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Uncertainty Reduction and the Threat of Supplier Retaliation: Two Views of the Backward Integration Decision¹

Ian C. MacMillan, Donald C. Hambrick, Johannes M. Pennings

Abstract

The article examines the decision to vertically integrate backwards from two perspectives: the extent to which vertical integration relieves the uncertainty of supply for a firm facing a variable demand function; and the threat that existing suppliers will retaliate if such vertical integration is attempted. Data from the PIMS data base are used to show that while the uncertainty reduction theory is strongly supported, there is value in complementing the theory by also taking potential retaliation into account: the results provide evidence that buyers will be discouraged from backward vertical integration if both the likelihood *and* the severity of retaliation are high.

I. C. MacMillan
University of
Pennsylvania,
Department of
Management,
Philadelphia,
U.S.A.

D. C. Hambrick
Columbia University,
Graduate School of
Business, New York,
U.S.A.

J. M. Pennings
University of
Pennsylvania,
Department of
Management,
Philadelphia,
U.S.A.

Perspectives on the Vertical Integration Phenomenon

Backward integration — the absorption into the firm of some of the tasks carried out by suppliers — is a major strategic option facing the firm. With backward integration, instead of simply paying suppliers, management must commit resources and attention (which could otherwise be devoted to the core business) to the additional tasks. This can be a substantial and often irreversible commitment.

It is the purpose of this paper to explore some of the factors that shape this important decision by studying the backward integration behaviour of a sample of business units in United States firms. With limited exceptions (e.g. Harrigan 1983), strategy researchers have not closely addressed vertical integration.

Most publications on the topic have come from the field of economics, as indicated in the reviews below. We see an opportunity to complement the wealth of economic literature with a strategic management perspective. We argue below that the literature approaches the backward vertical-integration decision from three major perspectives: market power, cost reduction, and uncertainty reduction. Naturally, each perspective has validity, but each considers primarily the positive incentives to integrate. In actuality there may be substantial disincentives, depending on the degree of dependency of buying firms on their suppliers, the dependency of the supplying firms on the buyers, and on the resultant danger of retaliation by suppliers.

Thus, the study reported below takes an interorganizational dependence perspective. Using this perspective, the business is viewed not only as an entity interacting with outside parties, but also as one concerned with the on-going

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character of those interactions. The purpose is to complement the other three perspectives, rather than to suggest a competing perspective. We first review the literature on backward integration, organizing around the three major motives suggested above.

The Market-Power Motive

Interest in vertical integration originally stemmed from studying the market-power implications of such actions by large firms. Economists continue to debate the potential for using vertical integration as a weapon to develop market power or monopolistic conditions. Following a long tradition of viewing vertical integration as an undesirable social trend, economists such as Spengler (1950) suggested that there could be positive benefits to vertical integration since it enabled producers to evade surcharges imposed by suppliers. On the other hand, Crandell (1968) argued that at least in the case of automobile assemblers, back integration into components not only allowed them to secure large shares of competitive markets, but also deterred entry into the assembly market. This was supported in a more general sense by Etgar (1978) who argued that when raw materials are scarce, firms will be motivated to back integrate and then refuse to supply new entrants or existing competitors. Gould (1977) stated that vertical integration can create barriers to arbitrage in otherwise competitive markets. However, Greenhut and Ohta (1979) used simulation techniques to argue that when vertical integration of successive monopolists is mutually profitable, welfare is increased. Warren-Boulton (1974) proposed that the welfare effect of vertical integration can be positive, negative *or* neutral depending on parameters such as the elasticities of substitution of labour for capital, or categories of labour for one another. So, the literature on market power as a reason for vertical integration is far from unequivocal.

Perhaps the reason for the mixed findings lies in the fact that suppliers may have differing powers to retaliate, so that the desire to achieve market power must be tempered by the capacity of the suppliers to take some form of punitive action. This will be discussed in more depth when we present the interorganizational dependence perspective.

The Cost-Reduction Motive

An alternative approach is taken by scholars in industrial organization, who view vertical integration as a strategy to reduce costs, rather than to gain monopoly power. Coase (1937) was one of the earliest writers to formally argue that firms will undertake those activities that they consider cheaper to administer internally than to buy in the external marketplace. Stigler (1951) argued that the type of activity to be integrated would change according to the stage in the life of the organization. Later, Williamson (1971) further elaborated the argument, stating that there are times when hierarchies are more efficient than

markets. Klein et al. (1978) suggested that even in competitive markets, enormous contracting, transaction, coordination and/or litigation costs could in some cases cause the firm to opt for vertical integration. In general, these authors have taken the perspective that the vertical integration issue is important primarily as a cost-reduction strategy. While this approach is certainly valid, it too focusses primarily on the positive incentive and ignores the disincentives associated with back integration — which include the threat of supplier retaliation.

The Uncertainty-Reduction Motive

A final group of authors take the perspective that firms back integrate to reduce uncertainty of supply. Arrow (1975) argued that in addition to other benefits or motives, partial back integration improves the firm's ability to forecast input prices, a position supported by Blair and Kaserman (1978). Carlton (1979) based his entire model of vertical integration behaviour on uncertainty of supply, arguing that firms would back integrate to save input costs for the high probability component of demand and only use suppliers for the low probability component of demand. The uncertainty argument is supported by White's (1971) analysis of the automobile industry, in which he claimed that supply risks motivate vertical integration. Mead (1978) in his study of the petroleum industry also argued that vertical integration reduces risk.

Additional uncertainty is introduced if the production of suppliers requires highly specialized assets. Klein et al. (1978) argued that when such assets are required, there is danger that suppliers may attempt to extract 'appropriable quasi-rents': by threatening to withhold supplies, suppliers with specialized assets can extract premiums from buyers who *must* have these supplies. Concern over inability to control this uncertainty may lead to vertical integration rather than use of market mechanisms.

Taken together, the above motives (market power, cost reduction, and reduction of supply uncertainty) create apparent compelling incentives to integrate back. We turn now to the major disincentive to do so: interorganizational dependence, with resulting capacity of suppliers to retaliate.

Interorganizational Dependence and Back Integration

The firm and its suppliers are tied to one another economically, and this relationship is characterized by uncertainty, due both to demand variability and relative power positions (Harrigan 1983). Recent interest in the management of interorganizational dependence has resulted in work by Pfeffer (1972), who studied merger behaviour as a function of interorganizational transfers of goods and services between merging companies; and Pfeffer and Salancik (1978) who reported on a large number of studies of strategies used to manage interorganizational dependence. It appears from these works, and the work of

Blois (1980), that a useful perspective on the back integration decision can be gained by taking into account interorganizational dependence.

In reality, particularly in oligopolistic and/or oligopsonistic situations, the decision to back integrate is accompanied by a risk of supplier retaliation. For unless the back integrator acquires enough capacity to satisfy its peak demand (in which case it has enormous overcapacity in normal times), the firm may find that its suppliers take punitive action when the firm turns to them for that portion of its supplies that cannot be supplied from its own integrated capacity. Retaliation can range from refusal to supply at all to assigning lowest priority to the firm's requests.

Such retaliation by suppliers is not irrational behaviour. Like any market-signalling activity, retaliation is intended to bring about long-term discipline. Even in the act of retaliation — turning down an order — the supplier often incurs no sacrifice, since it will usually occur at the same time that other buyers are eager for the supplies. Retaliation is therefore used as a vehicle for disciplining the buyers and thus discouraging other buyers from attempting, by vertical integration, to capture the profits being earned by suppliers.

So, the firm must make a trade-off between the various benefits of back integration discussed above (market power, cost reduction, uncertainty reduction) and the dangers of retaliation from suppliers. This trade-off is shaped by the degree of dependence between the firm and its suppliers, and herein lies a paradox: the very factors that would prompt a buyer to back integrate as a way to reduce uncertainty are the same factors that could make the firm vulnerable to retaliation by suppliers. The case of the firm's capital intensity provides a concise example at this point (to be developed more fully below). The highly capital-intensive firm could be inclined to integrate backward as a way to secure reliable raw material sources so that there are no expensive plant stoppages. But, unless the resultant integrated firm can meet all its requirements for a given raw material, it is vulnerable to retaliation from suppliers of that raw material, which could thus bring about the very plant stoppages that the firm sought to avoid in the first place.

The risk of retaliation has two components: likelihood and severity. The likelihood of a supplier retaliating is a function of numerous factors, including capacity utilization in the supplying industry, the supplier's market share, and the existence of alternative sales options for the supplier. The severity of retaliation is largely a function of how dependent the buyer is on the supplier.

Bilateral dependence between buyers and suppliers is expected to affect the decision to back integrate. By including the concept of retaliation in a study of backward integration, it is expected that certain equivocalities in past studies can be reconciled and certain additional variables can be usefully examined. We now turn to a discussion of some of the key variables thought to affect the decision to integrate backwards.

Some Variables Affecting Vertical Integration

Many variables could be used to predict vertical integration behaviour. For example, if the inquiry centred on cost-reduction motives, such variables as supplier profit rates (Adelman 1955) and supplier concentration (Newman 1978) would be important to include.

The predictive variables included in this study are not all-encompassing, but do represent a substantial base from which to explore the trade-offs between uncertainty reduction and avoidance of retaliation as generally competing forces in the back integration decision.

For ease of discussion, the variables have been separated into three groups. First are variables which indicate the relationships between buyers and sellers. The second set of variables are indicators of the buyer's production structure which may create supply pressures. Third are variables that indicate characteristics of demand, which can also create supply vulnerabilities.

Buyer–Seller Relationships

Market share. A large market share may suggest that the buyer is prompted to integrate backwards in an attempt to secure some portion of the large quantity of raw material it requires (Adelman 1955). This expected outcome from the uncertainty reduction argument is entered in Table 1. Since the large-share buyer is a major user of the raw material — that is, an attractive customer with great market power — we would expect a low likelihood of supplier retaliation if the buyer were to integrate. This expected outcome from the retaliation argument is similarly entered in Table 1. As will be seen, market

Table 1
Two Views on the
Predicted Associations
Between Selected
Variables and
Backward Integration

Variable	Association With Back Integration — 'Uncertainty Reduction' View	Association With Back Integration — 'Retaliation' View
Buyer-seller relationships		
Market share	+	+
Concentration of purchases	+	-
Alternative supply sources	-	+
Forward integrated suppliers	+	-
Buyer's importance to key suppliers	-	-
Production structure of buyer		
Customization	+	-
Capital intensity	+	-
Automation	+	-
Demand conditions		
Sales growth	+	-
Demand instability	-	-

share is one of the few variables where the uncertainty reduction and retaliation arguments coincide in their predicted effects on back integration.

Concentration of purchases. If the buyer obtains a large portion of its purchases from just a few suppliers, conflicting motives may arise regarding backward integration. On the one hand, the buyer may be prompted to integrate so as to buffer itself from its heavy dependence on the suppliers. On the other hand, the potential retaliation from these suppliers could discourage such integration. So, the uncertainty reduction and retaliation arguments raise conflicting predictions as to the effects of purchase concentration.

Alternative supply sources. From the point of view of the uncertainty reduction argument, if the buyer has ample alternative supply sources, then there is little motivation to integrate backward. However, the existence of ample supply alternatives means that retaliation from a given supplier would not be effective, and so backward integration could actually be encouraged.

Suppliers integrated forward. If suppliers are integrated forward into activities similar to those of the buyer firm, the impact on the back integration decision of the buyer is again two-sided. The uncertainty reduction argument suggests that the buyer would integrate backward in an attempt to achieve symmetry with the supplier. However, the ability to mete out punitive retaliation is considerably enhanced if the suppliers are competing with the buying firm. So, the retaliation perspective suggests that firms will be discouraged from integrating if their suppliers have integrated forwards.

Importance to suppliers. If the buyer accounts for a major portion of the revenues of its major suppliers, the predicted effect on the buyer's backward integration is negative, based on both the uncertainty reduction and retaliation arguments. The buyer is already in an advantageous position because of the supplier's dependence on it (Porter 1980), and the act of backward integration could elicit violent retaliation from such a supplier. A customer who is a major source of business may be able to extract major concessions, but only as long as it remains a customer. By becoming a competitor, the back integrator could provoke a 'cornered animal' response.

Buyer Vulnerability Due to Production Structure

Product customization. Firms with highly customized products tend to have to rely on a limited number of suppliers who are able to produce the specialized components necessary to customize the product. Such a situation raises conflicting pressures on the backward integration decision. On the one hand, the buyer may be tempted to integrate so as to obtain control over the specialized components that are integral to its strategy. On the other hand, unless the firm acquires all the component-making capacity it needs, it faces the

threat of being cut off from such supplies by the offended suppliers. In an imperfect market, the capability to produce the specialized component may be limited, in which case, retaliation may be effective.

Capital intensity. As we argued earlier, the uncertainty reduction perspective would argue that a capital intensive firm would integrate backward as a way to secure reliable raw material sources, so as to avoid expensive plant stoppages. Carlton (1979) argued in this vein that the risk of specialized, expensive assets being idle encourages vertical integration. The retaliation perspective argues for the reverse behaviour, because unless the firm can meet all its requirements for a given supply material, it is vulnerable to costly retaliation from suppliers, thus inducing the plant stoppages the firm sought to avoid in the first place.

Automation. As the production process becomes more and more automated, the same conflicting arguments apply as did in the case of capital intensity. Namely, on the one hand, the firm needs to secure reliable supplies, but on the other hand its susceptibility to retaliation is great as well.

Demand Conditions

Sales growth. If the sales of the buyer firm are growing rapidly, there are conflicting pressures on the decision to backward integrate. The uncertainty reduction advocate would argue that raw materials are frequently in short supply during a period of rapid growth, and so the buyer firm ought to secure its own sources. On the other hand, the risk of retaliation is substantial, since presumably the firm's competitors are also growing, thus making rationing by suppliers a distinct likelihood. Retaliation can certainly be one of the rationing criteria. These conflicting pressures may account for the contrast in Adelman's (1955) finding that sales growth was positively related to integration and Tucker and Wilder's (1977) finding of a negative relationship.

Sales instability. According to both the uncertainty reduction and retaliation arguments, volatile sales would discourage a firm from integrating backward. First, avoiding integration is a way to minimize uncertainty in a turbulent industry. Carlton (1979) argued that firms will use their own (back integrated) capacity for the certain component of demand and use outside suppliers for the uncertain component. By extension, highly unstable industries (with a small 'certain' component of demand) will discourage back integration. Harrigan (1983) argued along similar lines that more integration would occur in stable than in unstable industries. Retaliation becomes a factor in unstable industries since buyers must often turn to outside suppliers when extraordinary peak levels of demand occur — usually at the same time as the firm's competitors are trying to locate supplies.

In sum, Table 1 indicates substantial points of divergence between what would be predicted by the uncertainty reduction and the retaliation perspectives. Our

aim is not to demonstrate that one view is flatly superior to the other in predicting degrees of backward integration. If anything, we expect that the more established uncertainty reduction argument will be somewhat better supported by the results, which would further solidify that perspective, since new data and operationalizations are being used. However, to the extent that the retaliation argument *is* supported, then we will have an improved understanding of the complex forces that enter into the vertical integration decision.

Methodology

Sample

Ekhard (1979), in criticizing previous studies of vertical integration claimed that even when company data were used — which he judged to be preferable to the more usual industry data — such data did not take into account the fact that most major companies are in multiple lines of business. That is, even company data are not ‘fine grained’ enough. Ekhard went on to state ‘unfortunately I know of no data which could at reasonable cost resolve the issue’.

In fact, there is a data set which allows one to explore vertical integration at the level of the individual business unit, and this is the Profit Impact of Market Strategies (PIMS) data base (Buzzell 1983). The PIMS project is an ongoing, large-scale statistical study of environmental, strategic, and performance variables for individual business units. About 200 corporations submit data annually on a total of about 2,000 of their business units. Each business — often a division — is a distinct product market unit. For a technical summary of the PIMS data set, see Schoeffler et al. (1974).

This study used the last four years’ (generally late 1970s) PIMS data on businesses in the growth and maturity stages of the product life cycle. Four-year averages were used for all variables.

Tucker and Wilder (1977) contended that it is essential, if cross-sectional comparisons are to be made, to recognize that the closer a firm is to the raw materials stage in the industry chain, the greater the bias towards a large value for its vertical integration measure. To control for such bias, the study examined subsamples of capital goods ($n=99$), components/supplies ($n=275$) and consumer goods businesses ($n=178$). (Service businesses and raw materials businesses were not included.)

Measures

A key problem in conducting research on a phenomenon such as back integration has to do with measurement. Sichel (1973) argued that vertical integration actually changes as the industry evolves. He argued that ‘when all (or most) firms in the industry have taken on the additional activity the definition changes’.

Numerous ways of measuring back integration have been proposed. For instance, Adelman (1955) suggested income/sales and inventory/sales. Barnes (1955) suggested interplant transfers as a percentage of sales. Perry (1978) defined back integration in terms of the proportion of supply firms acquired by a monopsonist. Pfeffer (1972) measured merger activity. All these measures have serious problems, but the consensus, recommended earlier by Barnes (1955) is that some measure of value added/sales be used (also see Newman 1978). Tucker and Wilder used two measures for back integration. The first was (Depreciation + Interest + Labour + Pension expense + Compensation + Taxes + Rent + Net income) divided by Revenue. The second adjusted for trends in profits and taxes by using the above calculation and then adjusting by:

$$\frac{\text{value added} - (\text{net income} + \text{taxes})}{\text{sales} - (\text{net income} + \text{taxes})}$$

Unfortunately, all these previous studies treat vertical integration as a unitary phenomenon, without trying to disentangle forward from back integration. This seems an unfortunate comingling, since forward and back integration are conceptually and practically quite distinct options for the firm. The PIMS data base provides a unique opportunity to make this separation, since many more variables than those in conventionally reported financial statements are available.

Backward integration can be thought of as that portion of the cost of the manufactured product that is incurred by the firm itself. So, by having data on the firm's cost of goods sold and on the firm's outside purchases that go into the manufactured product, a fairly valid indicator of backward integration can be constructed, as follows:

$$\text{backward integration} = 1 - \frac{\text{purchases}}{\text{cost of goods sold}}$$

Of course this is not a perfect measure since it could reflect factors other than vertical integration (such as quantity discounts in purchases, internal labour efficiencies, and so on). In general, though, it largely captures the firm's degree of backward integration. (The full definitions of the dependent and independent variables are presented in Appendix 1.)

Data Analysis

For each subsample, a multiple regression of the independent variables on the vertical integration variable was conducted. A control variable — purchases from other divisions — was included because some of the businesses in the data base have vertical relationships with other businesses in their corporations. In this regard, it should be noted that a major backward integration move (such as the acquisition of a large supplier) could result in the creation of a new business

unit in the corporation and hence would not be reflected in the degree of integration of the focal business. Such an occurrence highlights the need to include the internal purchases variable as a control variable.

Results and Discussion

The regression results (Table 2) indicate a moderately high degree of explanation of backward integration in the three subsamples with R^2 s of .37, .55, and .44). The uncertainty reduction and retaliation views — where they diverge in their predictions — are about equally supported by the results, suggesting that both views have merit. The results for each independent variable will now be discussed in turn.

Table 2
Multiple Regression
Results (standardized
betas reported)

Variable	Consumer Product Businesses (n=178)	Capital Goods Businesses (n=99)	Component Suppliers Businesses (n=275)
Buyer-seller relationships			
Market share	.01	.18*	.09*
Concentration of purchase	-.04	-.29***	-.28***
Alternative supply sources	.03	.05	-.03
Suppliers integrated forward	-.27***	-.07	-.09
Buyer's importance to key suppliers	-.12**	-.09	.00
Production structure of buyer			
Customization	.23***	-.02	.29***
Capital intensity	.40***	.33***	.14**
Automation	-.02	.26**	.04
Demand conditions			
Sales growth	-.06	.05	.02
Sales instability	-.13*	.19**	.11*
Capacity utilization	.03	-.04	-.08
Internal purchases	-.20**	-.11	-.30***
R^2	.37***	.55***	.44***

* $p < .05$

** $p < .01$

*** $p < .001$

Based on both perspectives, market share was expected to be positively related to back integration. Such a relationship was found to be significant in two of the three subsamples, supporting the underlying ideas that large-share businesses attempt to secure some portion of their sizeable raw materials requirements, and that, because of their size, they are not dissuaded from doing so by retaliation.

Concentration of purchases was negatively related to back integration in all three subsamples, and significantly so in two of the three. This finding supports the retaliation view, which argued that if the firm were heavily dependent on just a few suppliers, it would be discouraged from integrating because of its vulnerability to severe punishment from those suppliers.

Both perspectives predicted that a firm would not back integrate if it had ample alternative sources of supply. However, there were no significant results for this variable.

The existence of suppliers who are integrated forward was negatively related to backward integration for all three samples, and its level of significance was particularly high for the consumer product sample. This pattern strongly supports the retaliation view which argued that firms would be dissuaded from integrating backwards if their suppliers were competing with them and could thus mete out severe retribution on two fronts. Such a finding suggests that backward vertical integration has a preemptive element to it, being very difficult to undertake if a supplier has already made the move to integrate forward.

The buyer's importance to key suppliers was negatively related to back integration in two of the samples, but with significance only in the consumer product sample. This negative relationship follows from both the uncertainty reduction and retaliation perspectives. There is little need for the firm to integrate since it already holds great bargaining power over the supplier, and any attempt to integrate could evoke an extremely violent response from the supplier who is so dependent on the buyer.

The degree to which the buyer customizes its own product was strongly positively related to backward integration in two of the three samples. This was the result expected by the uncertainty reduction view, in which the logic was that the firm needs to gain control over those specialized components that are integral to its product strategy. In this case, the retaliation view was not supported.

Capital intensity was strongly and positively related to backward integration in all three samples. This too was the result expected based on the uncertainty reduction argument. Apparently, capital intensive firms do try to secure control over their raw materials as a way to minimize the likelihood of expensive facility stoppages. The retaliation argument — that capital-intensive firms would be discouraged from integration — was not supported.

The firm's degree of automation had a significant positive association with back integration in the capital goods sample. The positive link was again consistent with the uncertainty reduction view, where the rationale was that automated firms can least afford supply disruptions, and so they will seek to secure control of the materials.

The firm's sales growth was not related to backward integration in any of the samples, and thus may exert effect only by interaction with some other key variables.

The firm's sales instability is the only variable for which opposing signs

appeared with significance. For the consumer product sample, the relationship to back integration was negative. This was the pattern expected on the basis of both the uncertainty reduction and retaliation perspectives. The logic — borne out only in the consumer product sector — was that firms would avoid embedding themselves even deeper in a turbulent environment and would also be dissuaded from integrating because they could be rebuffed when they attempt to use outside suppliers during periods of peak demand.

For the capital goods and components/supplies samples, the relationship between sales instability and back integration was significantly positive. This finding conflicts with expectations. It may be that vertical integration is seen as a way to reduce the risk of supply shortages in a turbulent industry (White 1971 Arrow 1975; Mead 1978). The contrast in findings across the subsamples is noteworthy and suggests that sectoral factors may mediate so as to alter the trade-offs in the vertical integration decision. We will return to the theme of underlying sectoral differences in a moment.

Finally, the control variable — degree of internal purchases — was consistently negatively related to backward integration. As noted earlier, this probably is an interesting reflection of the relationship between the overall corporation's strategy and structure. Namely, if a corporation is heavily involved in a given upstream stage of a vertical chain, it probably treats that activity as a discrete business unit. Downstream businesses would buy heavily from that sister unit, but would score low themselves on our vertical integration measure. In another firm with a less pronounced commitment to the upstream activity, that activity will often be folded into the focal downstream business so that its backward integration score will be high but its percentage of purchases from other units in the firm will be low. The importance of including such a control variable in any study of vertical integration should be clear.

The approach so far has been a sequential discussion of the various independent variables. It is useful to now try to extract a more general pattern from the results. If we look only at those variables where the uncertainty reduction and retaliation views resulted in opposing predictions, an interesting pattern emerges. The uncertainty reduction perspective is supported in those instances where the firm's production structure requires control over supplies — situations of product customization, capital intensity, and automation. Even though the severity of retaliation by suppliers could be great under these situations, there is nothing in the situations to suggest that the *likelihood* of such retaliation would be high. So in such situations, the threat of retaliation is generally ignored in favour of securing critical sources.

The retaliation perspective is supported in two instances — when purchases are heavily concentrated among a few key suppliers, and when suppliers are integrated forward. In both these situations, there is both a high severity and a high likelihood of retaliation — the suppliers are knowledgeable about the buyer's business and can exert great leverage over its destiny. So when retaliation by suppliers is a highly likely *and* severe threat, vertical integration is not undertaken, even though it could bring about reduced uncertainty. To a

large extent, this supports the argument we developed in the review of the literature — namely that in imperfect markets potential retaliation by suppliers acts to discourage backward integration. However, our results also appear to indicate that in less imperfect markets, retaliation is not a serious consideration, and that the uncertainty reduction view may be more appropriate even under moderately imperfect conditions.

Caveats

Though we feel that the research has provided some interesting insights into the vertical integration issue, there are some problems that should not go unaddressed:

1. Although the hypotheses were derived at a corporate level analysis, the empirical analysis was based on business-unit level data. Consequently, if the firm acquires a raw material supplier, and sets up another business unit, the score for vertical integration may actually get lower. While this may be solved by differentiating the purchase via other firms from internal purchases, it was not possible to do this with the PIMS data base.
2. Because of the limited nature of the PIMS data base there are obviously other important explanatory variables for vertical integration. For example, we argued that the likelihood and severity of supplier's retaliation is a discouraging factor for vertical integration, but, in reality, it is dependent upon the *relative* bargaining power of the supplier. However, the structural variables of the market for the supplier could not be included in the analysis. The results, therefore, do not capture the full bilaterality of the actual vertical integration situation.
3. The measure of vertical integration does not measure the movement of vertical interpretation from period to period. Further, this measure varies by selection of technology which could be totally independent of vertical integration. For example, if a firm adopts a material-saving and capital-augmenting technology, our vertical integration measure will increase, regardless of the actual vertical integration. Japanese firms, after the oil crisis, have aggressively been pursuing energy-saving and capital-augmenting technological innovation, and the changes have been drastic, but they really cannot be regarded as having increased vertical integration.

Summary

This study has provided support for two complementary views of analysing the backward integration decision. First, it appears that firms will integrate in order to reduce critical uncertainties. But, if suppliers are in a position to effectively and severely retaliate, the firm tends not to integrate. These perspectives, along with the more established market-power and cost-reduction

perspectives on vertical integration, help to round out our understanding of the complex forces that enter into the vertical integration decision.

A special feature of the study is its use of business-level data, which is increasingly necessary as firms become more and more diversified. However, the measurement of vertical integration at the business level also has a weakness, since the decision by the corporation to acquire a major supplier would not appear as an increase in the integration of the focal business, if the new addition were itself set up as a discrete business unit.

Another limitation is in the measure of integration. While it can be assumed that the measure largely reflects the degree of integration, it can reflect other factors as well, such as quantity discounts in purchases, labour efficiencies in production, and so on. We take these latter factors to be relatively minor in their effect on the measure, in comparison to the effect of the genuine degree of integration.

The study could have benefited from more data on the suppliers — their profit rates, concentration, capacity utilization. If such data had been available, the study could have examined the cost-reduction and market-power motives to integrate, in addition to other aspects of the uncertainty reduction and retaliation motives.

Despite these limitations, the study sheds new light on the complex trade-offs encountered in the decision to integrate backward. The study has strongly suggested that, in imperfect markets, decision-makers take into account the bilateral dependencies between buyers and sellers.

Note

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Appendix I: PIMS Variables Used in the Study

The following is a list of the variables used in the study. Next to each is the way in which the variable is measured and reported by the participating business unit. The SPI.4 data base was used.

1. *Purchases/cost of goods sold*: A transformed variable created by dividing cost of purchases/revenue by the sum of: cost of purchases/revenue and cost of manufacturing/revenue, to give cost of purchases/cost of goods sold.
2. *Relative integration back*: Three-point ordinal scale — relatively less, equal to or relatively more backward integrated than major competitors.
3. *Market share*: Percentage market share of business.
4. *Percentage purchased from three major suppliers*: Percentage purchases from three largest suppliers.
5. *Alternative supply sources*: Three-point ordinal variable reflecting none too many alternative sources of supply. 0=no alternative sources, 2=alternative sources easily available.
6. *Importance to three major suppliers*: Average percentage sales to business by the three major suppliers.

7. *Supplier integrated forward*: Three-point ordinal variable reflecting degree to which major suppliers are forward integrated. 0=no forward integration, 1=forward integration but not served market, 2=forward integration into served market.
8. *Product customization*: Two-point ordinal variable: 0=products more or less standard, 1=product is custom/tailored.
9. *Real sales growth rate*: Percentage growth of real sales — 4-year average.
10. *Served market instability*: Four-year mean absolute deviation of served market sales from served market growth rate.
11. *Internal purchases*: Percentage of purchases from internal suppliers.
12. *Capacity utilization*: Percentage capacity utilization.
13. *Percentage small batches*: Percentage of SBU sales which are produced in small batches.
14. *Capital intensity*: Gross book value of plant and equipment per dollar of revenues.

References

- Adelman, Michael A.
1955 'Concept of statistical measurement of vertical integration' in *Business concentration and price policy*. National Bureau of Economic Research (ed.), 322-330. Princeton: Princeton University Press.
- Arrow, Kenneth J.
1975 'Vertical integration and communications'. *Bell Journal of Economics*, Spring: 173-183.
- Barnes, Irston R.
1955 Comment on Adelman, Michael A., 'Concept of statistical measurement of vertical integration' in *Business concentration and price policy*. National Bureau of Economic Research (ed.), 322-330. Princeton: Princeton University Press.
- Blair, Roger, and David L. Kaserman
1978 'Uncertainty and the incentive for vertical integration'. *Southern Economic Journal* 26/07: 266-272.
- Blois, Kenneth
1980 'Quasi-integration as a mechanism for controlling external dependencies'. *Management Decision* (UK) 18/1: 53-63.
- Buzzell, Robert D.
1983 'Is vertical integration profitable?' *Harvard Business Review* 1&2: 92-102.
- Carlton, Dennis W.
1979 'Vertical integration in competitive markets under uncertainty'. *Journal of Industrial Economics* 27/3: 189-209.
- Coase, Ronald
1937 'The nature of the firm'. *Economica* 4/11: 387-405.
- Crandell, Robert
1968 'Vertical integration and the market for repair parts in the United States automobile industry'. *Journal of Industrial Economics* 16/7: 212-234.
- Ekhard, E. Woodrow, Jr.
1979 'A note on the empirical measurement of vertical integration'. *Journal of Industrial Economics* 28/1: 105-107.
- Etgar, Michael
1978 'The effect of forward vertical integration on service performance of a distributive industry'. *Journal of Industrial Economics* 26/3: 249-255.
- Gould, Jay R.
1077 'Price discrimination and vertical control: A note'. *Journal of Political Economy* 85/10: 1063-1071.
- Greenhut, Melvin L., and Howard Ohta
1979 'Vertical integration of successive oligopolists'. *American Economic Review* 69/3: 137-141.
- Harrigan, Kathryn R.
1983 'Vertical integration and corporate strategy'. Columbia Graduate School of Business Working Paper.

- Klein, Benjamin, Robert G. Crawford, and Armen A. Alchian
1978 'Vertical integration, appropriable rents and the competitive contracting process'. *Journal of Law and Economics* 21/2: 297-326.
- Mead, David E.
1978 'The effect of vertical integration on risk in the petroleum industry'. *Quarterly Review of Economics and Business* 18/Spring: 83-90.
- Newman, Howard H.
1978 'Strategic groups and the structure-performance relation'. *Review of Economics and Statistics* 60/08: 417-427.
- Perry, Martin K.
1978 'Vertical integration: The monopsony case'. *American Economic Review*, September: 461-470.
- Pfeffer, Jeffrey
1972 'Merger as a response to organizational interdependence'. *Administrative Science Quarterly* 18: 449-461.
- Pfeffer, Jeffrey, and Gerald R. Salancik
1978 *The external control of organizations*. London: Harper and Row.
- Porter, Michael E.
1980 *Competitive Strategy*. New York: The Free Press.
- Schoeffler, Sidney, Robert D. Buzzell, and Donald F. Heany
1974 'Impact of strategic planning on profit performance'. *Harvard Business Review* 52/2: 137-145.
- Sichel, Werner
1973 'Vertical integration as a dynamic industry concept'. *Anti-Trust Bulletin* 18/Fall: 477-482.
- Spengler, Joseph J.
1950 'Integration and anti-trust policy'. *Journal of Political Economy* 68/08: 347-352.
- Stigler, George
1951 'The division of labor is limited by the extent of the market'. *Journal of Political Economy* 59/3: 185-193.
- Tucker, Irvan B., and Ronald P. Wilder
1977 'Trends in vertical integration in the U.S. manufacturing sector'. *Journal of Industrial Economics* 26/1: 81-94.
- Warren-Boulton, Frederick R.
1974 'Vertical control with variable proportions'. *Journal of Political Economy* 82/07-08: 783-802.
- White, Lawrence
1971 *The automobile industry since 1945*. Cambridge, Ma.: Harvard University Press.
- Williamson, Oliver
1971 'The vertical integration of production: market failure considerations'. *American Economic Review* 59/05: 112-123.