

TESTING ORGANIZATIONAL ECONOMICS THEORIES OF VERTICAL INTEGRATION

Kaouthar Lajili, Marko Madunic and
Joseph T. Mahoney

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

Research Methodology in Strategy and Management, Volume 4, 343–368

Copyright © 2007 by Elsevier Ltd.

All rights of reproduction in any form reserved

ISSN: 1479-8387/doi:10.1016/S1479-8387(07)04012-X

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.

REFERENCES

- Acheson, J. M. (1985). The Maine lobster market: Between market and hierarchy. *Journal of Law, Economics and Organization*, 1(2), 385–398.
- Adelman, M. A. (1955). Concept and statistical measurement of vertical integration. In: *Business concentration and price policy* (pp. 281–322). Princeton, NJ: Princeton University Press.
- Adler, T. R., Scherer, R. F., Barton, S. L., & Katerberg, R. (1998). An empirical test of transaction cost theory: Validating contract typology. *Journal of Applied Management Studies*, 7(2), 185–200.
- Afuah, A. (2001). Dynamic boundaries of the firm: Are firms better off being vertically integrated in the face of technological change? *Academy of Management Journal*, 44(6), 1211–1228.
- Al-Obaidan, A. M., & Scully, G. W. (1993). The economic efficiency of backward vertical integration in the international petroleum refining industry. *Applied Economics*, 25(12), 1529–1539.
- Alchian, A. A., & Demsetz, H. (1972). Production, information costs, and economic organization. *American Economic Review*, 62(5), 777–795.
- Allen, D. W., & Lueck, D. (1992). The “back forty” on a handshake: Specific assets, reputation, and the structure of farmland contracts. *Journal of Law, Economics, and Organization*, 8(April), 366–376.

- Allen, D. W., & Lueck, D. (1998). The nature of the farm. *Journal of Law and Economics*, 41(2), 343–386.
- Alston, L. J., Datta, S. K., & Nugent, J. B. (1984). Tenancy choice in a competitive framework with transaction costs. *Journal of Political Economy*, 92(6), 1121–1133.
- Alston, L. J., & Higgs, R. (1982). Contractual mix in southern agriculture since the Civil War: Facts, hypotheses, and tests. *Journal of Economic History*, 42, 327–353.
- Anderson, E. (1985). The salesperson as outside agent or employee: A transaction cost analysis. *Marketing Science*, 4, 234–254.
- Anderson, E. (1988). Transaction costs as determinants of opportunism in integrated and independent sales forces. *Journal of Economic Behavior and Organization*, 9, 247–264.
- Anderson, E., & Coughlan, A. T. (1987). International market entry and expansion via independent or integrated channels of distribution. *Journal of Marketing*, 51, 71–82.
- Anderson, E., & Oliver, R. L. (1987). Perspectives on behavior-based versus outcome-based salesforce control systems. *Journal of Marketing*, 51(4), 76–88.
- Anderson, E., & Schmittlein, D. (1984). Integration of the sales forces: An empirical examination. *Rand Journal of Economics*, 15, 385–395.
- Argyres, N. (1996). Evidence on the role of firm capabilities in the vertical integration decisions. *Strategic Management Journal*, 17(2), 129–150.
- Argyres, N. S., & Liebeskind, J. P. (1999). Contractual commitments, bargaining power, and governance nonseparability: Incorporating history into transaction cost theory. *Academy of Management Review*, 24(1), 49–63.
- Armour, H. O., & Teece, D. J. (1980). Vertical integration and technological innovation. *The Review of Economics and Statistics*, 62(3), 470–474.
- Azoulay, P. (2004). Capturing knowledge within and across firm boundaries: Evidence from clinical development. *American Economic Review*, 94(5), 1591–1612.
- Balakrishnan, S., & Wernerfelt, B. (1986). Technical change, competition and vertical integration. *Strategic Management Journal*, 7, 347–359.
- Barney, J. B., Edwards, F. L., & Ringleb, A. H. (1992). Organizational responses to legal liability. *Academy of Management Journal*, 35, 328–349.
- Barry, P. J., Sonka, S. T., & Lajili, K. (1992). Vertical coordination, financial structure, and the changing theory of the firm. *American Journal of Agricultural Economics*, 75(5), 1219–1225.
- Barzel, Y. (1982). Measurement cost and the organization of markets. *Journal of Law and Economics*, 25(1), 27–48.
- Bercovitz, J. E. L. (1999). An analysis of the contract provisions in business-format franchise agreements. In: J. Stanworth & D. Purdy (Eds), *Franchising beyond the millennium: Learning lessons from the past*. Fort Lauderdale, FL: Nova Southeastern University, International Institute for Franchise Education.
- Bindseil, U. (1997). Vertical integration in the long run: The provision of physical assets to the London and New York stock exchanges. *Journal of Institutional and Theoretical Economics*, 153, 641–656.
- Blair, R. D., & Kasperman, D. L. (1983). *Law and economics of vertical integration and control*. New York, NY: Academic Press.
- Bowen, D. E., & Jones, G. R. (1986). Transaction cost analysis of service organization-customer exchange. *Academy of Management Review*, 11(2), 428–441.
- Brickley, J. A. (1999). Incentive conflicts and contractual restraints: Evidence from franchising. *Journal of Law and Economics*, 42(2), 745–774.

- Buttrick, J. (1952). The inside contracting system. *Journal of Economic History*, 12(Summer), 205–221.
- Buzzell, R. D. (1983). Is vertical integration profitable? *Harvard Business Review*, 61, 92–102.
- Cavanaugh, J. K. (1998). Asset-specific investment and unionized labor. *Industrial Relations*, 37(1), 265–279.
- Caves, R. E., & Bradburd, R. E. (1988). The empirical determinants of vertical integration. *Journal of Economic Behavior and Organization*, 9, 265–279.
- Chandler, A. D. (1977). *The visible hand: The managerial revolution in American business*. Cambridge, MA: Harvard Business School Press.
- Chatterjee, S., Lubatkin, M., & Schoenecker, T. (1992). Vertical strategies and market structure: A systematic risk analysis. *Organization Science*, 3(1), 138–156.
- Chatterjee, S. M. (1991). Gain in vertical acquisitions and market power: Theory and evidence. *Academy of Management Journal*, 34(2), 436–448.
- Cheung, S. N. S. (1973). The fable of the bees: An economic investigation. *Journal of Law and Economics*, 16(1), 11–33.
- Clark, K. B. (1989). Project scope and project performance: The effect of parts strategy and supplier involvement on product development. *Management Science*, 35(10), 1247–1263.
- Clevenger, T. S., & Campbell, G. R. (1977). Vertical organization: A neglected element in market-structure-profit model. *Industrial Organization Review*, 5, 60–66.
- Coase, R. (1937). The nature of the firm. *Economica*, 4, 386–405.
- Coff, R. (2003). Bidding wars over R&D-intensive firms: Knowledge, opportunism, and the market for corporate control. *Academy of Management Journal*, 46(1), 74–85.
- Coles, J. W., & Hesterly, W. S. (1998). The impact of firm-specific assets and the interaction of uncertainty: An examination of make or buy decisions in public and private hospitals. *Journal of Economic Behavior and Organization*, 36, 383–409.
- Crandall, R. (1968). Vertical integration and the market for repair parts in the United States automobile industry. *Journal of Industrial Economics*, 16(3), 212–234.
- Crocker, K. J., & Masten, S. E. (1991). Pretia ex machina? Prices and process in long-term contracts. *Journal of Law and Economics*, 34(1), 69–99.
- Crocker, K. J., & Masten, S. J. (1988). Mitigating contractual hazards: Unilateral options and contract length. *Rand Journal of Economics*, 19(3), 327–343.
- Crocker, K. J., & Reynolds, K. J. (1993). The efficiency of incomplete contracts: An empirical analysis of Air Force engine procurement. *Rand Journal of Economics*, 24, 126–146.
- D'Aveni, R. A., & Ilinitch, A. Y. (1992). Complex patterns of vertical integration in the forest products industry: Systematic and bankruptcy risks. *Academy of Management Journal*, 35(3), 596–625.
- D'Aveni, R. A., & Ravenscraft, D. J. (1994). Economies of integration versus bureaucracy costs: Does vertical integration improve performance? *Academy of Management Journal*, 37(5), 1167–1206.
- Dahl, C. A., & Matson, T. K. (1998). Evolution of the US natural gas industry in response to changes in transaction costs. *Land Economics*, 74(3), 390–408.
- Davies, S. W., & Morris, C. (1995). A new index of vertical integration: Some estimates for UK manufacturing. *International Journal of Industrial Organization*, 13, 151–177.
- Davis, R., & Duhaime, I. M. (1992). Diversification, vertical integration, and industry analysis: New perspectives and measurement. *Strategic Management Journal*, 13(7), 511–524.
- Dyer, J. H. (1996). Specialized supplier networks as a source of competitive advantage: Evidence from the auto industry. *Strategic Management Journal*, 17, 271–291.

- Eisenhardt, K. M. (1985). Control: Organizational and economic approaches. *Management Science*, 31(2), 134–149.
- Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57–74.
- Eramilli, M., & Rao, C. P. (1993). Service firms' international entry mode choice: A modified transaction cost approach. *Journal of Marketing*, 57(July), 19–38.
- Etgar, M. (1977). A test of the Stigler theorem. *Industrial Organization Review*, 5, 135–137.
- Etgar, M. (1978). The effects of forward vertical integration on service performance of a distributive industry. *Journal of Industrial Economics*, 26(3), 249–255.
- Folta, T., & Leiblein, M. J. (1994). Technology acquisition and the choice of governance by established firms: Insights from option theory in a multinomial logit model. *Academy of Management Proceedings*, 41, 27–31.
- Frank, S. D., & Henderson, D. R. (1992). Transaction costs as determinants of vertical coordination in the U.S. food industries. *American Journal of Agricultural Economics*, 74(4), 941–950.
- Gallick, E. C. (1984). *Exclusive dealing and vertical integration: The efficiency of contracts in the Tuna industry*. Washington, DC: Federal Trade Commission, Bureau of Economics.
- Galunic, C. D., & Anderson, E. (2000). From security to mobility: Generalized investments in human capital and agent commitment. *Organization Science*, 11(1), 1–20.
- Gibbons, R. (2005). Four formal(izable) theories of the firm? *Journal of Economic Behavior & Organization*, 58, 200–245.
- Globerman, S., & Schwindt, S. (1986). The organization of vertically related transactions in the Canadian forest products industries. *Journal of Economic Behavior and Organization*, 7, 199–212.
- Goldberg, V. P., & Erickson, J. R. (1987). Quantity and price adjustment in long-term contracts: A case study of petroleum coke. *Journal of Law and Economics*, 30(2), 369–398.
- Goldin, C. (1986). Monitoring costs and occupational segregation by sex: A historical analysis. *Journal of Labor Economics*, 4, 1–27.
- González-Díaz, M., Arruñada, B., & Fernández, A. (2000). Causes of subcontracting: Evidence from panel data on construction firms. *Journal of Economic Behavior & Organization*, 42, 167–187.
- Goodstein, J., Boeker, W., & Stephan, J. (1996). Professional interests and strategic flexibility: A political perspective on organizational contracting. *Strategic Management Journal*, 17, 577–586.
- Gort, M. (1962). *Diversification and integration in American industry*. Princeton, NJ: Princeton University Press.
- Grossman, S. J., & Hart, O. D. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, 94, 691–719.
- Heckman, J. (1974). Shadow prices, market wages, and labor supply. *Econometrica*, 42, 679–694.
- Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47, 153–161.
- Hall, M. C., & Rao, C. P. (1994). The impact of buyer-seller relationships on organizational purchasing. *Journal of Marketing Management* (Spring), 1–10.
- Hallagan, W. S. (1978a). Share contracting for California gold. *Explorations in Economic History*, 15(2), 196–210.

- Hallagan, W. S. (1978b). Self-selection by contractual choice and the theory of sharecropping. *The Bell Journal of Economics*, 9(2), 344–354.
- Hallwood, P. C. (1991). On choosing organizational arrangements: The example of offshore oil gathering. *Scottish Journal of Political Economy*, 38(3), 227–241.
- Hamilton, B. H., & Nickerson, J. A. (2003). Correcting for endogeneity in strategic management research. *Strategic Organization*, 1(1), 51–78.
- Harrigan, K. R. (1984). Formulating vertical integration strategies. *Academy of Management Review*, 9(4), 638–652.
- Harrigan, K. R. (1985a). Vertical integration and corporate strategy. *Academy of Management Journal*, 28(2), 397–425.
- Harrigan, K. R. (1985b). Exit barriers and vertical integration. *Academy of Management Journal*, 28(3), 686–697.
- Harrigan, K. R. (1986). Matching vertical integration strategies to competitive conditions. *Strategic Management Journal*, 7(6), 535–555.
- Harrison, J. S., Hall, E. H., & Caldwell, L. G. (1990). Assessing strategy relatedness in highly diversified firms. *Journal of Business Strategies*, 7(1), 34–46.
- Heide, J. B., Dutta, S., & Bergen, M. (1998). Exclusive dealing and business efficiency: Evidence from industry practice. *Journal of Law and Economics*, 41(2), 387–407.
- Heide, J. B., & John, G. (1988). The role of dependence balancing in safeguarding transaction specific assets in conventional channels. *Journal of Marketing*, 52(1), 20–35.
- Heide, J. B., & John, G. (1990). Alliances in industrial purchasing: the determinants of joint action in buyer-supplier relationships. *Journal of Marketing Research*, 27(1), 24–36.
- Heide, J. B., & Miner, A. S. (1992). The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-seller cooperation. *Academy of Management Journal*, 35, 265–291.
- Heimler, A. (1991). Linkages and vertical integration in the Chinese economy. *Review of Economics and Statistics*, 73(2), 261–267.
- Helfat, C. E., & Teece, D. J. (1987). Vertical integration and risk reduction. *Journal of Law, Economics and Organization*, 3(1), 47–67.
- Hennart, J.-F. (1988). Upstream vertical integration in the aluminum and tin industries. *Journal of Economic Behavior and Organization*, 9, 281–299.
- Hoetker, G. (2005). How much you know versus how well I know you: Selecting a supplier for a technically innovative component. *Strategic Management Journal*, 26, 75–96.
- Holmstrom, B. R., & Tirole, J. (1989). The theory of the firm. In: R. Schmalensee & R. D. Willig (Eds), *Handbook of Industrial Organization* (pp. 61–133). Elsevier Science Publishing.
- Hubbard, T. N. (2001). Contractual form and market thickness in trucking. *Rand Journal of Economics*, 32(2), 369–386.
- Hubbard, R. E., & Weiner, J. (1986). Regulation and long-term contracting in the U.S. natural gas markets. *Journal of Industrial Economics*, 35, 69–71.
- Jacobides, M. G. (2005). Industry change through vertical disintegration: How and why markets emerged in mortgage banking. *Academy of Management Journal*, 48(3), 465–498.
- Jacobides, M. G., & Hitt, L. M. (2005). Losing sight of the forest for the trees? Productive capabilities and gains from trade as drivers of vertical scope. *Strategic Management Journal*, 26, 1209–1227.

- John, G., & Weitz, B. A. (1988). Forward integration into distribution: An empirical test of transaction cost analysis. *Journal of Law, Economics and Organization*, 4(2), 337–355.
- Jones, G. R. (1984). Task visibility, free riding, and shirking: Explaining the effect of structure and technology on employee behavior. *Academy of Management Review*, 9(4), 684–695.
- Jones, G. R. (1987). Organization-client transactions and organizational governance structures. *Academy of Management Journal*, 30(2), 197–218.
- Jones, G. R., & Pustay, M. W. (1988). Interorganizational coordination in the airline industry, 1925–1938: A transaction cost approach. *Journal of Management*, 14(4), 529–546.
- Joskow, P. L. (1985). Vertical integration and long-term contracts: The case of coal burning electric generating plants. *Journal of Law, Economics and Organization*, 1(Spring), 33–80.
- Joskow, P. L. (1987). Contract duration and relationship-specific investments: Empirical evidence from coal markets. *American Economic Review*, 77(1), 168–185.
- Joskow, P. L. (1988a). Asset specificity and the structure of vertical relationships: Empirical evidence. *Journal of Law, Economics and Organization*, 4(1), 95–117.
- Joskow, P. L. (1988b). Price adjustments in long-term contracts: The case of coal. *Journal of Law and Economics*, 31(1), 47–83.
- Joskow, P. L. (1990). The performance of long-term contracts: further evidence from the coal markets. *Rand Journal of Economics*, 21, 251–274.
- Kaserman, D. L., & Mayo, J. W. (1991). The measurement of vertical economies and the efficient structure of the electric utility industry. *Journal of Industrial Economics*, 39(5), 483–502.
- Kaufmann, P. J., & Lafontaine, F. (1994). Costs of control: The source of economic rents for McDonald's franchisees. *Journal of Law and Economics*, 37(2), 417–453.
- Kerkvliet, J. (1991). Efficiency and vertical integration: The case of mine-mouth electric generating plants. *Journal of Industrial Economics*, 39(5), 467–482.
- King, R. P. (1992). Management and financing of vertical coordination in agriculture: An overview. *American Journal of Agricultural Economics*, 74, 1217–1218.
- Klein, B., Crawford, R., & Alchian, A. (1978). Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics*, 21, 297–326.
- Klein, S. (1989). A transaction cost explanation of vertical control in international markets. *Journal of the Academy of Marketing Science*, 17, 253–260.
- Klein, S., Frazier, G. L., & Roth, V. J. (1990). A transaction cost analysis model of channel integration in international markets. *Journal of Marketing Research*, 27(2), 196–208.
- Kleindorfer, P., & Knieps, G. (1982). Vertical integration and transaction-specific sunk costs. *European Economic Review*, 19, 71–87.
- Krickx, G. A. (1995). Vertical integration in the computer mainframe industry: A transaction cost interpretation. *Journal of Economic Behavior and Organization*, 26(1), 75–91.
- Laffer, A. B. (1969). Vertical integration by corporations, 1929–1965. *Review of Economics and Statistics*, 51(1), 91–93.
- Lafontaine, F. (1992). Agency theory and franchising: Some empirical results. *Rand Journal of Economics*, 23(2), 263–283.
- Lajili, K., & Mahoney, J. T. (2006). Revisiting agency and transaction costs theory predictions on vertical financial ownership and contracting: Electronic integration as an organizational form choice. *Managerial and Decision Economics*, 27, 573–586.

- Lajili, K., Barry, P. J., Sonka, S. T., & Mahoney, J. T. (1997). Farmers' preferences for crop contracts: A principal-agent analysis. *Journal of Agricultural and Resource Economics*, 22, 264–280.
- Lassar, W. M., & Kerr, J. L. (1996). Strategy and control in supplier–distributor relationships: An agency perspective. *Strategic Management Journal*, 17, 613–632.
- Lee, L. F. (1978). Unionism and wage rates: A simultaneous equation model with qualitative and limited (censored) dependent variables. *International Economic Review*, 19, 415–433.
- Lee, L. F. (1982). Some approaches to the correction of selectivity bias. *Review of Economic Studies*, 49, 355–372.
- Leffler, K. B., & Rucker, R. R. (1991). Transaction costs and the efficient organization of production: A study of timber-harvesting contracts. *Journal of Political Economy*, 99(5), 1060–1087.
- Leiblein, M. J. (2003). The choice of organizational form and performance: Predictions from transaction cost, resource-based and real options theories. *Journal of Management*, 29(6), 937–961.
- Leiblein, M. J., & Miller, D. J. (2003). An empirical examination of transaction and firm-level influences on the vertical boundaries of the firm. *Strategic Management Journal*, 24, 839–859.
- Leiblein, M. J., Reuer, J. J., & Dalsace, F. (2002). Do make or buy decisions matter? The influence of organizational governance on technological performance. *Strategic Management Journal*, 23(9), 817–834.
- Leontief, W. W. (1951). *The structure of American economy, 1919–1939*. New York: Oxford University Press.
- Levin, R. C. (1981). Vertical integration and profitability in the oil industry. *Journal of Economic Behavior and Organization*, 2(3), 215–235.
- Levy, D. T. (1984). Testing Stigler's interpretation of "The division of labor is limited by the extent of the market". *Journal of Industrial Economics*, 32(3), 377–389.
- Levy, D. T. (1985). The transaction cost approach to vertical integration: An empirical examination. *Review of Economics and Statistics*, 67(3), 438–445.
- Libecap, G. D., & Smith, J. L. (1999). The self-enforcing provisions of oil and gas unit operating agreements: theory and evidence. *Journal of Law, Economics, and Organization*, 15(2), 526–548.
- Libecap, G. D., & Wiggins, S. N. (1984). Contractual responses to the common pool: Prorationing of crude oil production. *American Economic Review*, 74(1), 87–98.
- Lieberman, M. B. (1991). Determinants of vertical Integration: An empirical test. *Journal of Industrial Economics*, 39(5), 451–466.
- Lindstrom, G., & Rozell, E. (1993). Is there a true measure of vertical integration? *American Economic Review*, 11, 44–50.
- Livesay, H. C., & Porter, P. G. (1969). Vertical integration in American manufacturing, 1899–1948. *Journal of Economic History*, 29(3), 494–500.
- Lubatkin, M., & Rogers, R. C. (1989). Diversification, systematic risk, and shareholder return: A capital market extension of Rumelt's 1974 study. *Academy of Management Journal*, 32(2), 454–465.
- Lyons, B. R. (1994). Contract and specific investment: An empirical test of transaction cost theory. *Journal of Economics and Management Strategy*, 3, 257–278.

- Lyons, B. R. (1995). Specific investment, economies of scale, and the make-or-buy decision: A test of transaction cost theory. *Journal of Economic Behavior and Organization*, 26, 431–443.
- MacDonald, J. M. (1985). Market exchange or vertical integration: An empirical analysis. *Review of Economics and Statistics*, 67(2), 327–331.
- Macher, J. T., & Richman, B. D. (2006). *Transaction cost economics: An assessment of empirical research in the social sciences*. Unpublished Manuscript.
- MacMillan, I. C., Hambrick, D. C., & Pennings, J. M. (1986). Uncertainty reduction and the threat of supplier retaliation: Two views of the backward integration decision. *Organization Studies*, 7, 263–278.
- Maddigan, R. J. (1981). The measurement of vertical integration. *Review of Economics and Statistics*, 63(3), 328–335.
- Maddigan, R. J., & Zaima, J. K. (1985). The profitability of vertical integration. *Managerial and Decision Economics*, 6(3), 178–179.
- Mahoney, J. T. (1992). The choice of organizational form: Vertical integration versus other methods of vertical integration. *Strategic Management Journal*, 13(8), 559–584.
- Mahoney, J. T. (2005). *Economic foundations of strategy*. Thousand Oaks, CA: Sage.
- Majumdar, S. K., & Ramaswamy, V. (1995). Going direct to market: The influence of exchange conditions. *Strategic Management Journal*, 16, 353–372.
- Martin, S. (1983). Vertical relationships and industrial performance. *Quarterly Review of Economics and Business*, 23, 6–18.
- Martin, S. (1986). Causes and effects of vertical integration. *Applied Economics*, 18, 737–755.
- Martin, X., Mitchell, W., & Swaminathan, A. (1995). Recreating and extending Japanese automobile buyer–supplier links in North America. *Strategic Management Journal*, 16, 589–619.
- Masten, S. E. (1993). Transaction costs, mistakes, and performance: Assessing the importance of governance. *Managerial and Decision Economics*, 14(2), 119–129.
- Masten, S. E., & Saussier, S. (2002). The econometrics of contracts: An assessment of developments in the empirical literature on contracting. In: E. Brousseau & J-M. Glachant (Eds), *The economics of contracts: Theory and application*. Cambridge, MA: Cambridge University Press.
- Masten, S. J. (1984). The organization of production: evidence from the aerospace industry. *Journal of Law and Economics*, 27(2), 403–417.
- Masten, S. J., & Crocker, K. J. (1985). Efficient adaptation in long-term contracts: Take-or-pay provisions for natural gas. *American Economic Review*, 75(5), 1083–1093.
- Masten, S. J., Meehan, J., & Snyder, E. (1989). Vertical integration in the U.S. auto industry. *Journal of Economic Behavior and Organization*, 12, 265–273.
- Masten, S. J., Meehan, J., & Snyder, E. (1991). The costs of organization. *Journal of Law, Economics and Organization*, 7, 1–25.
- Masten, S. J., & Snyder, E. (1993). United States v. United Shoe Machinery Corporation: On the merits. *Journal of Law and Economics*, 36(1), 33–70.
- Masters, J. K., & Miles, G. (2002). Predicting the use of external labor arrangements: A test of the transaction cost perspective. *Academy of Management Journal*, 45, 431–442.
- Mayer, K. J. (2006). Spillovers, and governance: An analysis of knowledge and reputational spillover in information technology. *Academy of Management Journal*, 49, 69–84.
- Mayer, K. J., & Argyres, N. S. (2004). Learning to contract: Evidence from the personal computer industry. *Organization Science*, 13, 387–410.

- Mayer, K. J., & Salomon, R. M. (2006). Capabilities, contractual hazards, and governance: Integrating resource-based and transaction costs perspectives. *Academy of Management Journal*, 49(5), 942–959.
- Monteverde, K. (1995). Technical dialog as an incentive for vertical integration in the semiconductor industry. *Management Science*, 41(10), 1624–1638.
- Monteverde, K., & Teece, D. J. (1982). Supplier switching costs and vertical integration in the automobile industry. *Bell Journal of Economics*, 13(1), 206–213.
- Mosakowski, E. (1991). Organizational boundaries and economic performance: An empirical study of entrepreneurial computer firms. *Strategic Management Journal*, 12(2), 115–133.
- Mulherin, J. H. (1986). Complexity in long-term contracts: An analysis of natural gas contractual provisions. *Journal of Law, Economics and Organization*, 2(1), 105–117.
- Muris, T. J., Scheffman, D., & Spiller, P. T. (1992). Strategy and transaction costs: The organization of distribution in the carbonated soft drink industry. *Journal of Economics and Management Strategy*, 1, 83–128.
- Nickerson, J. A., Hamilton, B. H., & Wada, T. (2001). Market position, resource profile, and governance: Linking Porter and Williamson in the context of international courier and small package services in Japan. *Strategic Management Journal*, 22(3), 251–273.
- Nickerson, J. A., & Mayer, K. J. (2005). Antecedents and performance implications of contracting for knowledge workers evidence from information technology services. *Organization Science*, 1(3), 225–242.
- Nickerson, J. A., & Silverman, B. S. (2003a). Why aren't all truck drivers owner-operators? Asset ownership and the employment relation in interstate for-hire trucking. *Journal of Economics and Management Strategy*, 12(1), 91–118.
- Nickerson, J. A., & Silverman, B. S. (2003b). Why firms want to organize efficiently and what keeps them from doing so: Inappropriate governance, performance, and adaptation in a deregulated industry. *Administrative Science Quarterly*, 48(3), 433–465.
- Norton, S. W. (1993). Vertical integration and systematic risk: Oil refining revisited. *Journal of Institutional and Theoretical Economics*, 149(4), 656–669.
- Novak, S., & Eppinger, S. D. (2001). Sourcing by design: Product complexity and the supply chain. *Management Science*, 47(1), 189–204.
- Ohanian, N. K. (1994). Vertical integration in the U.S. pulp and paper industry, 1900–1940. *Review of Economics and Statistics*, 76(1), 202–207.
- Ouchi, W. G. (1979). A conceptual framework for the design of organizational control mechanisms. *Management Science*, 25(9), 833–848.
- Oxley, J. E. (1997). Appropriability hazards and governance in strategic alliances: A transaction cost approach. *Journal of Law, Economics and Organization*, 13(2), 387–409.
- Oxley, J. (1999). Institutional environment and the mechanisms of governance: The impact of intellectual property protection on the structure of inter-firm alliances. *Journal of Economic Behavior and Organization*, 38(3), 283–309.
- Palay, T. (1984). Comparative institutional economics: The governance of rail freight contracting. *Journal of Legal Studies*, 13(June), 265–288.
- Parmigiani, A. (2007). Why do firms both make and buy? An investigation of concurrent sourcing. *Strategic Management Journal*, 28, 285–311.
- Pennings, J. M., Hambrick, D. C., & MacMillan, J. C. (1984). Interorganizational dependence and forward integration. *Organization Studies*, 5(4), 307–326.
- Pirrong, S. C. (1993). Contracting practices in bulk shipping markets: A transaction cost explanation. *Journal of Law and Economics*, 36(2), 937–976.

- Pisano, G. (1990). The R&D boundaries of the firm: An empirical analysis. *Administrative Science Quarterly*, 35, 153–176.
- Poppo, L., & Zenger, T. (1995). Opportunism, routines, and boundary choices: A comparative test of transaction cost and resource-based explanations for make-or-buy decisions. *Academy of Management Journal*, Best Papers Proceedings, 42–46.
- Poppo, L., & Zenger, T. (1998). Testing alternative theories of the firm: Transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services. *Strategic Management Journal*, 19(9), 853–877.
- Porter, G., & Livesay, H. C. (1971). *Merchants and manufacturers: Studies in the changing structure of nineteenth century marketing*. Baltimore, MD: John Hopkins University.
- Provan, K. G., & Skinner, S. J. (1989). Interorganizational dependence and control as predictors of opportunism in dealer–supplier relations. *Academy of Management Journal*, 32(1), 202–212.
- Rangan, K. V., Corey, R. E., & Cespedes, F. (1993). Transaction Cost Theory: Inferences from Clinical Field Research on Downstream Vertical Integration. *Organization Science*, 4(3), 454–477.
- Rangan, K. V., Menezes, M. A., & Maier, E. P. (1992). Channel selection for new industrial products: A framework, method, and application. *Journal of Marketing*, 56(3), 69–82.
- Reed, R., & Fronmueller, M. P. (1990). Vertical Integration: A comparative analysis of performance and risk. *Managerial and Decision Economics*, 11(3), 177–185.
- Regan, L. (1997). Vertical integration in the property-liability insurance industry: A transaction cost approach. *Journal of Risk and Insurance*, 64(1), 41–62.
- Richardson, J. (1993). Parallel sourcing and supplier performance in the Japanese automobile industry. *Strategic Management Journal*, 14, 339–350.
- Riordan, M. H., & Williamson, O. E. (1985). Asset specificity and economic organization. *International Journal of Industrial Organization*, 3, 365–378.
- Rothaermel, F. T., Hitt, M. A., & Jobe, L. A. (2006). Balancing vertical integration and strategic outsourcing: Effects on product portfolio, product success and firm performance. *Strategic Management Journal*, 27, 1033–1056.
- Rumelt, R. P. (1974). *Strategy, structure, and economic performance*. Cambridge, MA: Harvard University Press.
- Russo, M. V. (1992). Bureaucracy, economic regulation, and the incentive limits of the firm. *Strategic Management Journal*, 13(2), 103–118.
- Sanchez, R., & Mahoney, J. T. (1996). Modularity, flexibility and knowledge management in product and organizational design. *Strategic Management Journal*, 17(December), 63–76.
- Saussier, S. (1999). Transaction Cost Economics and Contract Duration: An Empirical Analysis of EDF Coal Contracts. *Louvian Economic Review*, 65, 3–21.
- Saussier, S. (2000). Transaction costs and contractual incompleteness: the case of Electricite de France. *Journal of Law, Economics and Organization*, 42, 189–206.
- Schilling, M. A., & Steensma, H. K. (2002). Disentangling the theories on firm boundaries: A path model and empirical test. *Organization Science*, 13, 387–401.
- Shaver, J. M. (1998). Accounting for endogeneity when assessing strategy performance: Does entry mode choice affect FDI survival? *Management Science*, 44(4), 571–585.
- Shelanski, H. A., & Klein, P. G. (1995). Empirical Research in Transaction Cost Economics: A Review and Assessment. *Journal of Law, Economics, and Organization*, 11(2), 335–361.

- Shepard, A. (1993). Contractual form, retail price, and asset attributes in gasoline retailing. *Rand Journal of Economics*, 24(1), 58–77.
- Silver, M. (1984). *Enterprise and the Scope of the Firm*. Oxford, UK: Martin Robertson.
- Silverman, B. S., Nickerson, J. A., & Freeman, J. (1997). Profitability, transactional alignment, and organizational mortality in the U.S. trucking industry. *Strategic Management Journal*, 18, 31–52.
- Simon, H. A. (1978). Rationality as process and as product of thought. *American Economic Review*, 68, 1–16.
- Spiller, P. T. (1985). On vertical mergers. *Journal of Law, Economics and Organization*, 1(2), 285–312.
- Stiles, C. H. (1992). The influence of secondary production on industry definition in the extended vertical market model. *Strategic Management Journal*, 13(3), 171–187.
- Stuckey, J. (1983). *Vertical integration and joint ventures in the aluminum industry*. Cambridge, MA: Harvard University Press.
- Taylor, C. R., Shaoming, Z., & Osland, G. E. (1998). A transaction cost perspective on foreign entry market entry strategies of US and Japanese firms. *Thunderbird International Business Review*, 40(4), 389–412.
- Teece, D. J. (1976). *Vertical Integration and Vertical Divestiture in the U.S. Oil Industry*. Stanford, CA: Stanford University Institute for Energy Studies.
- Teece, D. J. (1980). Economies of scope and the scope of the enterprise. *Journal of Economic Behavior and Organization*, 1(September), 223–247.
- Tucker, I. B., & Wilder, R. P. (1977). Trends in vertical integration in the U.S. manufacturing sector. *Journal of Industrial Economics*, 26(1), 81–94.
- Ulset, S. (1996). R&D outsourcing and contractual governance: An empirical study of commercial R&D projects. *Journal of Economic Behavior and Organization*, 30, 63–82.
- Umbeck, J. (1977). The California gold rush: A study of emerging property rights. *Explorations in Economic History*, 14(3), 197–226.
- Villalonga, B., & McGahan, A. M. (2005). The choice among acquisitions, alliances, and divestitures. *Strategic Management Journal*, 26, 1183–1208.
- Walker, G. (1994). Asset choice and supplier performance in two organizations – US and Japanese. *Organization Science*, 5(4), 583–593.
- Walker, G., & Poppo, L. (1991). Profit centers, single-source Suppliers, and transaction costs. *Administrative Science Quarterly*, 36(1), 66–87.
- Walker, G., & Weber, D. (1984). A transaction cost approach to make-or-buy decision. *Administrative Science Quarterly*, 29(3), 373–391.
- Walker, G., & Weber, D. (1987). Supplier competition, uncertainty and make-or-buy decisions. *Academy of Management Journal*, 30, 589–596.
- Weiss, A. M. (1992). The role of firm-specific capital in vertical mergers. *Journal of Law and Economics*, 35(1), 71–88.
- Weiss, A. M. (1994). Vertical mergers and firm-specific physical capital: Three case studies and some evidence on timing. *Journal of Industrial Economics*, 42(4), 395–417.
- Weiss, A. M., & Kurland, N. (1997). Holding distribution channel relationships together: The role of transaction-specific assets and length of prior relationships. *Organization Science*, 8(6), 612–623.
- Whyte, G. (1994). The role of asset specificity in the vertical integration decision. *Journal of Economic Behavior and Organization*, 23(3), 287–302.

- Wiggins, S. N., & Libecap, G. D. (1985). Oil field unitization: Commercial failure in the presence of imperfect information. *American Economic Review*, 75, 368–385.
- 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.
- Williamson, O. E. (1976). Franchise bidding for natural monopolies in general and with respect to CATV. *Bell Journal of Economics*, 7(1), 73–104.
- Williamson, O. E. (1979). Transaction-cost economics: The governance of contractual relations. *Journal of Law and Economics*, 22(2), 233–261.
- Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.
- Williamson, O. E. (1991a). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, 36(2), 269–296.
- Williamson, O. E. (1991b). Strategizing, economizing, and economic organization. *Strategic Management Journal*, 12, 75–94.
- Williamson, O. E. (1996). *The mechanisms of governance*. New York, NY: Oxford University Press.
- Zaheer, A., & Venkatraman, N. (1994). Determinants of electronic integration in the insurance industry: An empirical test. *Management Science*, 40(5), 549–566.
- Zaheer, A., & Venkatraman, N. (1995). Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Management Journal*, 16, 589–619.
- Zupan, M. A. (1989). Cable franchise renewals: Do incumbent firms behave opportunistically? *Rand Journal of Economics*, 20(4), 473–482.