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The Choice of Organizational Governance Form and Performance: Predictions from Transaction Cost, Resource-based, and Real Options Theories

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This paper develops an approach to organizational governance decisions that recognizes how the choice of organizational governance form affects both the creation and appropriation of economic value. The paper begins with a detailed survey of three theoretical approaches—transaction cost economics (TCE), the resource-based view (RBV), and Real Options analysis (RoA) to the study of organizational governance. This review serves to provide background material on each theory as well as to identify the similarities and differences in the assumptions underlying these perspectives. A concluding section provides a series of propositions for future empirical research that may help to integrate these theories by incorporating notions of both value creation and value appropriation.
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The field of strategic management describes why firms differ in their investment choices and subsequent performance (Rumelt, Schendel & Teece, 1994). Indeed, much of the work in the field can be categorized into studies that have examined factors that influence of one element of strategic choice, organizational governance, and those that have examined how firms' governance choices affect performance. For example, a prominent strand of strategy research has examined the conditions under which firms are most likely to utilize organizational governance forms such as markets or hierarchies (e.g., Monteverde & Teece, 1982a, 1982b; Walker & Weber, 1984), hierarchies or alliances (e.g., Pisano, 1990), or equity or non-equity alliances (e.g., Oxley, 1997). A second, distinct, stream of research has described how the decision to manage an economic activity through market contracts, alliances, or hierarchy influences performance in terms of indicators such as accounting

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returns (D'Aveni & Ravenscraft, 1994) or stock market reaction (McGahan & Villalonga, 2003).

While these two streams of research both involve the study of various organizational governance forms they have largely been developed independently from one another. For instance, much of the extant research examining why firms choose a particular organizational form follows transaction cost economic theory and argues that the optimal form of organization is primarily driven by efficiency considerations (e.g., Williamson, 1975, 1985). In contrast, prior research that has examined the performance implications of specific resource investments has frequently relied on resource-based reasoning (e.g., Barney, 1986; Rumelt, 1984; Wernerfelt, 1984) to describe the specific characteristics of resources and investments that are most likely to provide sustainable sources of competitive advantage. While work using Real Option analysis has related the choice between organizational governance forms and overall firm performance (e.g., Bowman & Hurry, 1993; Kogut, 1991), little effort has been put forth to link insights from Real Option analysis with insights from transaction cost economics (TCE) or the resource-based view (RBV).

The separation between these theories of organizational governance and competitive advantage is unfortunate for several reasons. First, the importance of common concepts such as bounded rationality, specific investment, and uncertainty suggests that important connections exist that may enhance our understanding of organizational governance and its relationship to economic performance. While transactions cost theorists argue that specific investment creates problems of opportunism that may frequently be resolved through governance choices (Williamson, 1985), transaction- or firm-specific investments are often required to create the types of resources most likely to generate above normal economic performance (e.g., Mahoney, 2001; McGahan, 1996). Second, if one takes firms as profit maximizing entities, it is likely that firms will choose governance mechanisms that allow them to assemble the necessary bundles of resources and capture some of the profits that accrue from these resources (Riordan & Williamson, 1985; Zajac & Olsen, 1993). Finally, recent research has demonstrated that the failure to integrate theories of organizational governance choice with theories of organizational governance form and performance may lead to misleading empirical findings (e.g., Leiblein, Reuer & Dalsace, 2002; Shaver, 1998; Silverman, Nickerson & Freeman, 1997).

This paper develops a conceptual approach to study organizational governance decisions that recognizes how the choice of organizational governance form affects both the creation and appropriation of economic value. This approach is based upon three prominent theories—TCE, RBV, and Real Options analysis (RoA). The paper proceeds as follows: The next section provides a review of the Transaction Cost, Resource-based and Real Options literature as applied to decisions involving firm boundaries, the acquisition and development of resources, and economic performance. This review provides an explicit statement of the assumptions, insights, and propositions that have been derived from each of these theoretical perspectives. The purpose of this review is to emphasize the similarities and differences in the assumptions and predictions offered by each theory. The paper then draws on this comparison to derive a series of research questions that are likely to lead to an integration of these three approaches. A concluding section discusses opportunities for future research to develop a more robust, integrated theory of organizational governance.

Transaction Cost Economics

Overview

Over the last twenty years, the standard framework for analyzing questions regarding the choice of organizational governance form has been transaction cost theory (Williamson, 1975, 1985). As opposed to the neoclassical economic conception of the firm as a production function that relates a firm's level of capital and labor to its productive output, TCE describes the firm as an efficiency-inducing administrative instrument that facilitates exchange between economic actors. In this respect, TCE follows Hayek (1945) and Barnard (1968) in asserting that adaptation is the central problem of economic organization. However, in contrast to Hayek's (1945) emphasis on the "marvel of the market" which allows efficient coordination autonomously between parties of an economic transaction through the price mechanism and Barnard's (1968) emphasis on the deeper and more cooperative responses that are available through conscious, deliberate, and purposeful coordination within a firm, TCE puts forth the notion that efficient organization necessitates matching transactions which require higher levels of coordination with organizational governance forms which provide the necessary levels of coordination in a cost effective manner. Excellent reviews of the theory and its application are provided by Joskow (1988) and Boerner and Macher (2003).

The two primary conceptual insights provided by transaction cost theory are that the governance of exchange agreements between economic actors is costly and that governance forms vary in their ability to facilitate exchange depending on the attributes in the transactional environment. The choice of organizational governance form is seen as a central means through which management affects the costs of monitoring and administration or, more specifically, the costs of negotiating and writing contracts and monitoring and enforcing contractual performance (Williamson, 1975). Although TCE advocates selecting a governance form that minimizes the sum of total production and transaction costs, its application has emphasized the importance of the costs associated with governing and monitoring transactions. Due to the economies of scale and specialization available in the marketplace, as well as the administrative and incentive limits associated with managing economic transactions within a firm (i.e., hierarchical governance), the theory generally assumes that simple market contracts provide a more efficient, or lower cost, mechanism for managing economic exchanges than hierarchical organization. Given that most complex contracts are incomplete, the theory holds that in certain situations the costs of market exchange may increase substantially and surpass the technical efficiencies provided by the market.

Primary Assumptions

There are two main assumptions underlying the TCE perspective. First, individuals within a firm are assumed to be *boundedly rationale* (Cyert & March, 1963; March & Simon, 1958; Nelson & Winter, 1982). In spite of their best efforts to deal with the complexity and unpredictability of the world around them, they are limited in their ability to plan for the future and to accurately predict and plan for the various contingencies that may arise. As a result,

it is costly, both in time and resources, for individuals to acquire and interpret information about the contracting environment and the firm. The second assumption underlying the TCE framework is that of *opportunism*. The assumption of opportunism suggests that some economic actors are "self-interest seeking with guile" (Williamson, 1975: 26) or subject to "frailties of motive" (Simon, 1982: 303). Although not all parties are prone to such opportunistic behavior, the assumption of bounded rationality suggests that it is costly to identify untrustworthy individuals *ex ante* (Williamson, 1996).

There are two important implications associated with these assumptions. First, boundedly rational managers find it costly to negotiate and write complete contingent claims contracts that fully describe each party's responsibilities and rights for all future contingencies that could conceivably arise during a transaction. That is, market *contracts are incomplete*. The notion of incomplete contracts suggests that when circumstances arise which are not accounted for in the original agreement, individuals will need to negotiate revised terms which address the newly uncovered contingency. These renegotiations may lead to calculated efforts to take advantage of the vulnerabilities of one's trading partner in the hopes of achieving a more favorable distribution of the joint economic profits derived from the exchange. Consequently, managers will find it valuable to institute costly mechanisms to *monitor and enforce contractual performance* that allow them to identify non-compliance and communicate instances of non-compliance to an arbiter that may provide enforcement.

Main Theoretical Predictions

The primary theoretical prediction put forth by TCE is that of "discriminating alignment." The basic idea put forth is to match simple exchanges with simple modes of governance and more complex exchanges with more complex forms of organization. Deviation from the optimal form of governance, as dictated by transactional attributes associated with various contracting hazards, is predicted to lead to inefficiencies. Thus, when contractual safeguards are inadequate for the hazards present in a given exchange, the theory predicts that motivation and coordination costs will rise. Typically, these costs have been associated with the likelihood of opportunistic behavior (Williamson, 1975, 1985), the potential for hold-up (e.g., Klein, Crawford & Alchian, 1978), challenges in measurement and monitoring (Barzel, 1982), or insufficient levels of coordination (Alchian & Demsetz, 1972). When excessive governance is utilized, the transaction will be hindered by unnecessarily weak incentives and the costs of additional administration. Normative implications are often drawn from such models under the implicit assumption of the presence of a selection environment that ensures that observed governance choices are efficient.

The notion of discriminating alignment suggests that both transactions and governance forms differ in substantive ways. In the theories of Williamson (1975) and Klein et al. (1978), transactions are seen to differ in terms of market contracting inefficiencies which originate from small numbers bargaining situations. While small numbers bargaining situations may exist *ex ante*, the primary contribution of TCE has centered on its ability to describe the specific exchange characteristics that are likely to lead to *ex post* small numbers situations.

TCE maintains that the likelihood of *ex post* small numbers bargaining situations and the resulting potential for opportunistic behavior is most likely to occur in economic exchanges that involve significant specialized investment (Klein et al., 1978; Williamson, 1975, 1979). The presence of specific investment creates three costs. First, as the level of specialized investment increases, quasi-rents (the difference between earnings and opportunity costs) are created that may be subject to hold-up (e.g., Klein et al., 1978). The presence of these quasi-rents may result in costly opportunistic bargaining and haggling. Second, in anticipation of these hold-up costs, economic actors may backward induct and engage in inefficient positioning tactics (Grossman & Hart, 1986). For instance, by reducing their level of specific investment, firms may limit the total economic value created in an exchange. Finally, exchanges which require one or both parties to make significant transaction-specific investments benefit to a greater extent from coordinated adaptation. As a result, the tradeoffs between the high-powered incentives and autonomous adaptation of the market and the added safeguards and centralized coordinating properties of internal organization shift in favor of more firm-like structures.

The theory indicates that the need for coordination and the likelihood of opportunistic behavior may also be affected by the level of market, supplier, or technological uncertainty or complexity in an economic exchange. By increasing the number of contingencies that may affect a market contract, uncertainty raises the potential for opportunistic behavior as well as the expected costs of writing and enforcing a contingent claims contract (e.g., Williamson, 1985). By inhibiting a firm's ability to measure the contribution of any individual activity, uncertainty also increases the need for the superior monitoring and administrative control provided by hierarchy (e.g., Barzel, 1982; Demsetz, 1988).

Uncertainty also has a second, indirect, influence on the expected costs of exchange. Market exchange is not only hazardous in uncertain environments because it is more costly to write complete contracts in these environments, but also because uncertain environments facilitate subsequent contractual renegotiation that can be hazardous in the presence of specific investments. Since exchanges conducted in uncertain environments are more likely to encounter unanticipated contingencies that require renegotiation than exchanges conducted in more stable environments, market failure is particularly likely in situations where both high levels of asset specificity and uncertainty are present.

In matching transactions characterized by different types and levels of exchange hazards with appropriate governance forms, the theory indicates that substantive differences exist across organizational governance forms. Typically, organizational form is conceptualized in terms of three distinct types: unilateral market contracts, intermediate or hybrid forms including "alliances," and hierarchical, integrated firms. Williamson (1991) maintains that these different governance structures vary discretely in terms of incentive intensity, administrative controls, and contract law regime. As compared to market contracts, hierarchical governance provides weaker performance incentives. These weaker incentives are thought to promote a team orientation. Firms provide access to a broader and more flexible set of administrative control systems as compared to market contracts (Holmstrom, 1979). Market contracts are subject to classical contract law where the identity of the parties is irrelevant and individual transactions involve clear "sharp in, sharp out" exchanges (Macneil, 1974). In contrast, firms are subject to an implicit law of forbearance where fiat rules the day.

Asset Specificity and Organizational Form

The vast majority of empirical literature in TCE has examined the factors which influence the choice of organizational form. The following paragraphs briefly summarize the measurement and findings regarding the relationship between asset specificity, uncertainty, and organizational form.

Williamson (1996) identifies six types of asset specificity: (1) site, (2) physical asset, (3) human asset, (4) dedicated asset, (5) brand name capital, and (6) temporal. Site specificity refers to the co-location of facilities so as to minimize inventory or production costs. It has been measured in terms of the physical proximity of contracting parties (Joskow, 1985). Physical asset specificity refers to the use of co-specialized assets that are customized for a particular use or purpose. For instance, the use of specialized dies and equipment associated with the use of those dies (Walker & Weber, 1987). Human asset specificity refers to an employee's development of firm-specific skills or knowledge. Human asset specificity has been proxied both by the development of specialized knowledge that occurs as an individual salesperson tailors his or her working relationship to an organization (Anderson, 1985) as well as by the specificity of communication between semiconductor product designers and manufacturing engineers (Monteverde, 1995). Dedicated asset specificity refers to additional investments in plant or equipment made in order to sell the increased output to a particular customer. For example, it has been argued that the specialized durable assets in JIT relationships represent a form of specific dedicated assets (Frazier, Spekman & O'Neal, 1988). Brand name capital specificity refers to investment in reputation. Gatignon and Anderson (1988) argue for the use of advertising intensity as a measure of brand name equity. Temporal or spatial specificity refers to investments made to facilitate the timely response or coordination of human assets. Temporal specificity has been proxied by the use of on-site human assets in industries such as ship building where the timing and coordination of constructions projects is critical (Masten, Meehan & Snyder, 1991).

Empirical research has provided strong and consistent support for the theorized relationships between transaction-specific investment and governance form. Notable studies that demonstrate a positive relationship between the level of specificity and more integrated governance include Monteverde and Teece's (1982a, 1982b) work regarding the governance of automotive components in the automotive assembly industry, Stuckey's (1983) case study of the aluminum industry, Anderson's analysis of the decision to utilize a direct sales force in the electronics industry (Anderson, 1985; Anderson & Schmittlein, 1984), and Masten's (1984) work in the aerospace industry. More recently, Monteverde (1995) finds that the decision to integrate product design with manufacturing is related to the level of required investment in specific human capital. In a study focused on hybrid governance forms, Oxley (1997) finds that more hierarchical alliance modes are favored when appropriability hazards are high due to difficulty in specifying or limiting the scope of technology underlying the alliance.

Uncertainty and Organizational Form

Although the relationship between uncertainty and firms' governance decisions is also stressed in much of the existing literature, empirical studies have yielded fragile and at

times contradictory results (see Mahoney, 1992; Sutcliffe & Zaheer, 1998 for reviews). For instance, empirical studies focusing on one aspect of behavioral uncertainty—measurement uncertainty—have demonstrated a positive relationship between the ability to measure an employee's productivity and the degree of vertical integration (Anderson, 1985; John & Weitz, 1988). In contrast, research focusing on technological uncertainty (e.g., Balakrishnan & Wernerfelt, 1986; Harrigan, 1986; Walker & Weber, 1984, 1987) has demonstrated a negative relationship between uncertainty and integration. Research examining the influence of demand uncertainty has illustrated both negative (e.g., Harrigan, 1986) and positive relationships (John & Weitz, 1988; Levy, 1985; Walker & Weber, 1987) with integration.

As recently pointed out by Sutcliffe and Zaheer (1998), empirical contradictions regarding the relationship between uncertainty and governance form may be due, in part, to the different sources of uncertainty and variety of measures employed. For instance, behavioral or measurement uncertainty has been operationalized in terms of the accuracy of sales records (Anderson, 1985) and as the difficulty in evaluating performance (Anderson & Schmittlein, 1984; Poppo & Zenger, 1998). These behavioral measures of uncertainty have frequently been applied when discussing the direct relationship between the cost of measuring the output of a partner and the optimal form of organization.

In contrast, the concept of environmental uncertainty has often been applied to discussions which emphasize how unforeseen contingencies may affect market contracts between two parties. Environmental uncertainty has been measured in perceptual terms regarding the degree to which demand (Heide & John, 1990), technology (Walker & Weber, 1984), or supplier performance (Walker & Weber, 1987) is unpredictable. Objective measures include Balakrishnan and Wernerfelt's (1986) use of the average age of plant and equipment as a proxy for technological uncertainty, Levy's (1985) use of the sum of squared errors from a regression of the relevant product market's historical unit demand as a measure of demand uncertainty, and Henisz's (2000) use of political interaction data to derive a measure of political uncertainty.

The market hazards that influence governance choice are most likely to occur when contract renegotiation takes place *in the presence of* specific assets. Thus, market failure is particularly likely in situations where both high levels of asset specificity and uncertainty are present. Empirical research has provided findings consistent with this interactive effect (Coles & Hesterly, 1998; Leiblein & Miller, 2003; Walker & Weber, 1987).

Resource-based View

Overview

The RBV has emerged as an important explanation for persistent firm-level performance differences. In contrast to theories of firm performance that focus on product-market position and the exercise of market power (e.g., Bain, 1956; Porter, 1980), the RBV maintains that firms may enjoy persistent performance advantages due to the relative superiority with which their resources address the needs of customers. Early contributions emphasized firms' ability to create and sustain competitive advantage by acquiring and defending

advantageous resources positions. For instance, Wernerfelt (1984) noted that both product- and resource-market scarcity might lead to persistent sources of advantage. Barney (1986) described how imperfections in the market for strategic factors may affect a firm's subsequent economic performance. Lippman and Rumelt (1982) and Rumelt (1984) described how ambiguity regarding the cause and effect nature of the resource development process might provide sustained sources of competitive advantage under uncertainty. Thorough reviews of the resource-based literature are provided by Mahoney and Pandian (1992) and Barney and Arikan (2001).

The RBV provides two primary conceptual insights. First, it recognizes that factor markets exist wherein firms may develop or acquire the resources necessary for product-market competition. Second, the RBV points out that the resources which lead to persistent performance differentials are much broader in nature and more difficult to accumulate than the tangible assets and factors of production typically emphasized in neoclassical economic theories. For instance, the resource-based literature of ten draws upon Penroses' (1959) discussion of the administrative and entrepreneurial skills of top management teams, Nelson and Winter's (1982) notion of routines, or Itami's (1987) notion of invisible assets such as technology, customer trust, brand image, and corporate culture. Given these insights, the RBV describes how competition for resources may affect a firm's ability to implement valuable product-market strategies (Wernerfelt, 1984) and to capture economic value (Rumelt, 1984).

Primary Assumptions

There are a number of assumptions underlying the RBV. The first set of assumptions state that firms are *profit maximizing* entities directed by *boundedly rational* managers (Conner, 1991; Rumelt, 1984). As a result, managers are assumed to lack the knowledge, foresight, and skill to accurately predict and plan for all the various contingencies that may arise in their search for profitable opportunities. The second set of assumptions suggest that firms' must make *up-front investments* for the opportunity to engage in the process of creating new resources whose eventual value is inherently ambiguous and uncertain (Lippman & Rumelt, 1982). These assumptions lead to the critical concepts of resource heterogeneity and resource immobility. The idea of resource heterogeneity implies that competing firms possess different bundles of resources. The idea of resource immobility implies that many of these resource differences may persist over time.

Main Theoretical Predictions

Resource-based logic has used to generate four primary predictions regarding competitive advantage and performance (Peteraf, 1993). The first prediction describes the characteristics of resources that provide temporary sources of competitive advantage. For instance, resource-based logic suggests that firms may gain temporary competitive advantages by leveraging valuable, rare, and non-substitutable resources. *Valuable resources* are those that enable forms to develop and implement strategies that have the effect of increasing customers' willingness to pay or reducing a suppliers' opportunity cost (e.g., Brandenburger & Stuart, 1996). *Rare resources* are those for which demand exceeds sup-

ply. *Non-substitutable resources* are those that, either in isolation or in combination, can be uniquely used to help conceive of and implement a strategy.

Second, the RBV indicates that competitive advantage may be sustainable if there are *ex post* limits to competition. In contrast to the barriers to competition highlighted in the industrial organization literature such as capacity preemption (Dixit, 1989), spatial preemption (Schmalansee, 1978), or contractual preemption (Aghion & Bolton, 1978), the RBV emphasizes how characteristics in the resource development process may inhibit the efficient imitation of critical resources. Barney and Arikan (2001) catalogue a number of rationales for resource immobility that have been developed in the RBV literature. For instance, Lippman and Rumelt (1982) indicate that the persistence of resource heterogeneity across firms is due to enforceable rights for the exclusive use of a resource or causal ambiguity regarding the application of a resource. Dierickx and Cool (1989) suggest that resources are immobile when they are subject to time compression diseconomies, are causally ambiguous, are characterized by interconnected asset stocks, or are characterized by asset mass efficiencies. Barney (1991) suggests that resources are inelastic in supply when they are path dependent, causally ambiguous, or socially complex. These notions of resource heterogeneity and resource immobility are often used as starting assumptions for applications of the RBV framework (e.g., Barney, 1991; Wernerfelt, 1984).

The third prediction offered by the RBV describes the conditions under which economic profits may be generated. In order for a firm to enjoy an economic profit or rent, it must generate more value from its resources than expected at the time of their acquisition or development. Thus, firms which acquire or develop valuable resources in factor markets where there are *ex ante* limits to competition may generate temporary economic profits. Barney (1986), following Demsetz (1973), suggests two ways that markets can be imperfectly competitive. First, in the face of uncertainty, firms can be lucky and purchase or develop a resource at a cost below its true economic value. Second, it may be the case that a particular firm has unusual insights about the future value of the resources it is acquiring or developing in a strategic factor market. For example, a firm may create economic value through an acquisition strategy that creates private value above and beyond the value brought by other bidders and leverages its own valuable and costly to imitate resources (Barney, 1988). Similarly, a firm may be able to generate an economic rent in factor markets where it bids against firms who have less accurate expectations about the future value of underlying resources or economic factors (Makadok & Barney, 2001).

The fourth RBV prediction suggests that firms may generate sustained economic profits by continuously leveraging valuable, rare, and costly to imitate resources in ways their competitors cannot anticipate. This implies that ongoing economic profits are the result of a firm maintaining excess supply in critical resources which are both imperfectly mobile and generalizable. Imperfect mobility is necessary to insure that the resource is more valuable to the focal firm than any other potential bidding firm. The resource must also be partially generalizable so that it can be extended into new applications. While the existing literature is relatively silent on the characteristics of resources that exhibit these types of characteristics, Rivkin (2001) develops a promising simulation model which suggests that such resources are of moderate complexity. One may consider Nucor's ability to repeatedly start-up steel mini-mill production sites (Ghemawat, 1992) or Cooper Industries ability to repeatedly transform old-line manufacturers (Collis & Montgomery, 1998) as representa-

tive of moderately complex resources that competitors have been unable to duplicate and have been extended into related application areas.

Although the primary predictions offered by the RBV are with regard to the relationship between investment in resources with particular characteristics and competitive advantage or performance, the framework also offers direct predictions regarding organization form. At its most basic level, RBV scholars have emphasized how resource heterogeneity may affect the implicit assumption that transaction costs are the determining factor in economic organization by arguing that organizational form is determined by firms' unique strengths and weaknesses. For instance, the RBV suggests that the ability to leverage valuable, firm-specific resources held in excess supply may lead to a marginally higher likelihood that firm-hierarchy will be optimally chosen to manage an economic exchange. Thus, a firm with a unique and valuable productive capability will be more likely to internalize those activities that are complementary to its unique features than firms' that lack this capability (e.g., Argyres, 1996; Barney, 1999; Leiblein & Miller, 2003; Quinn & Hilmer, 1994).

Resource-based logic has also been used to describe the conditions under which it is optimal to coordinate specialized resources within a firm (e.g., Conner & Prahalad, 1996; Liebeskind, 1996). This work focuses almost exclusively on the role of knowledge, particularly tacit knowledge, in explaining organizational governance choice (e.g., Grant, 1996; Kogut & Zander, 1992, 1993, 1996; Spender, 1996). For instance, the knowledge-based approach emphasizes difficulties associated with combining resources (Teece, Pisano & Shuen, 1997) and proposes that the use of a firm—as opposed to joint ventures, contracts, or other organizational governance forms—provides a superior mechanism for coordinating economic activities relative to other forms of organization. Firms are argued to be more efficient than other governance forms such as markets at combining and diffusing knowledge because of their superior coordinative attributes (Conner, 1991) and information processing abilities (Gulati & Singh, 1998). It is important to note that this argument is developed independent of assumptions regarding opportunistic behavior. Thus, even if parties to an exchange are presumed to act in good faith, members of one firm "may quite literally not understand what another firm wants from them" (Langlois & Foss, 1997). The general proposition is that firms exist because they are better than markets at creating, recombining, and transferring certain types of knowledge (e.g., Kogut & Zander, 1992).

Resources and Competitive Advantage

The vast majority of empirical literature in the resourced-based tradition has examined the performance implications of valuable, rare, and costly to imitate resources. As the value of a particular resource is context specific, this literature has demonstrated relationships between a wide range of resources and measures of performance. For instance, prior work has examined the competitive implications of competence in functional areas such as manufacturing (e.g., Pisano, 1994), technology development (e.g., Afuah, 2000), and marketing (e.g., Schoenecker & Cooper, 1998). Prior research has also examined the competitive implications associated with the ability to integrate knowledge across functional areas (e.g., Henderson & Cockburn, 1994) as well as the importance of maintaining an appropriate scope of resources (e.g., Brush & Artz, 1999). Still other work has studied how a firm's resources affect its ability to interact with suppliers (e.g., Lorenzoni & Lipparini, 1999) or

to engage in an alliance network (e.g., Baum & Berta, 1999; McEvily & Zaheer, 1999). Perhaps the greatest volume of work has focused on the importance of intangible resources such as reputation and culture (e.g., Hall, 1993; Rao, 1994). Miller and Shamsie (1996) suggest a potentially useful categorization of resource types in their study of the US movie industry where they propose a distinction between property- and knowledge-based resources.

The variety of resources analyzed in prior studies suggests the need to more carefully consider the relationship between specific categories of resources, product-market position, and competitive advantage (Priem & Butler, 2001). One recent approach to this problem has focused on the concept of resource immobility at a more fine-grained level by analyzing the barriers to internal and external knowledge transfer (e.g., Rivkin, 2001; Szulanski, 1996). An alternative approach has been examined in a recent paper by Nickerson, Hamilton and Wada (2001) which describes the performance implications of "fit" among strategic choices associated with market position, resource position, and organizational governance form.

Resources and Organizational Form

Empirical research has also examined the relationship between the possession of particular types of resources and organizational governance form. This work has provided evidence consistent with the proposition that highly specific resources and activities are most efficiently coordinated within firm hierarchies. For instance, Kogut and Zander (1993) have argued that firms are able to transfer knowledge that is difficult to understand and codify at a lower cost to wholly owned subsidiaries than to third parties. In a survey of project engineers, Zander and Kogut (1995) present results suggesting that the tacitness of manufacturing innovations affects the duration of time until they can be transferred to the market. Consistent with this view, a recent study by Almeida, Song and Grant (2002) presents evidence from the patent citations of semiconductor companies to suggest that multinational firms are more effective at transferring technological knowledge over both alliances and markets.

Real Options Analysis

Overview

Real Options Analysis has emerged as a compelling approach for evaluating investment opportunities in uncertain environments. The concept of real options analysis was proposed by Myers (1977) who applied format work on financial options to issues associated with capital budgeting and the allocation of R&D resources. Noting that some investment opportunities confer the right, but not the obligation, to take specific operating action in the future, this work emphasized the manner in which investments create economic value through operating flexibility. A broad variety of real options have been studied in the finance literature including the option to defer production, the option to temporarily shut down production, and the option to change a project's output mix (e.g., Majd & Pindyck, 1987; McDonald & Siegel, 1986; Trigeorgis, 1998). In the management literature, attention has been focused on corporate growth and flexibility options with notable studies examining aspects of entrepreneurial failure (McGrath, 1997), investment in joint ventures (Chi & McGuire, 1996;

Folta, 1998; Folta & Leiblein, 1994; Kogut, 1991; Reuer & Leiblein, 2000), market entry (Miller & Folta, 2000), and organizational governance (Leiblein & Miller, 2003). Trigeorgis (1998) and Copeland and Anitkarov (2001) provide recent reviews. Adner and Levinthal (2004) and McGrath, Ferrier, and Mendelow (2004) debate the boundaries associated with the application of real options theory to the field of management.

Two key insights underlie the application of Real Option theory to the field of strategic management. First, Real Option analysis recognizes that there are opportunity costs associated with irreversible investment under uncertainty. As a result, the ability to defer committing resources under uncertainty is valuable (e.g., McDonald & Siegel, 1986). Second, Real Option analysis recognizes that many investments create valuable follow-on investment opportunities, or growth options (Bowman & Hurry, 1993; Kester, 1981; Myers, 1984). Taken together, these insights suggest that certain up-front investments allow management to capitalize on favorable opportunities and mitigate negative shocks by proactively confronting uncertainty over time in a flexible fashion (Kogut, 1991) rather than by attempting to avoid uncertainty (e.g., Cyert & March, 1963). This managerial flexibility may be exploited when the firm receives new information regarding market demand, competitive conditions, the viability of new processes technologies, and so forth.

Primary Assumptions

Two key assumptions underlie the real option perspective. First, Real Options theory assumes that managers are able to write contracts that provide *implicit or explicit claims* on future, follow-on opportunities. This assumption implies that managers possess a level of foresight sufficient to engage in negotiation over the price and provisions associated with a call option, *ex ante*, that will mitigate *ex post* bargaining costs and opportunities for the seller to hold-up the buyer (e.g., Chi & McGuire, 1996). In order for the holder of an option to capture economic value, she must be able to create at least a preferential claim that allows her to benefit by exercising the option when uncertainty is resolved favorably and to limit downside risk by killing the option when uncertainty is resolved unfavorably. Second, Real Options theory assumes that, *a priori*, it is possible to *specify a distribution of expected returns* associated with an investment. This assumption implies that it is possible to develop estimates of the potential value associated with various options to abandon, defer, or increase investment along a particular investment trajectory. This assumption also implies a conception of uncertainty that is closer to Knight's (1921) concept of risk, where probabilities of potential outcomes are available to guide choice than uncertainty, where information is too imprecise to be adequately summarized by probabilities.

There are two important implications associated with these assumptions. First, a firm's value consists of two components—the present value of existing assets in place and the present value derived from the creation of discretional future opportunities—and the value of these two components is estimable (e.g., Miller & Modigliani, 1961). Second, the Real Options approach indicates that, for uncertain projects over which managers have discretion and can act flexibly, traditional techniques will often under-estimate value (Myers, 1977). The ability to flexibly update an investment plan conditional upon the arrival of new information is valuable and this value is not accounted for in traditional theories of investment or governance. These two implications are important for studies of corporate development

in general and organization governance in particular because they suggest that firms may choose governance structures in a dynamic fashion in anticipation of future opportunities.

Main Theoretical Predictions

The Real Option approach has been used to generate a number of predictions regarding the potential value associated with investments that provide the option holder with the ability to improve performance by expanding into attractive markets or technologies as well as the opportunity to contain downside risk by deferring investment, abandoning operations, and expanding or contracting activities. These real option arguments describe how firms may lay claim to future rent generating opportunities through current investments. This section draws on Leiblein and Miller (2003) to describe how option theoretic principles may influence the manner in which exchange and firm attributes may influence choice of organizational governance form.

The first and simplest means through which organizational governance decisions may create value is through the option to defer investment. When investments are irreversible, that is they cannot be fully recovered without incurring some costs, and the future value of these investments is uncertain, Real Options theory indicates that committing prematurely may impose considerable risks. In these situations, there is value associated with the *option of waiting* for new information that might affect the desirability or timing of the investment. The ability to delay or defer an irreversible investment can thus be an important source of flexibility (McDonald & Siegel, 1986; Pindyck, 1991) and the economic value associated with this flexibility may suggest deferring investment even if the static net present value associated with the project is positive. For instance, if integration of production entails greater sunk costs than production through market contracting, integration will expose the firm to the risk of owning assets that may turn out to have little value due to changes in either the underlying technology or product demand. Market contracting, in contrast, may incur greater short-term marginal production costs but provide the firm with the flexibility to pursue alternative technologies in the future. Real option theory recognizes the expected value associated with this latter flexibility and indicates that, under uncertainty, it may be optimal to utilize market like mechanisms that provide greater flexibility. The value associated with the option to defer is greatest when uncertainty is high and the immediate cash flows lost due to postponing investment are relatively small.

The second means through which Real Option analysis informs organizational governance decisions is through growth options. Growth options provide the firm with the right, but not the obligation, to later expand or develop a related product or technology. Growth options are particularly valuable in high-technology industries where there are often weak appropriability regimes and inter-generational knowledge spillovers are significant. In these contexts, it will often be desirable to internalize activities associated with early generations of a product or technology in order to maintain a claim on the opportunity to participate in subsequent generations of that product or technology. For instance, in the biotechnology industry, a firm will often have to invest in an internal pilot production process in order to develop the requisite expertise necessary to have the option to source or fabricate internally at scale production. Thus, even if it is possible to efficiently contract for production in the

marketplace, it may be optimal for the firm to internalize the transaction in order to maintain the option value associated with subsequent generations of the product.

Finally, the Real Option approach also helps describe how firm-level characteristics affect decisions regarding organizational form. A firm-level influence on governance is suggested by the Real Option theory predication that certain resources create economic value by providing the ability to flexibly switch use of assets. For instance, Kulatilaka and Trigeorgis (1994) describe how firms in industries with volatile product demand can benefit by investing in plant and equipment that allows them to alter their manufactured product-mix. However, other types of switching options may also be created. A firm's product-market diversification strategy may affect its governance choice between internal and outsourced production by altering its ability to achieve economies of scale and scope in production. For instance, a diversified firm is more likely to invest in a given process technology knowing that even if demand for the initial product fails to meet expectation, the manufacturing facility may be converted for use in one of its other product markets. Thus, product-market diversification provides a lower bound on the available scale a firm may use to justify internal investment in a given process technology. Similarly, and of greater importance in technologically volatile industries, diversified firms are able to continue utilizing a technology after it becomes obsolete in its primary product-market application by shifting its use to a less-demanding application.

Opportunities for Future Research

Questions for Debate

The summaries of the TCE, RBV, and Real Options literatures offered in the preceding sections describe the conditions under which it is possible to generate economic profits as well as how the alignment between an economic exchange and the chosen mode of governance affects the distribution of profits across firms involved in an exchange. As noted in these reviews, the three theoretical streams differ in their underlying assumptions (see also Silverman, 2001). These differing assumptions offer a fruitful set of questions for further debate.

Opportunism

The first issue for debate is one that has frequently been raised in the literature and concerns the assumption of opportunism. To what extent is the notion of opportunism necessary for a theory of organization? While there have been some critiques of transaction costs reliance on the concept of opportunism (Dondaldson, 1990; Ghoshal & Moran, 1996), resource-based scholars have generally argued that opportunism is simply not required for a theory of governance (Conner & Prahalad, 1996). For instance, one reason for hierarchical organization may be to achieve improved coordination between independent economic actors co-location. It has also been argued that relational contracting may lead to a level of "trust" that reduces the propensity for opportunistic behavior (e.g., Ring & Van de Ven, 1992) and acts as a substitute for more formal governance mechanisms. By assuming a world of perfect rationality and contracting with explicit claims on future opportunities, the real option framework also leaves little room for the notion of opportunism.

In summary, the existing literature offers a number of plausible explanations regarding the existence and relative importance of opportunism, coordination, and trust in determining organizational governance form. What is left is the difficult task of devising empirical studies that carefully disentangle the influence of these variables on governance choice either through the development of conflicting hypotheses or direct measurement of abstract concepts such as opportunism and trust. One promising avenue is suggested by Mayer and Bercovitz (2003). In a recent study of contracts in the information technology industry, they propose to test whether prior relationships provide a level of trust that reduces the need for more protective governance provisions (suggesting opportunism is of great concern) or whether prior relationships provide learning opportunities that allow transacting organizations to improve their bilateral coordination through more refined contractual provisions. While the results of this study vary with the measurement of prior relationship strength, their study is illustrative of the type of study that may help to inform this debate.

Resource Heterogeneity

The second issue for debate, the relative importance of resource heterogeneity, has also been subject to much discussion. Demsetz (1988, p. 147) and Winter (1988, p. 175) note that TCE suppresses differences in firms' capabilities in favor of a concern with incentives. Indeed, it has been argued that firms' governance choices are frequently driven by their ability to leverage unique capabilities (Bettis, Bradley & Hamel, 1992; Langlois & Foss, 1997; Quinn & Hilmer, 1994). The real option framework suggests that governance choices may also be shaped by firms' unique perceptions regarding future value generating opportunities. While Williamson (1998, 1999) and others recognize the value associated with embracing such resource and strategy heterogeneity, they also point out the simultaneous need to identify the conditions under which different resources are and are not valuable (e.g., Priem & Butler, 2001). As suggested below in the section "Leveraging Capabilities," the relative importance of transaction costs vis à vis current resources and investment stakes aimed at generating potential opportunities is ultimately an empirical question.

Role of Uncertainty

The third issue for debate involves the meaning and implication of uncertainty. In clarifying the role of uncertainty across each of these theories it may be helpful to recall Knight's (1921) distinction between risk and uncertainty wherein risk is considered measurable in terms of statistical probability distributions regarding an outcome or the consequences of an outcome, and uncertainty is defined as the lack of knowledge regarding future states of the world.

The distinction between risk and uncertainty provided by Knight and others provides two insights. First, the three approaches differ with respect to their relative emphasis on risk and uncertainty. For instance, while TCE is agnostic with regards to the distinction between these two conceptualizations, the RBV emphasizes how uncertainty regarding the value created by joining two or more economic activities leads to heterogeneous, costly-to-imitate resource profiles (Rumelt, 1984). In this view, all agents have access to the same, albeit incomplete, set of information and firms' choose governance structures in an effort to

access and develop potentially valuable resource bundles. In contrast, Real Options theory, at least in its strictest form, emphasizes the role of risk in its attempt to value the underlying distribution of future returns and follow-on opportunities associated with a particular investment. Second, the three theories differ in the importance they place on upside and downside outcomes. TCE emphasizes the downside associated with risk or uncertainty in describing how uncertainty in the presence of specific investment may lead to misappropriation or hold-up problems (Williamson, 1985). In contrast, both the RBV and RoA approaches emphasize the upside profit creating opportunities associated with uncertainty and risk. In the RBV, early bets made under uncertainty are thought to result in heterogeneous distribution of resources which provide sustainable sources of advantage. In the RoA approach, firms make investments subject to their prior beliefs regarding the distribution of potential payoffs. Indeed, the real options view of uncertainty may be linked to Penrose's (1959, p. 56) conception of uncertainty as the level of an entrepreneur's confidence in his estimates or expectations. These very different conceptualizations of uncertainty suggest a need for additional research which carefully examines the influence of different dimensions of uncertainty on both opportunism and current/future rent creation.

Directions for Integration

As empirical research exists which independently supports each of these perspectives, future advances are likely to require a coherent and systematic program that rigorously tests potential sources of integration between these theories of organizational form and performance. Langlois and Foss (1997) propose that joint application of the transaction cost and resource-based approaches may provide a more comprehensive analysis of organizations. Williamson (1998, 1999) suggests that additional insight is likely to be gained by improving our understanding how firm competencies and transactional characteristics jointly and interactively determine the optimal form of economic organization. Barney (1999) offers a series of rich examples that help to clarify the drivers of the cost of opportunism in the market and the cost of creating a resource within the firm. More recently, work has attempted to develop and test models that link and integrate concepts from these perspectives (e.g., Argyres & Liebeskind, 1999; Kogut & Kulatilaka, 2001; Leiblein & Miller, 2003; Jacobides & Winter, working paper)

The purpose of this section is to raise a series of specific questions that highlight opportunities for future research to empirically link the TCE, RBV, and Real Options approaches to organization. In deriving questions that point to potential linkages, it is interesting to note that managers face two interrelated problems when determining an optimal mode of economic organization. First, they must identify and assemble a bundle of resources that creates value. Second, they must decide how to capture value through the governance of this bundle of resources. Whereas the RBV and Real Options approaches provide insight into the former question, TCE can provide insight into the latter (e.g., Chi, 1994).

Path dependence and interdependence. At a basic level, the RBV and Real Options literatures suggests that TCE dominated views of organization may be extended by changing the level of analysis, both in terms of time and the transaction. The value of extending existing transaction-level analysis to include the effects of temporal and transactional dependence

has been acknowledged by Williamson. For instance, Williamson (1998, p. 43) describes how a firm's historical pre-commitments may create a level of inertia that locks it in to an existing organizational form. As a result, existing governance alternatives will often be preferred to new alternatives. The role of temporal path dependence also suggests a connection between TCE and the Real Options literature. TCE often assumes that the most important investments in exchange relationships are specific and "inflexible" in nature. As a result, these investments may not be modified over time based on the firm's experience. In contrast, the Real Options literature suggests that astute managers will purposefully alter their investment profiles in response to positive and negative shocks to the environment. Thus, for instance, a firm utilizing an options approach may be expected to exercise an option by shifting a moderate form of organizational such as a joint venture or alliance to a more hierarchical form of governance in response to the receipt of positive information. The long and extensive literature on inertia at the organizational level (e.g., Hannan & Freeman, 1977, 1984) suggests a number of ways in which this simple logic regarding the influence of history on governance choice may be extended.

A firm's governance choices may also be influenced by a firm's portfolio of contemporaneous exchange relationships. Argyres and Liebeskind (1999) introduce the notion of governance inseparability to describe situations where there are interdependencies between related governance decisions. In their model, the formal and informal commitments embedded in a firm's existing portfolio of contractual relationships alter the incentive structure of subsequent make or buy decisions. Thus, a firm's past and current governance decisions constrain the range and types of governance mechanisms that it can adopt in subsequent exchanges. To the extent that resources might fruitfully be operationalized as "clusters" of transactions, approaches that consider multiple transactions through some form of interdependence may facilitate the integration of TCE and RBV (Williamson, 1999).

Leveraging capabilities. The RBV and Real Options approaches may also be used to identify *a broader set of resources and investment opportunities that directly influence governance decisions in conjunction with existing transaction-level concerns*. For instance, Barney (1999) and Teece (1980, 1982) describe situations where a firm's governance decision may be influenced by its desire to exploit advantages in their expected cost of developing or acquiring capabilities. These additional considerations suggest the value in extending existing TCE-based models or organizational choice to include additional parameters that capture the potential influence of a firm's unique capabilities or follow-on opportunities may have on contemporaneous governance choices. While the relative variance explained by capability and transaction-level theories of governance choice remains an empirical issue, it is important to point out that extensions of this type do not alter the logic underlying either theory. Instead, bringing the theories together in this fashion merely points to an additional "shift parameter" (Oxley, 1999; Williamson, 1991) or complementary linkage between the approaches.

Empirical research is emerging which demonstrates the relative predictive power associated with variables intended to measure transaction-, resource-, and option-based effects. Argyres's (1996) case study of vertical integration decisions describes how firm-specific production capabilities and transaction cost concerns jointly affect governance decisions. Silverman (1999) indicates that while firms are more likely to diversify into industries where

their technological resource base is valued, the absence of market hazards reduces the likelihood of entry through firm governance and suggests that there are circumstances in which firms exploit their technological resources through contractual means. Leiblein and Miller's (2003) study of vertical integration decisions through transaction cost, resource-based, and real options lenses demonstrates the joint importance of transaction-specific characteristics as well as firm-specific production capabilities and options in the semiconductor industry. To the extent that the RBV and real options perspectives point out which assets should be joined to create value and TCE points out how these assets should best be governed, a joint approach promises to aid in the development of strategic management research.

Hazard mitigating capabilities. The RBV may further be used to develop arguments regarding the manner in which *resources and transactional-characteristics interactively affect governance choice*. For instance, the RBV may point to resources which provide "hazard mitigating capabilities" (Delios & Henisz, 2000) that allow firms to utilize market contracts in the presence of exchange hazards. Along these lines Barney and Hansen (1994) develop resource-based logic which suggests that firms with management teams that are better able to analyze complex environments are better able to anticipate contractual hazards and therefore more likely to utilize market-like forms of governance than there less well-endowed competitors. Reuer, Zollo and Singh (2002) develop a learning approach which suggests that prior interactions aid in the creation of contracting skills associated with the ability to craft more complete contracts, better negotiate market-based exchanges, and to improve monitoring and enforcement of contractual compliance.

Resource-based logic may also be developed which suggests that firms' which are better able to identify trustworthy partners or to develop a reputation for trustworthiness may mitigate concerns regarding opportunistic behavior and therefore be more likely to utilize market-like governance forms. Such trust has been tied to personal experiences between individuals that share a professional affiliation (e.g., von Hippel, 1988), institutional experiences that allow organizations in a particular field or industrial district to observe firms that have previously engaged in successful partnerships (e.g., Saxenian, 1990), as well as prior ties between firms (Gulati, 1995; Ring & Van de Ven, 1992). To the extent that trust mitigates opportunistic behavior, parties will tend to substitute relational governance for formal contracts (Dyer & Singh, 1998). As Gulati (1995, p. 93) succinctly concludes, "Where there is trust, people may choose not to rely upon detailed contracts to ensure predictability."

Coordinating mechanisms. The contention in the knowledge-based branch of the RBV that firm organization represents a social community specializing in the creation and transfer of tacit knowledge (e.g., Kogut & Zander, 1996) points to another possible means of integrating transaction- and firm-level theories of organization. Specifically, these two streams suggest that *the coordination mechanisms associated with various forms of organization mediate the relationship between exchange characteristics and governance choice*.

The knowledge-based view indicates that governance choice affects the ease with which knowledge may be created and transferred (e.g., Kogut & Zander, 1993). However, it has also been noted that the use of high-bandwidth communication channels and idiosyncratic communication codes affect the efficacy of knowledge creation and transfer (e.g., Arrow, 1974; Monteverde, 1995; Pelikan, 1969). The richer contextual cues and greater interaction pro-

vided by high-bandwidth communication channels such as face to face meetings, physical demonstrations facilitate the development and transfer of complex and uncertain knowledge to a greater extent than low-bandwidth channels such as e-mail, fax, letters, or phone calls where there is little emotional content, redundancy, or interactivity. Thus, exchanges which involve highly tacit and/or complex knowledge are facilitated by the high-bandwidth communication channels and idiosyncratic communication codes associated with firm organization. However, the specific nature of these same knowledge transfer mechanisms creates contracting hazards emphasized by TCE. Heiman and Nickerson (2002) have begun to develop logic consistent with this approach.

Organizational form and performance. In an emerging body of research, scholars are beginning to examine the performance implications of decisions regarding organizational form. TCE presumes that firms whose transactions are inappropriately aligned will suffer adverse performance consequences and eventually fail. Much of this work follows Anderson (1988), in examining the performance implications of the fit between firms' governance choices and a set of specific attributes of the transaction at hand. For instance, Poppo and Zenger (1998) examined the relationship between transactional misalignment and one dimension of performance, customer satisfaction, and found that managers become less satisfied with the cost, quality, and responsiveness of outsourced activities as these activities become more specific. Leiblein et al. (2002) examine the effects of transactional misalignment on the technological performance of firms active in the integrated circuit industry. Macher (Georgetown, working paper) and Sampson (NYU, working paper) provide evidence that transactional alignment improves manufacturing and R&D performance, respectively. In a study utilizing the 1980 deregulation of the trucking industry, Silverman et al. (1997) examined the mortality of large motor carriers in the US trucking industry and found that carriers which failed to align their capital structure with the normative prescriptions offered by extant transaction cost theory were more likely to fail than similar competitors who maintained alignment. Taken together, these studies suggest that future research would benefit from the construction of integrated models of firms' strategic choices as well as the drivers and performance implications of those choices. Moreover, these studies provide early evidence of the potential for studies which examine how firm-specific resources, growth options, and governance choice interact to affect firm performance.

Conclusion

This paper provides a survey of TCE, resource-based, and Real Options theories of the firm. As illustrated in the review, these three approaches are based on different assumptions regarding the nature of economic actors and the environment and provide different insights regarding the optimal nature of firm behavior. Each theory has undoubtedly been shaped by the economic environment in which it was first developed and, given their different stages of maturity, has been subject to a different degree of empirical scrutiny. Nevertheless, an exploration of the research on which these perspectives are based suggests a number of promising opportunities for research that pushes forward the frontiers of organizational economics and bridges it more concretely to other perspectives within organization theory.

In addition, the paper suggests three potential ways in which future empirical work may productively examine how the resources and investment opportunities identified by the RBV and Real Options approaches affect the relationship between exchange characteristics and governance choice identified by TCE.

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