THE ORGANIZATION AND PERFORMANCE IMPLICATIONS OF VERTICAL INTERFIRM EXCHANGES AT SMALL AND ENTREPRENEURIAL FIRMS

DISSERTATION

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By

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ABSTRACT

This dissertation aims to further advance our theoretical and empirical understandings of interfirm governance decisions among entrepreneurial or small firms and their large firm exchange partners. Entrepreneurial firms often establish relationships with large firm partners to gain access to critical resources. While these relationships can support the growth and even survival of the entrepreneurial firm, they can also present great risk if the large firm partner behaves in an opportunistic manner. Entrepreneurial firm managers must decide how to govern these relationships so the potential benefits can be realized and the risks minimized. Consisting of three related essays, this dissertation applies resource-based theory (RBT) and transaction cost economics (TCE) to empirically investigate the antecedents to and performance implications of exchange governance choice among entrepreneurial and small firms in exchanges with large firm partners.

The first essay develops and tests a model to provide simultaneous consideration of the benefits and costs associated with how entrepreneurial firms govern alliances with large partners. The empirical setting is alliances between entrepreneurial biotechnology firms and their large downstream partners. Primary and secondary data for this study was collected on 59 entrepreneurial firm-large firm dyads in a three-phase process.
The second essay presents a similar model and tests it using a sample of 365 relationships between small firms and their primary financial services supplier. Data for this study is taken from the Federal Reserve Board’s 1998 Survey of Small Business Finances (SSBF).

Whereas the first two essays analyze the antecedents to and performance consequences of one governance device in each interfirm relationship, the third essay examines the tradeoffs among multiple governance devices that firms bundle together. A total of 796 small firm-financial institution relationships from the SSBF are used in this study. The study examines the relationships and tradeoffs among five different governance devices to determine how they tend to be bundled into effective and efficient governance mechanisms. The performance implications and possible prioritization schemes of different governance device combinations are compared and discussed.
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Hypothesized relationships
CHAPTER 1

INTRODUCTION

The study of how firms design governance to organize vertical exchanges has interested organizational scholars for some time (Arrow, 1974; March & Simon, 1958; Mayer, Davis, & Schoorman, 1995; Rousseau, Sitkin, Burt, & Camerer, 1998; Williamson & Ouchi, 1981). The problem of governing an exchange between autonomous parties can be viewed as a problem of assembling governance devices to efficiently perform exchange-organizing tasks and maximize the productive value of the exchange. Beyond this general interest among organizational scholars, small business and entrepreneurship scholars have specifically sought to better understand the complexity of these firms’ governance design choices in exchanges with their large firm partners and how that governance choice affects the small and entrepreneurial firms’ emergence and growth (Alvarez & Barney, 2001; Fischer & Reuber, 2004; Pearce & Hatfield, 2002; Venkataraman, Van de Ven, Buckeye, & Hudson, 1990; Yli-Renko, Sapienza, & Hay, 2001). This interest is driven, at least in part, by studies of small and entrepreneurial firms that suggest managers at these firms may not see their governance interests reflected in the ultimate governance design employed in exchanges with larger and more dominant partners (Gopinath, 1995; Subramani & Venkatraman, 2003). This suggests small and entrepreneurial firms may represent a unique phenomenon because managers at
both firms in a vertical exchange are generally expected to have assessed and agreed on the governance design for their exchange.

Many scholars use transaction cost economics (TCE) to explain how managers determine the most efficient way to organize exchanges between firms. Based on assumptions of bounded rationality and opportunism, TCE suggests the optimal governance design for reducing incentive conflicts at the lowest cost can be determined from attributes of the exchange (Williamson, 1985). While empirical tests of TCE are largely supportive (David & Han, 2004; Shelanski & Klein, 1995), this approach overlooks the effects of firm-level heterogeneity (Williamson, 1999).

Other scholars account for the heterogeneous capabilities of exchange partners by using resource-based theory (RBT) in explanations of exchange governance choice. The literature using RBT to understand how firms organize economic exchanges has progressed in at least two streams. The first stream is the productive capabilities stream (Jacobides & Hitt, 2005). The theory developed in this literature is independent of TCE logic and does not require the opportunism assumption. This work is focused on how opportunities to create competitive advantage by exploiting unique firm-level productive capabilities affect governance choice (e.g., Barney, 1999; Combs & Ketchen, 1999; Jacobides & Hitt, 2005; Leiblein, 2003; Leiblein & Miller, 2003; Madhok, 2002; Poppo & Zenger, 1998).

Although TCE and RBT have largely been developed independent of one another, scholars are now beginning to consider the predictions of both theories – regarding the firm-specific and exchange-specific conditions that influence governance choice – together (Jacobides & Winter, 2004; Leiblein, 2003; Madhok, 2002). This approach has
potential to improve explanations of the small and entrepreneurial firm governance phenomenon described above. On one hand managers at entrepreneurial firms tend to choose the governance that best enables them to access complementary resources that will stabilize their firm as a player in its targeted markets (Eisenhardt & Schoonhoven, 1996; Larson & Starr, 1992). This phenomenon is best explained by the productive capabilities arguments based on RBT. On the other hand, exchanges with dominant partners can also present great risk because relying heavily on an alliance partner for critical resources often gives rise to small numbers bargaining that renders the entrepreneurial firm vulnerable to opportunistic behavior (Williamson, 1985). The argument that entrepreneurial firm managers evaluate governance choices based on the degree to which conditions of the exchange raise the potential for opportunistic behavior is consistent with transactions cost economics (Deeds & Hill, 1996; Yli-Renko et al., 2001). Combining these approaches contributes to this conversation among entrepreneurship scholars by acknowledging that entrepreneurial firm managers simultaneously balance threats of loss and opportunities for gain when making these strategic decisions (Poppo & Zenger, 1998).

Yet another stream of research in the study of how firms design governance to organize their vertical exchanges simultaneously examines the antecedents to governance choice and the relationship between that choice and exchange performance (Leiblein, Reuer, & Dalsace, 2002; Nickerson & Silverman, 2003). This work is primarily based on the hypothesis that exchange performance improves to the extent governance choice matches characteristics of the exchange.
Chapter 2 of this dissertation uses the combined TCE-productive capabilities lens together with the methods developed in the governance fit-performance literature to address two research questions. First, to what extent are entrepreneurial firms’ governance design interests addressed in their alliances with larger, more established partners? Second, what are the performance implications of this choice for an entrepreneurial firm that uses the appropriate governance for its situation? Adding RBT arguments about antecedents of governance choice to the often-tested TCE arguments this way logically extends the exchange performance hypothesis as well.

The second stream of literature that uses RBT in explaining exchange governance is the hazard-mitigating capabilities literature. The logic developed here accepts the opportunism assumption and adds firm-level attributes to the standard TCE logic (e.g., Argyres & Liebeskind, 1999; Barney & Hansen, 1994; Delios & Henisz, 2000; Dyer, 1996a; Foss & Foss, 2005). This extends TCE and, therefore, avoids criticism aimed at the productive capabilities stream from scholars who debate that a theory of economic organization cannot ignore the incentive problems that arise under conditions of opportunism (Foss, 1996; Mahoney, 2001). Hazard-mitigating capabilities enable a firm to reduce potential incentive alignment conflicts in an exchange arising from moral hazard and adverse-selection. Models developed in the hazard-mitigating capabilities literature generally start with transaction-level attributes and add firm-level attributes to capture the incremental explanatory power of hazard-mitigating capabilities in governance design decisions (e.g., Leiblein & Miller, 2003).

The study reported in chapter 3 combines the governance choice distinctions identified in the combined TCE-hazard-mitigating capabilities stream with the exchange
performance analysis made possible by the governance fit-performance stream. Similar to
the study reported in chapter 2, this study extends theory of exchange governance choice
and performance to address two questions specific to small firms. First, to what extent are
small firms’ governance design interests addressed in exchanges with their primary
suppliers? Second, what are the performance implications of governance choice for the
small firm that uses the appropriate governance for its situation?

Literature on the antecedents to and consequences of governance design choice
often examines one form of governance at a time (David & Han, 2004; Hennart, 1993;
Shelanski & Klein, 1995). For example, the governance design in empirical studies is
often constructed as a dichotomous choice of market (“buy”) versus hierarchy (“make”).
The studies reported in chapters 2 and 3 take this approach by predicting the use of equity
and explicit enforcement devices, respectively, as governance devices. A wide variety of
governance designs fall between any two extreme forms, however, and few scholars
argue that firms employ only one governance device at a time (Hennart, 1993; Hill, 1990;

A growing literature adopts this reasoning and uses organizational economics to
suggest firms employ various combinations of governance devices when designing a
governance bundle that fits the conditions of their exchange most efficiently. Some of the
governance devices explored to date that may be combined to form these bundles include
formal contracts (Joskow, 1988), trust (Arrow, 1974), hostages (Williamson, 1983), and
bargaining power (Gambetta, 1988; Klein, Crawford, & Alchian, 1978). Blomqvist,
Hurmelinna, & Seppanen (2005), for example, propose that because small firms are less
likely to possess contracting expertise they will supplement formal contracts with trust in
exchanges with large firms. Alvarez, Barney, and Bosse (2003) suggest that entrepreneurial firms often construct an interrelated bundle of governance devices to ensure the efficient and effective management of their exchanges with large firms.

While these studies help identify the tradeoffs between two or more governance devices, questions remain about how certain devices interact in a bundle to affect the performance of the exchange. The study reported in chapter 4 devises an approach to address these questions by associating each governance device with the exchange-organizing task(s) that it serves to perform. The exchange-organizing tasks that a governance design must perform include establishing, structuring, monitoring, adapting, and enforcing the exchange (Coase, 1937; Williamson, 1975, 1985). Chapter 4 identifies unique governance devices that are commonly used to address specific exchange-organizing tasks and builds testable hypotheses about governance bundle design by deductively reasoning how three-way interactions among certain exchange-organizing tasks likely affect the remaining tasks. This study addresses two research questions. First, how do relationships and trade-offs among multiple exchange-organizing tasks affect the way governance devices are bundled? Second, to what extent are the resulting bundles associated with differences in exchange performance? The study aims to contribute to theory by unpacking the governance design choice so managers and scholars can better understand how various governance devices are most efficiently bundled.
CHAPTER 2

DO ENTREPRENEURIAL FIRM MANAGERS GET WHAT THEY WANT OUT OF THEIR ALLIANCE GOVERNANCE DESIGNS? DOES IT MATTER?

Resource-based theory (RBT) emphasizes the importance of firm-specific resources and capabilities in guiding exchange governance choice (Leiblein, 2003; Madhok, 2002; Poppo & Zenger, 1998). Transaction cost economics (TCE) suggests that governance is chosen to reduce the threat of opportunism created by transaction specific investments made by parties to an exchange (Williamson, 1975, 1985). Although these theories have largely been developed independent of one another, scholars are now beginning to consider the predictions of both theories – regarding the firm-specific and exchange-specific conditions that influence governance choice – together (Jacobides & Winter, 2004; Madhok, 2002). Another stream of research has recently developed methods for examining the antecedents to governance choice and the relationship between that choice and exchange performance simultaneously (Leiblein & Miller, 2003; Nickerson & Silverman, 2003). This paper combines logic initiated in the former stream with insights from the latter stream in a specific empirical context: Governance choices made by entrepreneurial firms in alliances with larger and more established firms.

Developing these arguments and testing them in this setting serves two purposes. First, for many years scholars have sought to understand why entrepreneurial firms adopt
different modes of governance in exchanges with their large firm partners and how that governance choice affects an entrepreneurial firm’s emergence and growth (e.g., Alvarez & Barney, 2001; Fischer & Reuber, 2004; Pearce & Hatfield, 2002; Venkataraman, Van de Ven, Buckeye, & Hudson, 1990; Yli-Renko, Sapienza, & Hay, 2001). On one hand managers at entrepreneurial firms tend to choose the governance that best enables them to access complementary resources that will stabilize the entrepreneurial firm as a player in its targeted markets (Eisenhardt & Schoonhoven, 1996; Larson & Starr, 1992). This phenomenon is best explained by the productive capabilities arguments based on RBT. On the other hand, exchanges with dominant partners can also present great risk because relying heavily on an alliance partner for critical resources often gives rise to small numbers bargaining that renders the entrepreneurial firm vulnerable to opportunistic behavior (Williamson, 1985). The argument that entrepreneurial firm managers evaluate governance choices based on the degree to which conditions of the exchange raise the potential for opportunistic behavior is consistent with transactions cost economics (Deeds & Hill, 1996; Yli-Renko et al., 2001). Combining these approaches contributes to this conversation among entrepreneurship scholars by acknowledging that entrepreneurial firm managers simultaneously balance threats of loss and opportunities for gain when making these strategic decisions (Poppo & Zenger, 1998).

The second purpose served by developing and testing these arguments in this setting is that it provides a particularly rigorous test of the combined theory. Managers at both firms in an exchange are generally expected to assess and agree on the governance design they will use to organize their exchange. Studies of entrepreneurial firms, however, suggest their governance interests may not be reflected in the ultimate
governance design employed in exchanges with larger and more established partners (Subramani & Venkatraman, 2003). This often occurs when the entrepreneurial firm makes specific investments that have little or no salvage value outside the alliance giving the partner a controlling influence over governance design decisions (Fischer & Reuber, 2004; Christensen & Bower, 1996; Venkataraman et al., 1990; Yli-Renko et al., 2001). If this theory is not rejected in such a setting where it should be more difficult to detect, it passes a comparatively more rigorous test.

Structuring a joint RBT-TCE lens in this study promises to inform the governance choice and performance questions raised in the entrepreneurship literature. Specifically, this study is guided by two research questions: (1) to what extent are entrepreneurial firms’ governance design interests addressed in their alliances with larger, more established partners? and (2) what are the performance implications of this choice for an entrepreneurial firm that uses the appropriate governance for its situation? Using the entrepreneurial firm-large firm alliance setting provides a rigorous test of theory.

The rest of the paper is organized as follows. The next section provides a brief outline of RBT and TCE and presents a set of hypotheses. Rationale for testing these hypotheses in a sample of alliances between entrepreneurial biotechnology firms and their large firm partners is then provided. In the methods section the data, the measures, and empirical estimation procedures are described. Finally, the results and a discussion of their implications for research on interfirm relationships at entrepreneurial firms are presented.
2.1 Theory and hypotheses

2.1.1 Resource-based theory and technical innovation capability

Resource-based theory suggests that inimitable firm heterogeneity, or the possession of unique resources or capabilities, is an important source of firm growth and survival (Barney, 1986; Lippman & Rumelt, 1982; Peteraf, 1993). For a firm’s resources or capabilities to generate these benefits they must meet three conditions: they must be heterogeneously distributed within the industry; they must be impossible to buy or sell in the available factor markets at less than their true marginal value; and they must be difficult or costly to replicate (Barney, 1986; Henderson & Cockburn, 1994; Peteraf, 1993). Several authors have suggested that unique capabilities in research and development – that is, technical innovation capabilities – are particularly likely sources of competitive advantage because they reflect complex, tacit knowledge of how to recombine resources to generate economic value (Henderson & Cockburn, 1994; Nelson, 1991).

For the purpose of this study entrepreneurial firms are firms seeking to generate and appropriate economic value by forming unique combinations of resources in an uncertain environment (Rumelt, 1987; Venkataraman, 1997). It follows that possessing a unique capability in research and development to facilitate new technical innovations is often critical to the performance and survival of entrepreneurial firms (Rangone, 1999). Possessing this capability, however, is not enough to guarantee entrepreneurial firm survival and growth. In fact, entrepreneurial firms that have technical innovation capabilities often lack other resources and capabilities they need to commercialize their innovations (Eisenhardt & Schoonhoven, 1996). One way entrepreneurial firms can...
compensate for this lack of resources is by seeking alliances with partners that have complementary resources. The partners provide access to complementary resources that are critical to successful commercialization such as customer relationships, marketing and distribution infrastructure, research and production facilities, and financial capital. When entrepreneurial and other firms control these types of complementary resources they often seek to create economic value by forming strategic alliances (Alvarez & Barney, 2001; Baum, Calabrese, & Silverman, 2000; Deeds & Hill, 1996; Mitchell & Singh, 1996).

How entrepreneurial firms govern these alliances is important to their subsequent performance (Alvarez & Barney, 2001; Fischer & Reuber, 2004; Pearce & Hatfield, 2002; Venkataraman et al., 1990; Yli-Renko et al., 2001). The productive capabilities logic of RBT suggests managers will consider the extent of their firm-specific resources and capabilities when deciding how to govern interfirm relationships (Leiblein, 2003; Williamson, 1999). Accordingly, entrepreneurial firm managers can be expected to take their firm’s technical innovation capability into consideration when choosing how to organize an alliance (Eisenhardt & Schoonhoven, 1996). The greater its technical innovation capability, the more value the entrepreneurial firm stands to generate by commercializing its innovations and, therefore, the more appealing the firm will be to potential alliance partners.

Prior research has distinguished among alliance governance forms according to whether or not they involve the exchange of equity (e.g., Gulati & Singh, 1998; Osborn & Baughn, 1990). Building on this work, the governance choice examined in this study is whether or not the entrepreneurial firm sells any of its equity to its large firm alliance
partner. This is fitting given entrepreneurial firms often sell equity to a larger partner as part of their alliance governance design (Alvarez & Barney, 2001).

RBT argues equity alliances can foster knowledge development and transfer by establishing interfirm communication channels, shared language, and routines (Grant, 1996; Kogut & Zander, 1996). These benefits can be important when an entrepreneurial firm and its alliance partner need to develop and share complex, tacit knowledge in order to commercialize the entrepreneurial firm’s technical innovations (Alvarez & Barney, 2004). However, selling equity is not the only way an entrepreneurial firm can organize an alliance when its objective is to commercialize innovations.

An entrepreneurial firm that is especially attractive to potential large firm alliance partners may seek to govern its alliance without selling equity to its partner. This is because selling equity can be a relatively costly form of governance, and like other governance devices, the decision to use equity is justified only when the expected benefits of using it outweigh the costs of using it (Williamson, 1985). Selling equity can be a relatively expensive form of governance because it generally requires elaborate legal and financial negotiations not required when firms use other governance devices (Gulati & Singh, 1997; Myers, 2000; Oxley, 1997). Furthermore, an alliance partner that holds a block of equity in an entrepreneurial firm typically holds board seats at that firm (Chi, 1994; Pisano, 1989) and actively participates in setting direction for the firm by influencing senior management (Lerner, 1995). When the value of the entrepreneurial firm is closely tied to the specific knowledge of the founding team, limiting an alliance partner’s potential influence over the firm may increase overall firm value (Hart, 1995; Myers, 2000). The implication for governance choice is that when multiple potential
alliance partners are competing for access to an entrepreneurial firm’s technical innovation capability, that entrepreneurial firm may be less likely to sell equity in order to organize its alliance.

_Hypothesis 1:_ When an entrepreneurial firm has greater technical innovation capability it will not seek to govern the alliance by selling equity to its partner.

2.1.2 Transaction cost economics and opportunistic behavior

The RBT argument presented here predicts differences in productive firm capabilities are important to exchange governance decisions. TCE provides a different framework for explaining how firms make governance choices. According to TCE, the attributes of the exchange can suggest the optimal form of governance for the parties involved. TCE theory focuses on the appropriation concerns in exchanges that result from behavioral uncertainty and contracting problems. The optimal choice is based on which governance form will be the lowest cost yet will effectively minimize the threat that exchange partners will be unfairly exploited in the exchange (Williamson, 1975, 1985).

TCE argues the objective when designing governance is to create a combination of governance devices that together address the tasks required to organize an exchange (Coase, 1937; Williamson, 1975, 1985). This study focuses on two of those tasks, designing the incentive system and monitoring, that can serve to minimize exchange hazards that can arise due to opportunism. An incentive system design that minimizes threats of opportunism is one that aligns the behavior of parties in the exchange. When their incentives are aligned the potential rewards to each party encourage them to act in ways that ultimately benefit both parties. Having aligned incentives means parties that act in ways that maximize their individual rewards also maximizes their joint rewards. The
task of monitoring enables the parties to determine the extent to which the performance of the agreement is progressing as planned (Ouchi, 1979). Parties monitor each other by communicating about their respective behavior or output. Monitoring reduces threats of opportunism by making such behavior easier to recognize and address in a timely manner.

The exchange of equity is often used to distinguish among governance designs in studies derived from TCE (e.g., Oxley, 1997). In the context of this study, it is assumed that the entrepreneurial firm is not in a position to purchase significant equity in its large firm partner, but selling its own equity can help it overcome critical resource deficiencies. Selling equity to an alliance partner serves to both align the parties’ incentives and establish a monitoring device (Leiblein & Macher, working paper). When both parties share ownership in the entrepreneurial firm they share in the residual gains and losses of that firm. This aligns their incentives. Sharing equity typically improves monitoring by restructuring the entrepreneurial firm’s board to include representatives from the alliance partner firm (Chi, 1994; Pisano, 1989). Alliances that do not include an exchange of equity provide comparatively less protection against exchange hazards because they do not enjoy the incentive alignment and monitoring benefits of shared equity.

When an entrepreneurial firm expects its alliance partner to behave opportunistically, TCE predicts it will choose to sell equity to that partner as part of the governance design to mitigate that risk (Williamson, 1975; 1985). Again, selling equity can be a relatively expensive way to govern an alliance for an entrepreneurial firm so it is only likely to use this device when it perceives a legitimate threat of opportunism from its partner.
Hypothesis 2: When an entrepreneurial firm perceives greater threat of opportunism it will seek to govern the alliance by selling equity to its partner.

2.1.3 RBT, TCE, and partner dominance

Alliances between entrepreneurial firms and large firm partners that are formed to combine complementary but different resources and capabilities often involve relationship-specific investments. Relationship-specific investments are investments that have more value in a particular exchange relationship than in alternative exchange relationships. For example, when an entrepreneurial firm draws on a partner’s customer access resources to reach customers, and does so in a way that reduces the amount of time and money required for marketing activities, it often develops specialized routines to facilitate coordination and knowledge transfer between its technical experts and the product market experts at the partner firm. These interfirm routines, which generally emerge in path-dependent and socially complex ways, become strategic capabilities valuable only in the focal interfirm relationship. Developing such routines represents relationship-specific investments.

RBT and TCE both predict that when firms make relationship-specific investments in their exchange partners they are more likely to use equity in the exchange governance. RBT suggests that specific investments increase a firm’s ability to generate economic profits because these investments can often be valuable, rare, costly-to-imitate and non-substitutable (Barney, 1991). Using equity in the governance design is encouraged to facilitate interfirm knowledge development and transfer in this situation. TCE holds that specific investments increase the threat that a firm’s partner will behave opportunistically because it creates the potential for hold up (Williamson, 1975, 1985).
Using equity in the governance design is encouraged to reduce hazards by aligning incentives and facilitating improved monitoring. Linking RBT and TCE through the relationship-specific investment construct enables researchers to leverage the complementary analyses of how firm attributes and exchange attributes relate to governance choice.

Exchange partner dominance is one possible outcome of relationship-specific investment. Following Fischer and Reuber (2004), in this study it is recognized that there is more than one way in which an alliance partner can dominate an entrepreneurial firm. The first type of dominance explored in this study is customer access dominance. Customer access dominance is defined here as the proportion of the entrepreneurial firm’s customers that are provided by the alliance partner. Entrepreneurial firms in high-technology industries, in particular, often form alliances with established firms because they possess complementary resources and capabilities for accessing customers (Alvarez & Barney, 2001; Eisenhardt & Schoonhoven, 1996). As an alliance partner provides access to a larger proportion of an entrepreneurial firm’s customers, the entrepreneurial firm typically makes more specific investment in the relationship with that partner. Developing resources to access customers when commercializing a new product either requires specific investment at the outset or becomes specific over time because the utility and value of the new product is not easily reproducible with other routines for accessing customers (Mitchell & Singh, 1996). Thus, as its partner’s customer access dominance increases an entrepreneurial firm will be more likely to use equity in the governance design.
Hypothesis 3a: When its alliance partner has greater customer access dominance an entrepreneurial firm will seek to govern the alliance by selling equity to its partner.

The second type of alliance partner dominance explored in this study is financial dominance. Entrepreneurial firms that possess technical innovation capabilities often require financial capital from outside sources to commercialize their new products. Because entrepreneurial firms combine resources in new ways, they must find financial capital providers that understand how the entrepreneurial firm will use the funds, how long it could be before the funds can be repaid, and the amount of risk they are taking. Developing this level of understanding and tolerance in a financial capital provider often requires the entrepreneurial firm to make relationship-specific investment. This is because the partner generally must be taught about the entrepreneurial firm’s specific cash needs and how to evaluate, and wait for, payoffs far in the future. For the purpose of this study financial dominance is defined as the proportion of the entrepreneurial firm’s total capital that is provided by its alliance partner. Following the same logic established above, as its partner’s financial dominance increases an entrepreneurial firm will be more likely to use equity in the governance design.

Hypothesis 3b: When its alliance partner has greater financial dominance an entrepreneurial firm will seek to govern the alliance by selling equity to its partner.

2.1.4 Performance implications of governance choice

In addition to the similar predictions made by RBT and TCE regarding how alliance partner dominance will affect governance choice at entrepreneurial firms, these
theories make similar predictions of how governance choice will affect alliance performance. The common prediction shared by both perspectives is that alliance performance will improve to the extent that the governance choice matches the characteristics of the firms (RBT) and of the exchange (TCE). Thus, as these firm- and exchange-based characteristics evolve over time, firms adapt their governance choices to ensure they provide the appropriate amounts of interfirm productive capability development and opportunism mitigation at the minimum cost.

RBT logic suggests that firms learn how to govern their alliances over time and will therefore update their governance choices to maximize alliance performance (Dyer & Singh, 1998). Several authors (e.g., Mayer & Argyres, 2004; Ring & van de Ven, 1994) have emphasized that with enough time and effort alliance partners can create the optimal governance to realize the true value of their relationship. TCE makes a similar argument based on different logic. TCE suggests competitive pressure pushes firms to revise governance forms that do not fit the current exchange characteristics. This argument, referred to as the discriminating alignment hypothesis, is that governance choice adapts to changing exchange characteristics so that “transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competence, so as to affect an economizing result” (Williamson, 1999: 1090). Based on the reasoning provided by these theories, it follows that the performance implications of governance choice should hinge upon the fit or alignment between the chosen governance form and the attributes of the firm and the exchange. Governance misfit, or the degree to which a firm’s governance choice deviates from RBT and TCE prescriptions, should have negative performance implications.
While the arguments above relate governance choice to *alliance performance*, this study examines the relationship between governance choice and *entrepreneurial firm performance*. The purpose for this is grounded in the motivating questions about how entrepreneurial firms manage tradeoffs associated with alliance partners and is supported in the literature. Entrepreneurial firms generally form alliances with large firm partners to obtain resources necessary for their growth strategies. Several studies have found a link between alliance performance and firm performance (e.g., Baum & Oliver, 1991; Deeds & Hill, 1996; Uzzi, 1996). More specifically, alliances “contribute more to the overall performance of small firms than they do for large firms” (Sarkar, Echambadi, & Harrison, 2001: 708). Even more directly, Venkataraman, et al. (1990) found that entrepreneurial firms leverage relationships with complementary partners to overcome liabilities of age and size, and that failure of those leveraged relationships explain entrepreneurial firm failure.

**Hypothesis 4:** *Governance misfit in the alliance is negatively related to an entrepreneurial firm’s performance.*

Figure 2.1 presents a graphical representation of the relationships hypothesized in this study.

### 2.2 Methods

#### 2.2.1 Industry setting

The biotechnology industry provides an ideal empirical setting for this study because alliances between entrepreneurial firms and larger, potentially dominant firms are generally considered an important element of firm strategy in the biotechnology industry (Fisher, 1996; Kale, Dyer, & Singh, 2002). Further, prior research has found
empirical evidence that an entrepreneurial biotechnology firm’s strategic alliances can be a significant predictor of its performance (Alvarez & Barney, 2001; Baum et al., 2000; Deeds & Hill, 1996). It has also been found that these entrepreneurial biotechnology firms often feel unfairly exploited by their larger firm alliance partners (Alvarez & Barney, 2001). In this setting, decisions at an entrepreneurial firm about how to govern its alliances with a large firm partner may have an important impact on the long-term performance of the entrepreneurial firm.

2.2.2 Data

Given the research questions driving this study, it was necessary to collect data on those entrepreneurial firms that were actually engaged in an alliance with a large firm. The data collection was conducted in three phases. In the first phase, interviews were conducted with managers in four young biotechnology firms engaged in alliances with a large partner. Directors of Business Development were identified as key informants at each firm after these interviews suggested that they held the predominant responsibility for determining governance arrangements for strategic alliances. The findings from these interviews were used to develop and pre-test a survey.

The second phase of data collection was to execute the survey developed in phase one. A survey methodology was employed to collect data for certain independent variables that are not available through secondary sources such as alliance governance form, customer access dominance, and opportunistic behavior. All U.S. publicly traded biotechnology companies with fewer than 100 employees in 1995 were sent a survey in 1996. These firms were identified using Health Care Atlas, Acquisition, Technology Transfer, and Sources of Capital Directory, 1996. A single-informant methodology was
used because few individuals were knowledgeable about relationship governance and performance (Podsakoff & Organ, 1986). These managers were all directly involved in creating and or managing these firms' alliance strategies.

The method utilized to develop the final survey is similar to Geringer (1998) and Parkhe (1993), and its development and administration followed the “total design approach” advocated by Dillman (1978). A cover letter, return stamped-envelope, and survey were addressed and mailed to the Directors of Business Development for each company sampled. The selection of Directors of Business Development increased the likelihood that those completing the survey were knowledgeable about their firm’s alliance experience (Kumar, Stern, & Anderson, 1993).

A total of 236 surveys were mailed; 83 surveys were returned. Of these, three were returned blank, eight indicated that their firm had not pursued any alliances with large firms, and 72 indicated that their firm had pursued an alliance with a large firm. Since the number of the 236 firms in the original sample pursuing alliances with a large firm is not known, an exact response rate cannot be calculated for this study. However, this response rate can be no less than 31.6% (72 firms pursuing at least one alliance that returned a survey/236 total firms – 8 firms that were not pursuing any alliances with large firms). This minimum sample return is consistent with the 30 – 35% response rate that was expected (Milliken, 1990).

Non-response bias was evaluated by comparing early respondents (first half) with late respondents (second half) following Armstrong and Overton (1977) under the

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1 Since these managers were reluctant to share the identity of their alliance partner beyond a general description, a dyadically matched supplier-side data collection was not attempted.
assumption that late respondents are more similar to non-respondents than early respondents are to non-respondents. Two-sample t-tests on all of the variables in this study indicated that early and late respondents do not differ from one another. This suggests there is little evidence of non-response bias for the study.

Although 72 firms returned surveys and indicated that they had alliances with large firm partners, 13 of those firms’ surveys were missing data on at least one question used in the study. This reduced the number of firm observations with complete data to 59. The fine grain provided by this carefully constructed smaller sample complements this study, and the models used (described below) provide sufficient statistical power based on the low number of theoretical controls required (Russo & Harrison, 2005).

The third phase of data collection involved acquiring secondary data publicly available on each firm that responded to the survey in phase two. Data for calculating the dependent variable for firm performance and the remaining components of the independent variables were collected from the CRSP/COMPUSTAT merged database and the NBER Patent Citation Data File (Hall, Jaffe, & Tratjenberg, 2001). The market value of the firm's common equity and the accounting information required to calculate firm performance were gathered from the CRSP/COMPUSTAT merged database at the end of the firm’s 1996 fiscal year. R&D expenses were collected and depreciated for each year the firm had been public. The R&D expense information utilized in computing firm performance was also collected from the CRSP/COMPUSTAT merged database. The data required to compute each firm’s technical innovation capability was collected from the NBER Patent Citation Data File (Hall et al., 2001).
2.2.3 Dependent variables

Firm performance – The logic of using entrepreneurial firm performance as the dependent variable in this study required a measure that would objectively capture the consequences of alliance governance choice. Entrepreneurial firm performance was therefore measured by calculating market value added (MVA) (Stewart, 1991). MVA captures the market’s forward-looking assessment of firm value and uses it to provide a more precise economic valuation of the firm than is possible using accounting figures alone. It represents the cumulative measure of the stock market's assessment at a particular time of the net present value of all of a company's past and planned capital projects (Stewart, 1991). In biotech the market commonly uses alliance announcements as signs of volatility in entrepreneurial firms’ values. Thus, MVA is a market-based measure of the amount of wealth created by the firm and reflects the market’s assessment of any alliance activity at the firm.

MVA is calculated by taking the difference between the firm’s market value and the capital employed by the firm. The formula for MVA is \( MVA_t = MV_t - C_t \), where \( MVA_t \) is Market Value Added at time \( t \), \( MV_t \) is Market Value of the firm at time \( t \), and \( C_t \) is Value of the Capital Invested in the firm at time \( t \).

In this study, the common log of MVA is measured at the firm’s 1996 fiscal year end so that it coincides with the time period in which the survey data was collected. The firm’s market value (\( MV_t \)) is the actual market value of the firm’s common equity plus the book value of preferred stock, minority interests, long-term non-interest-bearing liabilities, all interest-bearing liabilities, and the present value of all non-capitalized leases. The capital employed by the firm (\( C_t \)) is the firm’s assets less non-interest-bearing...
current liabilities plus certain equity equivalent accounting reserves (bad debt, LIFO, goodwill amortization, R&D, unusual losses). In the case of biotechnology companies, it is important to adjust this figure by adding depreciated R&D to the capital employed (Deeds, DeCarolis, & Coombs, 1998). Investment in R&D is depreciated at a rate of 20% per year. This is added into total capital because in an economic sense it represents investments by the organization and therefore should be considered part of the capital employed by the firm.

Governance form – Alliance governance forms have been distinguished in the literature according to whether or not they involve the use of equity (e.g., Gulati & Singh, 1998; Osborn & Baughn, 1990; Oxley, 1997). Non-equity relationships are those in which the entrepreneurial firm and its partner exchange resources (e.g., financial capital, access to market channels, managerial expertise, technical knowledge, etc.) but not equity. The non-equity form represents a less costly form of governance when compared to the equity form (Gulati & Singh, 1998). The use of equity as a governance form in this study occurs when the alliance partner provides resources in exchange for an equity stake in the entrepreneurial biotechnology firm. Governance form in this study is equal to zero for non-equity governance and is equal to one for equity governance. Of the 59 firms in this study, 28 used equity and 31 used non-equity governance in their alliance.

2.2.4 Independent variables

Technical Innovation Capability – Entrepreneurial firms are typically the vehicles for new technical innovation in the biotechnology industry. These firms tend to form alliances with larger established firms in order to access their product market and financial resources. Ninety-five percent of the firms in this sample indicated they had
formed the alliance as part of their growth strategy. The large firms, in turn, seek alliances as a way to access the Technical Innovation Capability of entrepreneurial firms. For the purpose of this study, Technical Innovation Capability is measured by computing each firm’s citation-weighted patent stock. Citation-weighted patent stock gives a more useful basis upon which to judge the economic value of a high-technology firm’s R&D capability compared to either R&D expenditures or a simple patent count (Hall et al., 2004; Hirschey, Richardson, & Scholz, 2001). The citation-weighted patent stock calculation incorporates scientific information on the quality of patents by capturing how often a firm’s patents are cited in subsequent patent applications, relative to the typical pace of patent citations. An alternative measure, the value of the firm’s R&D expenditures, tends to be limited in the case of rapidly changing technological environments (Hirschey et al., 2001). The formula for calculating the citation-weighted patent stock at a point in time is: \( K_t = (1 - \delta) K_{t-1} + I_t \) where \( K_t \) is knowledge stock at end of period \( t \), \( I_t \) is the flow of patent citations during \( t \), and \( \delta \) is the depreciation rate of \( K \), set = 15%. In this study, Technical Innovation Capability was computed by summing the citation-weighted patent stock for every year the entrepreneurial firm existed through 1996.

Customer Access Dominance – For the purpose of this study, Customer Access Dominance is defined as the proportion of the entrepreneurial firm’s customers that are provided by its partner. The information used to construct this variable comes from three survey questions.

Q1 What percent of your customers is attributable to this alliance?
Q2 What are the financial savings to your firm in reaching your customers through your alliance compared to gaining access to your customers alone? Let 100% reduce your costs to zero, and let 0% represent no financial savings.

Q3 What are the approximate time savings to your firm in reaching your customers through your alliance compared to gaining access to your customers alone? Let 100% reduce your time to zero, and let 0% represent no time savings at all.

A factor analysis was performed to reduce these three questions into one factor so that the factor score could then be used as a valid measure of Customer Access Dominance. This measure appears to have strong face validity as these three questions capture the proportion of customers as well as the out-of-pocket cost savings and time savings the entrepreneurial firm accessed through its partner. The measure captures the proportion of the entrepreneurial firm’s customer access resources that would have to be replaced if the alliance partner were to withdraw. The factor loadings of 0.833 or larger suggest these three questions are all closely associated with each other. Table 2.1 shows the results of the factor analysis after varimax rotation.

Financial Dominance – For the purpose of this study, Financial Dominance is defined as the proportion of the entrepreneurial firm’s total capital provided by its alliance partner. Financial capital can be in the form of debt, grants, or equity. Financial Dominance was computed by dividing the dollar amount of financing provided by the partner (captured via the survey) by the total capital employed by the entrepreneurial firm ($C_t$). The total capital employed by the firm ($C_t$) is described above as a component of the MVA calculation. This Financial Dominance measure captures the proportion of the
entrepreneurial firm’s financial resources that would have to be replaced if the partner were to withdraw from the relationship.\(^2\)

*Opportunistic Behavior* – TCE suggests that the threat of opportunistic behavior in an exchange should be considered when deciding governance form. Williamson (1975) defined opportunistic behavior as self-interest seeking with guile. In this study, *Opportunistic Behavior* is measured with two survey questions.

Q4 To what extent does your alliance partner engage in self-interested behavior at the expense of the overall alliance?

Q5 To what extent is your alliance characterized by the potential for retribution or tit-for-tat behavior?

A factor analysis was performed to reduce these two questions into one factor so that the factor score could then be used as a valid measure of opportunistic behavior. This measure appears to have strong face validity as these two questions capture the entrepreneurial firm’s perception of the degree to which its partner is self-interest seeking in this alliance (Williamson, 1985). A varimax rotation was performed for ease of interpretation in an analysis that included the only other survey-based, multi-item variable – *Customer Access Dominance* (defined above) – and explained 74.2% of overall variance. The two opportunism questions loaded together with loadings exceeding 0.855 indicating close association with each other. Table 2.1 shows the variables loading on the two factors after the varimax rotation.

\(^2\) This measure of financial dominance is not a measure of ownership proportion and, therefore, is not an alternative measure for the governance choice variable. For example, three entrepreneurial firms in this sample provided equity in exchange for non-financial resources from their alliance partner. Furthermore, nine entrepreneurial firms that did not exchange equity have financial dominance greater than zero.
Governance Misfit – Hypothesis four suggests that entrepreneurial firm performance is influenced by the degree to which its alliance is appropriately governed. To test this hypothesis, Governance Misfit measures the degree to which a firm’s governance choice deviates from RBT and TCE prescriptions. This variable captures the probability that another governance form is more appropriate considering both the value creation potential based on firm-specific characteristics (RBT logic) and the contractual hazards based on characteristics of the exchange (TCE logic). The method for computing this variable follows Anderson (1988), Silverman, Nickerson, & Freeman (1997), and Leiblein, Reuer, & Dalsace (2002). The first step in creating this variable is to estimate the most likely value for Governance Form (Equity) using a probit model that includes proxies for variables that, according to RBT and TCE, should affect a firm’s governance decision. The probit model is: \( \text{Prob}(Y_i = 1) = \Phi(\beta'X_i) \) where \( Y_i \) is the governance choice variable for the \( i \)th observation, \( X_i \) is a vector of characteristics describing the firm and the exchange that are believed to predict governance choice, \( \beta \) is a vector of estimated coefficients for these characteristics, and \( \Phi(\cdot) \) is the standard normal cumulative distribution function. The degree of Governance Misfit is then defined as \( 1 - \Phi(\beta'X_i) \) when Governance Form (Equity) is equal to one (i.e., when the alliance is governed with equity) and as \( \Phi(\beta'X_i) \) when Governance Form (Equity) is equal to zero (i.e., when equity is not used). The interpretation of Governance Misfit is that it captures the probability that too much governance is employed for alliances that are governed with equity and the probability that too little governance is employed for alliances that are governed without equity (Leiblein et al., 2002).
The vector of characteristics describing the firm and the alliance that are believed to predict governance choice in the first stage probit model ($X_i$) include *Opportunism*, *Market Dominance*, *Financial Dominance*, and *Technical Innovation Capability* plus *Relationship Age* (defined below) which is used as a control variable.

### 2.2.5 Control variables

*Relationship Age* – In addition to the theoretically driven variables defined above, other relationship-specific characteristics may influence the results of this analysis. Specifically, Reuer and Arino (2002) found that firms tend to change the governance form used in their alliances when a misalignment exists between the chosen governance form and features of the exchange. Firms can be expected to improve governance alignment (i.e., reduce *Governance Misfit*) as their relationships age. Thus, *Relationship Age* is used in the first stage of this study to control for this influence on *Governance Form*. In addition, Deeds and Rothaermel (2003) found that the age of an entrepreneurial biotechnology firm’s alliance is correlated with the performance of the alliance. *Relationship age* is, accordingly, used as a control variable in the second stage of this study that predicts performance. *Relationship Age* is measured in years and is available from the survey.

*Technical Innovation Capability* – RBT explains conditions under which firms generate superior economic performance. In the context of alliances, resources and capabilities that fit these conditions can be used to predict governance choice (as reasoned above). RBT theory can also be used to predict direct relationships between these resources and capabilities and firm performance. For example, several authors have used RBT to hypothesize a positive relationship between technical innovation capability
and entrepreneurial firm performance (e.g., DeCarolis & Deeds, 1999; Deeds, DeCarolis, & Coombs, 1997, 1998; Rangone, 1999). Accordingly, Technical Innovation Capability is used as a control variable in the second stage of this study to help isolate the relationship between governance misfit and firm performance.

*Customer Access Dominance and Financial Dominance* – The relationship-specific investments that result in customer access dominance and financial dominance discussed above also fit the conditions of resources that can support superior economic performance per the RBT. The specialized routines that emerge to coordinate the synergistic activities of technical experts at the entrepreneurial firm and product market experts at the large firm are often valuable, rare, and difficult-to-imitate. Similarly, the unique expectations and agreements that emerge in regards to specialized capital investments from the large firm partner also fit those characteristics. RBT logic suggests that as the level of dominance (both customer access dominance and financial dominance) increases, entrepreneurial firm performance will also increase. These two constructs are therefore included as control variables in the second stage of this study.

Table 2.2 shows means, standard deviations, and correlations among the explanatory variables.

**2.2.6 Analytical methods**

Addressing the research questions in this study raises two research design issues that must be controlled. First, when an independent variable in a performance model is a choice variable, other unobserved variables are potentially correlated with the error term. This endogeneity bias would be a problem in this study if Governance Form (Equity) were used directly in the model. This study controls for endogeneity by using probit
analysis in a propensity score matching technique to construct *Governance Misfit*. This construct accounts for as much of the observable differences across firms that adopt different governance choices as possible (Rosenbaum & Rubin, 1984).

The second research design issue arises because the second research question requires a comparative analysis. That is, it is important to compare the performance implications of the governance form chosen to governance forms not chosen. This raises a complication as performance is only observed for the governance form the firms chose. The performance associated with the governance form the firms did not choose is not observed. Thus, researchers must control for this sample selection bias to comment on the comparative difference of governance choices on performance (Masten, 1993; Poppo & Zenger, 1998). Tests that do not address this problem can produce biased results if governance choice is not random (Leiblein et al., 2002). This study uses a two-stage modeling approach to control for sample selection bias (Masten, 1993; Poppo & Zenger, 1998). The first stage estimates the influence of various characteristics on alliance governance using a dichotomous model that correlates the explanatory variables with the governance decision. This stage allows for measurement of the relative magnitude of the effects associated with each variable across governance forms. The first stage also is used to estimate the inverse Mills ratio. The second stage examines the relationship between the appropriateness of the governance choice and subsequent entrepreneurial firm performance. The inverse Mills ratio is used in the second stage to account for selection bias in estimating the entrepreneurial firm performance.
2.3 Results

Table 2.3 presents the results from the first-stage governance choice model. The probit model utilized in this first stage uses all firms in the sample for which a complete set of variables is available (N = 59). This model differentiates between the firms that used equity governance and those that used non-equity governance in their alliances. This stage of the analysis introduces measures derived from RBT and TCE that are expected to affect governance choice as specified in hypotheses 1, 2, 3a, and 3b.

In regards to H1, the coefficient associated with Technical Innovation Capability is not statistically significant. This finding does not provide support for H1. Likewise, H2 is not supported, as Opportunistic Behavior is not found to have a positive relationship with the use of equity governance in this sample. The positive and significant coefficients associated with both Customer Access Dominance and Financial Dominance in this model are consistent with expectations. This provides support for both H3a and H3b, respectively.

Because the probability of a type II error is higher at smaller sample sizes, the results are likely to be unreasonably conservative. The bootstrapping technique (Efron & Gong, 1983) provides one way to check what the coefficient estimates and their standard errors would have been with a larger sample. Bootstrapping uses the Monte Carlo algorithm to generate a random sample drawn with replacement from the actual sample. The results of executing a bootstrap analysis with 50 replications in this study did not change the sign or significance of the coefficient estimates in the first stage. This suggests sample size is not introducing a bias.
Given the significance of this first stage probit model (p = 0.0112), these results are useful in the formulation of the inverse Mills ratio required for the multivariate regression estimates presented for the second-stage performance model.

Table 2.4 provides the results of the performance models. Controlling for sample selection bias requires estimating choice-specific performance equations for the sample of firms that chose equity governance and for the firms that chose non-equity governance via OLS. This procedure provides unrestricted estimates for each of the covariates in alliances that use equity governance separately from those using non-equity governance.

Model I provides a baseline specification that includes the control variables only. All of the performance models exclude *Opportunistic Behavior* as a predictor because there is no basis in TCE logic for expecting *Opportunistic Behavior* to relate directly to performance. That is, *Opportunistic Behavior* is expected to correlate with governance choice but not with entrepreneurial firm performance. Based on RBT logic all of the other variables that are expected to correlate with governance choice (i.e., *Technical Innovation Capability*, *Customer Access Dominance*, and *Financial Dominance*) are also expected to correlate with firm performance. Model I also uses the inverse Mills ratio term (λ) as a control variable. Due to the size of the split samples, however, the number of independent variables in these models is restricted to ensure sufficient power in the model for detecting the hypothesized relationship in H4. Neither RBT nor TCE provide logic for prioritizing which control variables should be retained in this situation. Thus, *Relationship Age* and *Customer Access Dominance* were dropped in these models based on their lower levels of significance. The statistical insignificance of the coefficient
estimate for the self-selection control ($\lambda$) suggests that self-selection bias is not present in this setting.

Model II replaces the self-selection control ($\lambda$) with the measure for Governance Misfit. The coefficient for Governance Misfit is not statistically significant in Model II suggesting that H4 may not be supported.

In the interest of fully addressing the reduced power associated with smaller samples a bootstrapped nonparametric median regression was used in Model III. In contrast to OLS, nonparametric median regression (Koenker & Hallock, 2001) is based on a model that specifies only very general conditions and none regarding the specific form of the distribution from which the sample was drawn.\(^3\) Median regression reduces the absolute error, is more robust to outliers, and provides more consistent coefficient estimates than OLS. The bootstrap method is often used with median regression on small samples in the applied economic literature (e.g., Buchinsky & Hahn, 1998) and has been found to remove small sample biases in estimated coefficients (Brownstone & Valletta, 2001). The coefficient estimates and their significance in Model III are interpreted in a manner similar to OLS. Even after controlling for the likelihood that the relationship hypothesized in H4 between Misfit and Firm Performance would be difficult to detect even if it was there – and after executing a nonparametric technique to relax the distributional assumptions of OLS – H4 is not supported.

\(^3\) Less complex nonparametric tests, specifically Spearman’s Rank Correlation and Kendall’s Rank Correlation, were also performed on the sub-samples to examine the relationship between Misfit and Firm Performance. Neither test found a significant relationship.
2.4 Discussion

This study uses two currently prominent theories from the management literature – transactions cost economics and resource-based theory - that have been tested on established firms. This paper uses these theories to address two research questions specific to entrepreneurial firms to see if these theories have the same predictive power when firm conditions vary from those of established firms. The findings suggest that the general claim of entrepreneurship scholars that the behavior of entrepreneurial firms and established firms differ is supported (Sarkar et al., 2001; Stinchcombe, 1965).

Specifically, this study suggests that entrepreneurial firms in relationships with larger alliance partners differ from established firms in (1) how the governance of their relationship is determined and (2) how that governance choice relates to subsequent performance.

The first research question asks the extent to which entrepreneurial firms’ governance design interests are addressed in their alliances with larger, more established partners. Using RBT and TCE, the study hypothesizes that entrepreneurial firms will seek to govern their alliances based on the same firm-specific and exchange-specific characteristics that are important to governance choice in relationships among large, established firms. The findings show that, consistent with both RBT and TCE, the interdependence that typically results from relationship-specific investment does help explain governance choice in this setting. Exchange partner dominance resulting from relationship-specific investment is positively related to the use of equity in the governance design. The interpretation in relationships among established firms is that more equity governance is used when there is relationship-specific investment to better
facilitate complementary resource combinations and to provide better incentive alignment and monitoring. The same arguments seem plausible in the context of this study.

However, the RBT-based prediction that the entrepreneurial firm managers will influence governance choice based on firm-specific characteristics is not supported in this study. There are at least two possible explanations for this result. First, the alliance partner may be uncertain about the future value of the entrepreneurial firm’s technical innovation capability. Knight (1921) first suggested uncertainty about resource value as a phenomenon unique to entrepreneurial firms. If the large firm partner is uncertain about the technical innovation capability of the entrepreneurial firm, it may not take that resource into consideration when designing governance for the alliance. In governance choices for alliances between two large, established firms uncertainty about ex post resource value may be less likely, leading to consideration of all strategically important resources and capabilities at both firms. The second possible explanation is that the large firm’s interest in coordinating the technical innovation capability of the entrepreneurial firm can offset the entrepreneurial firm’s interests for less costly governance. Either of these explanations would explain this difference between the experiences of entrepreneurial and established firms.

The TCE-based prediction that when an entrepreneurial firm expects its alliance partner to act opportunistically it will seek to use equity in the governance design was also not supported in this study. The literature on established firms generally supports the link between threat of opportunistic behavior and shared ownership (David & Han, 2004). Perhaps the same link is not detectable in relationships between entrepreneurial firms and their large firm alliance partners because the entrepreneurial firms have less
influence over governance design. Entrepreneurial firms may not have the bargaining power to extract safeguards in alliances with certain partners and may not have alternatives to partnering with those firms. The results of a study by Subramani and Venkatraman (2003) can be interpreted to suggest that if the alliances in this sample were studied after aging for many more years (i.e., 17 years on average) the entrepreneurial firms might be able to craft revised governance designs that have the effect of safeguarding them ex post. Of course, after 17 years many of the firm-specific and exchange-specific characteristics will likely change as well.

This discussion about how governance decisions differ in alliances between entrepreneurial firms and their large firm partners acknowledges that an entrepreneurial firm’s alliance partners may have much more influence over governance design than the entrepreneurial firm. Future research on interfirm governance decisions where at least one of the firms is combining resources in a new way (i.e., is an entrepreneurial firm) might help to illuminate more precisely the conditions under which this occurs.

The second research question guiding this study asks how the choice of governance is related to performance at the entrepreneurial firm. In the literature on established firms, governance misfit is typically associated with lower performance (Leiblein et al., 2002; Nickerson & Silverman, 2003). This is consistent with the logic of both RBT and TCE. The entrepreneurship literature also suggests that how entrepreneurial firms govern their relationships with large firm partners affects their performance (Alvarez & Barney, 2001; Fischer & Reuber, 2004; Pearce & Hatfield, 2002; Venkataraman et al., 1990; Yli-Renko et al., 2001). In this study, however, governance does not explain any of the variation in entrepreneurial firm performance.
This finding is particularly surprising given the binary nature of the governance construct used in this study. Equity is not the only governance device firms use to govern their exchanges. In fact, many exchanges are likely to be managed through bundles of governance devices, each of which may be designed to address the benefits and costs of the exchange in a different way (Alvarez, Barney, & Bosse, 2003; Williamson, 1985; 1991).

This study might find a different result compared to previous studies for two reasons. First, the study is based upon the combined logic of RBT and TCE. None of the previous studies in the entrepreneurship literature have taken this approach. Based on RBT logic, this research design controls for key non-governance influences on entrepreneurial firm performance. An entrepreneurial firm’s performance is known to depend heavily on its technical innovation capability (Deeds et al., 1997, 1998; DeCarolis & Deeds, 1999; Rangone, 1999). Results from all of the models in this study that seek to explain differences in performance suggest the control variable for technical innovation capability is related with better firm performance. This study also controls for the variance in performance that is attributable to the interdependence between firms that results from relationship-specific investment. Financial dominance by the large firm partner in this setting did help explain entrepreneurial firm performance in this study. A second reason this study might find a different result than previous studies are the rigorous controls used for both endogeneity bias and sample selection bias. Both of these research design choices are attempts to isolate the true relationship between choosing the appropriate governance design for a particular alliance and the subsequent entrepreneurial firm performance.
If the way entrepreneurial firms govern their alliances with large firm partners does not affect their performance, as this study suggests, perhaps entrepreneurial firm managers should be encouraged to focus less on governance design and more on (1) capability development and (2) selecting dominant exchange partners that possess resources that are more complementary.
Figure 2.1  Hypothesized relationships
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of customers attributable to this alliance</td>
<td>0.833</td>
<td></td>
</tr>
<tr>
<td>% financial savings in reaching customers attributable to this alliance</td>
<td>0.859</td>
<td></td>
</tr>
<tr>
<td>% time savings in reaching customers attributable to this alliance</td>
<td>0.838</td>
<td></td>
</tr>
<tr>
<td>Extent to which this alliance partner engages in self-interested behavior at the expense of the overall alliance</td>
<td>0.855</td>
<td></td>
</tr>
<tr>
<td>Extent to which this alliance is characterized by the potential for retribution or tit-for-tat behavior</td>
<td>0.864</td>
<td></td>
</tr>
</tbody>
</table>

Extraction method: Principal component analysis
Rotation method: Varimax with Kaiser normalization
Rotation converged in 3 iterations

Table 2.1 Rotated component matrix
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Firm Performance</td>
<td>4.012</td>
<td>2.256</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2 Relationship Age</td>
<td>2.941</td>
<td>3.474</td>
<td>0.157</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Opportunistic Behavior</td>
<td>0.000</td>
<td>1.000</td>
<td>-0.066</td>
<td>-0.007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Customer Access Dominance</td>
<td>0.000</td>
<td>1.000</td>
<td>-0.001</td>
<td>0.143</td>
<td>-0.134</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Financial Dominance</td>
<td>0.108</td>
<td>0.221</td>
<td>-0.315*</td>
<td>0.005</td>
<td>0.200</td>
<td>0.080</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Technical Innovation Capability</td>
<td>106.566</td>
<td>163.494</td>
<td>0.356**</td>
<td>-0.058</td>
<td>0.028</td>
<td>0.112</td>
<td>-0.162</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Governance Form (Equity)</td>
<td>0.479</td>
<td>0.503</td>
<td>-0.090</td>
<td>-0.014</td>
<td>-0.093</td>
<td>0.201†</td>
<td>0.295*</td>
<td>-0.117</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Governance Misfit</td>
<td>0.389</td>
<td>0.212</td>
<td>0.264*</td>
<td>-0.144</td>
<td>-0.074</td>
<td>0.308*</td>
<td>-0.287*</td>
<td>0.187</td>
<td>0.101</td>
<td></td>
</tr>
<tr>
<td>9 Correction for Self-Selection</td>
<td>0.890</td>
<td>0.431</td>
<td>0.127</td>
<td>-0.342**</td>
<td>0.077</td>
<td>-0.554***</td>
<td>-0.598***</td>
<td>0.305*</td>
<td>-0.470***</td>
<td>-0.047</td>
</tr>
</tbody>
</table>

N = 59 (min.) to 72 (max.)
† p < 0.10
*p < 0.05
**p < 0.01
*** p < 0.001

Table 2.2 Descriptive statistics and correlation matrix for performance model
Table 2.3 Probit estimates for first-stage governance choice model

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficient estimates (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.582 †</td>
</tr>
<tr>
<td></td>
<td>(0.360)</td>
</tr>
<tr>
<td>Relationship Age</td>
<td>0.100</td>
</tr>
<tr>
<td></td>
<td>(0.082)</td>
</tr>
<tr>
<td>Opportunistic Behavior</td>
<td>-0.136</td>
</tr>
<tr>
<td></td>
<td>(0.187)</td>
</tr>
<tr>
<td>Customer Access Dominance</td>
<td>0.350 †</td>
</tr>
<tr>
<td></td>
<td>(0.186)</td>
</tr>
<tr>
<td>Financial Dominance</td>
<td>4.168 *</td>
</tr>
<tr>
<td></td>
<td>(1.963)</td>
</tr>
<tr>
<td>Technical Innovation Capability</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
</tr>
</tbody>
</table>

N 59
Log likelihood -33.41
Prob > chi2 0.0112 *

Positive coefficients indicate a greater probability of hierarchical governance (i.e., equity)
† p < 0.10
* p < 0.05
** p < 0.01
*** p < 0.001
<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model I: Heckman</th>
<th>Model II: OLS</th>
<th>Model III: Bootstrapped Median Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-equity</td>
<td>Equity</td>
<td>Non-equity</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.241 **</td>
<td>4.520 ***</td>
<td>2.624 **</td>
</tr>
<tr>
<td></td>
<td>(1.579)</td>
<td>(1.259)</td>
<td>(0.879)</td>
</tr>
<tr>
<td>Financial Dominance</td>
<td>-3.935</td>
<td>-3.638 *</td>
<td>-5.000</td>
</tr>
<tr>
<td></td>
<td>(5.997)</td>
<td>(1.719)</td>
<td>(6.408)</td>
</tr>
<tr>
<td>Technical Innovation</td>
<td>0.005 **</td>
<td>0.003</td>
<td>0.004 *</td>
</tr>
<tr>
<td>Capability</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Correction for Self-</td>
<td>-1.424</td>
<td>-0.266</td>
<td></td>
</tr>
<tr>
<td>Selection ((\lambda))</td>
<td>(1.234)</td>
<td>(1.626)</td>
<td></td>
</tr>
<tr>
<td>Governance Misfit</td>
<td></td>
<td></td>
<td>3.121</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2.538)</td>
</tr>
<tr>
<td>Model F</td>
<td>2.29 ↑</td>
<td>3.24 *</td>
<td>2.36 ↑</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.114</td>
<td>0.199</td>
<td>0.120</td>
</tr>
<tr>
<td>Pseudo R^2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† p < 0.10
* p < 0.05
** p < 0.01
*** p < 0.001

Note: Model III bootstrap 50 reps

Table 2.4 Estimates for second-stage firm performance models
Scholars often use transaction cost economics (TCE) to explain how managers determine the most efficient way to organize exchanges between firms. Based on assumptions of bounded rationality and opportunism, TCE suggests the optimal governance design for reducing incentive conflicts at the lowest cost can be determined from attributes of the exchange (Williamson, 1985). While empirical tests of TCE are largely supportive (David & Han, 2004; Shelanski & Klein, 1995), this approach overlooks the effects of firm-level heterogeneity (Williamson, 1999). Scholars have recently begun accounting for the heterogeneous capabilities of exchange partners by using resource-based theory (RBT) in explanations of exchange governance choice.

The literature using RBT to understand how firms organize economic exchanges has progressed in at least two streams. The first stream is the productive capabilities stream (Jacobides & Hitt, 2005). The theory developed in this literature is independent of TCE logic and does not require the opportunism assumption. This work is focused on how opportunities to create competitive advantage by exploiting unique firm-level productive capabilities affect governance choice (e.g., Barney, 1999; Combs & Ketchen,
1999; Jacobides & Hitt, 2005; Leiblein, 2003; Leiblein & Miller, 2003; Madhok, 2002; Poppo & Zenger, 1998). The logic underlying the productive capabilities stream, however, has drawn criticism from scholars who debate that a theory of economic organization cannot ignore the incentive problems that arise under conditions of opportunism (Foss, 1996; Mahoney, 2001).

The second stream of literature that uses RBT in explaining exchange governance accepts the opportunism assumption and adds firm-level attributes to the standard TCE logic (e.g., Argyres & Liebeskind, 1999; Barney & Hansen, 1994; Delios & Henisz, 2000; Dyer, 1996a; Foss & Foss, 2005). This hazard-mitigating capabilities literature extends TCE and, therefore, avoids the criticism aimed at the productive capabilities stream. Hazard-mitigating capabilities enable a firm to reduce potential incentive alignment conflicts in an exchange arising from moral hazard and adverse-selection. Models developed in the hazard-mitigating capabilities literature generally start with transaction-level attributes and add firm-level attributes to capture the incremental explanatory power of hazard-mitigating capabilities in governance design decisions (e.g., Leiblein & Miller, 2003).

Yet another stream of research in the study of how firms design governance to organize their vertical exchanges simultaneously examines the antecedents to governance choice and the relationship between that choice and exchange performance (Leiblein, Reuer, & Dalsace, 2002; Nickerson & Silverman, 2003). This work is primarily based on the hypothesis that exchange performance improves to the extent governance choice matches characteristics of the exchange. This study combines the governance choice distinctions identified in the hazard-mitigating capabilities stream with the exchange
performance analysis made possible by this latter stream. Adding RBT arguments about antecedents of governance choice to the often-tested TCE arguments logically extends the exchange performance hypothesis as well.

While the theoretical contribution of this paper can be generalized, the empirical phenomenon examined is specific to small firms. Managers at both firms in a vertical exchange can generally be expected to have assessed and agreed on an exchange governance design. Studies of small firms, however, suggest their governance interests may not be reflected in the ultimate governance design employed in exchanges with larger and more dominant partners (Gopinath, 1995; Subramani & Venkatraman, 2003). The purpose of this paper is to extend theory of exchange governance choice and performance to address two questions specific to small firms. First, to what extent are small firms’ governance design interests addressed in exchanges with their primary suppliers? Second, what are the performance implications of governance choice for the small firm that uses the appropriate governance for its situation?

The rest of the paper is organized as follows. The next section briefly outlines TCE and the hazard-mitigating capabilities literature and develops testable hypotheses. The relationships between small firms and their primary suppliers of financial services that provide the setting for the study are then described. The methods section describes the data, the measures, and empirical estimation procedures. Finally, results are presented and their implications for research on interfirm relationships at small firms are discussed.
3.1 Theory and hypotheses

3.1.1 Transaction cost economics and exchange-specific characteristics

Transaction cost economics provides one perspective on how small firm managers determine the most efficient way to organize exchanges with a primary supplier. According to TCE, parties to an exchange decide which governance devices to include in their overall governance design based on the characteristics of their exchange. The governance design objective is to assemble the lowest cost combination of governance devices that adequately addresses the exchange-organizing tasks of establishing, structuring, monitoring, adapting, and enforcing the exchange (Coase, 1937; Williamson, 1975, 1985). Each of these organizing tasks to complete an exchange gives rise to transaction costs. Devising and implementing governance to address these tasks is costly. However, to the extent these organizing tasks are not adequately addressed in the governance design, the risk of opportunistic exploitation by one or more party raises costly exchange hazards (Klein, Crawford, & Alchian, 1978; Williamson, 1985). The basic argument of TCE is that governance designs differ in substantive ways and are chosen based on their ability to address these organizing tasks at the lowest total transaction cost.

Scholars have distinguished governance designs in many ways. One common way to distinguish among governance designs is the extent to which they include a specific governance device such as shared equity or an exchange of hostages (David & Han, 2004; Shelanski & Klein, 1995). The aspect of governance design that is of primary interest in this study is the use of governance devices that serve to address the exchange-organizing task of enforcing the exchange. The enforcing task is concerned with
penalizing parties to the exchange for cheating one another. Enforcement devices are the focus in this study because of their prevalence in exchanges between small firms and more established firm partners. Klein argues that in this setting “explicit contractual restraints are often placed on the smaller, less well-established party, while an implicit brand name contract-enforcement mechanism is relied on to prevent cheating by the larger, more well-established party” (Klein, 1980: 360).

TCE logic suggests one common reason for including explicit enforcement devices in a governance design is that the exchange is characterized by the potential for holdup. The potential for holdup arises when one or more parties to the exchange has the ability and the incentive to renege on their partner by taking advantage of unspecified or unenforceable elements of the exchange (Klein, 1980). Enforcement devices can help parties to an exchange avoid the hazard of holdup by aligning the parties’ incentives. In situations where the magnitude of the potential holdup can be anticipated, the enforcement device is structured to impose a capital loss in such a way that opportunism becomes irrational (Bradach & Eccles, 1989; Klein, 1980). Enforcement devices in this study are explicit contract clauses that impose a capital loss on the small firm that is sufficient to deter it from cheating. Such enforcement devices can work two ways. First, they can signal, ex ante, that the small firm has cooperative intentions because it is willing to guarantee that it will incur a loss if it cheats. Second, these devices may actually deter the small firm from cheating ex post.

A small firm that agrees to include an enforcement device in the governance design incurs a marginal transaction cost because writing and implementing additional contractual clauses adds cost. For this reason, small firm managers will only agree to
include an enforcement device in the contract when the benefit to them exceeds the amount of this marginal transaction cost. The promise of a lower price from a supplier, for example, might be enough to justify such an expense.

In addition to TCE, the logic of agency theory also helps explain why enforcement devices are common in exchanges. Based on the assumption that the interests of two parties in an exchange are not likely to be perfectly aligned, agency theory argues the extent to which interests diverge results in an efficiency loss. The efficiency loss can be reduced if the exchange includes appropriate monitoring and bonding mechanisms (Jensen & Meckling, 1976). Bonding mechanisms are like enforcement devices in that a party that has potential to holdup its partner guarantees that it will not holdup its partner or that the partner will be compensated if it does take such actions (Jensen & Meckling, 1976).

According to TCE, asset specificity is one of the exchange characteristics that indicate the potential for costly exchange hazards such as holdup. Asset specificity refers to the fact that investments in an exchange have a higher value in that exchange than in any other use or to any other potential exchange partner. When one firm will make or has made a larger specific investment in the exchange, a governance design that does not address the enforcing task will leave that firm with little recourse if its partner acts opportunistically in the future. However, when both firms in the exchange invest in specific assets the assets form a reciprocal dependency that reduces each partner’s incentive to engage in opportunism (Dyer, 1996b). This study focuses on relationship-specific investments rather than exchange-specific investments because exchanges between a small firm and a supplier that it considers “primary” likely occur in the context
of a relationship that includes multiple exchanges. To the extent two partners have a relationship in which neither could costlessly replace the other, their specific investments are specific to the relationship rather than to any particular exchange.

Hypothesis 1a: When a small firm and its primary supplier have both made relationship specific investments the small firm will be less likely to use an enforcement device in the exchange.

Uncertainty is another exchange characteristic identified by TCE that is proposed to have an effect on exchange governance design. Uncertainty raises the number of contingencies expected to potentially arise over the course of the agreement. Longer term exchanges, for example, are associated with more potential for unanticipated contingencies and, therefore, make opportunism harder to predict. In anonymous exchanges it is simple for both parties to arrange alternative exchange partners regardless of the potential for contingencies. The level of uncertainty in such cases is not helpful in predicting governance design. However in exchanges where the identity of the parties matters, such as exchanges between a small firm and its primary supplier, increases in uncertainty encourage the use of more enforcement devices in the governance design to protect against any increases in future holdup potential (Williamson, 1985).

Hypothesis 1b: When the exchange is characterized by more uncertainty the small firm will be more likely to use an enforcement device in the exchange with its primary supplier.

One of the valuable advances in TCE has been the development of arguments that support measuring transaction costs as a function of transaction characteristics such as asset specificity and uncertainty (Williamson, 1975; 1985). However, transaction costs
can also be measured directly. Direct transaction costs include costs associated with the exchange-organizing tasks of establishing, structuring, monitoring, adapting, and enforcing (Coase, 1937; Williamson, 1975, 1985). Monitoring costs are incurred to determine the degree to which the agreement is progressing as planned (Ouchi, 1979). Parties monitor each other by communicating about their respective behavior or output. The difficulty and costs of monitoring can vary, for example, depending on the distance that separates the parties. When monitoring is more difficult parties to an exchange may attempt to mitigate the increase in transaction costs by employing enforcement devices in the governance design as a guarantee against opportunism (Klein, Crawford & Alchian, 1978). Designing governance this way would substitute stronger enforcement for weaker monitoring.

Hypothesis 1c: When the exchange is characterized by higher monitoring costs the small firm will be more likely to use an enforcement device in the exchange with its primary supplier.

3.1.2 Resource-based theory and firm-specific characteristics

Transaction cost economics focuses on attributes of exchanges as predictors of the most efficient governance design. The basic level of analysis in this theory is the transaction (Williamson, 1985; 1999). Differences between firms in an exchange are not central to most empirical tests of TCE because firms are simply one way to organize exchanges; firms are one type of governance device. In fact, a reduced-form TCE analysis expresses governance costs as a function of asset specificity and a vector of exogenous shift parameters. Shift parameters in TCE include any changes in the institutional environment that adjust the cost of using one type of governance relative to
another (Riordan & Williamson, 1985). Williamson (1991) suggests that reputation effects are an example of a shift parameter that may adjust the comparative costs of governance devices.

“Parties to a transaction to which reputation effects apply can … benefit from the experience of others. … Improved reputation effects attenuate incentives to behave opportunistically in interfirm trade – since the immediate gains from opportunism in a regime where reputation counts must be traded off against future costs.” (Williamson, 1991: 291)

Reputations, though, are specific to exchange partners rather than exchanges or the institutional environment. Accordingly, TCE logic has been acknowledged for its potential to incorporate any factor, including firm-level differences, which may affect governance costs (Williamson, 1999). Resource-based theorists have also begun drawing attention to the effect of firm-level attributes on the comparative costs of governance devices (Argyres & Liebeskind, 1999; Barney & Hansen, 1994; Delios & Henisz, 2000; Dyer, 1996a; Foss & Foss, 2005; Leiblein, 2003; Williamson, 1999). This literature is referred to as the *hazard-mitigating capabilities* literature (Delios & Heinz, 2000). Barney and Hansen (1994), for example, argue that when two parties both have values, principles, and standards of behavior that would be violated if they acted opportunistically, they can govern exchanges between them using less costly governance devices in the contract without incurring additional exchange hazards. Arguments in this literature generally hold that transaction costs are a function of firm-level attributes covered by RBT and the exchange attributes articulated in TCE (e.g., Leiblein & Miller, 2003).
RBT was originally developed as a theory of competitive advantage. It suggests that inimitable firm heterogeneity, or the possession of unique resources or capabilities, is an important source of firm growth and survival (Barney, 1986; Lippman & Rumelt, 1982; Peteraf, 1993). For a firm’s resources or capabilities to generate these benefits they must meet three conditions: they must be heterogeneously distributed within the industry; they must be impossible to buy or sell in the available factor markets at less than their true marginal value; and they must be difficult or costly to replicate (Barney, 1986; Henderson & Cockburn, 1994; Peteraf, 1993). Firm reputations fit these three conditions because they develop over time when firms demonstrate consistent patterns of behavior (Barney & Hansen, 1994; Itami, 1987). A firm with a reputation for not acting opportunistically with its exchange partners possesses a hazard-mitigating capability that may give it a governance cost advantage and make it a more appealing potential exchange partner to other firms. A favorable reputation for possessing hazard-mitigating capabilities is a credible signal because it is correlated with the firm’s actual (rather than professed) pattern of behavior and it is too costly for a hazard-inducing firm to develop a pattern of hazard-mitigating behavior (Barney & Hansen, 1994).

Small firms in particular often lack the resources and capabilities they need for survival and growth. This typically compels them to identify ways to overcome their resource scarcities (Mahoney & Pandian, 1992). One solution is to seek exchange partners that have a favorable reputation for not acting opportunistically in exchanges with other small firms (Delios & Henisz, 2000). Suppliers with such favorable reputations present lower risk of future contracting problems. When a small firm’s primary supplier for a particular resource type possesses hazard-mitigating capabilities,
the value of their ongoing relation could represent an implicit enforcement device to the extent it outweighs any benefits that could be gained by the small firm from acting opportunistically in the focal exchange. Writing an additional enforcement clause into the contract in this situation would be inefficient.

Hypothesis 2a: When a small firm believes its primary supplier has a favorable reputation the small firm will be less likely to use an enforcement device in the exchange.

Small firms can also possess hazard-mitigating capabilities. A small firm’s favorable reputation for not behaving opportunistically in exchanges with its suppliers is, using the previous logic, a credible signal that it possesses hazard-mitigating capabilities. TCE and RBT suggest small firm managers will seek the governance design that best provides access to their supplier’s resources at the lowest cost (Eisenhardt & Schoonhoven, 1996; Leiblein, 2003; Madhok & Tallman, 1998; Williamson, 1999). Thus, when a small firm possesses hazard-mitigating capabilities, it will also take those capabilities into consideration when determining the appropriate level of explicit enforcement required in the contract.

Hypothesis 2b: When a small firm has a favorable reputation the small firm will be less likely to use an enforcement device in the exchange.

In addition to the effect on governance choice when one party to an exchange has a favorable reputation, Barney & Hansen (1994) propose that two parties with favorable reputations can gain competitive advantage by working with each other. This competitive advantage comes from complementary governance cost advantages these exchange partners may enjoy. That is, when both exchange partners possess hazard-mitigating
capabilities they may experience the advantages of more costly governance without the need to build such governance devices into the contract. The need for enforcement devices that penalize cheating is reduced when neither party expects its partner to cheat.

Hypothesis 3: When a small firm has a favorable reputation the effect of its primary supplier’s favorable reputation will make it less likely to use an enforcement device in the exchange.

The focus in this study is on exploring the relationships between small firms’ governance interests and the ultimate governance design selected in an exchange. Clearly, any model attempting to isolate such relationships is required to control for rival hypotheses. The exchange-specific and firm-specific characteristics that can be expected to influence the primary supplier’s governance interests are therefore controlled in the empirical model as described in the methods section.

Performance Implications of Governance Choice

The theory developed thus far uses RBT to extend TCE predictions about governance choice. TCE also predicts that governance choice affects exchange performance. Exchange performance, according to TCE, improves to the extent governance choice matches characteristics of the exchange. Adding RBT arguments about hazard-mitigating capabilities to TCE logically extends the exchange performance prediction of TCE as well. That is, exchange performance should improve to the extent governance choice matches characteristics of the exchange and of the partners.

TCE suggests competitive pressure pushes firms to remedy governance forms that do not fit the exchange characteristics. This argument, referred to as the discriminating alignment hypothesis, holds that managers adapt their governance designs over time as
exchange characteristics change so that “transactions, which differ in their attributes, are
aligned with governance structures, which differ in their cost and competence, so as to
affect an economizing result” (Williamson, 1999: 1090). Thus, adding RBT arguments
suggests that as firm- and exchange-based characteristics evolve over time, firms adjust
their governance choices to ensure they continue to address all of the exchange-
organizing tasks at the minimum total cost.

Following this reasoning the performance implications of governance choice
should hinge upon the fit or alignment between the chosen governance design and the
attributes of the firm and the exchange. Governance Misfit, or the degree to which a
firm’s governance choice deviates from TCE and RBT prescriptions, should have
negative performance implications for the exchange (Leiblein, Reuer & Dalsace, 2002;
Silverman, Nickerson, & Freeman, 1997). Because the focus of the present study is on
the small firm’s role in governance design, it is appropriate to examine exchange
performance from the small firm’s perspective.

Hypothesis 4: In a relationship with a primary supplier, governance misfit is negatively
related to a small firm’s exchange performance.

3.2 Methods

3.2.1 Empirical Setting

Exchanges between small firms and their primary suppliers present an ideal
empirical setting for enriching our understanding of exchange governance strategy. The
manner in which small firms govern exchanges with their main suppliers of critical
resources is vitally important to their emergence and growth (e.g., Alvarez & Barney,
2001; Fischer & Reuber, 2004; Pearce & Hatfield, 2002; Venkataraman, Van de Ven,
This study examines exchanges of financial capital between small, private firms and their primary financial institutions. Financial capital in the form of debt is one of the most common resources required for small firms to operate (Cassar, 2004; Gopinath, 1995). One study found that over 80 percent of the roughly five million small firms in the United States use some kind of credit and have outstanding debt on their books (Bitler, Robb, & Wolken, 2001). The majority of financial capital employed at these firms is provided by the banking sector (Keasey & Watson, 1992; Scherr, Sugrue, & Ward, 1993). Because small, private firms are generally more dependent on their banks than large publicly traded firms (Berger & Udell, 1995), they are more likely to have difficulty influencing exchange governance due to asymmetric bargaining power (Gopinath, 1995). This setting provides for a rigorous test of exchange governance theory because a small firm’s performance is likely a function of the exchange governance choice, but detecting the small firm’s governance design interests in the ultimate governance device employed with its primary supplier of financial capital may be difficult.

Decisions about how to govern the exchange between a small firm and its primary financial institution may greatly affect the economic performance of the small firm. On one hand, the financial partner can demonstrate opportunistic behavior by not providing the level of responsiveness to the small firm’s needs that it originally promised, by increasing its fee structure for services used by the small firm, or by enforcing the small firm’s loan covenants more stringently. On the other hand, the small firm can use the loan

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4 Because hypothesis tests can only be used to prove a theory incorrect, testing a theory in settings where it is more difficult to detect provides a conservative test of the theory. If the theory is not rejected in such a setting, it has passed a comparatively more rigorous test.
proceeds to fund risky projects unsupported by the supplier. The extent to which this latter hazard is efficiently addressed in the governance design will be reflected in the small firm’s cost of capital on the loan. The cost of capital is critical to small firm performance. Access to affordable financial capital has been shown to have important implications for the operations of the business, risk of failure, firm performance, and the growth potential of small firms (Bruno, McQuarrie, & Torgrimson, 1992; Cassar, 2004; Deeds, DeCarolis, & Coombs, 1997; Gopinath, 1995; Saparito, Chen, & Sapienza, 2004; Uzzi, 1999).

3.2.2 Data

The data analyzed in this study are taken from the 1998 Survey of Small Business Finances (SSBF). The SSBF provides data on the characteristics of firms with fewer than 500 employees and the use of financial services at these firms. The 1998 survey was conducted in 1999 and 2000 by the National Opinion Research Center for the U.S. Federal Reserve Board of Governors. The firms surveyed constitute a nationally representative sample of 3,561 small businesses operating in the United States as of year-end 1998, where a small business is defined as a domestic for-profit, nonfinancial, nonsubsidiary, nonagricultural, nongovernmental business employing fewer than 500 employees. The sample was drawn from the Dun & Bradstreet Market Identifier file as of May 1999. These data are broadly representative of approximately five million small firms operating in the US as of year-end 1998.5

Given the research questions guiding this study, it was necessary to examine data on those small firms that were actually engaged in a borrowing relationship with their

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primary supplier of financial services. Of the 3,561 firms in the 1998 SSBF, 408 private firms indicated that they had recently received a loan from their primary supplier of financial services. After dropping those cases for which there was missing data or which represented outliers more than three standard deviations from the mean, the final sample includes 365 lending transactions between small firms and their primary suppliers of financial services. Ninety-five percent of these firms have fewer than 10 shareholders, and only two firms (<1%) have more than 100 shareholders.

Nearly all small businesses (about 96 percent of the 3,561) in the SSBF used at least one financial service in 1998. In general, use of financial services increases with firm age (Boot, 2000). However, the 365 firms in the study sample are slightly larger and younger compared to all firms in the 1998 SSBF. Firms that were extended credit by their primary financial institution average $2.1 million in assets and 12.5 years of age. The average size and age for firms in the full survey are $1.6 million in assets and 14.4 years old, respectively. The median number of employees is 14 in the study sample compared to 5 in the full survey.

3.2.3 Dependent variables

Exchange Performance. The measure of Exchange Performance in this study is the small firm’s cost of capital on its most recent loan. The small firm’s cost of capital provides an exchange performance measure that objectively captures the consequences of loan governance choice for the small firm. Cost of capital is often measured in the lending literature as the interest rate on the loan (Petersen & Rajan, 1994; Uzzi, 1999). The exchange performance variable in this study adjusts the interest rate to control for two factors that, if unaddressed, would result in misleading findings. The formula for cost
of capital takes the interest rate on the loan and adds any points paid by the firm and subtracts the prime rate at the time of the loan. This approach controls for any instances where points had been paid to buy down the interest rate and for changes in the institutional environment at the time of the exchange. This second modification is important because theory argues changes in the institutional environment can shift the comparative costs of different governance bundles (Williamson, 1985). The prime rate is the interest rate banks charge their best customers. The Federal Reserve indirectly moves the prime rate by changing the federal funds rate, the discount rate or both. The prime rate data was collected from the Federal Reserve for the month and year in which the loan agreement was made.

Enforcement Device. Governance forms in borrowing relationships are often distinguished according to whether or not they involve the exchange of collateral (e.g., Bester, 1985; Binks & Ennew, 1997; Boot, 2000). The enforcement device measured in this study is collateral. An exchange that is governed using collateral has an explicit contract clause that identifies assets that secure the loan. Collateral imposes a capital loss on the small firm that is sufficient to deter it from cheating. If the small firm does not repay the loan according to the terms of the agreement, the lender has the right to take possession of the collateral. Thus, borrowers are motivated to abide the loan agreement by their desire to avoid forfeiting the collateral. Enforcement Device in this study is equal to zero if the loan agreement does not call for the small firm to pledge assets as collateral. Thirty-seven percent of the small firm-financial institution exchanges in the sample are governed without collateral. The remaining exchanges use collateral to provide an
enforcement device in the loan governance design. *Enforcement Device* is set equal to one for these exchanges.

### 3.2.4 Independent variables

*Relationship specific investment* indicates the extent to which both parties in the exchange have made investments in their relationship that have little value in any other relationship. The relationship banking literature suggests when a small firm procures more of its financial service needs from one supplier it becomes more costly for either party to leave the exchange (Binks & Ennew, 1997; Saparito, Chen, & Sapienza, 2004). The proportion of resource needs acquired from one supplier has also been used as an indicator of co-specialized investment in the management literature (Subramani & Venkatraman, 2003; Teece, 1986). The proportion of financial service needs acquired from its primary supplier captures the small firms’ investment in specialized skills and assets because financial service suppliers typically require commercial customers to develop management control and reporting processes based on the services they use (Binks & Ennew, 1997; Uzzi & Lancaster, 2003). As a small firm acquires more of its financial services from one supplier, these management control and reporting processes develop in a way that integrates the requirements for exchanging confidential information for each type of financial service. If the small firm is forced to replace its primary supplier for any portion of its financial service needs, the prior investment in integrated control and reporting processes cannot be redeployed. A small firm that has a high concentration of exchanges with one primary financial service supplier is also more likely to engage in regular contact with its bank officer resulting in stronger interpersonal relationships between managers and bankers and deeper mutual understanding of needs.
Thus, this measure also captures a degree of human asset specificity that cannot be redeployed by the small firm in relationships with other exchange partners.

This measure also proxies the supplier’s relationship-specific investment because loan officers build human-specific assets as they learn about the unique needs and strengths of a small firm (Binks & Ennew, 1997; Uzzi & Lancaster, 2003). This investment is difficult to leverage in relationships with another bank customer. Thus, as a small firm acquires more of its financial service needs from one supplier, the exchange becomes “neither faceless nor instantaneous”– a condition that distinctly characterizes relationship-specific investment (Williamson, 1985: 56).

The measure for Relationship specific investment indicates the extent to which both firms make specific investments in the exchange. It is not designed to indicate whether or not there have been asymmetric investments by the two parties. Two control variables described later capture the extent to which the small firm may be dependent on its supplier and, therefore, control for possible asymmetry in bargaining power that could affect the exchange governance design. Relationship-specific investment is computed in this study by dividing the number of financial service products the small firm acquires from its primary supplier by the total number of financial service products used at the small firm. Thirteen financial services were considered: checking accounts, savings accounts, lines of credit, capital leases, mortgages, motor vehicle loans, equipment loans, other loans, transaction services, credit-related services, cash management services, pension services, and brokerage services.6

6 Transaction services cover the provision of paper money and coins, the processing of credit card receipts, the collection of night deposits, and wire transfers. Cash-management services include the provision of sweep accounts, zero-balance accounts, lockbox services, and other services designed to automatically
Loan maturity provides the proxy for *Uncertainty* in this study. This variable is measured as the original length of time in months over which the loan was to be repaid. It is harder to anticipate how a longer term exchange will unfold in all its detail compared to a shorter term exchange. Longer term exchanges are associated with more potential for unanticipated contingencies which, in turn, provide more potential for opportunistic behavior in the exchange. Length of term is one recognized proxy for uncertainty in TCE (Williamson, 1975).

A longer geographic distance between the small firm and its primary financial services provider raises the costs to monitor ex post behavior in the exchange. Following prior literature (e.g., Carman & Langeard, 1980; Combs & Ketchen, 1999; Marshall, 1920; Oxley, 1999; Uzzi, 1999), *Monitoring Costs* in this study is measured as the geographic distance in miles between the small firm and its primary financial institution.⁷

The theory developed in this paper suggests a small firm might seek access to a particular supplier’s capabilities because it expects those capabilities to support the use of more efficient governance design in the exchange. One valid type of signal the small firm might use to evaluate a supplier’s hazard-mitigating capabilities is the supplier’s reputation (Barney & Hansen, 1994). A supplier with a reputation for forming more cooperative customer relationships, for example, may be favored for this reason. Binks and Ennew (1997) find small firms and their primary suppliers often benefit when they invest liquid funds in liquid, interest-bearing assets. *Credit-related services* are the provision of bankers acceptances, letters of credit, sales finance, and factoring. *Trust and pension services* consist of the provision of 401(k) plans, pension funds, business trusts, and securities safekeeping.

⁷ If the institution was located in the same city as the small firm, the small firm owner was asked to estimate the number of miles between the firm and the institution. When the institution was located in a different city, the distance was calculated from the zip codes of the financial institution and the small firm’s headquarters office.
are involved in more cooperative relationships. More directly, Gopinath (1995) suggests that the perception of a cooperative attitude on the part of its primary bank often leads a small firm to seek different exchange governance. Thus, when a supplier exhibits a cooperative tendency to, for example, pursue mutual benefits through information sharing and adaptation with the small firm, the small firm may place a higher value on their overall relationship that makes cheating in the focal exchange irrational.

In addition to the supplier’s reputation for cooperating with small firms, the supplier’s reputation for offering favorable trade terms to small firms sends a signal that it possesses hazard-mitigating capabilities. A reputation for offering more favorable trade terms, such as attractive credit policies, signals that a supplier has historically demonstrated capabilities enabling it to mitigate exchange hazards better than its competitors. Other favorable trade terms, such as promises of product availability or lenient buyer obligations, also signal hazard-mitigating capability.

In this study Supplier Reputation captures whether the small firm chose to enter the exchange with this supplier based on the supplier’s reputation for cooperating with customers and its reputation for offering favorable trade terms. The SSBF asked small firm owners an open-ended question to list the factors that influenced their decision to seek the loan from this supplier. Answers to this question were recoded into categorical responses by the National Opinion Research Center. If the small firm identified any of the following financial institution characteristics, the supplier is recognized for having a reputation for cooperating with customers: specialization in small business services, knowledge of the small firm’s industry, quality of service, convenience or ease of use, or ability to obtain multiple financial services at the institution. The following responses
were used to indicate whether the financial institution had a reputation for offering favorable trade terms: credit availability, lower collateral requirements, favorable lending policies or terms. If the small firm did not identify either of these supplier-specific reputations, Supplier Reputation is set equal to zero. If only one of these types of reputation was indicated, Supplier Reputation takes a value of one. If being cooperative and having favorable trade terms were both indicated, Supplier Reputation is set equal to two.

The relevant Small Firm Reputation in this setting must credibly signal to a financial institution that the small firm has a pattern of honoring its borrowing commitments. In compiling the SSBF, the National Opinion Research Center purchased the Dun and Bradstreet (D&B) Commercial Credit Score for each small firm that completed the survey. This score ranges from one (low risk) to 5 (high risk) and predicts the likelihood that a firm will be delinquent in paying its financial obligations, will seek legal relief from creditors, or will otherwise dishonor its credit obligations based on its past payment patterns, public filings and financial information. Lenders commonly use D&B ratings in assessing the behavioral patterns of small firm borrowers to determine their creditworthiness (Cole, 1998). Small Firm Reputation is computed in this study as one divided by the D&B rating to establish the proper sign.

Governance Misfit – Hypothesis four suggests that the small firm’s performance is influenced by the degree to which the exchange with its primary supplier is appropriately governed. To test this hypothesis, Governance Misfit measures the degree to which the use of an enforcement device in the exchange deviates from joint TCE and RBT prescriptions. This variable captures the probability that the exchange should have
been governed differently considering both the contractual hazards based on characteristics of the exchange (TCE logic) and the hazard-mitigating capabilities based on firm-specific characteristics (RBT logic). The method for computing this variable follows Anderson (1988), Silverman, Nickerson, & Freeman (1997), and Leiblein, Reuer, & Dalsace (2002). The first step in creating this variable is to estimate the most likely value for Enforcement Device using a probit model that includes proxies for variables that, according to TCE and RBT, should affect a firm’s exchange governance decision. The probit model is: \( \text{Prob}(\text{Y}_i = 1) = \Phi(\beta'X_i) \), where \( \text{Y}_i \) is the governance choice variable for the \( i \)th observation, \( X_i \) is a vector of characteristics describing the exchange and the firm that are believed to predict governance choice, \( \beta \) is a vector of estimated coefficients for these characteristics, and \( \Phi (\cdot) \) is the standard normal cumulative distribution function.

The degree of Governance Misfit is then defined as \( 1 - \Phi(\beta'X_i) \) when Enforcement Device is equal to one (i.e., when the exchange is governed with collateral) and as \( \Phi(\beta'X_i) \) when Enforcement Device is equal to zero (i.e., when no collateral is used). The interpretation of Governance Misfit is that it captures the probability that too much enforcement is employed for exchanges that are governed with collateral and the probability that too little enforcement is employed for exchanges that are governed without collateral (Leiblein et al., 2002). The vector of characteristics describing the exchange and the firms that are believed to predict enforcement device usage in the first stage probit model (\( X_i \)) include Relationship-specific investment, Uncertainty, Monitoring Costs, Supplier Reputation, and Small Firm Reputation plus multiple control variables (defined below).
3.2.5 Control variables

Empirically isolating the relationships between the expected governance design interests of small firm managers and the ultimate governance form employed in the exchange requires the use of control variables. This study controls for characteristics of the exchange, the small firm, and the existing relationship between the two parties that are expected to influence governance choice according to theory as well as those shown to affect small firm financing in prior research (Cole & Wolken, 1995). Sixteen variables are used as controls in the models predicting Enforcement Device.

Eight of these controls are included to account for how financial institutions can be expected to assess small firm characteristics. Firm Age is used as a control because older firms can be expected to present less risk of default compared to younger firms (Berger & Udell, 1995; Gopinath, 1995). The size of the small firm may also affect the use of collateral because firms with more assets may present less risk of loan default (Gopinath, 1995). Firm Size is measured as the log of total assets. Small Firm Industry is controlled with a variable that identifies whether the small firm is in manufacturing (SIC codes 2000 – 3999) or a service industry (all other SIC codes) (Cole, 1998; Petersen & Rajan, 1994).

Financial institutions often consider a small firm’s legal form of organization when assessing loan governance options. The form of organization specifies the extent to which small firm owners are liable for the debt in the event of a loan default. A small

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8 Dummies were originally constructed to indicate each small firm’s two-digit standard industrial classification because anecdotal evidence suggests bankers may consider industry classification when assessing borrower credit quality (Cole, 1998). Because including those dummies weakens the governance choice model, the dichotomous manufacturing versus service classification was selected as the industry control variable in this study.
firm in which the owner has Limited Liability may represent more risk to the bank due to moral hazard. Moral hazard occurs when small firm owners act to maximize their own utility in situations where they do not bear the full consequences of their actions to the detriment of the lender. For example, small firm owners with limited liability have an incentive to expropriate wealth from the lender by undertaking riskier projects than promised ex ante (Hart & Moore, 1988; Jensen & Meckling, 1976). When the small firm owners have limited liability, financial institutions can attempt to address the potential for moral hazard by employing governance forms that discourage it. If the small firm is organized as a proprietorship or a partnership, the owner(s) is fully liable for the debts of the firm and Limited Liability is set equal to zero. If the small firm is organized as any other legal form (e.g., LLC, S-corporation, C-corporation) the liability of the owner(s) is limited, and this variable is set equal to one. Seventy percent of the firms in the sample are organized in a way that limits the liability of the owner(s). The Number of Owners and Owner Managed variables are used as controls based on similar logic. A larger Number of Owners (shareholders) may reduce the risk of loan default to the lender as it suggests stronger small firm viability (Astebro & Bernhardt, 2003). A small firm that is Owner Managed may present moral hazard, and prior studies show owner-managed firms are more likely to have collateralized loans (Shailer, 1999).

Owner Gender is included as a control variable based on the theory that there is a normative male model of entrepreneurial achievement in our society that disadvantages women (Brush, Carter, Gatewood, Green, & Hart, 2001). In this literature female-owned small firms are often believed to suffer discrimination in lending terms and interest rates (Cavalluzzo, Cavalluzzo, & Wolken, 2002). Coleman (2000) found that women-owned
service firms are more likely to govern their loans with collateral and to pay higher interest rates. When the owner of a small firm in this study is female, *Owner Gender* is set equal to one. For male owners this variable is zero.

Small firms with more leverage (debt) are often asked to provide more collateral as leverage increases the risk the small firm will pay back the loan slowly or default on it. *Leverage Ratio* is computed by dividing total loans by total assets.

This study controls for five characteristics of the loan that may influence governance design. The *Loan Type* often affects the use of collateral. For example, loans for hard assets such as vehicles and equipment are typically secured with collateral (Berger & Udell, 1995). *Loan Type* is set equal to one for business mortgages, vehicle loans and equipment loans. The remaining types of loans (e.g., lines of credit) are set equal to zero. *Loan Size* may affect the decision to use collateral as the financial institution stands to lose more in the event of a larger loan default. Cressy (1996) found support that collateralization is less likely with smaller loans.

To clearly isolate the decision to govern the loan agreement with collateral, this study controls for whether the agreement was also governed with a *Compensating Balance* and a *Personal Guaranty*. If the agreement includes a *Compensating Balance* clause, the small firm keeps a deposit at the financial institution for the duration of the loan. Should the small firm fail to repay the loan this deposit may be forfeited. A *Personal Guaranty* makes the small firm owner personally responsible for the obligations of the loan agreement. If either of these governance devices is used in the loan agreement, the respective value is set equal to one.
Finally, three control variables are used to account for relationship characteristics the financial institution may assess when determining its exchange governance design interests with a small firm. Longer relationships between exchange partners are thought to support better coordination and control making additional enforcement devices excessive. Berger and Udell (1995) found that as small firm-bank relationships age, collateral is used less frequently. Relationship Length measures the time elapsed since the small firm and its primary financial services provider began their relationship. This construct is measured in months. The range of Relationship Length in the sample is from zero months to 17 years, and the median is 4 years.

One of the explanations for why this empirical setting is ideal for testing a theory of economic exchange governance and performance is that small firms often have less bargaining power than their primary financial service providers. Argyres and Liebeskind (1999) propose that younger firms tend to have less bargaining power. This study already controls for this affect with Firm Age. Resource dependence theory (Pfeffer & Salancik, 1978) provides another point of view on power. It proposes that firms choose governance forms to avoid dependence upon their suppliers for critical resources (Argyres & Liebeskind, 1999). Financial capital is a critical resource for small firms (Cassar, 2004; Gopinath, 1995). Therefore, two additional controls for bargaining power in this setting are Dollar Dependence and Credit Dependence. Dollar Dependence is the proportion of the small firm’s assets and liabilities in dollars attributable to this relationship. It is calculated as the total dollar volume of business between the small firm and its primary financial supplier (including all deposits and loans) divided by the small firm’s cash and loans outstanding. Credit Dependence is the total dollar amount borrowed from this bank
divided by total loans at the small firm. Both measures are used to account for the fact that while only some small firms have deposits held by their supplier, the ones that do are potentially more dependent on their supplier. Note that an incremental dollar exchanged between the parties is not associated with additional specialized investment in management processes (by the small firm) or loan officer knowledge (by the supplier). Expanding the portfolio of services exchanged, however, is a measure of Relationship-specific investment. Dollar Dependence and Credit Dependence help isolate the effect of the measure for Relationship-specific investment because that measure now captures only the incremental variation in Enforcement Device (collateral) attributable to the co-specialized investment made by both parties.

In addition to serving as key variables for hypotheses one through three in the models predicting Enforcement Device, some of these variables are also used in the tests of hypothesis four. In the models predicting Exchange Performance, the following controls to help isolate the relationship between Governance Misfit and Exchange Performance: Firm Age, Small Firm Industry, Owner Gender, Leverage Ratio, Loan Size, and Small Firm Reputation.

Table 3.1 shows means, standard deviations, and correlations among the explanatory variables.

### 3.2.6 Analytical methods

Addressing the research questions in this study requires a multi-stage analysis. In the first stage, a probit analysis is conducted to estimate the governance choice model and to compute Governance Misfit. The second stage is an OLS analysis conducted to examine the relationship between Governance Misfit and small firm Exchange
Performance. The methods employed in this study control for two research design issues: endogeneity and sample selection bias.

Small firm managers pick the Enforcement Device that they believe will improve firm performance. Because Enforcement Device is not randomly assigned to exchanges it is endogenous in models predicting Exchange Performance. For example, if small firms that are risky are less likely to use collateral as a form of governance and therefore receive higher interest rates ceteris paribus, then failure to control for this correlation will yield an estimated Enforcement Device effect on interest rates that is biased up.

Endogeneity is a potential problem in this sample as Enforcement Device and Exchange Performance are correlated (p = 0.006) (see Table 3.1). A control for endogeneity bias is provided by the way Governance Misfit is constructed and used. This construct uses the propensity score matching approach to account for as much of the observable differences across firms that adopt different governance choices as possible (Rosenbaum & Rubin, 1984).

The second research design issue arises because the second research question requires a comparative analysis. That is, it is important to compare the performance implications of Governance Misfit separately for each governance form chosen. In the second stage OLS is used to estimate four separate performance equations. The sample is first split into two sub-samples based on whether the loan agreement used collateral. This accounts for the possibility that each sub-sample is a non-random sample of all exchanges. Those two sub-samples are then split again based on whether the governance choice represented a good fit or poor fit. Because there were no significant breaks in the distribution of Governance Misfit in either governance choice sub-sample all exchanges
above the median value of Governance Misfit were identified as having “poor fit” with
the remaining exchanges being labeled “good fit.” This technique enables a comparative
analysis of the performance implications of governance choice.9

3.3 Results

Table 3.2 presents the results of the first-stage governance choice models. The
probit models utilized in this first stage use all exchanges in the sample (N=365). These
models differentiate between the exchanges that used collateral to add enforcement to
their governance design (Enforcement Device = 1) and those that did not (Enforcement
Device = 0). Model I in Table 3.2 presents the baseline specification with control
variables only. Model II in Table 3.2 introduces measures derived from TCE that are
expected to capture the relationships between the small firm’s governance design
interests and the ultimate governance used in the exchange as specified in hypotheses 1a,
1b, and 1c.

In regards to H1a, the coefficient associated with Relationship-specific Investment
is negative (p = 0.033). This finding supports H1a. Likewise, H1b is supported as
Uncertainty has a positive relationship (p = 0.008) with the use of collateral in an
exchange. The coefficient estimate for Monitoring Costs (p = 0.681) suggests that H1c is
not supported in this sample.

Model III in Table 3.2 introduces the hazard-mitigating capabilities that based on
RBT are expected to help explain governance choice. H2a is supported as Supplier

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9 An alternative two-stage technique for controlling sample selection bias was also performed. The inverse
Mills ratio was calculated based on the first stage probit model. The inverse Mills ratio was then included
as a control in two second stage performance models – one for each governance choice subsample. The
coefficient estimates generated by this technique are not reported as Governance Misfit and the inverse
Mills ratio are highly multicollinear in the second stage models.
Reputation (p = 0.002) is negatively related to the use of collateral as a governance device. The negative coefficient estimate for Small Firm Reputation (p = 0.042) provides support for H2b.

Hypothesis H3 calls for an examination of the interaction between Supplier Reputation and Small Firm Reputation on governance choice. Model IV in Table 3.2 shows that this term (p = 0.902) does not help explain the variance in governance choice in this sample. Thus, H3 is not supported.

Table 3.3 reports the coefficient estimates generated by each of the four performance models. These coefficient estimates were used to predict the cost of capital for each small firm in each of the four sub-samples. Table 3.4 presents the mean predicted cost of capital for each sub-sample and the differences between their distributions based on two-sample t-tests. Among the exchanges that used collateral Governance Misfit is negatively related to Exchange Performance because the small firms in the sub-sample with good fit experienced significantly lower costs of capital compared to those in the sub-sample with poor fit (p = 0.000). On the other hand, the results were opposite (p = 0.998) among exchanges that did not use collateral as a governance device. These results provide partial support for H4.

3.4 Discussion

While managers at both firms in a vertical exchange can generally be expected to have assessed and agreed on an exchange governance device, prior literature suggests small firms’ governance interests may not be reflected in the ultimate governance design employed in an exchange (Gopinath, 1995; Subramani & Venkatraman, 2003). This outcome is more likely in exchanges between small firms and their primary suppliers
because in this setting the small firm managers’ influence on governance choice may be limited by asymmetric bargaining power. Bargaining power asymmetries often arise when a small firm values the resources of its primary supplier more than the supplier values the resources of the small firm (Buchanan, 1992; Pfeffer & Salancik, 1978; Subramani & Venkatraman, 2003). An important issue for small firm managers is to understand the extent to which their governance interests are addressed in exchanges with their primary suppliers. This understanding provides insight on the degree to which they may be burdened by excess transaction costs. Arriving at an optimal governance design in this type of exchange presents one of the more complex tasks facing a small firm’s managers (Gulati & Singh, 1998; Subramani & Venkatraman, 2003).

This study directly examines these issues by bringing together three current research streams to empirically test two related research questions using a sample of exchanges between small firms and their primary suppliers of financial services. Transaction cost economics and the hazard-mitigating capabilities logic based in resource-based theory are used together to predict the most efficient governance choice given certain attributes of the exchange and certain attributes of the parties in the exchange. These theories also suggest that picking the most efficient governance choice is positively associated with better exchange performance. This study extends TCE by (1) adding RBT arguments about the effect of firm-specific hazard-mitigating capabilities on governance choice and (2) using this expanded governance choice model to strengthen the prediction linking governance choice fit and exchange performance.

The first research question guiding this study is to what extent are small firms’ governance design interests addressed in exchanges with their primary suppliers?
Governance design in this setting can have a major impact on the survival and growth of small firms. However, small firms may have difficulty getting their governance interests incorporated into exchanges with their primary suppliers due to a lack of bargaining power. Six separate hypotheses were constructed from transaction cost economics and resource-based theory to predict the governance design interests of small firm managers. Finding support for four of these hypotheses suggests that it would be inaccurate to reject the possibility that small firm managers’ interests are, in fact, being reflected in the ultimate exchange governance design.

The theory developed and tested here is not unique to small firms. That these findings are largely consistent with both TCE and RBV predictions suggests the principles and assumptions underlying these theories are generally representative of this empirical setting. The implication is that perhaps a new theory to explain small firm governance design is not necessary. It may also be possible, however, that the phenomenon examined here is specific to the setting where the small firm has identified its supplier as the primary supplier for a particular resource type. The small firm may have chosen that supplier as the primary supplier expressly because that supplier accommodates the small firm’s interests in negotiated outcomes such as governance design. The need for new theory to explain phenomena unique to small firms can be confirmed by comparing whether small and large firms differ in their ability to influence and benefit from governance design decisions in specific types of vertical exchanges (e.g., exchanges with primary suppliers versus non-primary suppliers). Addressing such questions in future research promises valuable insights.
The second research question guiding this study is what are the performance implications of the governance choice for the small firm that uses the appropriate governance for its situation? Splitting the sample based on both governance choice and governance fit to perform the required analysis in this study revealed some interesting insights on this issue. When small firms appropriately use collateral to govern the exchange they benefit from a lower cost of capital. This is consistent with the theoretical prediction that the most efficient governance choice is contingent on conditions of the exchange and the firms in the exchange. However, the data also shows small firms generally pay a higher cost of capital when they appropriately govern the exchange without collateral. This result is inconsistent with the theory. The performance models reveal one three-way interaction that provides direction for possible future inquiries about this result. When women small business owners have appropriately chosen to govern these exchanges without collateral they experience a cost of capital that is 2.2% ($p = 0.002$) less compared to male small business owners in the same sub-sample. Women small business owners, in other words, experience the predicted relationship between Governance Misfit and Exchange Performance. In fact, women tend to pay a lower cost of capital when their exchanges are appropriately governed with collateral, too. This finding is generally inconsistent with the literature on women-owned small businesses (Carter, Anderson, & Shaw, 2001; Marlow & Patton, 2005), and it raises questions for future research.

In summary, transaction cost and resource-based logic have shown themselves to be important considerations when analyzing how small firms influence and benefit from exchanges with their primary suppliers. The findings of this study suggest that small firm
Managers may take both exchange characteristics (TCE) and firm-specific (RBV) considerations into account when determining their governance design interests. This implies that if either of these complementary theories is used without the other the analysis may generate misleading findings.

It is important to point out that scholars only view these as separate but complementary explanations today because the field has not yet gone far enough to integrate them into one theory. Blending the logic of TCE and hazard-mitigating capabilities is fruitful, but this approach does not go far enough in explaining the antecedents to and performance implications of managerial decisions about economic organization. Other theories can also be thoughtfully integrated to address these questions about economic organization. For example, agency theory and property rights theory can be used together to more fully explain how partners’ interests in aligning incentives affect governance design (Kim & Mahoney, 2005). The resource-based arguments about productive capabilities can also be integrated with these theories to deepen our understanding of this phenomenon (Leiblein, 2003). Governance design has even been explained using the real option framework to account for the influence of firms’ unique perceptions regarding the future value generating potential of an exchange (Leiblein, 2003). With so many theories that convincingly explain principles that underlie governance design decisions, scholars realize that none of them provides a comprehensive view. The opportunity available is now is to examine and explain the assumptions and predictions that these theories share in common – and the assumptions and predictions on which they differ – and to explain how the principles central to these theories jointly and interactively explain economic organization (Leiblein, 2003).
Whether scholars take the approach of merging these currently distinct theories into one unified theory or they treat the separate theories as building blocks of an entirely new theory, the end result has potential to be a more powerful and universally applicable explanation of organizational economics.
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<td>0.15 ***</td>
<td>0.02</td>
<td>0.06</td>
<td>0.01</td>
<td>-0.05</td>
<td>0.00</td>
<td>0.02</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Leverage Ratio</td>
<td>-0.26 ***</td>
<td>0.22 ***</td>
<td>0.64 ***</td>
<td>0.16 ***</td>
<td>0.39 ***</td>
<td>0.24 ***</td>
<td>-0.26 ***</td>
<td>-0.14 **</td>
<td>0.07</td>
<td>-0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>Compensating Balance</td>
<td>0.11 *</td>
<td>-0.02</td>
<td>-0.01</td>
<td>0.03</td>
<td>-0.07</td>
<td>0.04</td>
<td>0.09 †</td>
<td>-0.09 †</td>
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<td>-0.21 ***</td>
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<td>0.09 †</td>
<td>0.15 ***</td>
<td>0.03</td>
<td>0.28 ***</td>
<td>-0.09 †</td>
<td>-0.03</td>
<td>-0.03</td>
<td>0.09 †</td>
<td>-0.02</td>
<td>0.18 ***</td>
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<tr>
<td>13</td>
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<td>0.03</td>
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<td>0.05</td>
<td>-0.06</td>
<td>-0.05</td>
<td>0.04</td>
<td>-0.01</td>
<td>-0.10 †</td>
<td>0.00</td>
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</tr>
<tr>
<td>14</td>
<td>Dollar Dependence</td>
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<td>0.04</td>
<td>0.03</td>
<td>-0.08</td>
<td>0.06</td>
<td>-0.05</td>
<td>-0.04</td>
<td>-0.26 ***</td>
<td>0.01</td>
<td>0.03</td>
<td>0.06</td>
<td>-0.05</td>
<td>-0.04</td>
</tr>
<tr>
<td>15</td>
<td>Credit Dependence</td>
<td>-0.21 ***</td>
<td>0.07</td>
<td>0.16 ***</td>
<td>0.07</td>
<td>0.10 †</td>
<td>0.12 *</td>
<td>-0.09 †</td>
<td>-0.03</td>
<td>0.14 **</td>
<td>0.07</td>
<td>0.24 ***</td>
<td>-0.04</td>
<td>0.06</td>
<td>-0.03</td>
</tr>
<tr>
<td>16</td>
<td>Relationship-specific Investment</td>
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<td>-0.10 *</td>
<td>-0.15 **</td>
<td>0.06</td>
<td>-0.16 **</td>
<td>-0.06</td>
<td>-0.02</td>
<td>0.06</td>
<td>-0.02</td>
<td>0.06</td>
<td>-0.11 *</td>
<td>-0.07</td>
<td>-0.11 *</td>
<td>0.05</td>
</tr>
<tr>
<td>17</td>
<td>Uncertainty</td>
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<td>0.07</td>
<td>0.01</td>
<td>-0.04</td>
<td>0.04</td>
<td>-0.11 *</td>
<td>-0.02</td>
<td>0.10 †</td>
<td>0.27 ***</td>
<td>0.21 ***</td>
<td>-0.11 *</td>
<td>-0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>18</td>
<td>Monitoring Costs</td>
<td>0.04</td>
<td>-0.03</td>
<td>0.10 †</td>
<td>0.09 †</td>
<td>0.06</td>
<td>-0.03</td>
<td>-0.13 *</td>
<td>-0.01</td>
<td>0.06</td>
<td>0.10 †</td>
<td>0.13 *</td>
<td>-0.02</td>
<td>0.05</td>
<td>-0.08</td>
</tr>
<tr>
<td>19</td>
<td>Supplier Reputation</td>
<td>-0.02</td>
<td>-0.08</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.03</td>
<td>-0.04</td>
<td>0.01</td>
<td>0.01</td>
<td>0.06</td>
<td>0.03</td>
<td>0.06</td>
<td>-0.01</td>
<td>-0.03</td>
</tr>
<tr>
<td>20</td>
<td>Small Firm Reputation</td>
<td>0.12 *</td>
<td>-0.18 ***</td>
<td>-0.10 *</td>
<td>0.01</td>
<td>-0.11 *</td>
<td>0.04</td>
<td>0.10 †</td>
<td>0.06</td>
<td>0.15 **</td>
<td>-0.04</td>
<td>-0.12 *</td>
<td>-0.02</td>
<td>-0.05</td>
<td>-0.08</td>
</tr>
<tr>
<td>21</td>
<td>Supplier Rep. x Sm. Fmr. Rep.</td>
<td>0.11 *</td>
<td>-0.12 *</td>
<td>-0.12 *</td>
<td>-0.04</td>
<td>-0.10 *</td>
<td>0.02</td>
<td>0.08</td>
<td>0.03</td>
<td>0.13 **</td>
<td>-0.10 *</td>
<td>-0.09 †</td>
<td>-0.01</td>
<td>0.10 †</td>
<td>-0.08</td>
</tr>
<tr>
<td>22</td>
<td>Enforcement Device</td>
<td>-0.10 †</td>
<td>0.10 †</td>
<td>0.23 ***</td>
<td>0.18 *</td>
<td>0.12</td>
<td>0.06</td>
<td>-0.09 †</td>
<td>-0.05</td>
<td>0.11 *</td>
<td>0.29 ***</td>
<td>0.24 ***</td>
<td>-0.11 *</td>
<td>0.09 †</td>
<td>0.06</td>
</tr>
<tr>
<td>23</td>
<td>Governance Misfit a</td>
<td>0.12 †</td>
<td>-0.11 †</td>
<td>-0.37 ***</td>
<td>-0.19 **</td>
<td>-0.04</td>
<td>0.16 *</td>
<td>0.04</td>
<td>-0.16 *</td>
<td>-0.50 ***</td>
<td>0.36 ***</td>
<td>0.12 †</td>
<td>0.09</td>
<td>-0.13 †</td>
<td>-0.04</td>
</tr>
<tr>
<td>24</td>
<td>Enforcement Device</td>
<td>-0.21 *</td>
<td>-0.28 **</td>
<td>0.41 ***</td>
<td>-0.27 **</td>
<td>-0.24 **</td>
<td>0.19 *</td>
<td>-0.18 †</td>
<td>-0.17 †</td>
<td>0.24 **</td>
<td>0.55 ***</td>
<td>0.46 ***</td>
<td>-0.28 **</td>
<td>0.23 **</td>
<td>0.05</td>
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Table 3.1 Descriptive statistics and correlation matrix
<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model I Coefficient estimates (S.E.)</th>
<th>Model II Coefficient estimates (S.E.)</th>
<th>Model III Coefficient estimates (S.E.)</th>
<th>Model IV Coefficient estimates (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.623 *** (0.677)</td>
<td>-2.145 ** (0.711)</td>
<td>-1.973 ** (0.728)</td>
<td>-1.986 ** (0.735)</td>
</tr>
<tr>
<td>Firm Age</td>
<td>0.001 (0.001)</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
</tr>
<tr>
<td>Firm Size</td>
<td>0.035 (0.046)</td>
<td>0.040 (0.046)</td>
<td>0.048 (0.046)</td>
<td>0.048 (0.046)</td>
</tr>
<tr>
<td>Small Firm Industry</td>
<td>0.714 ** (0.243)</td>
<td>0.848 *** (0.255)</td>
<td>0.931 *** (0.259)</td>
<td>0.931 *** (0.259)</td>
</tr>
<tr>
<td>Limited Liability</td>
<td>-0.135 (0.182)</td>
<td>-0.113 (0.186)</td>
<td>-0.128 (0.191)</td>
<td>-0.128 (0.191)</td>
</tr>
<tr>
<td>Number of Owners</td>
<td>-0.001 (0.006)</td>
<td>-0.003 (0.005)</td>
<td>-0.003 (0.005)</td>
<td>-0.003 (0.005)</td>
</tr>
<tr>
<td>Owner Managed</td>
<td>-0.084 (0.226)</td>
<td>-0.097 (0.233)</td>
<td>-0.148 (0.240)</td>
<td>-0.147 (0.241)</td>
</tr>
<tr>
<td>Owner Gender</td>
<td>0.042 (0.185)</td>
<td>0.067 (0.187)</td>
<td>0.109 (0.191)</td>
<td>0.110 (0.191)</td>
</tr>
<tr>
<td>Leverage Ratio</td>
<td>0.690 ** (0.263)</td>
<td>0.725 ** (0.269)</td>
<td>0.815 ** (0.275)</td>
<td>0.813 ** (0.275)</td>
</tr>
<tr>
<td>Loan Type</td>
<td>0.818 *** (0.155)</td>
<td>0.736 *** (0.167)</td>
<td>0.812 *** (0.172)</td>
<td>0.823 *** (0.173)</td>
</tr>
<tr>
<td>Loan Size</td>
<td>0.146 ** (0.056)</td>
<td>0.119 * (0.060)</td>
<td>0.116 * (0.061)</td>
<td>0.116 * (0.061)</td>
</tr>
<tr>
<td>Compensating Balance</td>
<td>-0.311 (0.343)</td>
<td>-0.317 (0.349)</td>
<td>-0.279 (0.362)</td>
<td>-0.280 (0.362)</td>
</tr>
<tr>
<td>Guaranty</td>
<td>0.154 (0.154)</td>
<td>0.152 (0.157)</td>
<td>0.148 (0.160)</td>
<td>0.146 (0.160)</td>
</tr>
<tr>
<td>Relationship Length</td>
<td>0.001 (0.001)</td>
<td>0.001 (0.001)</td>
<td>0.001 (0.001)</td>
<td>0.001 (0.001)</td>
</tr>
<tr>
<td>Dollar Dependence</td>
<td>0.404 (0.314)</td>
<td>0.643 † (0.341)</td>
<td>0.661 † (0.352)</td>
<td>0.661 † (0.353)</td>
</tr>
<tr>
<td>Credit Dependence</td>
<td>-0.476 † (0.290)</td>
<td>-0.583 * (0.297)</td>
<td>-0.475 (0.306)</td>
<td>-0.475 (0.306)</td>
</tr>
<tr>
<td>Relationship-specific Investment</td>
<td>-0.727 * (0.338)</td>
<td>-0.862 ** (0.349)</td>
<td>-0.860 ** (0.349)</td>
<td>-0.860 ** (0.349)</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>0.005 ** (0.001)</td>
<td>0.005 ** (0.001)</td>
<td>0.005 ** (0.001)</td>
<td>0.005 ** (0.001)</td>
</tr>
<tr>
<td>Monitoring Costs</td>
<td>-0.002 (0.005)</td>
<td>-0.005 (0.005)</td>
<td>-0.005 (0.005)</td>
<td>-0.005 (0.005)</td>
</tr>
<tr>
<td>Supplier Reputation</td>
<td>-0.436 ** (0.140)</td>
<td>-0.422 ** (0.181)</td>
<td>-0.422 ** (0.181)</td>
<td>-0.422 ** (0.181)</td>
</tr>
<tr>
<td>Small Firm Reputation</td>
<td>-0.702 * (0.346)</td>
<td>-0.757 (0.569)</td>
<td>-0.757 (0.569)</td>
<td>-0.757 (0.569)</td>
</tr>
<tr>
<td>Supplier Reputation x Small Firm</td>
<td>0.075 (0.606)</td>
<td>0.075 (0.606)</td>
<td>0.075 (0.606)</td>
<td>0.075 (0.606)</td>
</tr>
<tr>
<td>N</td>
<td>365</td>
<td>365</td>
<td>365</td>
<td>365</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-202.99</td>
<td>-196.57</td>
<td>-189.77</td>
<td>-189.76</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td>0.000 ***</td>
<td>0.000 ***</td>
<td>0.000 ***</td>
<td>0.000 ***</td>
</tr>
</tbody>
</table>

Positive coefficients indicate a greater probability of enforcement device use
†  p < 0.10
*  p < 0.05
**  p < 0.01
***  p < 0.001

Table 3.2 Probit estimates for first-stage governance choice model
### Table 3.3 Estimates for second stage exchange performance models

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Good Fit</th>
<th>Poor Fit</th>
<th>Good Fit</th>
<th>Poor Fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enforcement Device = 1 (Collateral)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.981 ***</td>
<td>2.302 *</td>
<td>8.720 ***</td>
<td>4.034 *</td>
</tr>
<tr>
<td>(0.972)</td>
<td>(1.168)</td>
<td>(2.343)</td>
<td>(1.633)</td>
<td></td>
</tr>
<tr>
<td>Firm Age</td>
<td>-0.002 †</td>
<td>-0.005 **</td>
<td>-0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.003)</td>
<td>(0.002)</td>
<td></td>
</tr>
<tr>
<td>Small Firm Industry</td>
<td>0.236</td>
<td>1.447 *</td>
<td>Dropped</td>
<td>0.871</td>
</tr>
<tr>
<td>(0.278)</td>
<td>(0.750)</td>
<td>(0.718)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner Gender</td>
<td>-0.552 †</td>
<td>0.914 *</td>
<td>-2.207 **</td>
<td>-0.108</td>
</tr>
<tr>
<td>(0.324)</td>
<td>(0.444)</td>
<td>(0.667)</td>
<td>(0.732)</td>
<td></td>
</tr>
<tr>
<td>Leverage Ratio</td>
<td>-0.194</td>
<td>-0.461</td>
<td>-0.831</td>
<td>0.912</td>
</tr>
<tr>
<td>(0.411)</td>
<td>(0.586)</td>
<td>(0.985)</td>
<td>(0.734)</td>
<td></td>
</tr>
<tr>
<td>Loan Size</td>
<td>-0.232 **</td>
<td>-0.067</td>
<td>-0.561 **</td>
<td>-0.246 †</td>
</tr>
<tr>
<td>(0.074)</td>
<td>(0.108)</td>
<td>(0.229)</td>
<td>(0.138)</td>
<td></td>
</tr>
<tr>
<td>Small Firm Reputation</td>
<td>0.435</td>
<td>-0.267</td>
<td>1.878</td>
<td>2.398 †</td>
</tr>
<tr>
<td>(0.419)</td>
<td>(0.752)</td>
<td>(2.464)</td>
<td>(1.303)</td>
<td></td>
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<tr>
<td>N</td>
<td>114</td>
<td>115</td>
<td>68</td>
<td>68</td>
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<tr>
<td>Model F</td>
<td>2.90 **</td>
<td>3.57 **</td>
<td>3.48 **</td>
<td>2.59 *</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.092</td>
<td>0.119</td>
<td>0.156</td>
<td>0.125</td>
</tr>
</tbody>
</table>

† p < 0.10  
* p < 0.05  
** p < 0.01  
*** p < 0.001

### Table 3.4 Mean predicted cost of capital based on second stage models

<table>
<thead>
<tr>
<th></th>
<th>Good Fit</th>
<th>Poor Fit</th>
<th>Difference</th>
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</thead>
<tbody>
<tr>
<td>Collateral</td>
<td>0.56%</td>
<td>1.00%</td>
<td>-0.44%***</td>
</tr>
<tr>
<td>No Collateral</td>
<td>1.47%</td>
<td>0.90%</td>
<td>0.57%</td>
</tr>
</tbody>
</table>

† p < 0.10  
* p < 0.05  
** p < 0.01  
*** p < 0.001
The study of how firms design governance to organize vertical exchanges has interested organizational scholars for some time (Arrow, 1974; March & Simon, 1958; Mayer, Davis, & Schoorman, 1995; Rousseau, Sitkin, Burt, & Camerer, 1998; Williamson & Ouchi, 1981). The exchange-organizing tasks that a governance design must perform include establishing, structuring, monitoring, adapting, and enforcing the exchange (Coase, 1937; Williamson, 1975, 1985). Literature on the antecedents to and consequences of governance design choice often examines one form of governance at a time (David & Han, 2004; Hennart, 1993; Shelanski & Klein, 1995). For example, the governance design in empirical studies is often constructed as a dichotomous choice of market (“buy”) versus hierarchy (“make”). A wide variety of governance designs fall between these two extreme forms, however, and few scholars argue that firms employ only one governance device at a time (Hennart, 1993; Hill, 1990; Macneil, 1978; Williamson, 1993). Macneil (1978), for example, suggests contracts are often augmented by a variety of norms and informal arrangements.

A growing literature adopts this reasoning and uses organizational economics theory to suggest firms employ various combinations of governance devices when...
designing a governance bundle that fits the conditions of their exchange most efficiently.

Some of the governance devices explored to date that may be combined to form these bundles include formal contracts (Joskow, 1988), trust (Arrow, 1974), hostages (Williamson, 1983), and bargaining power (Gambetta, 1988; Klein, Crawford, & Alchian, 1978). Blomqvist, Hurmelinna, & Seppanen (2005), for example, propose that because small firms are less likely to possess contracting expertise they will supplement formal contracts with trust in exchanges with large firms. Alvarez, Barney, and Bosse (2003) suggest that entrepreneurial firms often construct an interrelated bundle of governance devices to ensure the efficient and effective management of their exchanges with large firms.

While these studies help identify the tradeoffs between two or more governance devices, questions remain about how certain devices interact in a bundle to affect the performance of the exchange. One approach to addressing these questions is to associate each governance device with the exchange-organizing task(s) that it serves to perform. The problem of governing an exchange between autonomous parties, after all, is the problem of combining various governance devices so that important exchange-organizing tasks are performed in the most efficient way. This study identifies unique governance devices that are commonly used to address the specific exchange-organizing tasks of partner selection, monitoring, adapting, and enforcing (Coase, 1937; Williamson, 1975, 1985). This enables the construction of testable hypotheses about governance bundle design by deductively reasoning how three-way interactions among certain exchange-organizing tasks likely affect the remaining tasks.
The purpose of this study is to address two research questions. First, how do relationships and trade-offs among multiple exchange-organizing tasks affect the way governance devices are bundled? Second, to what extent are the resulting bundles associated with differences in exchange performance? This study aims to contribute to theory by unpacking the governance design choice so managers and scholars can better understand how various governance devices are most efficiently bundled.

The rest of the paper is organized as follows. The next section outlines the theoretical arguments based on organizational economics that support hypotheses about relationships among governance devices. The methods section describes the exchanges between small firms and their suppliers of financial capital that provide the setting for the study. The choice of governance in this setting can be critical to firm performance and survival. The data, the measures, and empirical estimation procedures are then described. The final sections present the results and discuss the implications for research on interfirm relationships.

4.1 Theory and hypotheses

The term governance has traditionally been defined broadly as a mode of organizing economic exchanges (Williamson & Ouchi, 1981). An extensive literature in organizational economics argues the organizing tasks required for completing an economic exchange include establishing, structuring, monitoring, adapting, and enforcing the exchange (e.g., Coase, 1937; Williamson, 1975, 1985). Each of these organizing tasks to complete an exchange gives rise to transaction costs. Transaction costs are the expenses in time and resources that are associated with the process of completing an exchange other than the price. To the extent these organizing tasks are not adequately
performed, the risk of opportunistic exploitation by one or more party raises costly exchange hazards (Klein, Crawford, & Alchian, 1978; Williamson, 1985). Furthermore, exchange partners can also incur opportunity costs from maladaptation if they employ a governance design that *inefficiently* performs these organizing tasks (Malone, 1987; Masten, Meehan, & Snyder, 1991; Williamson, 1985). The basic argument of organizational economic scholars is that governance designs, which can differ in substantive ways, are intended to accomplish these organizing tasks at the lowest total transaction cost.

Scholars have distinguished governance designs in many ways. Williamson (1991) argues that governance designs differ in terms of their contract law regime, incentive intensity, administrative controls, and performance attributes. He uses these dimensions to describe how two polar extreme governance designs, markets and hierarchy, differ. Exchanges governed via markets are characterized by classical contract law where disputes are settled in courts, by the direct and immediate reward of effort (strong incentive intensity), by weak administrative controls, and by exchange partners that autonomously adapt to changing circumstances. Exchanges governed via internal organization or “hierarchy”, on the other hand, are characterized by forbearance (i.e., exchange partners must settle disputes internally), by weak incentive intensity, by strong administrative controls, and by partners that cooperatively adapt to changes in the exchange environment. A third governance structure, the “hybrid”, is so named because it displays intermediate values in all four of these dimensions (Williamson, 1991: 280). Williamson points out that each governance design is aligned on these four dimensions. For example, when an exchange is governed via hierarchy the boss makes certain
decisions regarding activities other exchange parties will perform, and parties to the exchange accept this because their incentives are not directly affected by the boss’ decisions in the short term. This, in turn, supports conscious, deliberate, and purposeful cooperation among exchange parties.

These three governance structures are commonly used in empirical tests of TCE. Reviews of the empirical TCE literature show that the hierarchy-versus-market dichotomy is the most frequently examined dependent variable (David and Han, 2004; Shelanski & Klein, 1995). The hierarchy-versus-hybrid and hybrid-versus-market dichotomies are also among the most commonly examined governance choices.

While the four dimensions Williamson uses to distinguish between governance designs – contract law regime, incentive intensity, administrative controls, and performance attributes – are helpful in a broad sense, using them to understand differences in governance designs that fall within the hybrid category is more difficult. This is an interesting problem because most exchanges are arguably governed using some form of hybrid design (Hennart, 1993). For example, long-term contracts are often one part of a governance design that can include varying levels of safeguards and administrative devices to support organizing tasks such as information disclosure and dispute resolution (Williamson, 1991).

Many researchers seeking to explain differences in governance designs have developed additional dimensions for distinguishing types of governance. For example, Bradach and Eccles (1989) distinguish between formal governance devices such as written contracts and informal devices such as trust. Hennart (1993) argues that governance is distinguishable based on whether it rewards parties to the exchange on the
basis of their outputs (indirect control mechanisms) or on the basis of their inputs (direct control mechanisms). Barney and Hansen (1994) suggest governance is either economic (i.e., market-based or contractual) or social (i.e., consisting of reputation, legitimacy, social network effects). Similarly, Poppo and Zenger (2002) propose a distinction between formal contracts and relational governance. Uzzi (1999) makes a case for characterizing governance as either formal or self-enforcing. Most recently a distinction is being made between generic versus firm-specific governance devices (Argyres & Liebeskind, 1999; Barney & Hansen, 1994; Delios & Henisz, 2000; Foss & Foss, 2005; Leiblein & Miller, 2003). While each of these dichotomous distinctions arguably helps researchers better understand governance design choices, most of these scholars acknowledge that governance design is not really a dichotomous choice. Questions remain regarding how to further unpack the complexity of governance design choice.

Many unique governance devices can be used simultaneously in an exchange, and the resulting bundle of governance devices may not be accurately reflected in one of the pure forms in any of these dichotomies. Leiblein and Macher (working paper) have begun further decomposing governance design decisions by distinguishing among four types of alliances based on different levels of common ownership and colocation. They argue that common ownership helps align incentives, increase monitoring, and improve managerial control whereas colocating personnel improves coordination and learning among partner firms. This logic is based on two main concepts. First, governance devices vary with regard to which exchange-organizing tasks they perform. Second, parties to an exchange will design bundles of these devices to manage the hazards present in their particular exchange.
This perspective on governance choice views governance designs as bundles of atomistic governance devices rather than characterizing governance designs on the basis of a single governance device. Alvarez, Barney and Bosse (2003) also take this view in exploring the explicit relationships and tradeoffs among four different governance devices – trust, formal contracts, reputation, bargaining power – to determine which devices tend to be used together and which devices do not in exchanges between entrepreneurial firms and larger, more established firms.

This study further clarifies governance design choice by more closely associating individual governance devices with the unique exchange-organizing tasks of establishing, monitoring, adapting, and enforcing the exchange. The governance designs examined all include a formal long-term contract, but the terms of the contract tend to vary. Building on the distinctions from the literature reviewed here, the hypotheses address contract-based devices (i.e., clauses) as well as informal devices outside the contract. For example, one governance device identified in this study serves primarily to monitor exchanges and another device is primarily used to enforce exchanges. Thus, this study adheres to the concept that governance designs are bundles of atomistic governance devices, each of which perform certain exchange-organizing tasks. Whereas Leiblein and Macher’s (working paper) approach associates two or three exchange-organizing tasks with each governance device, this study unpacks governance bundles one step further by associating each device with only one exchange-organizing task.

4.1.1 Exchange-organizing tasks and governance devices

This section describes four exchange-organizing tasks and the governance devices that address them. The first exchange-organizing task considered is *partner selection.*
The identity of each partner matters in exchanges that are governed with long-term contracts because premature termination or maladaptation places burdens on one or both parties. When the partners’ identities matter, the parties incur exchange-organizing costs associated with searching for one another (Coase, 1937). This is the exchange-organizing task of partner selection. Partner selection includes evaluating potential exchange partners before the exchange takes place to minimize hazards associated with adverse selection. Adverse selection occurs when one party to an exchange acts on privately held information in a manner that adversely affects its uninformed exchange partner. This happens, for example, when a party prone to opportunistic behavior misrepresents its typical behavior in order to attract an exchange partner. Thus, the purpose of the partner selection task is to accurately assess ex ante the extent to which the other party may act opportunistically in the exchange (Barney & Hansen, 1994).

Signaling is one approach used to minimize adverse selection hazards in this situation. Signaling is when one party attempts to signal information about its unobservable characteristics or capabilities through observable actions (Spence, 1973). For a signal to be credible, it must be prohibitively costly to send the same type of signal inaccurately. A valuable signal in the present context is one that indicates a potential exchange partner demonstrates a capability for self-control (i.e., not acting opportunistically). Barney and Hansen (1994) argue that firm reputations can support the partner selection task by legitimately signaling superior exchange governance capabilities. Firm reputations develop over time when firms demonstrate consistent patterns of behavior (Itami, 1987). A firm with a reputation for not acting opportunistically with its exchange partners possesses a hazard-mitigating capability that
may give it a governance cost advantage and make it a more appealing potential exchange partner to other firms. A favorable reputation for possessing hazard-mitigating capabilities is a credible signal because it is correlated with the firm’s actual (rather than professed) pattern of behavior and it is too costly for a hazard-inducing firm to develop a pattern of hazard-mitigating behavior (Barney & Hansen, 1994).

Managers at both firms in an exchange can generally be expected to have assessed and agreed on the governance design they will employ in the exchange. Managers at both firms, therefore, will seek to accurately assess, *ex ante*, the other party’s propensity for opportunistic behavior as they perform the partner selection task. For this reason, the favorable reputations of the supplier and the focal firm are both governance devices that address partner selection at a high level. Neutral or unfavorable reputations are considered low level partner selection devices.

Once the exchange has been initiated, parties to the exchange need to address the tasks of monitoring, adapting, and enforcing the exchange. ¹⁰ These tasks address the ex post hazards that can arise after relationship initiation. The task of monitoring enables parties to determine the degree to which the performance of the agreement is progressing as planned (Ouchi, 1979). Parties monitor each other by communicating about their respective behavior or output. Scholars of interfirm collaboration emphasize that when this communication is transmitted through personal and face-to-face interactions it facilitates mutual understanding, shared values, and relational commitment (e.g., Doz,

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¹⁰ Three additional exchange-organizing tasks have been identified in the literature: specifying the roles and responsibilities of parties in the exchange (Jensen, 1983), developing a system by which future contingencies and consequential rights and responsibilities are spelled out (Barney & Ouchi, 1986), and designing an incentive system to allocate rewards to parties based on observed performance (Holmstrom & Tirole, 1989; Stinchcombe, 1985). These additional tasks fall outside the focus of this study.
1996; Ring & Van de Ven, 1994). Furthermore, to the extent evaluating the other party’s behavior requires an understanding of subtle contextual cues, high-bandwidth interface methods such as face-to-face meetings will strengthen monitoring. High-bandwidth interface methods are also superior in settings where information about output is confidential. In this study, exchange partners whose primary interface method is personal or face-to-face are considered to use a high level monitoring device. Low-bandwidth interface methods such as e-mail, fax, and letters represent a low level monitoring device.

The task of adapting an exchange to changing circumstances is critical in exchanges that include long-term contracts. This is because boundedly rational managers cannot predict the full set of contingencies that may possibly affect the contract (Williamson, 1985). The result is that parties to a long-term contract generally need a governance device that permits adjustments to be made as unforeseen events unfold. These adjustments are required to restore the efficiency of the governance design. Cooperative adaptation devices promote harmonious adjustments and preserve the continuity of the exchange relation (Williamson, 1983). In the absence of an adaptation device that supports cooperative adaptations, parties are left to haggle with each other over potential changes to the exchange. One type of informal cooperative adaptation device is a relationship between two partners in which concurrent exchanges operate to promote cooperation. In such a setting opportunistic haggling over adaptations threaten the future prospects of not only the focal exchange, but also of the concurrent exchanges. Furthermore, individual parties have incentive to show flexibility based on the expectation that such actions will be reciprocated (Williamson, 1991). The extent to which the firm and its supplier are engaged in more concurrent exchanges is considered
in this study to represent a high level adaptation device that enables quick and flexible
responses to changing circumstances. Fewer concurrent exchanges between parties to the
focal exchange indicate a low level adaptation device.

The final exchange-organizing task examined in this study is enforcing the
exchange. The task of enforcing the exchange is concerned with recognizing and
penalizing parties to the exchange for cheating one another. While contractual
arrangements can entail a combination of explicit and implicit enforcement devices
(Klein, 1980), this study focuses on explicit enforcement devices. Specifically,
enforcement devices in this study are contract clauses that impose a capital loss on the
cheater that is sufficient to deter cheating. Governance designs that include a higher
number of explicit enforcement clauses in the contract have a high level enforcement
device. Fewer enforcement clauses in the contract signify a low level enforcement device.

Table 4.1 summarizes the linkages between exchange-organizing tasks and their
respective governance devices explored in this study.

4.1.2 Hypotheses

The notion of discriminating alignment in transaction cost theory provides a
strong basis for predicting which exchange-organizing tasks – and therefore which
governance devices – will be bundled together. This logic will be used to address the first
research question regarding how interactions among exchange-organizing tasks affects
the way governance devices are bundled. The discriminating alignment hypothesis argues
parties to an exchange will organize their exchange by designing the most cost-efficient
governance bundle that has features to specifically address the opportunities and hazards
that characterize their exchange (Williamson, 1985). A governance design, therefore, can
be viewed as a combination of governance devices that is assembled based on its overall ability to minimize the total costs associated with partner selection, monitoring, adapting, and enforcing the exchange. Governance bundles will differ with regard to how well they address each of these tasks. For example, when two or more of these tasks are addressed particularly well in an exchange, it may signal that the remaining tasks can be addressed at comparatively lower cost. Using a higher level of one governance device is assumed in this argument to be more costly than using a lower level of the same device, all else equal. Writing and implementing each additional contractual clause, for example, adds cost. The overarching logic is that total transactions costs will rise when a governance bundle is inadequate for the hazards present in the exchange and that total transactions costs will be excessive when the bundle contains high level governance devices that are unnecessary.

The hypotheses developed in this study anticipate how governance devices are combined into bundles to minimize total transaction costs. Each hypothesis predicts the governance device characteristics that will distinguish one bundle from the other bundles. That is, hypotheses one through four below predict there will be four mutually exclusive and collectively exhaustive governance bundles defined by various combinations of five governance devices. The basic arguments presented hinge on the interactions among exchange-organizing tasks as proxied by extreme levels of three specific governance devices.

The first two governance bundles predicted are derived largely based on the reasoning of Barney and Hansen (1994). The argument is that a particularly discriminating partner selection process may reduce the emphasis exchange partners must
place on other exchange-organizing tasks. Barney and Hansen suggest that when a firm possesses values, principles, and standards of behavior that would be violated if it acted opportunistically, that firm is unlikely to act opportunistically in the future. Consistent with resource based theory, to the extent these values, principles, and standards of behavior are (1) not common among all firms, (2) impossible to acquire at less than their true marginal value, and (3) costly to imitate (Barney, 1986; Henderson & Cockburn, 1994; Peteraf, 1993), they represent a firm-specific hazard-mitigating capability. The implication for governance design is that when both firms in an exchange possess such hazard-mitigating capabilities those firms may be able to address the remaining exchange-organizing tasks at comparatively lower cost.

Firms often seek exchange partners that have superior exchange governance capabilities as indicated by a favorable reputation for not acting opportunistically. This is because partners with favorable reputations may present lower risk of future problems associated with the other exchange-organizing tasks. This study specifically examines how the partner selection task affects the comparative costs of enforcing the exchange. When neither firm expects its partner to cheat they will perceive less need for costly high level enforcement devices to penalize cheating. Heide (1994) makes a similar argument that the extent to which common values among exchange partners have been established, the need for explicit enforcement clauses will be comparatively less. Thus, when both parties possess favorable reputations, adding high level enforcement devices will result in an inefficient governance bundle.

If, however, the focal firm does not have a favorable reputation for possessing hazard-mitigating capabilities, the supplier will insist on protecting itself from ex post
enforcement hazards in the exchange by adding high level enforcement to the governance bundle. Barney and Hansen (1994) make a consistent argument that when just one of the parties has a favorable reputation the fact that the other party may act opportunistically provides incentive to invest in additional high level governance devices to address the remaining exchange-organizing tasks. A firm that does not enjoy a favorable reputation may, therefore, be forced to incorporate a high level enforcement device in the governance bundle to show that it will not act opportunistically in the exchange ex post.

Hypothesis 1: When a firm and its supplier both possess favorable reputations the comparatively higher performance of their partner selection task serves as an alternative to using a high level enforcement device in the bundle. Exchanges characterized by favorable supplier reputation, favorable firm reputation, and few enforcement clauses in the contract will represent a unique governance bundle (“Bundle 1”).

Hypothesis 2: When a firm possesses an unfavorable reputation and its supplier possesses a favorable reputation, the comparatively lower performance of their partner selection task will not serve as an alternative to using more formal enforcement devices in the bundle. Exchanges characterized by favorable supplier reputation, unfavorable firm reputation, and many enforcement clauses in the contract will represent a unique governance bundle (“Bundle 2”).

The logic used to deduce the final two governance bundles is based largely on the concept of relational exchanges. Relational exchanges are defined as exchanges in which historical or social context affect the behavior of the parties (Macneil, 1978; 1980).
Parties in a relational exchange tend to develop shared interests that serve as self control and therefore mitigate the need for formal contractual enforcement devices (Dwyer, Schurr, & Oh, 1987; Macneil, 1978; 1980).

When parties to an exchange primarily use personal or face-to-face interface methods they generate and share more information with each other about their behavior and output. Thus, performing the monitoring task using personal interface as a governance device may help minimize the likelihood that one party in the exchange will behave opportunistically because that behavior will be more difficult to hide or disguise. The importance of using a personal interface method as a governance device for monitoring becomes more significant when the scope of behaviors and outputs to be monitored expands or the severity of inaccurate monitoring increases. Both of these conditions arise when the parties to an exchange are engaged in a higher number of concurrent exchanges with each other. As mentioned above, in this setting partners are more likely to cooperatively negotiate adaptations to an exchange as needed to protect the future prospects of their concurrent exchanges. Expectations of other exchanges with this partner, therefore, represent an incentive to abide by the norms of the focal exchange (Axelrod, 1984).

When parties have addressed the adaptation of their focal exchange with several concurrent exchanges and they organize the monitoring of their exchange with personal interface, both parties have better information about the current state of the exchange as well as comparatively more incentive to cooperatively adapt it. As a result they will be less likely to seek governance devices to perform the enforcement task because they will be more aware of any attempts of opportunism and they will have the ability to adapt the
exchange in a way that reduces the incentive to act opportunistically. Thus, when high levels of these two governance devices are used together in a bundle it is less likely parties to the exchange will invest in high level enforcement devices.

In contrast, the relational contracting literature (Macneil, 1978, 1980) argues that to the extent exchange partners are not influenced by past and future exchange relationships they are more likely to pursue their autonomous interests vigorously and to rely more on economic and legal sanctions to enforce their exchanges. When two parties in an exchange have little personal contact (a low level monitoring device) and fewer concurrent exchanges (a low level adaptation device), it is more difficult for one party in the exchange to determine how the other party will behave. In these conditions the use of more enforcement devices may reduce total transaction costs by instituting severe economic penalties for cheating. With enforcement mechanisms in place, the parties will find it in their best interest not to cheat – even though they are in an exchange with a party with which they have few relational ties.

*Hypothesis 3:* When a firm and its supplier employ personal interface methods to monitor a high number of concurrent exchanges their comparatively stronger relationship serves as an alternative to using a high level enforcement device in the bundle. Exchanges characterized by personal interface method, a high number of concurrent exchanges, and few enforcement clauses in the contract will represent a unique governance bundle ("Bundle 3").

*Hypothesis 4:* When a firm and its supplier employ impersonal interface methods to monitor a low number of concurrent exchanges their comparatively
weaker relationship will not serve as an alternative to using a high level enforcement device in the bundle. Exchanges characterized by impersonal interface method, a low number of concurrent exchanges, and many enforcement clauses in the contract will represent a unique governance bundle (“Bundle 4”).

The theory developed thus far suggests interrelationships among exchange-organizing tasks will affect how their respective governance devices are combined in governance bundles. The logic has been based primarily on the discriminating alignment hypothesis of transaction cost economics (TCE). This same argument can be used as the basis for hypotheses about how governance choice affects exchange performance. Exchange performance improves to the extent governance choice efficiently addresses hazards of the exchange. While all four of the governance bundles derived above result from competitive pressure to maximize efficiency, it is unlikely that all four bundles are associated with similar levels of exchange performance. Tests of TCE often find that governance design helps to explain variance in exchange performance (David & Han, 2004; Shelanski & Klein, 1995).

The final two hypotheses in this study address the second research question regarding the extent to which these bundles are associated with differences in exchange performance. Barney and Hansen (1994) argue that when both parties have superior governance capabilities they may enjoy governance cost advantages in their exchange compared to exchanges where only one party has such capabilities. An important assumption underlying this argument is that the cost of developing and signaling superior governance capabilities through a favorable reputation is often less than the cost of using
more enforcement clauses in the contract. Explicit enforcement clauses must be negotiated for each exchange whereas the cost of establishing a favorable reputation is spread across numerous economic exchanges, thus reducing the per-exchange cost (Barney & Hansen, 1994). Thus, the cost advantage arises for two parties with favorable reputations because no additional investment in governance devices is required for both parties to be assured their partner will not exploit any vulnerabilities that might arise in the exchange. This scenario is represented in Bundle 1 above where both parties possess favorable reputations. In the case where one party has an unfavorable reputation – represented by Bundle 2 – no such cost advantage is expected.

Hypothesis 5: The exchange performance of Bundle 1 will exceed that of Bundle 2.

The two governance bundles represented in hypotheses three and four are also expected to be associated with different levels of exchange performance. The interfirm relationships represented in Bundle 3 may generate cost advantages for those firms. The logic presented here is similar to that used to derive hypothesis five. Two firms that have a high number of concurrent exchanges and that primarily interact via personal interface methods can spread the costs of developing these governance devices across multiple exchanges. This reduces the per-exchange cost of these governance devices for both partners. On the other hand, the cost of using more enforcement clauses in the contract is specific to the focal exchange. This logic is consistent with findings by Uzzi (1999) that when banks and their clients are engaged in stronger relationships the clients realize lower borrowing costs net of other determinants of the lending decision.

Hypothesis 6: The exchange performance of Bundle 3 will exceed that of Bundle 4.
4.2 Methods

4.2.1 Empirical Setting

The setting of this study is lending exchanges between small firms and their financial capital supplier. These exchanges provide an ideal empirical setting for this study for three reasons. First, these exchanges fall somewhere between pure market exchanges and pure hierarchical exchanges. They employ long-term contracts, yet they vary in their use of other governance devices. Second, they typically use a variety of governance devices that can be easily associated with specific exchange-organizing tasks identified in organizational economic theory. How these devices are bundled is important to firm performance because opportunism on the part of its financial capital supplier can directly affect a firm’s economic performance and survival (Cassar, 2004; Gopinath, 1995). Loan governance design is also important to the financial service suppliers because when a firm defaults on a loan it may be impossible to recover that loss if the exchange governance was maladaptive. Finally, exchanges in which small firms access financial capital are interesting subjects for this study because external financial capital is often one of the most important resources for operating small firms. One study found that over 80 percent of the roughly five million small firms in the United States use some kind of credit and have outstanding debt on their books (Bitler, Robb, & Wolken, 2001). Furthermore, access to affordable financial capital has important implications for the operations of the business, risk of failure, firm performance, and the growth potential of a small firm (Bruno, McQuarrie, & Torgrimson, 1992; Cassar, 2004; Deeds, DeCarolis, & Coombs, 1997; Gopinath, 1995; Saparito, Chen, & Sapienza, 2004; Uzzi, 1999).
4.2.2 Data

The data analyzed in this study are taken from the 1998 Survey of Small Business Finances (SSBF). The SSBF provides data on the characteristics of firms with fewer than 500 employees and the use of financial services at these firms. The 1998 survey was conducted in 1999 and 2000 by the National Opinion Research Center for the U.S. Federal Reserve Board of Governors. The firms surveyed constitute a nationally representative sample of 3,561 small businesses operating in the United States as of yearend 1998, where a small business is defined as a domestic for-profit, nonfinancial, nonsubsidiary, nonagricultural, nongovernmental business employing fewer than 500 employees. The sample was drawn from the Dun & Bradstreet Market Identifier file as of May 1999. These data are broadly representative of approximately five million firms operating in the US as of year-end 1998.\footnote{For a more detailed description of the 1998 SSBF see Bitler, Robb, & Wolken, 2001.}

Given the research questions guiding this study, it was necessary to examine data on those firms that were actually engaged in a borrowing relationship with a supplier of financial capital. Of the 3,561 firms in the 1998 SSBF, 796 firms indicated that they had recently received a loan. Nearly all businesses (about 96 percent of the 3,561) in the SSBF used at least one financial service in 1998. In general, use of financial services increases with firm age (Boot, 2000). However, the 796 firms in the sample are slightly larger and younger compared to firms in the full survey. Firms that recently received a loan average $2.4 million in assets and 11.0 years of age. The average size and age for firms in the full survey are $1.6 million in assets and 14.4 years old, respectively. The median number of employees is 12 in the sample compared to five in the full survey.
4.2.3 Dependent variables

Testing hypotheses one through four required an initial bundle assignment for each exchange in the sample. The rules were based on extreme values of the three governance devices hypothesized to interact in each hypothesis. Each bundle is named for the hypothesis that predicts it (e.g., Bundle 1 is derived from H1, Bundle 2 from H2, etc.). Exchanges were initially assigned to Bundle 1 if they had values of Supplier Reputation and Firm Reputation above the median and a value of Enforcement below the median. The rule for Bundle 2 was based on different extreme values of the same three governance devices: the values of Supplier Reputation and Enforcement were equal to or above the median value and the value of Firm Reputation was below the median. The rules for initially assigning exchanges to Bundles 3 and 4 were based on extreme values of a different set of governance devices. Bundle 3 captured those exchanges for which Concurrent Exchanges and Interface Method were above the median and Enforcement was below the median. Exchanges were initially assigned to Bundle 4 if they were characterized by the opposite extreme values of these three governance devices. These initial bundle assignments represent the dependent variable in the first stage of the analysis.

Hypotheses five and six call for tests of performance differences among certain governance bundles. The measure of Exchange Performance in this study is based on the firm’s cost of capital on its most recent loan. The firm’s cost of capital provides an exchange performance measure that objectively captures the consequences of loan governance choice for the firm. Cost of capital is often measured in the lending literature as the interest rate on the loan (Petersen & Rajan, 1994; Uzzi, 1999). Exchange
Performance is computed in this study by adding any points paid by the firm to the initial interest rate on the loan and subtracting the prime rate at the time of the loan agreement. This formula controls any instances where points had been paid to buy down the interest rate and controls for changes in the institutional environment at the time of the exchange. This second modification is important because theory argues changes in the institutional environment can shift the comparative costs of different governance bundles (Williamson, 1985). The prime rate is the interest rate banks charge their best customers. Loans to firms are often tied to the prime rate, with less creditworthy borrowers paying a higher rate. The Federal Reserve indirectly moves the prime rate by changing the federal funds rate, the discount rate or both. The prime rate data was collected from the Federal Reserve for the month and year in which the loan agreement was made.

4.2.4 Independent variables

Consistent with the concept of one governance device used in the partner selection task, Supplier Reputation captures whether the firm chose to enter the exchange with this supplier based on the supplier’s reputation for cooperating with customers and its reputation for offering favorable trade terms. The SSBF asked firm owners an open-ended question to list the factors that influenced their decision to seek the loan from this supplier. Answers to this question were recoded into categorical responses by the National Opinion Research Center. If the firm identified any of the following financial institution characteristics, the supplier is recognized for having a reputation for cooperating with customers: specialization in small business services, knowledge of the firm’s industry, quality of service, convenience or ease of use, or ability to obtain multiple financial services at the institution. The following responses were used to
indicate whether the financial institution had a reputation for offering favorable trade terms: credit availability, lower collateral requirements, favorable lending policies or terms. If the firm did not identify either of these supplier-specific reputations, Supplier Reputation is set equal to zero. If only one of these types of reputation was indicated, Supplier Reputation takes a value of one. If being cooperative and having favorable trade terms were both indicated, Supplier Reputation is set equal to two.

The relevant Firm Reputation in this setting must credibly signal to a financial institution that the firm has a pattern of honoring its borrowing commitments. Lenders commonly use Dun and Bradstreet (D&B) ratings in assessing the behavioral patterns of business borrowers to determine their creditworthiness (Cole, 1998). In compiling the SSBF, the National Opinion Research Center purchased the D&B Commercial Credit Score for each firm that completed the survey. This score ranges from one (low risk) to five (high risk) and predicts the likelihood that a firm will be delinquent in paying its financial obligations, will seek legal relief from creditors, or will otherwise dishonor its credit obligations based on its past payment patterns, public filings and financial information. Firm Reputation is computed in this study as one divided by the D&B rating to establish the proper sign.

Interface Method in this study captures the level at which the parties in the exchange address the exchange-organizing task of monitoring in the governance bundle they created. Personal contact between exchange partners promotes the exchange of information that leads to improved mutual understanding and cooperation (Marshall, 1920; Carman & Langeard, 1980). When two parties primarily interact via personal or face-to-face meetings it becomes easier for a firm and its supplier to monitor one another.
An exchange is characterized by personal interface (a high level monitoring device) when the firm owner indicated that the most frequent method of conducting business with this supplier is via personal face-to-face interactions and telephone conversations. Exchanges employ an impersonal interface method (a lower level monitoring device) when the primary communication is by mail, direct withdrawal or wire, ATM, internet, fax, or courier pick up.

The number of *Concurrent Exchanges* between partners is used as a governance device to proxy mutual adaptation to unforeseen circumstances because when there are more concurrent exchanges the supplier has more business to protect, and thus less reason to act opportunistically in this one exchange. The focal firm also has more reason to collaborate because it has more of its resource needs at stake if it acts opportunistically in this one exchange. The relationship banking literature suggests when a firm procures more of its financial service needs from one supplier it becomes more costly for either party to leave the exchange (Binks & Ennew, 1997; Saparito, Chen, & Sapienza, 2004). *Concurrent Exchanges* is computed in this study by adding the number of financial service products the firm acquires from the supplier. Thirteen financial services were considered: checking accounts, savings accounts, lines of credit, capital leases, mortgages, motor vehicle loans, equipment loans, other loans, transaction services, credit-related services, cash management services, pension services, and brokerage services.  

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12 *Transaction services* cover the provision of paper money and coins, the processing of credit card receipts, the collection of night deposits, and wire transfers. *Cash-management services* include the provision of sweep accounts, zero-balance accounts, lockbox services, and other services designed to automatically invest liquid funds in liquid, interest-bearing assets. *Credit-related services* are the provision of bankers acceptances, letters of credit, sales finance, and factoring. *Trust and pension services* consist of the provision of 401(k) plans, pension funds, business trusts, and securities safekeeping.
The construct that captures the extent to which a particular governance bundle explicitly addresses *Enforcement* is the number of enforcement clauses in the contract. Three explicit enforcement devices are considered in this study. First, collateral is an explicit enforcement device because if the firm does not repay the loan according to the terms of the agreement, the lender has the right to take possession of the collateral. Collateral motivates borrowers to abide the loan agreement to avoid forfeiting their collateral. Governance forms in borrowing relationships are often distinguished according to whether or not they involve the exchange of collateral (e.g., Binks & Ennew, 1997; Boot, 2000). The second type of enforcement clause is a compensating balance clause. If the agreement includes a compensating balance clause the firm must keep a deposit at the financial institution for the duration of the loan. Should the firm fail to repay the loan this deposit will be forfeited. Finally, a personal guaranty makes the firm owner personally responsible for the obligations of the loan agreement. These three contractual clauses serve as enforcement devices because they serve to penalize the firm in the event it cheats the supplier. If the loan agreement does not include any of these three enforcement clauses, *Enforcement* is set equal to zero. *Enforcement* is set equal one, two, or three according to how many of these three enforcement devices are included in the contract. Seventeen percent of the exchanges in the sample do not use any explicit enforcement devices in their governance bundle.

### 4.2.5 Analytical methods

The theory developed above in hypotheses one through four suggests how the governance devices explored in this study interact with one another and, consequently,
how managers are likely to combine those governance devices into efficient bundles to organize their exchanges. Testing these hypotheses requires a technique that permits examination of the differences between the four governance bundles with respect to the five discriminating variables (governance devices) simultaneously. Multiple discriminant analysis (MDA) is used to weigh and linearly combine the five governance device variables and classify the exchanges into bundles with as much separation between bundles as possible. This technique tests theory by observing whether the exchanges are classified as predicted and confirming whether all five governance devices provide significant discriminatory power (Hair, Anderson, Tatham, & Black, 1998). This method also eases the interpretation of the three-way construct interactions in hypotheses one through four.\textsuperscript{13}

Independent sample t-tests are performed on the Exchange Performance of each exchange in the validation sample based on its predicted bundle assignment to test hypotheses five and six.

4.3 Results

The most common method used to test validity of an MDA model is to randomly split the sample into an analysis sample and a validation sample. Following this approach with these 796 exchanges resulted in an analysis sample with 401 exchanges and a validation sample with 395 exchanges. The analysis sample was used to derive the three

\textsuperscript{13} Note other statistical methods were considered and ultimately rejected for this study. Multiple regression is not suited to a situation where there are four possible nonmetric dependent variables. Ordered probit is also not suitable in this situation as it can only indicate if the independent variables are associated with the dependent variable; it does not provide insight as to whether the cases are actually classified as predicted. Finally, while MDA is related to factor analysis one important difference given the questions in this study is that factor analysis looks for structures underlying data based on similarities whereas MDA derives underlying functions based on differences.
discriminant functions that best classify the data into four bundles. Because the analysis in this study is guided by theoretical logic, the direct method was used to estimate the discriminant functions so that all the predictors were assessed simultaneously rather than stepwise. The discriminant function coefficients from the analysis sample are then applied to the validation sample to test how well the discriminant functions actually classify a set of independent data into bundles (Hair, Anderson, Tatham, & Black, 1998). The standardized canonical discriminant function coefficients are presented in Table 4.2. These coefficients serve a similar purpose as beta weights in OLS regression models as they indicate the relative importance of the discriminating variables in predicting the bundle assignments. The method generated three discriminant Z scores for each exchange. This allows each exchange to be plotted in three dimensions.\textsuperscript{14}

The test for statistical significance of a discriminant function is computed by comparing the distributions of the discriminant scores for each bundle. A smaller overlap in distributions indicates the discriminant functions separate the bundles well (Hair, et al., 1998). Wilk’s lambda is an indicator of the degree of separation achieved by these functions. Wilk’s lambda can be converted into a chi-square value for a test of how well the functions distinguish among groups. The $\chi^2$ significance levels reported in Table 4.2 ($p = 0.000$) indicate that substantive differences exist among these four bundles.

The prediction capability of the MDA model is also important in this study because the hypotheses seek a model that classifies exchanges into one of four governance bundles as expected. In this stage exchanges are assigned to bundles based on

\textsuperscript{14} MDA is not limited to a single variate, as is multiple regression, but creates three variates representing dimensions of discrimination among the four bundles (Hair, et al, 1998).
their discriminant scores. The validation sample is then used to construct a classification matrix which contains the number of correctly classified and incorrectly classified exchanges. If the percentage of correctly classified exchanges from the validation sample is above the proportional chance threshold the predictive power is not merely an artifact of the set of exchanges used in the analysis sample, but demonstrates a base level of generalizability (Hair, et al., 1998; Morrison, 1969). The classification results of the 395 exchanges in the validation sample are reported in Table 4.3. The model correctly classified 86.6 percent of all exchanges. The model is best at predicting exchanges with the characteristics derived in hypotheses two (i.e., Bundle 2) as 99.1 percent of the exchanges in the validation sample were correctly classified in that bundle. The prediction accuracy was lowest (75.4 percent correctly classified) for exchanges with the characteristics derived in hypothesis four (i.e., Bundle 4). In this study the more conservative proportional chance criterion is used because the four bundle sizes are unequal (Hair, et al., 1998). Given the proportion of exchanges assigned to each bundle in the validation sample, the computed proportional chance criterion is 52.1 percent. Classification accuracy is determined if the actual proportion of exchanges correctly classified exceeds the proportional chance criterion by 25 percent. Table 4.3 shows the model correctly classified 86.6 percent of the exchanges in the validation sample, which is above the 65 percent threshold (0.521 x 1.25 = 0.651).\(^\text{15}\)

The significance results of Wilk’s lambda combined with the prediction accuracy findings provide strong support for hypotheses one, two, three, and four in the validation sample.

\(^{15}\) Given that the dependent variable is nonmetric, it is not possible to use a measure such as r-square to assess predictive accuracy in MDA. The relevant procedure in MDA is to assess each observation in the validation sample as to whether it was correctly classified (Hair, et al., 1998).
sample. The way governance devices are actually bundled supports the proposed interactions among the exchange-organizing tasks involved in partner selection and enforcement (H1 and H2) as well as the interactions among the monitoring, adapting, and enforcing tasks (H3 and H4).

The bundle membership predictions for each exchange in the validation sample were saved for use in testing hypotheses five and six. Table 4.4 reports the results of t-tests that compare the Exchange Performance of validation sample exchanges predicted to belong to Bundles 1 versus 2 and Bundles 3 versus 4. The cost of capital adjusted for points and the current institutional environment for firms that used Bundle 1 is lower than for those using Bundle 2 (p = 0.013). This finding supports H5. The cost of capital for firms that are engaged in multiple concurrent exchanges with their supplier and that primarily use a personal interface method (Bundle 3) is lower than for those firms that must address lower level monitoring and adapting capabilities with increased use of enforcement devices (Bundle 4) (p = 0.016). This finding supports H6. The fact that these t-tests are significant also serves as a criterion-related validity check of the discriminant functions derived in the MDA.

4.4 Discussion

The purpose of this study is to better understand the complexity of interfirm governance design choice – to theoretically unpack the ambiguous “swollen middle” – and its importance to exchange performance. The theoretical logic developed here builds from the foundation that exchange governance designs must address specific exchange-organizing tasks such as partner selection, monitoring, adapting, and enforcing. The study then advances the concept that governance designs can be viewed as bundles of
governance devices where each device serves to perform one of those organizing tasks. Casual observation shows all five of the governance devices examined in this study are used in varying bundles to govern exchanges. The interesting problem is how managers combine the various governance devices so that important exchange-organizing tasks are performed in the most efficient way. Managers could combine high and low values of five governance devices to form thirty-one possible bundles. However, the hypothesized relationships and trade-offs among the exchange-organizing tasks in this study suggest that only four such bundles will be observed in practice.

The findings of this study support these arguments. Based on these results it would be inaccurate to reject the possibility that the way certain exchange-organizing tasks are undertaken affects the way other exchange-organizing tasks must be addressed to achieve an efficient governance design. Specifically, four governance bundles can be distinguished in this sample based on how they combine extreme values of five unique governance devices.

The second research question in this study explores relationships between the exchange performance of contrasting governance bundles. The first two bundles contrast in how they address the partner selection task. The second two bundles contrast in the ways they address the monitoring and adapting tasks. In both comparisons the bundles that employ a lower level enforcement device outperform those that use a higher level enforcement device. This is especially interesting considering the use of collateral alone – the most common enforcement device used in the sample – is significantly correlated with exchange performance in the full sample (r = .107; p = 0.003). So while using collateral can reduce a firm’s cost of capital, doing so is unnecessary if the firm has the
benefit of either a superior partner selection process or an established relationship with its exchange partner. This insight points to the importance of understanding exchange governance design choice at this more detailed level of analysis.

This insight also suggests that there may be another class of distinctions that can be used to understand the cost of using individual governance devices. The governance devices used in this paper to address the partner selection task are firm reputations. Reputations are firm-specific. A firm with a reputation for possessing hazard-mitigating capabilities can use that as a governance device in multiple exchanges with multiple partners simultaneously. The marginal cost of using this firm-specific governance device in each additional exchange is zero as long as the firm’s behavior remains consistent with its reputation. The governance devices used in this study to address the monitoring and adapting tasks are the interface method and number of concurrent exchanges, respectively. Both of these are relationship-specific. A firm’s interface method and number of concurrent exchanges can be used as governance devices in multiple exchanges simultaneously, but only with the focal partner. The fact that a firm primarily uses a personal interface method with one supplier, for example, cannot be used by that firm to govern its exchange with another supplier. The marginal cost of using relationship-specific governance devices can be spread across all of the exchanges between two firms, but is unlikely to reach zero because each additional exchange that must be organized may change the comparative effectiveness of these governance devices. Furthermore, the marginal cost of relationship-specific governance devices will always be positive in exchanges with new partners. Finally, the governance device used in this study to address the enforcement task is the number of enforcement clauses in the
contract. To the extent each exchange is governed by its own contract, such as with the exchanges in this sample, the number of enforcement clauses is exchange-specific. A firm’s use of enforcement clauses cannot be used in multiple exchanges nor with multiple partners simultaneously. The marginal cost of using exchange-specific governance devices is equal to the cost of designing and implementing them each time they are used in a governance bundle. In summary, then, firm-specific governance devices may be used at the lowest marginal cost; exchange-specific governance devices may be used at the highest marginal cost; and relationship-specific governance devices may incur a marginal cost that falls between these two extremes.

This pattern of logic suggests it may be fruitful to conduct more empirical tests to compare the costs of using firm-specific, relationship-specific, and exchange-specific governance devices. Results of hypotheses five and six in this study can be interpreted as support for the proposition that exchange-specific governance devices incur the highest marginal cost. A t-test shows the mean exchange performance of the bundle that primarily relies on firm-specific governance devices (Bundle 1) significantly exceeds the bundle that primarily relies on relationship-specific governance devices (Bundle 3) also supports this pattern of logic ($p = 0.026$).

The main points of this discussion – that managers in this sample combine extreme values of five governance devices to form four unique governance bundles and the comparative cost of those governance devices differ – can be combined to specify the conditions under which managers will likely use each of these four bundles.

Managers who are organizing an exchange between two firms that both already enjoy firm-specific reputations for possessing hazard-mitigating capabilities should
incorporate low level enforcement devices in the governance bundle. This is because when both parties possess superior exchange governance capabilities their highly efficient partner selection process reduces the likelihood that cheating will occur and need to be punished in their exchange. In this situation the partners experience the exchange-organizing advantages of more costly governance without the need to pay extra for relationship-specific or exchange-specific governance devices in the bundle.

When managers cannot rely on firm-specific governance devices to organize their exchange at the lowest cost the second most favorable governance bundle identified in this study is one that relies primarily on relationship-specific governance devices. When two parties interact personally with each other to monitor a high number of concurrent exchanges their implicit interest in relational continuity enables them to use less costly (low level) exchange-specific enforcement devices in the governance bundle. In this setting both parties have incentives not to cheat because it would be easily recognized by their partner and would jeopardize the outcomes of their other exchanges together.

When only one of the firms has a firm-specific governance device such as a favorable reputation the best design choice for managers is to include a high level enforcement device in the contract. The comparatively stronger enforcement in this bundle comes at a higher cost but can work two ways. First, it may signal, ex ante, that the party without a hazard-mitigating capability has cooperative intentions. Second, it may actually deter that party from cheating ex post.

Finally, when managers at both firms do not enjoy the benefits of firm-specific governance devices and are not concerned with their past and future exchange relationship they tend to rely on high level enforcement devices in their governance
bundle. Without the benefit of either hazard-mitigating capabilities or relational governance devices these firms must rely more heavily on more costly exchange-specific governance devices such as contractual enforcement clauses. Perhaps these insights and ideas will foster future arguments for advancing organizational economic theory.

The empirical setting examined in this study is exchanges between small firms and their financial service providers. While theoretical arguments were not developed for why small and large firms may differ in their governance design choices at the level of exchange-organizing tasks, there are some small firm considerations that may affect this discussion. Small firms are often described as resource-constrained in the literature. This condition would conceivably force small firms to seek more low-cost governance devices when organizing their exchanges. If the above propositions about the relative cost of governance devices are correct, small firms will therefore be compelled to use firm-specific devices such as firm reputation as much as possible. Another common argument is that small firms cannot afford expert legal advice so will often favor relational governance devices. This, too, would be supported by the propositions about the relative cost of governance devices. A final consideration that may affect the generalizability of this study is that some entrepreneurship and small business scholars are suggesting there may be differences in how exchanges between small ventures and their larger exchange partners are organized because the larger partners often have a potentially controlling influence over the small firm (Blomqvist, Hurmelinna, & Seppanen, 2005; Yli-Renko, Sapienza & Hay, 2001). Empirically examining this issue would require another sample of exchanges between two partners of equal size and influence in order to allow for comparisons.
While this study found statistical support for its deductively derived hypotheses about alternative governance designs and differences in their performance outcomes, it is based on five specific governance devices commonly used in lending exchanges between firms and their financial service suppliers. The encouraging results reported here will hopefully motivate additional research on the relationships between and among various exchange-organizing tasks that affect governance design in other empirical settings. This is part of a larger body of work that seeks to explain how certain governance devices are commonly bundled together to create governance designs that adequately address the risks associated with each exchange-organizing task.
**Table 4.1  Exchange-organizing tasks and their respective governance devices**

<table>
<thead>
<tr>
<th>Exchange-organizing task</th>
<th>Governance Device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Low level</strong></td>
</tr>
<tr>
<td>Partner Selection</td>
<td>• Neutral or unfavorable supplier reputation</td>
</tr>
<tr>
<td>Partner Selection</td>
<td>• Neutral or unfavorable firm reputation</td>
</tr>
<tr>
<td>Monitoring</td>
<td>• Impersonal interface method</td>
</tr>
<tr>
<td>Adaptation</td>
<td>• Low number of concurrent exchanges</td>
</tr>
<tr>
<td>Enforcement</td>
<td>• Few enforcement clauses in contract</td>
</tr>
<tr>
<td>Function</td>
<td>Supplier Reputation</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>1.023</td>
</tr>
<tr>
<td></td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>-0.176</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Eigenvalue</th>
<th>% of Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.766</td>
<td>68.90%</td>
</tr>
<tr>
<td>2</td>
<td>0.967</td>
<td>24.10%</td>
</tr>
<tr>
<td>3</td>
<td>0.284</td>
<td>7.10%</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Function 1 through 3</th>
<th>Functions 2 through 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilk's lambda:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-square</td>
<td>0.105</td>
<td>0.396</td>
</tr>
<tr>
<td></td>
<td>1680.1</td>
<td>736.2</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Function 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance (p)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4.2 MDA estimates for discriminant functions
86.6% of original grouped cases correctly classified.

Table 4.3 Validation sample classification results

<table>
<thead>
<tr>
<th>Original Bundle Membership</th>
<th>Predicted Bundle Membership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>84.5</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.9</td>
<td>99.1</td>
</tr>
<tr>
<td>3</td>
<td>1.3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>13.1</td>
</tr>
</tbody>
</table>

Table 4.4 Mean exchange performance based on predicted bundle assignment of validation sample

<table>
<thead>
<tr>
<th>Bundle 1</th>
<th>Bundle 2</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.543</td>
<td>1.087</td>
<td>0.544 *</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bundle 3</th>
<th>Bundle 4</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.997</td>
<td>1.601</td>
<td>0.604 *</td>
</tr>
</tbody>
</table>

* p < 0.05
REFERENCES


