested that doing otherwise would have been wiser. The major reason for over-integration in such cases seems to have been needs of corporate strategy. As the results concerning volatile settings revealed, managers must weigh the costliness of sustaining losses in competition against the potential strategic gains they hope to make. My study of competitive histories revealed that some firms were willing to bear these costs in order to pioneer the development of new industries. Firms also bore these costs where the SBUs involved were of high strategic importance. The danger in this behavior is that of forgoing opportunities to spread risks to outsiders. As competitive conditions evolve, so should firms' uses of vertical integration.

Firms might also court danger by committing to inflexible, vertically integrated asset positions too soon — and hanging on to them too long; they must recognize whether or not such commitments best serve their strategy needs. Porter (1980) and others who have argued for preemptive strategies suggested that early integration may provide competitive advantages (MacMillan, 1983). Without dismissing the value of their arguments, I suggest a clarification based on an industry's stage of development. Such wildcat gambles, often acts of desperation, are most frequently made by firms in underdog positions (MacMillan, 1980). Firms that integrate early must often do so in order to gain footholds in industries in which they could not afford to piggy-back on the later investments of others. Such firms must be prepared to fight the wars of attrition necessary to build new channels of distribution or to create other infrastructures they need. Their strategies will tolerate subsidizing initial losses created by vertical integration in order to achieve long-term success.

LIMITATIONS OF RESULTS

Measurement problems limit the results of this study. First, firms differ as to how they define their SBUs, and thus some SBUs studied were, for reasons beyond the scope of this study, more broadly-integrated than others. There are also limits to what field interviews, reconstructed histories, and delphi inquiries can teach about firms' vertical integration decisions. Finally, there may be other factors in operation that my framework does not encompass.

In a study where many structural variables could interact with each other, it was difficult to extract meaningful proxies for competition. High multicollinearity prevented my specifying all of the environmental variables collected in one model of vertical integration behavior. Firms' diversification strategies also created measurement difficulties. Despite meticulous efforts to measure these phenomena, I must be conservative regarding the degree of confidence with which my interpretations can be asserted.

The data seem to suggest that patterns exist among a firm's strategy, competitive environment, bilateral bargaining power, and degree of vertical integration. Tests with specifications other than a regression model (such as weighted least squares and the nonlinear cumulative logistic function) yielded similar results; such tests sometimes produced higher coefficients of multiple determination than the regression model did, but the corresponding beta values of the independent variables were also more difficult to interpret operationally.

The new dimensions this study developed and tested offer an alternative set of criteria for evaluating whether firms should segment or discourage vertically integrated relationships among SBUs. But caution is in order in interpreting the magnitude of the influence of environment on these dimensions. I suspect, for example, that sales growth and phase of industry development are key forces affecting firms' decisions to undertake many (or few) stages of vertical integration, but more study of this issue is needed.

CONCLUSIONS

This study expanded the operational meaning of vertical integration by developing the concept's principal dimensions and testing them with field interview data. Findings offer substantial evidence that vertical integration strategies differ across industries as well as within them. Findings also suggest that some combinations of vertical integration strategy dimensions are more likely within certain settings than within others. Firms must consider demand, competitive volatility, and behavior of outsiders when developing schemes to meet resource needs through integration. Since the bargaining power of outsiders can shrink or grow with time, knowledge of buyer-seller relationships will allow firms to shift the burdens of risky investments when they can.

Choosing vertical integration strategies is the province of the chief executive officer (CEO), a firm's chief strategist. Policies to augment intrafirm cooperation often require faith and perseverance in a long-term vision that originates with the CEO. Intervention to exploit potential intelligence or economic advantages (or to dismantle inappropriate relationships) may be necessary, especially where increasingly brief product lives, accelerated rates of innovation, or competitors' rapid capacity for expansion (and integration) characterize industries. Critics of business performance might do well to give top management some acknowledgement for taking risks and shaping vertical strategies for the long-term benefit of shareholders.

Finally, the nature of synergies must be reconsidered. No synergy between SBUs exists unless executives consciously enforce policies causing SBUs to (1) communicate, (2) share inputs, outputs, R & D, or other useful attributes and capabilities, or (3) cooperate in some other useful manner. If firms' management systems are weak, they can create situations in which vertical integration becomes a mobility barrier. If firms do not have internal mechanisms that balance needs for SBU autonomy and corporate strategy needs, they exacerbate their problems with vertical integration. Although, as Williamson (1975) suggested, firms may integrate to escape external costs associated with market transactions, there are costs to managing transfers across internal boundaries as well. If firms are unwilling or unable to bear these management costs, they may as well go to outside markets.

Firms use vertical integration to control their need for certainty, but if competitive conditions and demand become *too* unfavorable for them to endure, they will face increasing pressure to reduce the number of stages they engage in or their degree of integration. In dramatic contrast to Stigler's (1951) hypothesis, this study found that firms reduce their breadth of integrated activities and their number of stages in the early and late stages of their industry's development. But if firms lack the internal mechanisms needed to exploit the advantages integration can provide—if they lack the bargaining power needed to win concessions from suppliers (or from distributors or customers), or if their industries become highly volatile—then the strategic outlook for vertical integration does not seem good. Less internal investment may be better than more when weak firms contemplate the role of vertical integration in their corporate strategies.

REFERENCES

- Adelman, M. A. 1949. Integration and antitrust policy. *Harvard Law Review*, 63 (1): 27–77.
- Arrow, K. J. 1975. Vertical integration and communication. *The Bell Journal of Economics*, 6: 173–183.
- Blois, K. J. 1972. Vertical quasi-integration. *Journal of Industrial Economics*, 20: 253–272.
- Bork, R. 1954. Vertical integration and the Sherman Act: The legal history of an economic misconception. *University of Chicago Law Review*, 22: 157–201.
- Bowman, E. H. 1978. Strategy, annual reports, and alchemy. *California Management Review*, 20(3): 64–71.
- Coase, R. H. 1937. The nature of the firm. *Econometrica*, 5: 386–405.
- Crandall, R. W. 1968a. *Vertical integration in the United States automobile industry*. Unpublished doctoral dissertation, Northwestern University, Evanston, Ill.
- Crandall, R. W. 1968b. Vertical integration and the market for repair parts in the United States automobile industry. *Journal of Industrial Economics*, 16: 212–234.
- Hambrick, D. C. 1983. Strategies for mature industrial-product businesses: A taxonomic approach. Working paper, Columbia University, New York.
- Harrigan, K. R. 1980. *Strategies for declining businesses*. Lexington, Mass: D.C. Heath.
- Harrigan, K. R. 1983a. *Strategies for vertical integration*. Lexington, Mass.: D.C. Heath.

- Harrigan, K. R. 1983b. Research methodologies for contingency approaches to business strategy. *Academy of Management Review*, 8: 398-405.
- Harrigan, K. R. 1985. *Strategies for joint ventures*. Lexington, Mass.: D.C. Heath.
- Hayes, R., & W. Abernathy. 1980. Managing our way to economic decline, *Harvard Business Review*, 58(4): 67-77.
- Johnston, J. 1972. *Econometric methods*. New York: McGraw-Hill.
- Kaserman, D. 1978. Theories of vertical integration: Implications for anti-trust policy. *Antitrust Bulletin*, 23: 483-510.
- Laffer, A. B. 1969. Vertical integration by corporations, 1929-1965. *Review of Economics and Statistics*, 51: 91-93.
- MacMillan, I. C. 1980. How Business Strategists Can Use Guerilla Warfare Tactics, *Journal of Business Strategy*, 1(2): 63-65.
- MacMillan, I. C. 1983. Preemptive Strategies. *The Journal of Business Strategy*, 4(2): 16-26.
- MacMillan, I. C., Hambrick, D. C., & Pennings, J. 1983. Backward vertical integration and inter-organizational dependence: A PIMS — based analysis of strategic business units. Working paper, Columbia University, New York.
- Maddigan, R. J. 1979. *The impact of vertical integration on business performance*. Unpublished doctoral dissertation, Indiana University, Bloomington, Ind.
- Pfeffer, J., & G. R. Salancik. 1978. *The external control of organizations: A resource dependence perspective*. New York: Harper & Row.
- Porter, M. E. 1974. Consumer behavior, retailer power, and market performance in consumer goods industries. *Review of Economics and Statistics*, 56: 419-436.
- Porter, M. E. 1976. *Interbrand choice, strategy, and bilateral market power*. Cambridge: Harvard University Press.
- Porter, M. E. 1980. *Competitive strategy: Techniques for analyzing industries and competitors*. New York: Free Press.
- Stigler, G. J. 1951. The division of labor is limited by the extent of the market. *Journal of Political Economy*. 59(3): 185-193.
- Thompson, J. D. 1967. *Organizations in action*. New York: McGraw-Hill.
- Tucker, I. B., & Wilder, R. P. 1977. Trends in vertical integration in the U.S. manufacturing sector. *Journal of Industrial Economics*, 26: 81-94.
- Williamson, O. E. 1969. Allocation efficiency and the limits of antitrust. *American Economic Review: Papers and Proceedings*, 59: 105-123.
- Williamson, O. E. 1971. The vertical integration of production: Market failure considerations. *American Economic Review*, 61: 112-123.
- Williamson, O. E. 1975. *Markets and hierarchies*. New York: Free Press.

Kathryn Rudie Harrigan earned a D.B.A. degree at Harvard and is Associate Professor of Strategic Management at Columbia University. Her research interests include industry and competitor analysis, turnaround management, competitive dynamics, and global strategies. Her books include *Strategies for Declining Businesses* (1980), *Strategies for Vertical Integration* (1983), and *Strategic Flexibility: A Management Guide for Changing Times* (1985), and *Strategies for Joint Ventures* (1985).