

TESTING ORGANIZATIONAL ECONOMICS THEORIES OF VERTICAL INTEGRATION

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ABSTRACT

This article classifies empirical research on vertical integration under four approaches – value-added-to-sales, qualitative–quantitative, input–output, and microanalytic. The emphasis here is on the microanalytic approach which has accumulated the most systematic evidence to support its theoretical propositions. In particular, this article emphasizes theoretical and empirical contributions from organizational economics (especially transaction costs and agency theories) for both vertical integration and (vertical) contracting. Limitations and methodological challenges concerning the empirical testing of theories of vertical integration are addressed and suggestions for further research are provided.

INTRODUCTION

Why are some firms highly vertically integrated, while others specialize and outsource their remaining transactions in markets? A fundamental response

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proposed by Coase (1937) maintains that the parties to an exchange take a comparative assessment and choose the governance structure (e.g., spot market, contract, hybrid, and firm) that reduces their transaction costs. Williamson (1971, 1975) emphasized that the Coasean transaction costs proposition required constructs that are operational. In particular, *discrete* structural forms need to be identified that have *differential* efficiencies, and the observable dimensions of transaction costs need to line up with various governance structures in a discriminating way (Williamson, 1991a).

This article focuses on the governance structure of the vertically integrated firm. The primary objective is to provide a framework for a systematic assessment of empirical literature in the fields of industrial organization, strategic management, and related fields that employ theories of vertical integration. Developing such a framework serves at least two purposes: first, it provides a useful cognitive map of the empirical research on vertical integration, and second, it facilitates further inquiry for theoretical and empirical advancement. The article is organized as follows.

The first section provides theoretical foundations for vertical integration, which are based primarily on transaction costs and agency perspectives. Empirical research is classified under four categories: (1) value-added-to-sales; (2) qualitative–quantitative hybrid; (3) input–output; and (4) a microanalytic approach. The second section focuses on the microanalytic approach. In particular, this section explores the testable implications of agency and transaction costs theories for explaining and predicting vertical integration. Empirical evidence from strategic management, marketing, and organizational economics perspectives are examined. Strong empirical evidence supports the conclusion that microanalytic empirical research yields systematic results for explaining and predicting vertical integration. The third section discusses limitations and methodological challenges concerning empirical testing of vertical integration. The final section provides a summary and suggestions for further research.

THEORETICAL FRAMEWORK FOR VERTICAL INTEGRATION AND CONTRACTING DECISIONS

The strands of the research literature (especially mathematical economic models) formally show the Coasean logic that in the absence of transaction costs, vertical contracting (e.g., exclusive dealing, resale price maintenance, and exclusive territories) can replicate the economic advantages of vertical

integration (Blair & Kaserman, 1983; Holmstrom & Tirole, 1989; Mahoney, 1992). Therefore, the formulation of vertical integration strategies (Harrigan, 1984) requires consideration of governance structures to *implement* business objectives (such as increasing revenues, decreasing costs, and reducing risks in ways that cannot be easily replicated by shareholders).

The generalizable thesis of the transaction costs research literature is that the particular governance structure chosen to implement the strategy of vertical integration primarily serves efficiency purposes (Williamson, 1991b). Williamson's (1975) seminal research develops a well-grounded theoretical framework for explaining and predicting market failure. In short, contractual difficulties arise when opportunistic agents engage in frequent transactions in an environment of sufficient uncertainty and complexity that surpass bounded rationality capabilities (Simon, 1978). Furthermore, it is essential to underscore that environmental uncertainty and complexity, which can lead to *incomplete contracting*, allow for potential expropriation of economic quasi-rents only when relationship-specific investments surround an exchange (Klein, Crawford, & Alchian, 1978; Williamson, 1985).

The importance of relationship-specific assets in explaining and predicting vertical integration is supported by a large body of research literature including statistical testing (the primary focus of the current article) as well as formal modeling (e.g., Gibbons, 2005; Kleindorfer & Knieps, 1982; Riordan & Williamson, 1985) and case studies.¹ In contrast, research on vertical integration within the early industrial organization framework focused primarily on measurement techniques. The focus of the measurement literature was on relative comparison of industries with one another, or examination of firms and industries over time. Table 1 provides a list of empirical research on vertical integration including tests of transaction cost theory of vertical integration using (1) value-added-to-sales (e.g., Levy, 1985); (2) qualitative-quantitative hybrids (e.g., Armour & Teece, 1980); (3) input-output (e.g., MacDonald, 1985); and (4) microanalytic approaches (e.g., Masten, Meehan, & Snyder, 1991).

Transaction Costs and Agency Theory

A parsimonious framework that may explain and predict the choice of governance structure is developed here. The governance choice is influenced by *frequency*, *uncertainty* (demand and technological), and *asset specificity* (physical, human, and site) in transaction costs theory (Williamson, 1979).

Table 1. Empirical Research on Vertical Integration.

(1) Value-added to sales		
Adelman (1955)	Etgar (1977)	MacMillan, Hambrick, and Pennings (1986)
Balakrishnan and Wernerfelt (1986)	Laffer (1969)	Pennings et al. (1984)
Buzzell (1983)	Levy (1984)	Tucker and Wilder (1977)
Crandall (1968)	Levy (1985)	
	Lindstrom and Rozell (1993)	
(2) Qualitative-Quantitative Hybrid		
Al-Obaidan and Scully (1993)	Helfat and Teece (1987)	Palay (1984)
Armour and Teece (1980)	Hennart (1988)	Provan and Skinner (1989)
Chatterjee (1991)	Kaserman and Mayo (1991)	Reed and Fronmueller (1990)
Chatterjee et al. (1992)	Kerkvliet (1991)	Rumelt (1974)
D'Aveni and Ilinitch (1992)	Levin (1981)	Russo (1992)
D'Aveni and Ravenscraft (1994)	Lieberman (1991)	Spiller (1985)
Davis and Duhaime (1992)	Livesay and Porter (1969)	Stuckey (1983)
Folta and Leiblein (1994)	Lubatkin and Rogers (1989)	Weiss (1992)
Goldberg and Erickson (1987)	MacMillan et al. (1986)	Weiss (1994)
Gort (1962)	Majumdar and Ramaswamy (1995)	
Harrigan (1985a)	Martin et al. (1995)	
Harrigan (1985b)	Muris et al. (1992)	
Harrigan (1986)	Norton (1993)	
(3) Input-Output		
Caves and Bradburd (1988)	Heimler (1991)	Martin (1983)
Clevenger and Campbell (1977)	Leontief (1951)	Martin (1986)
Davies and Morris (1995)	Lindstrom and Rozell (1993)	Stiles (1992)
Frank and Henderson (1992)	MacDonald (1985)	
Hallwood (1991)	Maddigan (1981)	
Harrison et al. (1990)	Maddigan and Zaima (1985)	
(4) Microanalytic (TCE, Measurement, Agency)		
Anderson (1985)	Joskow (1985)	Pirrong (1993)
Anderson (1988)	Joskow (1987)	Pisano (1990)
Anderson and Coughlan (1987)	Joskow (1988b)	Poppo and Zenger (1995)
Anderson and Schmittlein (1984)	Klein (1989)	Poppo and Zenger (1998)
Argyres (1996)	Klein, Frazier, and Roth (1990)	Provan and Skinner (1989)
Azoulay (2004)	Krickx (1995)	Rangan, Corey, and Cespedes (1993)
Clark (1989)	Lajili et al. (1997)	Rangan et al. (1992)
Coles and Hesterly (1998)	Leiblein and Miller (2003)	Regan (1997)
Dyer (1996)	Lyons (1995)	Saussier (2000)
Etgar (1978)	Masten (1984)	Silverman, Nickerson, and Freeman (1997)
Folta and Leiblein (1994)	Masten et al. (1989)	Walker (1994)
Gallick (1984)	Masten et al. (1991)	Walker and Poppo (1991)
Globerman and Schwindt (1986)	Masten and Snyder (1993)	Walker and Weber (1984)
González-Díaz, Arrunada, and Fernandez (2000)	Monteverde (1995)	Walker and Weber (1987)
Goodstein et al. (1996)	Monteverde and Teece (1982)	Whyte (1994)
Hall and Rao (1994)	Mosakowski (1991)	Williamson (1976)
Hoetker (2005)	Nickerson et al. (2001)	Zaheer and Venkatraman (1994)
Hubbard (2001)	Nickerson and Mayer (2005)	Zaheer and Venkatraman (1995)
Jones (1987)	Nickerson and Silverman (2003a, 2003b)	
John and Weitz (1988)	Ohanian (1994)	

The positive agency theory literature (Alchian & Demsetz, 1972; Eisenhardt, 1989) emphasizes the role of *measurement* uncertainty influencing governance choice. As different individuals organize activities into team production, monitoring of coordinated activities becomes a central problem. Asymmetric information (between principals and agents) due to team production leads to the so-called “*nonseparability problem*” (Alchian & Demsetz, 1972). If reward cannot be based on output, a manager will need to monitor behavior or effort (Barzel, 1982).

A second agency theory variable concerns knowledge of the transformation process or *task programmability* (Eisenhardt, 1985; Ouchi, 1979). Low task programmability reduces effectiveness of monitoring effort. The joining of transaction costs and agency theory yields frequency, asset specificity, demand uncertainty, technological uncertainty, task programmability, and non-separability as six key factors influencing governance choice (Mahoney, 1992). Although each of these variables has been operationalized, no single empirical study has considered all six variables simultaneously. The following section provides a microanalytical approach to develop propositions concerning vertical integration, which are the theoretical foundations to motivate implementing such an empirical study.

A MICROANALYTIC APPROACH TO VERTICAL INTEGRATION AND PROPOSITIONS

By selecting a particular governance structure, management aims to minimize the sum of production and transaction costs.² This section advances 10 propositions based on organizational economics theories of vertical integration. Extant empirical evidence consistent with the outlined propositions is provided.

Microanalytic Approach: Propositions on Vertical Integration

Vertical integration can be viewed as substituting contractual or market exchanges with internal coordination of transactions. Specifically, such internal transactions are coordinated by an entrepreneur-coordinator who manages not by use of the price system but rather by *fiat*, which can substantially reduce the time and money that may otherwise be expended in the haggling between separate contractual parties. With this economic motivation in mind, it follows that vertical integration does not offer

advantage over a contract for a one-time exchange; however, as the frequency increases, the cost of vertical integration is more readily recovered. This economic logic suggests that increased frequency will increase the likelihood of vertical integration (Williamson, 1985).

Proposition 1. Vertical integration is a more likely governance choice when there is a high *frequency* of transacting.

Empirical evidence that supports this proposition can be found in Anderson and Schmittlein (1984), Heide and Miner (1992), and Klein (1989).

Transaction cost theory posits that contractual arrangements become more difficult to specify *ex ante* when uncertainty surrounding the exchange increases. Contracts designed under such conditions are necessarily incomplete and may require renegotiation in the face of unforeseen circumstances. Renegotiation poses a potentially hazardous threat for a contractual party who has limited exchange alternatives. Such an economic situation is known as small-numbers bargaining and because of the increased concern about contractual hold-up problems, there is anticipated to be an increase in the likelihood of vertical integration (Williamson, 1975). This dominant logic of vertical integration being a substitute for contracts when there is greater anticipation of contractual hazards leads to our second proposition.

Proposition 2. Vertical integration is a more likely governance choice when there are *small numbers* of potential trading partners.

Empirical evidence that supports this proposition can be found in Caves and Bradburd (1988), Levy (1985), MacDonald (1985), Ohanian (1994), Pisano (1990), and Provan and Skinner (1989).

Williamson (1996) identifies four basic types of asset specificity, and Masten et al. (1991) add a fifth type known as the temporal specificity. *Human asset specificity* involves uniquely related learning processes or teamwork. *Physical asset specificity* includes requirements for specialized machine tools and equipment. *Site specificity* occurs when unique locational advantages exist, as, for example, when a power plant is located near a coal mine to save on transportation costs. *Dedicated assets* are supplier's general investments that would not have been realized but for the prospect of selling a significant portion of product to one buyer. *Temporal specificity* refers to assets that must be used in a particular time period. For example, even small delays in delivery of a certain production input can cause large economic losses (e.g., a newspaper company not integrated into press printing may incur (temporal)

hold-up problems). Vertical integration can assure requisite inputs in such situations. This economic logic leads to our third proposition.

Proposition 3. Vertical integration is a more likely governance choice when there is a high level of *asset specificity* (human, site, or physical capital and dedicated capital), which locks trading partners into a small-numbers trading situation that may make contracting hazardous due to potential haggling costs and “hold-up” problems.

Empirical evidence that supports this proposition can be found in:

- (i) Site specificity: González-Díaz, Arruñada, and Fernández (2000), Joskow (1985, 1990), Masten et al. (1991), and Spiller (1985).
- (ii) Human capital specificity: Anderson (1985), Anderson and Coughlan (1987), Anderson and Schmittlein (1984), Armour and Teece (1980), Cavanaugh (1998), Coff (2003), Eramilli and Rao (1993), John and Weitz (1988), Klein (1989). Klein, Frazier, and Roth (1990), Masten et al. (1989, 1991), Masters and Miles (2002), Monteverde (1995), Monteverde and Teece (1982), Taylor, Shaoming, and Osland (1998), and Zaheer and Venkatraman (1995).
- (iii) Physical (dedicated) asset specificity: Bindseil (1997), Caves and Bradburd (1988), Globerman and Schwindt (1986), Heide and John (1988), Levy (1985), Lieberman (1991), MacDonald (1985), MacMillan et al. (1986), Masten (1984), Monteverde and Teece (1982), Ulset (1996), and Weiss (1992, 1994).
- (iv) Temporal or spatial proximity: Hubbard (2001), Masten et al. (1991), and Pirrong (1993).

Researchers have considered many types of uncertainty in the analysis of governance choice. Here we examine the effects of four types of uncertainty – demand (volume), technological, output measurement, and input measurement. Firms often face environmental uncertainty in the form of demand (volume) volatility (Walker & Weber, 1984). However, to the extent that volatile sales are anticipated, fluctuations in demand will not necessitate vertical integration, since a contingent claims vertical contract will suffice. Moreover, when asset specificity is low, competition attenuates opportunism, and hence demand uncertainty is inconsequential for the choice of governance structure. However, when asset specificity is high, an increase in volume uncertainty will have a direct positive influence on the likelihood of the governance choice of vertical integration (Williamson, 1979) due to increased contractual costs relative to hierarchical coordination. The

economic logic that vertical integration is more likely to substitute for contracts when uncertainty is high since contracts will be more incomplete and thereby pose greater contractual hazards leads to our fourth proposition.

Proposition 4. Vertical integration is a more likely governance choice when there is higher demand (volume) uncertainty, which makes contracting more hazardous (under conditions of asset specificity).

Empirical evidence that supports this proposition can be found in Heide and John (1990), John and Weitz (1988), Levy (1985), Lieberman (1991), MacMillan et al. (1986), and Walker and Weber (1984, 1987).

Increased technological uncertainty, which we turn to now, leads to different dynamics than demand uncertainty. The uncertain timing of the obsolescence of a technology can lead the firm not to choose a highly firm-specific technology, and hence vertical integration is *less* likely. From a real options perspective (Sanchez & Mahoney, 1996), the firm under uncertainty may not want to exercise its option to commit to vertical integration. As technological uncertainty is resolved, the sunk cost commitment to vertical integration may be made. This dominant logic leads to our fifth proposition.

Proposition 5. Vertical integration is a more likely governance choice when there is low uncertainty about the timing of the obsolescence of specific assets since this condition will allow greater investment in specific assets, which increases the likelihood of vertical integration.

Empirical evidence that supports this proposition can be found in Balakrishnan and Wernerfelt (1986), Crocker and Reynolds (1993), Harrigan (1986), Poppo and Zenger (1998), and Walker and Weber (1984, 1987).

If the uncertainty is due to the complexity of coordinating a technological system and transferring information (Teece, 1980), then vertical integration has typically been the predicted governance structure. The economic logic is the standard one that with increased complexity, contracts will be more incomplete and thereby pose greater contractual hazards (Grossman and Hart, 1986). In terms of empirical corroboration, Masten et al. (1991) find empirically that the strong association between human capital specificity and the increased likelihood of vertical integration is a consequence not so much of a decrease in the internal costs of organization, but rather is due to an increase in the cost of market exchange. Similarly, subsequent empirical evidence has found that the ease with which unstructured technical dialogue

is carried out between different departments of a semiconductor factory induces a need for hierarchically organized exchange (Monteverde, 1995). Both economic logic and empirical observation leads to our sixth proposition.

Proposition 6. Vertical integration is a more likely governance choice when there is increased complexity, which necessitates a higher degree of complex firm-specific language and routines.

Empirical evidence that supports this proposition can be found in Leiblein and Miller (2003), Masten (1984), Masten et al. (1991), Monteverde (1995), Monteverde and Teece (1982), and Novak and Eppinger (2001).

Agency Costs

In terms of the “efficient boundaries problem” (Afuah, 2001; King, 1992; Ouchi, 1979), ease of effective monitoring of work behavior favors vertical integration (Anderson & Oliver, 1987; Ouchi, 1979). Eisenhardt (1985, 1989) considered four measures of *task programmability* (service, product, selling time, and training time) and finds task programmability a significant influence on governance choice. If environmental conditions are uncertain and consequently outcome uncertainty is high, then it is difficult to determine effort from observing output (Eisenhardt, 1985; Lassar & Kerr, 1996). To the extent that improved monitoring of input is effective (i.e., high task programmability), vertical integration is predicted. This agency theory logic leads to our seventh proposition.

Proposition 7. Vertical integration is a more likely governance choice when there is higher task programmability, which allows for effective monitoring of inputs.

Empirical evidence that supports this proposition can be found in Eisenhardt (1985) and Jones (1987).

In addition to environmental uncertainty, transactions (agency) costs may arise from behavioral uncertainty. A significant aspect of information asymmetry in organization is the problem of ascertaining and rewarding individual effort in team production (Jones, 1984). Outcome uncertainty may be due to free-riding behavior in team production – the so-called non-separability problem (Alchian & Demsetz, 1972). While the source of uncertainty is now behavioral rather than environmental, the contractual

problem is still the same: Output is not a sufficient statistic for inferring individual effort. Once again, vertical integration is predicted.

Proposition 8. Vertical integration is a more likely governance choice when there is a high non-separability problem, which thereby necessitates that inputs be monitored to determine individual productivity.

Empirical evidence that supports this proposition can be found in Anderson (1985), Anderson and Schmittlein (1984), John and Weitz (1988), and Poppo and Zenger (1998).

To the extent that observation of output is not satisfactory for completing a market transaction, the monitoring of inputs and vertical integration may be favored to minimize costs. Goldin (1986) notes that it is generally presumed that one can monitor output quality more cheaply in lower-quality goods than in high-quality goods. In the latter, one may want to screen workers and hire only those who will produce goods of uniformly high quality and then supervise only by input (i.e., hierarchy). Such was the case in the manufacturing of clothing at the turn of the century; high-quality coats, for example, were made by skilled tailors working on time (i.e., salary), while lower quality coats were made by piece rate via independent workers. Relatedly, vertical integration may be an adaptive response to a product differentiation strategy that is driven by changing customer demand or technology supply conditions. For example, Barry, Sonka, and Lajili (1992) note that product differentiation at the farm level (e.g., corn with high oil content, soybeans designed for specific international markets) may lead to different quality control and monitoring costs for which new vertical coordination organizational forms may evolve. This agency theory logic leads to our ninth proposition.

Proposition 9. Vertical integration is a more likely governance choice when there is a higher degree of difficulty in ascertaining quality of (a differentiated) product by inspection, which suggests that the monitoring of inputs is required.

Empirical evidence that supports this proposition can be found in Anderson (1985), Anderson and Coughlan (1987), Caves and Bradburd (1988), and Jacobides and Hitt (2005).

Finally, a major proposition of transaction costs theory (Williamson, 1985) is that vertical integration is most likely to be chosen when both uncertainty and asset specificity are high, since contractual hazards are likely to be the most severe. Thus, conditions of increasing uncertainty have a positive effect

on the likelihood of vertical integration conditional on the presence of asset specificity. This fundamental economic logic leads to our tenth proposition.

Proposition 10. Vertical integration is a more likely governance choice when there is an interaction of high uncertainty and high asset specificity.

Empirical evidence that supports this proposition can be found in Anderson (1985), Coles and Hesterly (1998), Leiblein and Miller (2003), Leiblein, Reuer, and Dalsace (2002), Villalonga and McGahan (2005), and Walker and Weber (1987).

To be sure, there is substantial empirical evidence that corroborates a micro-analytical organizational economics approach for explaining and predicting vertical integration (Mahoney, 2005). We turn next to addressing some of the limitations and methodological challenges concerning the empirical testing of these theories of vertical integration as we move forward.

LIMITATIONS AND METHODOLOGICAL CHALLENGES

The first two sections of the current paper have focused on improving the model specification for explaining and predicting vertical integration from an economic efficiency perspective, and recent research shows improved model specifications are being adopted (e.g., Parmigiani, 2007). We also hasten to add here that it may prove fruitful to provide research designs that enable comparison of rival explanations in which alternative hypotheses are compared. For example, Spiller (1985) compares asset specificity and market-power explanations for vertical integration. Poppo and Zenger (1995, 1998) and Nickerson, Hamilton, and Wada (2001) also provide exemplar research designs for comparative examination of alternative theories.

Beyond econometric model specification, another important class of empirical problems involves econometric identification problems. Hamilton and Nickerson (2003) correctly note that a fundamental challenge in strategic management research is correcting for endogeneity. In the context of empirical work concerning governance choice for vertical coordination, strategic governance decisions are not made randomly, but rather are based on expectations of how these governance choices will influence future economic performance. Put more precisely, management's

governance decisions are endogenous to their expected economic performance outcomes (Masten, 1993). In other words, many empirical papers attempt to answer the (implicit) question: “How does the economic performance of firms that made a particular governance choice compare to that of firms that made alternative governance choices?” However, from a governance-choice perspective, the correct social science question that needs to be answered is: “How does the economic performance of a firm that made a particular governance choice compare with how *the same firm* would have performed if it had adopted an alternative governance choice?”

The endogeneity problem has substantive implications concerning our statistical analysis of these governance decisions. Statistical analysis that does not take into account management’s expectations of economic performance outcomes with respect to their governance decision can result in biased coefficient estimates. These biases result from key omitted variables that influence both governance choice and economic performance. Therefore, it is important that researchers in the strategy field utilize state-of-the-art econometric methodologies that account for omitted variables. Such econometric methods to correct for endogeneity when both strategic choice and economic performance are continuous include instrumental variable and two- and three-stage methods. In addition, econometric techniques to correct for endogeneity arising from discrete governance choices are growing in number as new econometric advances are made to correct for management’s self-selection of their (discrete) governance choice (Heckman, 1974, 1979; Lee, 1978, 1982). Exemplar research to guide current empirical work include Masten et al. (1991), Ohanian (1994), Poppo and Zenger (1998), Shaver (1998), González-Díaz, Arruñada, and Fernández (2000), and Saussier (2000) among others. We next consider further challenges in the discussion and conclusions section.

DISCUSSION AND CONCLUSIONS

Since the canonical problem in transaction costs theory concerns vertical integration, the final section focuses on areas for improvement here. Empirical research has provided strong support for central predictions of the transaction costs theory (Joskow, 1988a; Macher & Richman, 2006; Shelanski & Klein, 1995). Specifically, empirical findings generally corroborate the importance of various forms of relationship-specific

investments for explaining and predicting vertical integration. However, important issues, primarily associated with relationship-specific variables, invite further refinements. First, many empirical papers addressing the relationship between some form of asset specificity and vertical integration employ crude secondary data sources to approximate the underlying asset-specific investments. For example, researchers often utilize available measures such as advertising-to-sales ratios and R&D expenditures-to-sales ratios in the hopes of capturing different forms of asset specificity. Macher and Richman (2006) suggest, however, that when such crude proxies of asset specificity are found statistically significant, it is difficult to separate the effects of a particular variable from other confounding factors that may correlate with the specified explanatory variable. Moreover, multiple measures of explanatory variables are needed to improve construct validity of the analysis.

Second, additional difficulties in interpretation of results arise from employment of sub-optimal variables in a particular empirical setting. As Oxley (1997) suggests, many empirical studies relying on transaction cost rationale use firm-level characteristics to approximate for the transaction-level characteristics outlined by the theory. Oxley (1997) drawing from Williamson's work (1985), emphasizes that the microanalytic attributes of transactions, and not firm attributes, influence governance choices and should be used in empirical work. Much of the research that examines governance modes in international expansions has been susceptible to the critique of being a "non-microanalytic" approach.

A third lingering issue concerning empirical research on vertical integration (and also other governance forms) relates to empirical treatment of relationship-specific explanatory variables. Routinely, asset specificity variables have received an exogenous specification within the logistic model intended to explain governance choice. Related to endogeneity problems discussed in greater detail in the previous section, firms' decisions to invest in relationship-specific assets and to determine the amount invested are endogenous decisions (Masten & Saussier, 2002; Riordan & Williamson, 1985). Only a handful of recent papers such as Lyon (1995) and Saussier (2000) correct for this endogeneity problem.

Directions for Future Research

Internal costs of organization may play a significant role in integration decisions. Many empirical make-or-buy tests cannot distinguish if observed

governance forms are a consequence of market exchange hazards or are due to some systematic variation in the internal costs of organization (Masten et al., 1991). In this regard, Gibbons (2005) maintains that a more inclusive, and hence more appropriate, test of governance choice include a unified account of both the costs and the benefits of vertical integration.

Another direction for future research is to study vertical integration from the perspective of *path dependencies* and *interdependencies* (Mayer, 2006; Rothaermel, Hitt & Jobe, 2006; Schilling & Steensma, 2002). For example, Argyres and Liebeskind (1999) maintain that *governance non-separability* – i.e., interdependencies between related governance choices – can play an important role. Indeed, the formal and informal constraints embedded within the firm's existing set of contractual commitments can influence subsequent governance decisions. Empirical research that joins institutional theory in organization theory with institutional economics appears promising. Relatedly, Leiblein (2003) notes that to the extent that resources and capabilities might be operationalized as clusters of transactions, approaches that consider multiple transactions through some forms of interdependence may facilitate the integration of transaction cost theory and dynamic resource-based theory.

Finally, a fruitful direction for research concerns assessing how changes in information technology influence governance choice. Indeed, recent changes in coordination technologies can substantially impact transaction costs. For example, complex products previously requiring intensive coordination through in-house development and production are now being handled by loosely coupled processes for which coordination across many participating firms is now transaction cost efficient (Lajili & Mahoney, 2006; Sanchez & Mahoney, 1996).

Researchers in the strategic management field have already begun to address some of limitations emphasized here. We conclude with the anticipation that with better theory development and better econometric techniques, the next generation of researchers in the strategy field will take the existing research, and will do better.

NOTES

1. Case studies on vertical integration, contracting, and contracting design include: Acheson (1985), Adler, Scherer, Barton, and Katerberg (1998), Allen and Lueck (1992, 1998), Alston, Datta, and Nugent (1984), Alston and Higgs (1982),

Argyres (1996), Bercovitz (1999), Bowen and Jones (1986), Brickley (1999), Buttrick (1952), Chandler (1977), Cheung (1973), Crocker and Masten (1988, 1991), Crocker and Reynolds (1993), Dahl and Matson (1998), Dyer (1996), Gallick (1984), Galunic and Anderson (2000), Globerman and Schwindt (1986), Goldberg and Erickson (1987), Hallagan (1978a, 1978b), Heide, Dutta, and Bergen (1998), Hennart (1988), Hubbard (2001), Hubbard and Weiner (1986), Jacobides (2005), Jones and Pustay (1988), Joskow (1987, 1990), Kaufmann and Lafontaine (1994), Klein et al. (1978), Klein (1989), Lafontaine (1992), Leffler and Rucker (1991), Libecap and Smith (1999), Libecap and Wiggins (1984), Lyons (1994), Masten and Crocker (1985), Masten and Saussier (2002), Masten and Snyder (1993), Mayer and Argyres (2004), Mayer and Salomon (2006), Mulherin (1986), Muris, Scheffman, and Spiller (1992), Oxley (1997, 1999), Palay (1984), Pirrong (1993), Pisano (1990), Porter and Livesay (1971), Richardson (1993), Saussier (1999), Shepard (1993), Silver (1984), Stuckey (1983), Teece (1976), Umbeck (1977), Weiss and Kurland (1997), Wiggans and Libecap (1985), Williamson (1976), and Zupan (1989). For a useful collection of contract data, see the Contracting and Organizations Research Institute (CORI) at the University of Missouri: <http://cori.missouri.edu>

2. Transaction costs include the *ex ante* costs of (1) search and information costs; (2) drafting, bargaining, and decision costs; and (3) costs of safeguarding an agreement. Ex-post costs include: (1) costs of measuring input and output; (2) monitoring and enforcement costs; (3) adaptation and haggling costs; (4) economic bonding costs; (5) mal-adaptation costs; and (6) the residual economic loss due to shirking and cheating.

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