Organization Science

Publication details, including instructions for authors and subscription information:
http://pubsonline.informs.org

Network Prominence, Bargaining Power, and the Allocation of Value Capturing Rights in High-Tech Alliance Contracts

Umit Ozmel, Deniz Yavuz, Jeffrey J. Reuer, Todd Zenger

To cite this article:
Umit Ozmel, Deniz Yavuz, Jeffrey J. Reuer, Todd Zenger (2017) Network Prominence, Bargaining Power, and the Allocation of Value Capturing Rights in High-Tech Alliance Contracts. Organization Science 28(5):947-964. https://doi.org/10.1287/orsc.2017.1147

http://pubsonline.informs.org/journal/orsc/

ORGANIZATION SCIENCE
Vol. 28, No. 5, September–October 2017, pp. 947–964
ISSN 1047-7039 (print), ISSN 1526-5455 (online)

Network Prominence, Bargaining Power, and the Allocation of Value Capturing Rights in High-Tech Alliance Contracts

Umit Ozmel,[a] Deniz Yavuz,[a] Jeffrey J. Reuer,[b] Todd Zenger[c]

[a] Purdue University, West Lafayette, Indiana 47907; [b] University of Colorado, Boulder, Colorado 80309; [c] David Eccles School of Business, University of Utah, Salt Lake City, Utah 84112

Contact: uozmelya@purdue.edu, http://orcid.org/0000-0002-4229-7813 (UO); myavuz@purdue.edu (DY); Jeffrey.reuer@colorado.edu, http://orcid.org/0000-0002-1397-8134 (JJR); http://orcid.org/0000-0002-9830-4066 (TZ)

Received: November 7, 2014
Revised: August 6, 2015; February 10, 2016; August 31, 2016
Accepted: November 8, 2016
Published Online in Articles in Advance: August 22, 2017

https://doi.org/10.1287/orsc.2017.1147

Abstract. We suggest and provide empirical evidence that the bargaining power of alliance partners stemming from their prominence in alliance networks influences the ex-ante allocation of value capturing rights in high-tech alliance contracts. Network prominence can enhance the availability of alternative partners for a firm and thereby elevates the firm's bargaining power and enables the firm to receive (i) more value capturing rights vis-à-vis its partner (i.e., more *net* value capturing rights) and (ii) more rights to the unexpected outcomes vis-à-vis its partner. We empirically investigate the content of research and development (R&D) collaboration contracts between biotech and pharmaceutical firms and show that as the prominence of the client (i.e., pharmaceutical firm) increases, it is able to attain (i) more net value capturing rights to outcomes within the area of collaboration and (ii) more rights to unexpected outcomes. By contrast, increased prominence of the R&D firm (i.e., biotech firm) decreases both the number of net value capturing rights the client receives as well as the rights to unexpected outcomes that the client captures in an alliance contract. The bargaining power that the R&D firm attains from its prominent position in alliance networks becomes less important during hot IPO markets, which provide the R&D firm more outside options to obtain financial resources. By documenting the importance of firms' network positions as sources of bargaining power during alliance contracting, our paper contributes to the literature on strategic alliances, bargaining, and contract design.

Keywords: alliances • governance • contracts • networks • bargaining power • entrepreneurship

Introduction

Strategic alliances have become prevalent in recent decades, potentially delivering a wide array of well-known benefits to firms (e.g., Kogut 1988, Powell et al. 1996, Dyer and Singh 1998, Gulati 1998). Partners may at once design collaborative agreements to create value and position themselves to preferentially capture value (e.g., Argyres and Bercovitz 2013, Elfenbein and Zenger 2017, Ozmel and Guler 2015, Ozmel et al. 2013a). A recent and growing research stream highlights the role that contracts play in building valuable collaborative exchange relations (Poppo and Zenger 2002, Elfenbein and Lerner 2003, Argyres and Mayer 2007, Reuer and Arino 2007, Lazzarini et al. 2004, Reuer and Devarakonda 2016). In shaping exchange relationships through contracts, firms are, however, interested in both creating value and capturing it (e.g., Lafontaine 1992b, Bhattacharyya and Lafontaine 1995, Argyres and Bercovitz 2013, Tallman and Phene 2006, Ozmel et al. 2013b). In this regard, contracts are both inputs that support value-creating cooperation between firms and artifactual outcomes of partners' efforts to compete for this value.

While substantial work in recent years analyzes the determinants of alliance contracts, considerably less work explores value appropriation through contracting, or the factors that determine the negotiated distribution of value between a focal firm and its partners (e.g., Lafontaine 1992a, b; Bhattacharyya and Lafontaine 1995; Adegbesan and Higgins 2011; Argyres and Bercovitz 2013). In designing contracts, alliance partners must balance efforts to promote value creation with efforts to shape contractual terms to their specific benefit. These efforts to create and capture value do not play out sequentially but occur simultaneously, beginning even during the early stages of alliance negotiations. While outcomes during alliance execution ultimately indicate the net effect of these efforts, contracts are enduring artifacts that reveal information about the initial efforts by firms to both create and capture value during alliance negotiations.

The potential for divergent interests in regard to specific contractual provisions may be substantial, ultimately shaping partners' behaviors and outcomes in alliances (Gulati 1995a, b; Gulati 1998; Dyer and Singh 1998; Gans et al. 2008; Dushnitsky and Lenox 2006; Dushnitsky and Shaver 2009; Tallman and Phene 2006). Therefore, each partner's bargaining power may play a central role in the structure of these provisions.

We argue that a firm's network prominence, controlling for the network prominence of its partner, elevates the firm's bargaining power during alliance negotiations and may limit its partner's contractual rights to outcomes. Network prominence increases the availability of alternative partners and, therefore, elevates the firm's bargaining power vis-à-vis its current partner (Nash 1953). This greater availability of outside options enables firms with prominent network positions to negotiate more favorable contract terms. Network prominence may affect the availability of a firm's alternative partners by signaling a firm's future prospects and resource quality (Gulati and Gargiulo 1999, Ozmel et al. 2013a, McEvily et al. 2017), by certifying the resources and prospects of alliance partners (Stuart et al. 1999, Nicholson et al. 2005), or by helping the prominent firm access knowledge residing in its more expansive network of information channels (Powell et al. 1996, Gulati 1998).

To illustrate our theory, consider a relationship where a research and development (R&D) firm agrees to use its human capital and technological know-how to deliver an uncertain and difficult-to-specify output to a client firm in exchange for financial or other resources. The uncertainty and difficulty in measuring output creates incentives for both parties to seek ownership claims not only on predictable or targeted outcomes, but also on the frequently unexpected outcomes that may be highly valuable. The client, therefore, seeks to craft a contract that enumerates ownership over both expected outcomes within the domain of the collaboration as well as unexpected outcomes. By contrast, the R&D firm, as the owner of residual rights, seeks a contract that minimizes the scope of any rights that are explicitly and contractually granted to the client (e.g., Grossman and Hart 1986, Hart and Moore 1990).

In our empirical context of the biopharmaceuticals industry, collaboration agreements are commonplace between clients, such as large pharmaceutical firms, and R&D firms, which are typically smaller biotech firms. The client firms seek contracts that grant expansive claims on the R&D firms' output. The R&D firms, by contrast, prefer contracts with more narrow claims granted to the pharma firm and with greater rights accruing to the R&D firm itself. Our central argument is, hence, that the allocation of rights to expected and unexpected outcomes are negotiated into contracts in a way that reflects partners' bargaining power or outside options, as defined by their prominence in alliance networks.

First we analyze the impact of partners' network prominence on the "net value capturing rights," namely the rights assigned to the client in excess of the rights assigned to the R&D firm. These value-capturing rights may encompass a wide range of rights that include patents and intellectual property, licensing, manufacturing, and marketing in the main collaboration area. Our primary measure evaluates the distribution of these rights and both complements and adds greater precision to the measures used by Lerner and Merges (1998) and Adegbesan and Higgins (2011). We also compose a novel measure that directly assesses the allocation of "rights to unexpected outcomes." We test our theory on a sample of alliance contracts between biotech and pharmaceutical firms. Our findings are consistent with network prominence affecting the allocation of value capturing rights and rights to unexpected outcomes through its effect on partners' bargaining power. We find that, controlling for the R&D firm's network prominence, when a client's alliance network prominence is higher, the client obtains (i) more extensive contractually specified *net* value capturing rights and (ii) stronger rights to unexpected outcomes. On the other hand, a client obtains weaker rights when an R&D firm's network prominence is higher. Indeed, the client's relative network prominence compared to that of the R&D firm's significantly increases the number of net value capture rights that the client receives as well as the rights to unexpected outcomes assigned to the client. These results are consistent with both parties using their bargaining power to pursue their divergent interests.

To further identify our hypothesized relationship between the bargaining advantages accruing from a firm's network prominence and its value capturing rights, we explore whether exogenous variation in financial markets influences this relationship. During periods of attractive financial markets, R&D firms have more funding sources available beyond alliance partners (Lerner et al. 2003). Given that alternative funding opportunities are substitutes for the funding that R&D firms receive from their clients (i.e., pharmaceutical firms) in alliances, when R&D firms have access to alternative financial means, their need to team up with pharmaceutical firms decreases (Stuart et al. 2007). This substitution effect should influence the importance of network prominence when bargaining in alliances. Therefore, in attractive financial markets, when alternative sources of funds are available to R&D firms, the R&D firms' ability to find alternative alliances partners and sources of funding due to their network prominence becomes less important in shaping bargaining outcomes.

Supporting our hypothesis, the associations between an R&D firm's network prominence and both types of rights assigned to the client become less negative in more attractive financial markets. Thus, exogenous variation in the importance of bargaining power stemming from network prominence helps us to identify that network prominence indeed affects the allocation of rights through bargaining power. We also

take several additional steps to help with identification and mitigate any concerns with endogeneity by instrumenting for an R&D firm's network prominence, by controlling for many plausible alternative explanations, and by conducting a Heckman selection model to mitigate concerns with potential selection bias.

Our paper contributes to several related literatures on interorganizational collaborations, bargaining power, and strategic alliances. Even though the links between a firm's position in interorganizational networks and firm performance, innovative capability, and formation of partnerships are well established (Powell et al. 1996; Gulati 1998; Ahuja 2000a, b; Schilling and Phelps 2007; Ozmel et al. 2013a, b), to the best of our knowledge this is the first paper to investigate network prominence as a source of a firm's bargaining power in strategic partnerships in general and in crafting contracts in R&D and technology commercialization alliances in particular. In addition, we contribute to research on alliance contracts by offering new measures of firms' value capturing rights to unexpected outcomes outside the targeted area of collaboration. Relatedly, our paper contributes to recent studies on the tension between value generation, on the one hand, and firms' efforts to capture more of the value on the other hand. Hence, the theory we offer has the potential for broad application to research on different types of interorganizational partnerships in various contexts that is interested in the mechanisms through which firms can capture more value from their interfirm collaborations (e.g., Ozmel and Guler 2015). Finally, by documenting that network position shapes a firm's bargaining power, our paper contributes to studies that consider the availability of external funding (Higgins 2007, Lerner and Merges 1998, Lerner et al. 2003, Ozmel 2016) and the existence of franchisee associations (Argyres and Bercovitz 2013) as sources of a firm's bargaining power in its economic exchanges.

Theory and Hypotheses

Previous Studies on Bargaining Power and Contracts

Partners may at once design collaborative agreements to create more value and position themselves to preferentially capture it, often through the use of contract provisions (e.g., Bhattacharyya and Lafontaine 1995; Gallini and Lutz 1992; Lafontaine 1992a, b; Lafontaine and Shaw 1999; Lal 1990; Mathewson and Winter 1985; Sen 1993; Reuer and Arino 2007; Reuer and Devarakonda 2016). For instance, in franchising contracts, royalty rates are both used as monetary incentive generating value creating behavior and define the value that parties capture (Bhattacharyya and Lafontaine 1995).

The bargaining power of alliance partners is an important determinant of their ability to capture value through contracts (e.g., Adegbesan and Higgins 2011). For instance, bargaining power stemming from the existence of independent franchisee associations affects key features of these contracts (Argyres and Bercovitz 2013). It is also documented that resource-constrained R&D firms have less bargaining power when the external funding environment is weak (Higgins 2007, Lerner and Merges 1998), and they relinquish more control rights to their partners in alliance agreements as a consequence (e.g., Lerner et al. 2003).

Network Prominence and Bargaining Power

Firms with many direct and indirect ties to other firms in their network of inter-firm relationships enjoy greater prominence (e.g., Gulati 1998; Kogut et al. 1992; Stuart 1998, 2000; Podolny 2001; Hsu 2006). Network prominence enhances the availability of alternative partners, and shapes a firm's bargaining power, through a number of mechanisms. First, a firm's prominent network position signals to other firms that it possesses high quality resources and good future prospects (Ozmel et al. 2013a; Podolny 1993, 1994). As a result, a prominent firm's prospective partners face less adverse selection risk, enabling the prominent firm to expand its potential set of alliance partners (e.g., Hsu 2006). Relatedly, firms with prominent positions in alliance networks also certify the resources and prospects of their alliance partners (Stuart et al. 1999, Ozmel and Guler 2015), which might further increase the prominent firm's attractiveness and the number of potential partners seeking to collaborate with the firm (Nicholson et al. 2005, Hsu 2006).

Finally, prominent firms have timely access to the knowledge and other resources residing in other firms. Since valuable knowledge is often widely distributed across firms in high tech industries (Kogut et al. 1992, Powell et al. 1996), a prominent network position can increase a firm's chances of timely access to such knowledge (Powell et al. 1996). Thanks to extensive information channels, a prominent firm can also reduce the search costs associated with locating potential partners and assessing their quality (Walker et al. 1997, Gulati and Gargiulo 1999, Reuer and Devarakonda 2017). Furthermore, a prominent firm's extensive information channels also make the firm more visible to the other firms looking for an alliance partner (Sorenson and Stuart 2001). In sum, as a firm's network prominence increases, it possesses more alternative partners (Gulati 1998, Gulati and Gargiulo 1999, Powell et al. 1996, Stuart 1998).

However, a firm that has more alternative alliance partners is less dependent on its current partner because these alternative partners provide alternative sources for critical resources (e.g., Lerner et al. 2003, Gulati and Sytch 2007, Stuart 1998). These alternative sources, therefore, elevate the firm's bargaining power

at the alliance contracting stage (e.g., Bae and Gargiulo 2004, Hsu 2004, Stuart 1998, Lavie 2007, Ozmel and Guler 2015, Yan and Gray 1994). In particular, firms that have more alternative partners are more likely to possess a close next best partner, should negotiations with the first best exchange partner fail. This close alternative increases the firm's bargaining power vis-à-vis its current partner (Nash 1953).

Bargaining Power and Alliance Contracts

To illustrate our theory, we focus on R&D alliances in the biotechnology industry. Alliance contracts between biotech firms (R&D firms) and pharmaceutical companies (client firms) provide an ideal setting to test our theory, for several reasons. First, alliances are pervasive in biopharmaceuticals, creating a setting in which an abundance of direct and indirect ties create variation in network positions that may shape firms' bargaining power. Second, biotech alliances are often complex with highly uncertain outcomes, rendering bargaining over expected and unexpected outcomes important in contract negotiations. Third, in this setting, interests diverge between R&D firms and clients regarding the allocation of value capturing rights.

In examining the role of network prominence for contract outcomes, we focus on two types of contractual rights that determine partners' ability to capture value through an alliance. First we investigate the "*net* value capturing rights allocated to the client," namely the rights within the collaboration area that are assigned to the client *in excess* of the rights that are assigned to the R&D firm (Lerner and Merges 1998). In addition, we investigate the "rights to unexpected outcomes" assigned to the client, namely the rights that are contractually assigned to the client and are related to the unexpected inventions and spillovers outside of the main collaboration area, but stemming from the current alliance. "Rights to unexpected outcomes" assigned to the client are inherently relative to the rights that are left with the R&D firm because any rights that are left out of the contract belong to the R&D firm as the owner of the residual rights, as we discuss below. Both types of rights, therefore, represent important claims on value by the parties at the alliance contracting stage.

To begin with, each partner specifically seeks claims over a broad set of value capture rights. However, we argue that a firm with a more prominent network position, controlling for its partner's network prominence, will more successfully negotiate for these value capture rights. The client firm also seeks ownership claims, i.e., contractual rights, on the frequently unexpected outcomes of R&D activity. Otherwise, rights to unexpected outcomes (e.g., by-products, patents, etc.) not specified in the contract accrue to the R&D firm, consistent with the R&D firm owning the assets used in generating these outcomes. In other words, the R&D firm is entitled to any "residual rights," or rights that are not specifically allocated to the client (Grossman and Hart 1986, Hart and Moore 1990). In particular, prior work suggests that accumulated experience in biotech industry projects often generates unexpected value that accrues to the R&D firm (Teece 1981, Pisano 1989). For example, while working on the development of a pharmaceutical compound efficacious for one disease, the R&D firm may discover a compound efficacious for another. If the client does not have rights specified in the contract to this serendipitous discovery, the R&D firm becomes the beneficiary as it has the residual rights. However, clients with high network prominence, controlling for the R&D firm's network prominence, may leverage their position to bargain for more contractual rights, including those associated with discoveries outside the main intended area of collaboration.

The foregoing discussion suggests that R&D firms and their clients may have divergent interests, and each may use its bargaining power, as afforded by its network prominence, to influence the allocation of rights in contracts. Of course, both the R&D firm and client may enjoy network prominence, and thus the resulting allocation of contractual rights should reflect their relative bargaining power. As a result, controlling for the client's network prominence, increasing an *R&D firm's network prominence* increases the R&D firm's relative bargaining power against the client, which leads to (i) *fewer* net value capturing rights assigned to the *client* in excess of the rights assigned to R&D firm and (ii) *fewer* rights to unexpected outcomes assigned to the *client* vis-à-vis R&D firm. On the other hand, controlling for the R&D firm's network prominence, increasing a *client's network prominence* increases the client's bargaining power vis-à-vis the R&D firm, which leads to (i) *more* net value capturing rights assigned to the *client* and (ii) *more* rights to unexpected outcomes assigned to the client vis-à-vis R&D firm. Accordingly, we hypothesize as follows:

Hypothesis 1. *The greater a focal firm's network prominence, controlling for its partner's network prominence,* (i) *the greater are the net value capturing rights the focal firm obtains in excess of the rights assigned to its partner and* (ii) *the greater are the rights to unexpected outcomes the focal firm obtains vis-à-vis its partner.*

Exploiting Exogenous Variation in the Effect of Network Prominence on Bargaining Power

One way of identifying that network prominence affects contract terms through bargaining power according to the foregoing theoretical discussion is to test how the relationship between network prominence and contractual outcomes changes with exogenous events, such as financial market conditions, that affect

the importance of bargaining power stemming from network prominence.

Our argument relies first on the observation that the provision of funding for R&D is one of the primary roles that a client plays in R&D alliances (Lerner et al. 2003). The R&D firm, therefore, has greater bargaining power if there are other potential clients that are also willing to provide funds. Hence, R&D firm's network prominence increases its bargaining power by increasing the availability of alternative alliance partners willing to provide financing (Gulati 1998, Gulati and Gargiulo 1999). Yet, during periods of attractive financial markets, R&D firms have alternative funding sources that they can access such as venture capital financing or equity issuance (Lerner and Merges 1998, Lerner et al. 2003). Consequently, by providing alternative funding opportunities, attractive financial market conditions elevate the bargaining power of R&D firms and hence allow R&D firms to capture more rights in alliance contracts (Lerner et al. 2003). Given a particular level of funding required, once that funding is obtained from one source, there is no need to obtain it from another source. In other words, funding from alternative sources available in attractive market conditions and funding from large pharmaceutical firms through alliance formation are substitutes. Indeed, when R&D firms have access to alternative funds, their need to partner with pharmaceutical firms decreases in the first place (Stuart et al. 2007).

More importantly for our purposes, this substitution effect should influence the importance of network prominence in bargaining. Any means that aid searching for one type of financing (i.e., prominence in alliance networks) is expected to become less important once another form of financing is received or an alternative form becomes more easily accessed. Therefore, in attractive financial markets, when alternative sources of funds are available to R&D firms, the R&D firm's ability to find alternative alliance partners and sources of funds through network prominence becomes less important for both securing the funding and bargaining for the value capture rights and rights to unexpected outcomes. On the other hand, in unattractive markets, where the funding game plays out to a greater extent by attracting and contracting with large pharmaceutical firms through alliances, increasing an R&D firm's network prominence should have a higher marginal benefit on the R&D firm's overall ability to both secure funding and negotiate. We summarize these in the following hypothesis:

Hypothesis 2. *Controlling for a client's network prominence, the negative relationships between an R&D firm's network prominence and* (i) *the net value capturing rights assigned to the client in excess of the rights assigned to R&D firm, and* (ii) *rights to unexpected outcomes assigned to the client vis-à-vis the R&D firm are less pronounced when financial market conditions are more attractive.*

Methods

Sample and Data

We obtained biopharmaceutical alliance contract data from the Recap database for a randomly selected sample of 200 alliance contracts between 1980 and 2003. Even though Recap's choice of which alliance contracts to cover may not be random, Higgins (2007) argues that the direction and magnitude of any potential bias remains unclear. We merge contract data with patent data obtained from the NBER patent database for years prior to 2000 and from the United States Patent and Technology Office (USPTO) files for all subsequent years.

Dependent Variables

As our first dependent variable, to examine the relative value capture rights the client obtains, we use the net number of value capturing rights assigned to the client (*net number of client's value capturing rights*), which is equal to the total number of value capturing rights assigned to the client minus total number of value capturing rights assigned to the R&D firm. For this purpose, first we calculate the total number of value capturing rights for each client and R&D firm by counting the total number of rights each party obtains as in Lerner and Merges (1998) and Adegbesan and Higgins (2011). We started with the list of the value capturing rights identified by Lerner and Merges (1998) and Adegbesan and Higgins (2011) but included additional details we deemed important in measuring the allocation of these value capturing rights. In supplemental analyses, we also use the existing measures of the allocation of value-capturing rights between R&D and client firms (e.g., Lerner and Merges 1998, Adegbesan and Higgins 2011), and we found qualitatively similar results. Also, in our calculations, given that exclusive rights include basic rights, we assign two points for exclusive rights. Following the previous literature, we count the number of value capturing rights, rather than trying to rank them, given that it is very difficult to evaluate which types of rights are more valuable.

Table 1 lists the value capturing rights that we have considered when constructing our measure in comparison to Lerner and Merges (1998) and Adegbesan and Higgins's (2011) measures. Table 1 also provides the probabilities that a particular value capturing right would be assigned to the client or R&D firm conditional on these rights being assigned in the contract. Certain rights, such as universal marketing rights, are always allocated to the client conditional on their being allocated to a party. However, there is still substantial variation in whether these rights are assigned to any given client firm in the first place across our sample of contracts, and this heterogeneity might be explained by the variation in the relative bargaining power of agents.

As a second dependent variable, we have also developed a new measure to operationalize the rights to

Table 1. List of Value Capturing Rights

	Conditional probability that the right is assigned to client	Origin
Patents and intellectual property rights		
Ownership of some patents.	0.43	
Joint ownership of all patents.	0.50	LM (1998), AH (2011)
Ownership of all patents.	0.83	LM (1998), AH (2011)
Right to use/transfer unpatented know how and/or other intellectual property.	0.39	LM (1998), AH (2011)
Joint ownership of all unpatented know-how and intellectual property.	0.49	
Ownership of all unpatented know-how and intellectual property.	0.46	LM (1998), AH (2011)
Licensing rights		
Right to grant sublicenses.	0.62	LM (1998), AH (2011)
Perpetual license or option of continued licensing.	1.00	LM (1998), AH (2011)
Exclusive license.	0.75	
Product development and manufacturing		
Right to manage clinical trials and process development.	1.00	LM (1998), AH (2011)
Right to manufacture the final product.	0.74	LM (1998), AH (2011)
Marketing rights		
Basic marketing rights.	0.15	AH (2011)
Universal marketing rights.	1.00	LM (1998), AH (2011)
Exclusive marketing rights.	0.90	LM (1998), AH (2011)

Notes. The table lists the value capturing rights included in the study. The first column reports the conditional probability that these rights are assigned to the client given that these rights are assigned to a party in the contract. The second column indicates studies that have relied upon similar value capturing rights. We refer to Lerner and Merges (1998) as LM (1998) and Adegbesan and Higgins (2011) as AH (2011).

unexpected outcomes that are allocated to the client (*rights to unexpected outcomes*). Of course, the decision to include such rights in the contract may be a function of the two partners' prior relationships and experiences (Ryall and Sampson 2009, Bercovitz and Tyler 2014) as well as their bargaining power. Since we are unaware of any precedent for this measure in the literature, we consulted attorneys working in the field to create categories of rights to unexpected outcomes that might be allocated to a client. Based on these consultations, we then developed seven categories that describe the range of rights assigned to the client. We then placed each contract into one of these seven categories and assigned a corresponding score, as discussed below and presented in Table 2.

The first category consists of the cases where the contract specifies that rights to all unexpected outcomes outside of the collaboration area are specifically granted to the R&D firm, or cases in which the contract specifically mentions that the client has no rights to unexpected outcomes. For this category, we assign a score of 0 for the rights to unexpected outcomes allocated to the client. We then assign a score of 1 to contracts where nothing is specified. In this case, we assume that residual rights would accrue to the R&D firm as the owner of the research facilities and organization employing the researchers (Williamson 1985, Grossman and Hart 1986, Aghion and Tirole 1994, Lerner and Merges 1998) but that having this made explicit strengthens the position of the R&D firm legally. While prior work suggests that rights to unexpected value

Table 2. Definition of Rights to Unexpected Outcomes

Rights to unexpected outcomes	Score
R&D firm is given all rights or client firm is specifically not given any rights.	0
Nothing is specified.	1
Client is entitled to be informed about new developments. Client is given right of first negotiation or right of first offer that does not restrict target's actions if the offer is refused.	2
Client has the right of first refusal. Client is given right of first offer or negotiation with restrictions on third party offers if declined.	3
Joint ownership of all rights.	4
Client is given rights to unexpected outcomes that can be exercised by the client unilaterally.	5
Client is given all rights.	6

that arises in a biotech project accrue to the R&D firm (Teece 1981, Pisano 1989), our conversations with attorneys reveal that this allocation by default does not completely rule out the possibility that clients threaten to sue for these rights. Therefore, we rank this category lower than the contracts with explicit clauses that require the client to be informed, and the contracts that give the client the right of first refusal, or contracts that grant outright allocation of these rights to the client, which are all mechanisms that strengthen the client's legal position in claiming these rights and the value associated with unexpected outcomes. To verify that this assumption is not driving our results, we conduct a separate analysis that excludes this category of contracts where rights to unexpected outcomes are not specified, as discussed in the following sections.

We assign a score of 2 to cases where the R&D firm is required to inform the client about new discoveries and the client is given the right of first offer or right of first negotiation. In these cases, the R&D firm negotiates with the client in good faith but is not required to accept the client's offer. Moreover, there are no restrictions to the R&D firm in seeking agreements with third parties if the client's offer is refused. We assign a score of 3 to cases where the client has the first right of refusal or right of first offer, but at the same time where third-party transactions are restricted, for example by creating a lower limit on the price if the offer by the client is refused. Restrictions on third-party transactions are advantageous from the perspective of the client because it may reduce potential payment by the client (Bikhchandani et al. 2005) and may deter third parties from entry (Walker 1999). We assign a score of 4 to cases where the R&D and client firms hold joint rights over all unexpected outcomes. We assign a score of 5 to contracts that grant rights to the client that can be exercised by the client alone and that do not require the R&D firm's consent. In most of these cases, the client is required to compensate the R&D firm if they exercise their rights. Finally, a score of 6 is assigned to cases where all the rights pertaining to the unexpected outcomes are clearly given to the client. In the rare cases in which a client firm gets rights spanning multiple categories, we assign the highest score as the value for the *rights to unexpected outcomes* variable.

In measuring the rights to unexpected outcomes allocated to the client, we used an ordinal ranking, where the score assigned to this variable increases with the value of rights, rather than a count of the number of rights, for several reasons. First, as we described above, the rights to unexpected outcomes are fairly standard and can be ranked in terms of the extent to which a client receives such rights. Second, counting the number of rights is not possible when all rights to unexpected outcomes are assigned to the R&D firm or all the rights are assigned to the client. We also carry out three robustness analyses to evaluate our categorization of the rights and the rankings described above. First, due to some possible ambiguity regarding the ordinal ranking of categories with scores 4 and 5, we merged these two categories and assigned both a score of 4; relatedly in this process we reassigned those in the highest ranking category a score of 5. We denote this alternative measure *rights to unexpected outcomes-version2*. In another robustness test, we generated a simple dichotomous classification separating contracts where the client receives some rights to unexpected outcomes from those where the client receives none. More precisely, we generated a dummy variable (*rights to unexpected outcomes-version3*), which takes on a value of 1 if the score of the original variable is greater than or equal to 2, and 0 otherwise. Finally, we reran our analyses dropping all contracts where nothing is specified regarding the rights to unexpected outcomes, which we define as *rights to unexpected outcomes-version4*.

Independent Variables

For our main theoretical variables, we operationalize a firm's prominence in the industry-wide network of alliances. For this purpose, we first identify all alliances in the industry and for each year and firm we operationalize a firm's prominence using Bonacich's (1987) power centrality measure. Power centrality, or simply centrality for the sake of brevity, incorporates not only the firm's immediate ties but also the indirect ties of a firm that connect a firm's partners to others (e.g., Gulati and Gargiulo 1999, Podolny 2001, Nerkar and Paruchuri 2005, Ozmel et al. 2013a). *Centrality* for a firm i as of year t is defined as

$$Centrality_{i,t} = \alpha(I - \delta_t R_t)^{-1} R_t * p, \quad (1)$$

where R_t is the relationship matrix in which the entry corresponding to ith row and jth column of R_t is the number of previous alliances between firms i and j within the past five years (from the end of $t-5$ to the end of t); p is the vector of ones; and δ_t is the weighting coefficient, which can be assigned an arbitrary number. Following previous literature (e.g., Robinson and Stuart 2007), we set δ_t equal to three-quarters of the reciprocal of the largest eigenvalue of the R_t. Since the properties of the network may change over time, to allow comparability we set α so that the maximum centrality for each year is equal to 1.

We calculate separate centrality scores for each of the two firms in the alliance—the biotech firm (i.e., *R&D firm's network prominence*) as well as the pharmaceutical firm (i.e., *client's network prominence*). In addition, for robustness tests, we calculate *client's relative prominence* = log(1+*client's network prominence/R&D firm's network prominence*). To measure financial market conditions, or *market heat*, we calculate for every month the ratio of the number of biotech companies that went through an IPO in the previous six months compared to the total number of private biotech companies that

have been operating during that period (Ozmel et al. 2013b), multiplied by 1,000.

Control Variables

To address the small numbers problem that can surround alliance contracting, we follow Pisano (1990) and include the number of R&D firms in the same therapeutic area (*R&D firms in therapeutic area*) and the number of client firms that have been operating in the same therapeutic area (*client firms in therapeutic area*) in the last five years, as controls. We control for the *stage of R&D firm's product pipeline*, which is a dummy variable taking on a value of 1 if the venture's products have reached the clinical trials stage with the FDA, and 0 otherwise. *R&D firm's patent count* and *client's patent count* within the five years prior to forming the alliance are included to measure the innovative capability of the organizations (e.g., Podolny et al. 1996, Powell et al. 1996). We use venture capital (VC) prominence (*prominence of the VC firms investing in the R&D firm*) as another indicator of the firm's underlying, unobservable quality (Ozmel et al. 2017, Podolny 1994, Ozmel and Guler 2015). The R&D firm's size and client's size are included since size may be a proxy for resources available to each firm. We specifically use the log of each firm's total assets (*R&D firm's total assets* and *client's total assets*) at the contract year for this purpose. We also control for the log of the *R&D firm's age* and the *client's age* (Stinchcombe 1965, Carroll and Hannan 2000), *R&D firm's alliance count*, and *client's alliance count* during the past five years.

We also controlled for a variety of factors at the level of the current alliance. First, we control for the *stage of the alliance* It takes on a value of 1 if the product in the alliance is in clinical trials stage, and 0 otherwise. Furthermore, we control for the *number of previous alliances between R&D firm and client* (*i.e., prior ties*) in order to address the role of trust (Gulati 1995a), coordination and learning (Mayer and Argyres 2004, Argyres et al. 2007, Ryall and Sampson 2009, Bercovitz and Tyler 2014) between alliance partners. In all specifications, we also control for the *R&D firm's alliance count with pharmaceutical firms*, as a direct measure of R&D firms' experience obtained through prior alliances (Anand et al. 2010). We include the *equity amount invested*, measured as the log of the dollar value of equity invested plus one (Gulati 1995a, Robinson and Stuart 2007). We also included fixed effects for the *type of collaboration*, including dummy variables indicating for different categories of alliances (e.g., R&D, distribution, marketing, or licensing) using classifications provided by Recap. Finally, to control for any general time varying factors in alliance contracting, we include year fixed effects.

Estimation Approach

Matching between a client and an R&D firm may not be random (e.g., Marquez et al. 2015). As a result, to control for selection bias since client firms and R&D firms choose with whom to partner, and because omitted factors driving such decisions might also have an impact on the allocation of rights in realized alliances, we use a two-stage selection model as in Heckman (1979). For the development of the first-stage selection model, for each year t, we form all possible pairs of alliances, both realized and unrealized, between firms in the biopharma industry (Sørensen 2007, Bottazzi et al. 2008). Then, we estimate the formation of specific alliances between R&D firms and clients (Bottazzi et al. 2008). Following Robinson and Stuart (2007), we use the number of the R&D firm's previous bio-university licensing alliances as the exclusion restriction. This variable may make the R&D firm an attractive partner, affecting the formation of alliances, yet it is not likely to be related to an R&D firm's own quality and terms of realized alliances that follow because the product is not developed by the scientists employed by the R&D firm (Robinson and Stuart 2007).

In the second-stage regressions, we have adopted an ordered logit selection model, which is an application of Heckman (1979) for ordered logit models (Cameron and Trivedi 2005, Chiburis and Lokshin 2007). Specifically, the second stage regression equation is specified as follows:

$$\begin{aligned}\text{Dependent variable}_{i,j,t} = {} & \alpha\text{Network prominence}_{i,t} \\ & + \beta\text{Network prominence}_{j,t} \\ & + \sum_{k=1}^{n} \delta_k P_{k,t} + \varepsilon_{i,j,t}, \qquad (2)\end{aligned}$$

where P is the vector the control variables where n is the number of controls. The inverse mills ratio is included as one of the control variables to address the possible selection bias. Errors are clustered with respect to the client firm to address the possibility of heterogeneous contract design capabilities of different pharmaceutical firms or other factors that might affect the independence of observations within firms (Argyres and Mayer 2007).

We also considered the possibility that a firm's network prominence and bargaining power could both be explained by an omitted variable such as a firm's resources. As a consequence, to address the potential endogeneity of network prominence, we first control for various factors both for the R&D firm and client firm (e.g., firm's size, development, patent count, alliance count, age, etc.), which might affect both the firms' network prominence and bargaining power when designing contracts. Second, we conduct instrumental variable analyses, where we use five-year lagged value of the R&D firm's number of licensing alliances with universities, i.e., the R&D firm's number of bio-university alliances as of time $t-5$, to instrument for the R&D firm's network prominence at time t.

This lagged variable should affect alliance formation, which in turn shapes the R&D firm's alliance network prominence, yet it is not a measure of the underlying quality of researchers or research facilities owned by the R&D firm (Robinson and Stuart 2007), and hence should not directly affect bargaining power. Finally, by using a five-year lagged measure of the instrumental variable, we make sure that the time period in which instrumental variable is measured precedes the time period in which R&D firm's network prominence is calculated. For instrumental variable analysis, we use a two-stage OLS regression with errors robust to heteroskedasticity and clustered at the client level.

Results

Table 3 provides summary statistics of the main variables, and Table 4 provides pairwise correlations between these variables. The R&D firm's mean network prominence is 0.11, whereas the client's mean network prominence is 0.31. As expected, client firms are more central and hence more prominent in the alliance network. In the first-stage selection models, we find that the instrumental variable, number of R&D firms' bio-university licensing alliances, is positively and significantly ($p < 0.01$) related to the probability of an R&D firm forming an alliance with a client firm. The results also indicate that the likelihood of alliance formation increases with the client's network prominence and with the previous ties between the firms (results are available upon request).

Table 5 shows the results of ordered logit regressions, where the dependent variable is the net number of value capturing rights obtained by the client. When we include both R&D firm and client prominence variables, as shown in column 4, the estimation results indicate that an increase in the R&D firm's prominence, holding constant the client's prominence, is associated with the client firm receiving fewer net value capturing rights ($p < 0.01$). On the other hand, increases in the client firm's network prominence, holding the R&D firm's prominence constant, is associated with the client firm receiving more net value capturing rights ($p < 0.01$). Consistent with this logic, Table 5's column 5 also shows that as the prominence of the client relative to the prominence of the R&D firm increases, the client obtains more net value capturing rights ($p < 0.01$). These results are consistent with our Hypothesis 1. In robustness tests, we used alternative net value capturing rights calculated using Lerner and Merges' (1998) and Adegbesan and Higgins' (2011) methodologies. Our measure is highly correlated with both, with correlation coefficients higher than 0.90, and we obtain similar results with these alternative dependent variables. Among the control variables, R&D firm's patent count and market heat appear to affect the R&D firms' bargaining power positively, while the stage of the alliance negatively affects its bargaining power.

In Table 6, columns 1–5, we use the rights to unexpected outcomes assigned to the client as our dependent variable. In column 4, we find that when the

Table 3. Summary Statistics

	Variable	Mean	Std. dev.	Min	Max
1	*Net number of client's value capturing rights*	1.98	2.11	−3.00	8.00
2	*Rights to unexpected outcomes*	2.24	1.93	0.00	6.00
3	*R&D firm's network prominence*	0.11	0.11	0.00	1.00
4	*Client's network prominence*	0.31	0.26	0.00	1.00
5	*Market heat*	3.17	2.58	0.00	10.71
6	*R&D firms in therapeutic area*	211.41	393.60	0.00	4,588
7	*Client firms in therapeutic area*	151.54	251.63	0.00	2,220
8	*Stage of R&D firm's product pipeline*	0.42	0.50	0.00	1.00
9	*R&D firm's alliance count*	5.85	5.59	1.00	35.00
10	*Prominence of the VC firms investing in R&D firm*	0.45	0.36	0.00	1.00
11	*Stage of the alliance*	0.34	0.48	0.00	1.00
12	*Number of previous alliances between R&D firm and client*	1.10	0.33	1.00	3.00
13	*R&D firm's age*	3.69	1.05	0.00	5.51
14	*Equity invested in current alliance*	0.98	1.11	0.00	3.71
15	*R&D firm's patent count*	5.01	10.68	0.00	93
16	*R&D firm's total assets*	3.00	1.11	−0.20	5.67
17	*Client's total assets*	7.96	1.91	0.88	10.74
18	*Client's age*	3.99	0.81	2.40	5.65
19	*Client's alliance count*	15.25	19.64	0.00	101
20	*Client's patent count*	375.82	578.75	0.00	3,662
21	*Number of client's value capture rights*	3.84	2.12	0	9.00
22	*Number of R&D firm's value capture rights*	1.86	1.26	0	6.00

Table 4. Correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	*Net # of client's value capt. rights*	1																		
2	*Rights to unexp. outcomes*	**0.10**	1																	
3	*R&D firm's network prom.*	**−0.11**	**−0.06**	1																
4	*Client's network prominence*	**0.17**	**0.27**	0.02	1															
5	*Market heat*	**−0.14**	**−0.12**	0.02	−0.03	1														
6	*R&D firms in therap. area*	−0.04	**−0.06**	**−0.06**	−0.10	−0.02	1													
7	*Client firms in therap. area*	**−0.08**	**−0.10**	**−0.06**	**−0.07**	−0.03	**0.68**	1												
8	*Stage of R&D firm's products*	0.02	**0.10**	0.01	0.05	**−0.19**	0.00	**0.07**	1											
9	*R&D firm's alliance count*	−0.02	0.00	**0.46**	−0.01	−0.03	0.00	0.03	**0.25**	1										
10	*Prominence of the VC firms*	−0.02	**−0.17**	0.03	−0.03	0.00	**0.06**	0.05	0.05	0.02	1									
11	*Stage of the alliance*	**0.06**	**−0.14**	**−0.26**	**−0.15**	0.05	**0.15**	**0.18**	0.01	**−0.22**	−0.02	1								
12	*Number of prev. alliances*	−0.01	**0.10**	**0.07**	**0.12**	**0.07**	−0.03	−0.03	**0.06**	**0.23**	0.02	−0.02	1							
13	*R&D firm's age*	**−0.07**	**−0.12**	0.01	0.00	**−0.21**	0.1	**0.10**	**0.13**	0.05	**0.32**	−0.02	−0.03	1						
14	*Equity invested*	−0.02	**0.09**	**−0.07**	−0.02	**−0.11**	−0.01	−0.02	**0.15**	−0.04	**−0.12**	**−0.15**	**0.06**	0.03	1					
15	*R&D firm's patent count*	**−0.10**	−0.04	−0.01	0.03	−0.04	0.04	**0.06**	**0.11**	**0.16**	**0.15**	**0.06**	**0.23**	**0.23**	−0.01	1				
16	*R&D firm's total assets*	**−0.10**	−0.04	**0.19**	−0.04	−0.03	**0.16**	**0.19**	**0.07**	**0.17**	**0.13**	**0.07**	**0.06**	**0.09**	**0.11**	**0.28**	1			
17	*Client's total assets*	0.04	**0.10**	**−0.06**	**0.28**	**−0.08**	**−0.18**	**−0.22**	**0.07**	−0.03	0.04	**−0.14**	**0.09**	**0.07**	**0.18**	**0.07**	0.04	1		
18	*Client's age*	−0.04	0.01	**0.06**	**0.15**	0.05	**−0.22**	**−0.26**	**0.09**	**−0.06**	**0.09**	**−0.16**	**0.14**	0.02	**0.07**	0.02	**−0.07**	**0.64**	1	
19	*Client's # alliances*	**0.06**	**0.14**	**−0.13**	**0.67**	**−0.06**	0.05	**0.07**	**0.13**	**0.07**	**0.08**	**−0.06**	**0.10**	**0.07**	**−0.07**	**0.17**	0.05	**0.32**	**0.25**	1
20	*Client's # patents*	**−0.07**	−0.02	**−0.06**	**0.22**	**−0.14**	−0.10	**−0.09**	0.04	−0.03	0.08	−0.02	**0.09**	0.03	−0.05	**0.07**	0.02	**0.48**	**0.31**	**0.25**

Notes. Correlations in bold are significant at 10% or better. Variable names are shortened to fit into the table. Full variable names are reported in Table 3.

Table 5. Net Number of Client's Value Capturing Rights

	1	2	3	4	5
R&D firm's network prominence		−3.85*		−4.26**	
		(1.54)		(1.42)	
Client's network prominence			2.19*	2.43**	
			(0.92)	(0.90)	
Client's relative prominence					0.92**
					(0.26)
Market heat	−0.23*	−0.22+	−0.23*	−0.22+	−0.21+
	(0.11)	(0.12)	(0.11)	(0.12)	(0.12)
R&D firm's alliance count	0.02	0.07	0.03	0.09*	0.09*
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)
Client's alliance count	0.02*	0.02**	−0.01	−0.01	−0.00
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
R&D firms in therapeutic area	−0.00	−0.00	−0.00	0.00	0.00+
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Client firms in therapeutic area	−0.00	−0.00	−0.00	−0.00	−0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R&D firm's age	−0.00	0.06	−0.08	−0.02	−0.04
	(0.15)	(0.16)	(0.16)	(0.17)	(0.17)
Client's age	−0.55*	−0.52*	−0.37	−0.31	−0.41+
	(0.25)	(0.25)	(0.26)	(0.26)	(0.26)
R&D firm's total assets	−0.06	−0.01	−0.05	0.00	0.04
	(0.20)	(0.19)	(0.20)	(0.19)	(0.18)
Client's total assets	0.23*	0.20	0.21+	0.18	0.20
	(0.14)	(0.14)	(0.12)	(0.12)	(0.13)
R&D firm's patent count	−0.03	−0.03+	−0.02	−0.03+	−0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Client's patent count	−0.00*	−0.00*	−0.00*	−0.00*	−0.00+
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Prominence of the VC firms investing in R&D firm	0.53	0.49	0.67	0.64	0.53
	(0.50)	(0.49)	(0.54)	(0.54)	(0.50)
Stage of the alliance	0.92*	0.86*	1.06**	1.02**	0.80*
	(0.37)	(0.37)	(0.38)	(0.37)	(0.38)
Number of previous alliances between R&D firm and client	0.01	0.01	−0.22	−0.25	−0.22
	(0.62)	(0.58)	(0.58)	(0.54)	(0.66)
Equity invested in current alliance	−0.18	−0.23	−0.17	−0.22	−0.23
	(0.15)	(0.15)	(0.16)	(0.16)	(0.16)
Stage of R&D firm's product pipeline	0.26	0.28	0.19	0.22	0.09
	(0.42)	(0.43)	(0.41)	(0.42)	(0.42)
Inverse mills ratio	0.00	−0.00	0.00	−0.00	−0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Time dummies	Yes	Yes	Yes	Yes	Yes
Alliance type dummies	Yes	Yes	Yes	Yes	Yes
Log pseudo-likelihood	−365.10	−362.69	−362.43	−359.40	−359.23

Note. Robust standard errors in parentheses.
**, *, + represent significance at 1%, 5%, 10% levels, respectively.

R&D firm's prominence increases, holding constant the client's prominence, clients are allocated less rights to unexpected outcomes ($p < 0.01$). On the other hand, when the client firm's prominence increases, controlling the R&D firm's prominence, the client firm attains greater rights to unexpected outcomes ($p < 0.05$). Moreover, column 5 shows that as the client's prominence relative to the R&D firm's prominence increases, the client obtains more rights to unexpected outcomes ($p < 0.01$). Again these results are consistent with Hypothesis 1. We obtain similar results in robustness tests when we use alternative versions of the right to unexpected outcomes variable (Table 6, columns 6–8).

We find that a number of control variables are significant in explaining rights to unexpected outcomes that were not significant in explaining net value capture rights assigned to client. The stage of the R&D firm's product pipeline has a positive and significant coefficient, perhaps because obtaining rights to unexpected outcomes is more important for prominent

Table 6. Rights to Unexpected Outcomes Assigned to the Client

	1	2	3	4	5	6	7	8
R&D firm's network prominence		−7.45**		−8.78**		−8.82**	−4.37*	−8.99**
		(2.67)		(2.69)		(2.68)	(1.79)	(3.32)
Client's network prominence			2.46*	3.10*		3.07*	2.25*	2.78*
			(1.20)	(1.25)		(1.22)	(0.94)	(1.12)
Client's relative prominence					0.95**			
					0.34			
Market heat	−0.23*	−0.26*	−0.22*	−0.25*	−0.24*	−0.24*	−0.16**	−0.27*
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.06)	(0.12)
R&D firm's alliance count	−0.04	0.04	−0.03	0.07+	0.02	0.07*	0.02	0.04
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.06)
Client's alliance count	0.03**	0.03**	0.00	−0.00	0.01	−0.01	−0.01	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
R&D firms in therapeutic area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Client firms in therapeutic area	−0.00	−0.00	−0.00	−0.00	−0.00	−0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R&D firm's age	−0.06	0.00	−0.14	−0.09	−0.09	−0.07	−0.11	−0.11
	(0.21)	(0.21)	(0.22)	(0.22)	(0.21)	(0.22)	(0.13)	(0.29)
Client's age	−0.43+	−0.43	−0.20	−0.12	−0.28	−0.12	0.02	−0.49
	(0.24)	(0.28)	(0.27)	(0.31)	(0.25)	(0.30)	(0.22)	(0.33)
R&D firm's total assets	0.16	0.22	0.13	0.20	0.25	0.21	0.15	0.20
	(0.19)	(0.21)	(0.19)	(0.21)	(0.20)	(0.21)	(0.13)	(0.28)
Client's total assets	0.10	0.08	0.06	0.04	0.04	0.03	0.02	0.05
	(0.11)	(0.12)	(0.11)	(0.12)	(0.11)	(0.12)	(0.09)	(0.22)
R&D firm's patent count	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01	0.01	−0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Client's patent count	−0.00+	−0.00	−0.00*	−0.00+	−0.00	−0.00+	−0.00*	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Prominence of VC firms	−1.08*	−1.22*	−0.95+	−1.08*	−1.09*	−1.04*	−0.82*	−1.33+
	(0.52)	(0.51)	(0.54)	(0.52)	(0.51)	(0.53)	(0.38)	(0.71)
Stage of the alliance	−0.16	−0.32	−0.04	−0.19	−0.33	−0.23	−0.30	−0.60
	(0.38)	(0.38)	(0.40)	(0.39)	(0.38)	(0.39)	(0.28)	(0.57)
Number of previous alliances	1.01**	0.85*	0.85*	0.62	0.80*	0.71	0.82*	0.61
	(0.38)	(0.40)	(0.41)	(0.46)	(0.37)	(0.44)	(0.37)	(0.55)
Equity invested in current alliance	−0.19	−0.25+	−0.19	−0.26+	−0.21	−0.24+	−0.11	−0.35*
	(0.14)	(0.14)	(0.14)	(0.14)	(0.13)	(0.14)	(0.11)	(0.16)
Stage of R&D firm's pipeline	0.76*	0.78*	0.72+	0.71*	0.61	0.68+	0.67**	1.11**
	(0.36)	(0.36)	(0.37)	(0.37)	0.40	(0.37)	(0.25)	(0.47)
Inverse mills ratio	0.00	−0.00	0.00	−0.00	−0.00	−0.00	−0.00	0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Alliance type dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log pseudo-likelihood	−307.87	−303.07	−304.96	−298.77	−302.34	−281.24	−86.05	−189.85

Notes. In column 6, categories with scores 4 and 5 are merged. In column 7 the dependent variable is one if the score is ≥ 2, o/w = 0. In column 8, category with score = 1 is dropped. Robust standard errors *n* parentheses.

**, *, + represent significance at 1%, 5%, 10% levels, respectively.

R&D firms in early stages when unexpected findings could be more likely. In addition, the number of previous alliances between R&D firms and clients seems to have a positive effect on the rights for unexpected outcomes allocated to the client. To the extent that unexpected outcomes could be considered as a contingent event, this finding is broadly consistent with repeated exchange between two agents resulting in more contingency planning (Mayer and Argyres 2004, Argyres et al. 2007, Ryall and Sampson 2009, Bercovitz and Tyler 2014). On the other hand, the prominence of the VC firms affiliating with the R&D firm has a negative and quite significant effect on the client's rights to the unexpected outcomes ($p < 0.01$). This may suggest that R&D firms that are backed by prominent VCs may have higher bargaining power vis-à-vis their clients, perhaps due to increased access to alternative funding sources. Prominent VCs may have a stronger

Table 7. Identification with Exogenous Market Variation and Instrumental Variables Approach

	Panel A: Market heat		Panel B: Instrumental variable	
	Net number of client's value capturing rights	Rights to unexpected outcomes	Net number of client's value capturing rights	Rights to unexpected outcomes
R&D firm's network prominence	−10.01**	−14.32**	−36.66+	−17.26*
	(2.68)	(4.32)	(19.03)	(7.84)
Client's network prominence	2.76**	3.36*	3.77**	2.87*
	(0.92)	(1.38)	(1.42)	(1.21)
R&D firm's network prominence × Market heat	1.96*	2.37+		
	(0.83)	(1.38)		
Market heat	−0.44**	−0.46**	−0.00	−0.17+
	(0.15)	(0.13)	(0.18)	(0.10)
R&D firm's alliance count	0.10*	0.07+	0.37*	0.14+
	(0.04)	(0.04)	(0.15)	(0.07)
Client's alliance count	−0.01	−0.01	−0.03	−0.00
	(0.01)	(0.02)	(0.02)	(0.02)
R&D firms in therapeutic area	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Client firms in therapeutic area	−0.00	−0.00	−0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
R&D firm's age	0.01	0.01	0.38	−0.00
	(0.19)	(0.23)	(0.30)	(0.20)
Client's age	−0.24	−0.08	0.13	−0.04
	(0.26)	(0.32)	(0.38)	(0.32)
R&D firm's total assets	−0.05	0.16	0.38	0.33
	(0.20)	(0.21)	(0.35)	(0.21)
Client's total assets	0.15	−0.00	−0.09	−0.08
	(0.13)	(0.13)	(0.20)	(0.13)
R&D firm's patent count	−0.03+	−0.01	−0.03	−0.02
	(0.02)	(0.01)	(0.02)	(0.01)
Client's patent count	−0.00*	−0.00*	−0.00*	−0.00+
	(0.00)	(0.00)	(0.00)	(0.00)
Prominence of the VC firms investing in R&D firm	0.70	−1.18**	0.16	−0.97*
	(0.57)	(0.53)	(0.81)	(0.43)
Stage of the alliance	1.10**	−0.17	0.33	−0.41
	(0.38)	(0.39)	(0.63)	(0.35)
Number of previous alliances between R&D firm and client	−0.25	0.60	−0.27	0.85*
	(0.54)	(0.45)	(0.68)	(0.38)
Equity invested in current alliance	−0.18	−0.22	−0.49+	−0.30*
	(0.16)	(0.14)	(0.28)	(0.15)
Stage of R&D firm's product pipeline	0.18	0.68+	0.24	0.60+
	(0.41)	(0.39)	(0.44)	(0.33)
Inverse mills ratio	−0.00	−0.00		
	(0.01)	(0.00)		
Time dummies	Yes	Yes	Yes	Yes
Alliance type dummies	Yes	Yes	Yes	Yes
Log pseudo-likelihood	−356.08	−296.27		
Wald chi-squared			1,598.75	54,103.64
Adjusted *R*-sqr	0.11	0.13	—	0.15

Note. Robust standard errors clustered at the client firm level are reported in parentheses.
**, *, + represent significance at 1%, 5%, 10%.

preference for keeping rights to unexpected outcomes (rather than value capture rights associated with the focal collaboration) within the R&D firms given their strong preference for choosing investments with high growth options (Gompers 1995).

Identification with Exogenous Market Variation and Instrumental Variables Approach

Table 7's Panel A shows how the influence of bargaining power arising from an R&D firm's network prominence on the allocation of contractual rights changes

Figure 1. The Moderating Effect of Market Heat on the Relation Between R&D Firm Prominence and the Net Number of Client's Value-Capturing Rights

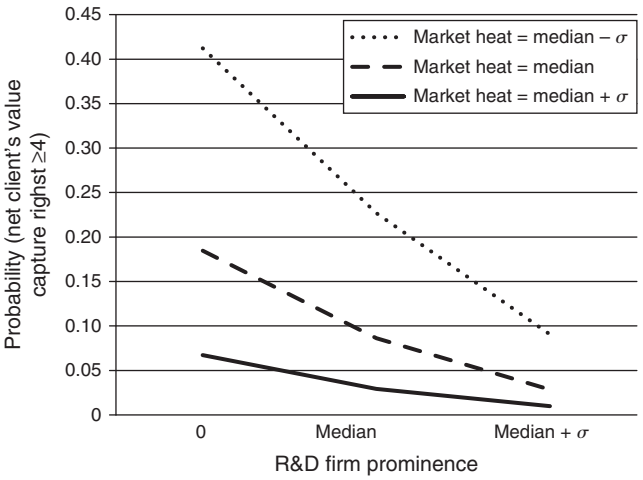
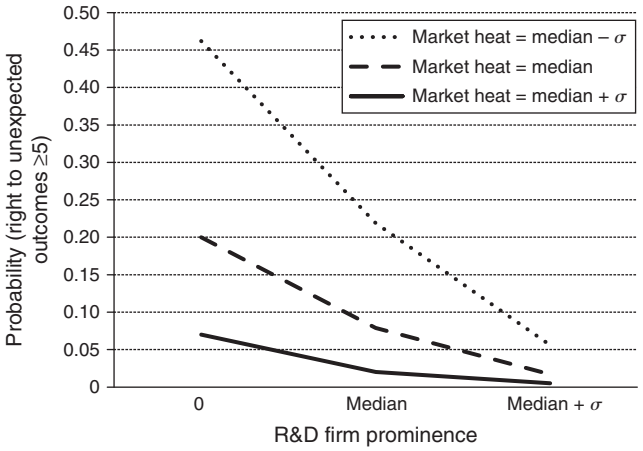


Figure 2. The Moderating Effect of Market Heat on the Relation Between R&D Firm Prominence and the Rights to Unexpected Outcomes



with exogenous variation in market heat. Please note that in all models we control for the client's network prominence along with all the other control variables. In both columns, the interaction between the R&D firm's network prominence and the market heat variable produces a positive and significant coefficient, as expected. In other words, the *negative* effects of an R&D firm's network prominence on (i) the client's *net* value capturing rights and (ii) the rights to unexpected outcomes assigned to the client, are both *less* pronounced when financial market conditions are attractive. In both columns, the main effect of market heat is negative and highly significant ($p < 0.01$) indicating that in attractive market conditions, R&D firms generally have higher bargaining power.

Figures 1 and 2 show, when all other variables are at their median levels, how the probability of net value capture rights assigned to the client being more than or equal to 4 and the probability of rights to unexpected outcomes allocated to the client being equal to or greater than 5, changes as a function of R&D firm prominence at various levels of market heat. In both figures, we find that the total effect of R&D firm prominence on both types of rights assigned to client is negative for all levels of market heat. More importantly, the slopes of the lines, which describe the relations between R&D firm prominence and the probability of the client obtaining rights, gets less negative as market heat increases. These graphs are both consistent with the sign of the interaction between market heat and R&D firm prominence being positive. These results are consistent with Hypothesis 2 and help us identify the influence of R&D firm's network prominence on the allocation of rights as a function of the bargaining power that network prominence confers.

To address the potential endogeneity of network prominence, we also conducted two-stage OLS regressions, using the R&D firm's five-year lagged number of bio-university alliances as an instrumental variable for R&D firm's network prominence. Cragg and Donald (1993) Wald *F*-statistics indicate that the instrument is not weak with 5% significance (Stock and Yogo 2005). Panel B of Table 7 reports second stage regressions for both measures of value capture, and this panel indicates qualitatively similar results to those reported in Tables 5 and 6.

Discussion

Contributions and Implications

Firms entering into alliances focus on both creating value and positioning themselves to capture it. Prior research has documented how a firm's position in interorganizational networks benefits firm performance, innovative capability, and the formation of partnerships (e.g., Shan et al. 1994; Powell et al. 1996, Gulati 1998; Ahuja 2000a, b; Stuart 2000; Schilling and Phelps 2007; Shipilov and Li 2008). In this paper, we focus on mechanisms through which network positions affect bargaining power and the division of value that is created. We show that a firm's prominence within alliance networks, controlling for the prominence of its partner, is an important source of the firm's bargaining power relative to its current alliance partner. The focal partner receives more of the net value capturing rights and more rights to unexpected outcomes as its network prominence increases.

Partnering with a prominent firm confers many advantages as shown in the previous literature (e.g., Gulati 1998; Kogut et al. 1992; Stuart 1998, 2000; Podolny 2001; Ozmel and Guler 2015). However, our results show that matching with more prominent actors also decreases relative bargaining power. Therefore, a novel

implication of our results is that selecting a prominent partner creates a trade-off between potentially greater value creation yet weakened bargaining power for value capture. On the other hand, the trade-off in matching with a less prominent partner would be lower value creation versus capturing a larger share of the value created.

An important contribution of this paper is to theoretically suggest and provide empirical evidence that rights to unexpected outcomes are an important consequence of the bargaining between alliance partners. Previous studies on alliance contracts predominantly focus on the allocation of rights related to the particular area of collaboration at hand. We aim at filling this gap through our novel content-based measure of the rights to unexpected outcomes, which may be an especially important source of value in high-tech alliances and other collaborations surrounded by high uncertainty.

Another novel feature of our study is to use exogenous variation in market conditions to both theoretically and empirically identify the effect of network prominence on the allocation of rights in alliance contracts owing to parties' bargaining power. Consistent with our theory, we find that during periods of attractive financial markets, when funding from alternative sources is more abundant, the marginal value of network prominence as a source of bargaining power decreases. Likewise, the bargaining advantages that accrue to partners from their prominent positions in networks and thereby shape the rights they obtain in alliance contracts will be more pronounced during periods of weaker financial markets. Controlling for the endogeneity of matching and network prominence does not change our conclusions.

Interestingly, even though there is a considerable set of studies on alliance contracts, there are relatively few studies aimed at analyzing the partners' attempts to appropriate more value through negotiating favorable contracts (e.g., Bhattacharyya and Lafontaine 1995, Lerner et al. 2003, Adegbesan and Higgins 2011, Argyres and Bercovitz 2013). Our paper contributes to the recent literature in this stream of research by incorporating the role that firms' alliance network positions play in enhancing the firm's bargaining power to capture more value appropriation rights. By doing so, our paper also illustrates that partners' efforts to create and capture value in an alliance indeed occur simultaneously, and these efforts start as early as the stage when partners negotiate contract terms.

Limitations and Future Research Directions

Our theory suggests that bargaining power arising from network prominence is an important determinant of contract design and the extent of value captured in alliance relationships. How revenues and other sources of value are shared affects agents' incentives to exert effort, innovate, and invest in relation-specific assets (Marquez and Yavuz 2013). Thus, bargaining power that arises from network prominence may also affect value creation in alliances, affecting the innovation outcomes of the firms as well as overall firm performance. Future studies, therefore, can analyze the implications of the firm's bargaining power and associated value-capturing rights the firm receives on the firm's incentives to exert effort, innovation outcomes, and overall performance.

In this study, we focus on the contract structure at the time of the alliance formation. However, as a firm's bargaining power with respect to its partner changes through time, the firm, or its partner, might be better positioned to renegotiate some of the contract terms. It would be interesting to analyze how the effect of network prominence on contract terms evolves through time, rather than shaping contract terms only at the outset of the collaboration, as we have done in this study (see Mayer and Argyres 2004, Argyres et al. 2007, Bercovitz and Tyler 2014).

Further research on other sources, or dimensions, of technology firms' bargaining power, and mechanisms through which bargaining power might affect outcomes would be interesting to investigate as well. For example, a technology venture's bargaining power may limit its financiers' capability to appropriate a venture's technology and intellectual property (e.g., Ozmel 2016), which might be an important determinant of the venture's decision regarding whether or not to receive corporate venture capital. Similarly, this might also affect a corporate venture capitalist firm's willingness to invest in a particular tech venture versus another.

In this paper, we incorporate the role of exogenous variation in market conditions in moderating the importance of the firm's bargaining power stemming from its network prominence on alliance contracts. We believe that future studies can further analyze other contingencies under which a tech firm's bargaining power associated with its network position can be more or less important. Relatedly, given that later stage alliances might be more about accessing complementary assets rather than money (Teece 1986), future studies can also investigate whether the dampening effect of the hot market conditions on the role of the alliance prominence in determining contractual rights might be less important for later stage alliances.

To conclude, we hope that this paper encourages future research on the distributional consequences of networks of interfirm collaborations in various other settings.

Acknowledgments

We appreciate valuable comments and suggestions of Gautam Ahuja, Nick Argyres, Janet Bercovitz, Dovev Lavie, Joe

Mahoney, PK Toh, and seminar participants at the 2014 INSEAD Network Conference, as well as those of anonymous referees.

References

Adegbesan JA, Higgins MJ (2011) The intra alliance division of value creation through collaboration. *Strategic Management J.* 32(2):187–211.

Aghion P, Tirole J (1994) The management of innovation. *Quart. J. Econom.* 109(4):1185–1209.

Ahuja G (2000a) The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management J.* 21(3):317–343.

Ahuja G (2000b) Collaboration networks, structural holes, and innovation: A longitudinal study. *Admin. Sci. Quart.* 45(3):425–455.

Anand J, Oriani R, Vassolo R (2010) Alliance activity as a dynamic capability in the face of a discontinuous technological change. *Organ. Sci.* 21(6):1213–1232.

Argyres N, Bercovitz J (2013) Bargaining power of franchisee associations. Working paper, Washington University in St. Louis, St. Louis.

Argyres N, Mayer KJ (2007) Contract design as a firm capability: An integration of learning and transaction cost perspectives. *Acad. Management Rev.* 32(4):1060–1077.

Argyres N, Bercovitz J, Mayer KJ (2007) Complementarity and evolution of contractual provisions: An empirical study of information technology services contracts. *Organ. Sci.* 18(1):3–19.

Bae J, Gargiulo M (2004) Partner substitutability, alliance network structure, and firm profitability in the telecommunications industry. *Acad. Management J.* 47(6):843–859.

Bercovitz J, Tyler BB (2014) Who I am and how I contract: The effect of contractors' roles on the evolution of contract structure in university-industry research agreements. *Organ. Sci.* 25(6): 1840–1859.

Bhattacharyya S, Lafontaine F (1995) Double-sided moral hazard and the nature of share contracts. *RAND J. Econom.* 26(4):761–781.

Bikhchandani S, Lippman S, Ryan R (2005) On the right-of-first-refusal. *Adv. Theoret. Econom.* 5(1):4.

Bonacich P (1987) Power and centrality: A family of measures. *Amer. J. Soc.* 92(5):1170–1182.

Bottazzi L, Da Rin M, Hellmann T (2008) Who are the active investors? Evidence from venture capital. *J. Financial Econom.* 89(3):488–512.

Cameron AC, Trivedi PK (2005) *Microeconometrics: Methods and Applications* (Cambridge University Press, New York).

Carroll G, Hannan M (2000) *Demography of Corporations and Firms* (Princeton University Press, Princeton, NJ).

Chiburis R, Lokshin M (2007) Maximum likelihood and two-step estimation of an ordered-probit selection model. *Stata J.* 7(2):167–182.

Cragg JG, Donald SG (1993) Testing identifiability and specification in instrumental variable models. *Econometric Theory* 9(2): 222–240.

Dushnitsky G, Lenox MJ (2006) When does corporate venture capital investment create firm value? *J. Bus. Venturing* 21(6):753–772.

Dushnitsky G, Shaver M (2009) Limitations to interorganizational knowledge acquisition: The paradox of corporate venture capital. *Strategic Management J.* 30(10):1045–1064.

Dyer JH, Singh H (1998) The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Acad. Management Rev.* 23(4):660–679.

Elfenbein D, Lerner J (2003) Ownership and control rights in Internet portal alliances, 1995–1999. *RAND J. Econom.* 34(2):356–369.

Elfenbein D, Zenger T (2017) Creating and capturing value in repeated exchange relationships: The second paradox of embeddedness. *Organ. Sci.* 28(5):894–915.

Gallini NT, Lutz NA (1992) Dual distribution and royalty fees in franchising. *J. Law, Econom. Organ.* 8(3):471–501.

Gans JS, Hsu D, Stern S (2008) The impact of uncertain intellectual property rights on the market for ideas: Evidence from patent grant delays. *Management Sci.* 54(5):982–997.

Gompers PA (1995) Optimal investment, monitoring, and the staging of venture capital. *J. Finance* 50(5):1461–1489.

Grossman SJ, Hart O (1986) The costs and benefits of ownership: A theory of vertical and lateral integration. *J. Political Econom.* 94(4):691–719.

Gulati R (1995a) Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Acad. Management J.* 38(1):85–112.

Gulati R (1995b) Social structure and alliance formation patterns: A longitudinal analysis. *Admin. Sci. Quart.* 40(4):619–652.

Gulati R (1998) Alliances and networks. *Strategic Management J.* 19(4):293–317.

Gulati R, Gargiulo M (1999) Where do interorganizational networks come from? *Amer. J. Soc.* 104(5):1439–1493.

Gulati R, Sytch M (2007) Dependence asymmetry and joint dependence in interorganizational relationships: Effects of embeddedness on a manufacturer's performance in procurement relationships. *Admin. Sci. Quart.* 52(1):32–69.

Hart O, Moore J (1990) Property rights and the nature of the firm. *J. Political Econom.* 98(6):1119–1158.

Heckman JJ (1979) Sample selection bias as a specification error. *Econometrica* 47(1):153–161.

Higgins MJ (2007) The allocation of control rights in pharmaceutical alliances. *J. Corporate Finance* 13(1):58–75.

Hsu D (2004) What do entrepreneurs pay for venture capital affiliation? *J. Finance* 59(4):1805–1844.

Hsu D (2006) Venture capitalists and cooperative startup commercialization strategy. *Management Sci.* 52(2):204–219.

Kogut B (1988) Joint ventures: Theoretical and empirical perspectives. *Strategic Management J.* 9(4):319–332.

Kogut B, Shan W, Walker G (1992) The make-or-cooperate decision in the context of an industry network: Networks and firms. Robert E, Nihria N, eds. *Network Organizations* (Harvard Business School Press, Cambridge, MA), 348–365.

Lafontaine F (1992a) Agency theory and franchising: Some empirical results. *RAND J. Econom.* 23(2):263–283.

Lafontaine F (1992b) How and why do franchisors do what they do: A survey report. Kaufmann P, ed. *Franchising: Passport for Growth and World of Opportunity, Sixth Annual Proc. Soc. Franchising* (International Center for Franchise Studies, University of Nebraska, Lincoln).

Lafontaine F, Shaw KL (1999) The dynamics of franchise contracting: Evidence from panel data. *J. Political Econom.* 107(5):1041–1080.

Lal R (1990) Improving channel coordination through franchising. *Marketing Sci.* 9(3):299–318.

Lavie D (2007) Alliance portfolios and firm performance: A study of value creation and appropriation in the US software industry. *Strategic Management J.* 28(12):1187–1212.

Lazzarini SG, Miller GJ, Zenger TR (2004) Order with some law: Complementarity versus substitution of formal and informal arrangements. *J. Law, Econom. Organ.* 20(2):261–298.

Lerner J, Merges RP (1998) The control of technology alliances: An empirical analysis of the biotechnology industry. *J. Indust. Econom.* 46(2):125–156.

Lerner J, Shane H, Tsai A (2003) Do equity financing cycles matter? Evidence from biotechnology alliances. *J. Financial Econom.* 67(4):411–446.

Marquez R, Yavuz MD (2013) Specialization, productivity, and financing constraints. *Rev. Financial Stud.* 26(11):2961–2984.

Marquez R, Nanda V, Yavuz MD (2015) Private equity fund returns and performance persistence. *Rev. Finance* 19(5):1783–1823.

Mathewson GF, Winter RA (1985) The economics of franchise contracts. *J. Law Econom.* 28(3):503–526.

Mayer KJ, Argyres N (2004) Learning to contract: Evidence from the personal computer industry. *Organ. Sci.* 15(4):394–410.

McEvily B, Zaheer A, Kamal DF (2017) Mutual and exclusive: Dyadic sources of trust in interorganizational exchange. *Organ. Sci.* 28(1):74–92.

Nash J (1953) Two-person cooperative games. *Econometrica* 21(1): 128–140.
Nerkar A, Paruchuri S (2005) Evolution of R&D capabilities: The role of knowledge networks within a firm. *Management Sci.* 51(5):771–785.
Nicholson S, Danzon PM, McCullough J (2005) Biotech-pharmaceutical alliances as a signal of asset and firm quality. *J. Bus.* 78(4):1433–1461.
Ozmel U (2016) When does a technology venture capture more value from its corporate venture capital investor: The effect of tech venture's bargaining power on its innovation outcome. Working paper, Purdue University, West Lafayette, IN.
Ozmel U, Guler I (2015) Small fish big fish: The performance effects of relative standing in partners' affiliate portfolios. *Strategic Management J.* 36(13):2039–2057.
Ozmel U, Reuer J, Gulati R (2013a) Signals across multiple networks: How venture capital and alliance networks affect interorganizational collaboration. *Acad. Management J.* 56(3):852–866.
Ozmel U, Reuer J, Wu CW (2017) Interorganizational imitation and acquisitions of high-tech ventures. *Strategic Management J.*, ePub ahead of print June 15, http://dx.doi.org/10.1002/smj.2666.
Ozmel U, Robinson DT, Stuart TE (2013b) Strategic alliances, venture capital, and exit decisions in early stage high-tech firms. *J. Financial Econom.* 107(3):655–670.
Pisano GP (1989) Using equity participation to support exchange: Evidence from the biotechnology industry. *J. Law, Econom. Organ.* 5(1):109–126.
Pisano GP (1990) The R&D boundaries of the firm: An empirical analysis. *Admin. Sci. Quart.* 35(1):153–176.
Podolny JM (1993) A status-based model of market competition. *Amer. J. Soc.* 98(4):829–872.
Podolny JM (1994) Market uncertainty and the social character of economic exchange. *Admin. Sci. Quart.* 39(3):458–483.
Podolny JM (2001) Networks as the pipes and prisms of the market. *Amer. J. Soc.* 107(1):33–60.
Podolny JM, Stuart TE, Hannan MT (1996) Networks, knowledge, and niches: Competition in the worldwide semiconductor industry, 1984–1991. *Amer. J. Soc.* 102(3):659–689.
Poppo L, Zenger TR (2002) Do formal contracts and relational governance function as substitutes or complements? *Strategic Management J.* 23(8):707–725.
Powell WW, Koput KW, Smith-Doerr L (1996) Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Admin. Sci. Quart.* 41(1):116–145.
Reuer JJ, Arino A (2007) Strategic alliance contracts: Dimensions and determinants of contractual complexity. *Strategic Management J.* 28(3):313–330.
Reuer JJ, Devarakonda S (2016) Mechanisms of hybrid governance: Administrative committees in non-equity alliances. *Acad. Management J.* 59(2):510–533.
Reuer JJ, Devarakonda R (2017) Partner selection in R&D collaborations: Effects of affiliations with venture capitalists. *Organ. Sci.* 28(3):574–595.
Robinson DT, Stuart TE (2007) Network effects in the governance of strategic alliances. *J. Law, Econom. Organ.* 23(1):242–273.
Ryall MD, Sampson R (2009) Formal contracts in the presence of relational enforcement mechanisms: Evidence from technology development projects. *Management Sci.* 55(6):906–925.
Schilling MA, Phelps CC (2007) Interfirm collaboration networks: The impact of large-scale network structure on firm innovation. *Management Sci.* 53(7):1113–1126.
Sen KC (1993) The use of initial fees and royalties in business-format franchising. *Managerial Decision Econom.* 14(2):175–190.
Shan W, Walker G, Kogut B (1994) Interfirm cooperation and startup innovation in the biotechnology industry. *Strategic Management J.* 15(5):387–394.
Shipilov AV, Li SX (2008) Can you have your cake and eat it too? Structural holes' influence on status accumulation and market performance in collaborative networks. *Admin. Sci. Quart.* 53(1):73–108.
Sørensen M (2007) How smart is smart money? A two-sided matching model of venture capital. *J. Finance* 62(6):2725–2762.
Sorenson O, Stuart TE (2001) Syndication networks and the spatial distribution of venture capital investments. *Amer. J. Soc.* 106(6):1546–1588.
Stinchcombe AL (1965) Social structure and organizations. March J, ed. *Handbook of Organizations* (Rand-McNally, Chicago), 142–193.
Stock JH, Yogo M (2005) Testing for weak instruments in linear IV regression. Stock JH, Andrews DWK, eds. *Identification and Inference for Econometric Models: Essays in Honor of Thomas J. Rothenberg* (Cambridge University Press, Cambridge, UK), 80–108.
Stuart TE (1998) Network positions and propensities to collaborate: An investigation of strategic alliance formation in a high-technology industry. *Admin. Sci. Quart.* 43(3):668–698.
Stuart TE (2000) Interorganizational alliances and the performance of firms: A study of growth and innovation. *Strategic Management J.* 21(1):791–811.
Stuart TE, Hoang H, Hybels RC (1999) Interorganizational endorsements and the performance of entrepreneurial ventures. *Admin. Sci. Quart.* 44(2):315–349.
Stuart TE, Ozdemir SZ, Ding WW (2007) Vertical alliance networks: The case of university–biotechnology–pharmaceutical alliance chains. *Res. Policy* 36(4):477–498.
Tallman S, Phene A (2006) Co-ordination, appropriation and governance in alliances: The biotechnology case. Arino A, Reuer JJ, eds. *Strategic Alliances: Governance and Contracts* (Palgrave Macmillan), 67–76.
Teece DJ (1981) Internal organization and economic performance: An empirical analysis of the profitability of principal firms. *J. Industrial Econom.* 30(2):173–199.
Teece DJ (1986) Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Res. Policy* 15(6):285–305.
Walker D (1999) Rethinking rights of first refusal. Economics and Business Discussion Paper Series No. 261, Harvard University, Cambridge, MA.
Walker G, Kogut B, Shan W (1997) Social capital, structural holes and the formation of an industry network. *Organ. Sci.* 8(2):109–125.
Williamson OE (1985) *The Economic Institutions of Capitalism* (Free Press, New York).
Yan A, Gray B (1994) Bargaining power, management control, and performance in United States–Chinese joint ventures: A comparative case study. *Acad. Management J.* 37(6):1478–1517.

Umit Ozmel focuses her work on the tension between value generation and value capture in strategic alliances, venture capital investments, and performance consequences as well as in technology entrepreneurship. Her papers have been published in the *Journal of Financial Economics*, *Academy of Management Journal*, *Strategic Management Journal*, and *Organization Science*. She received the Krannert School of Management Research Fellowship in 2017. She is the recipient of the 2016 SalgoNoren outstanding MBA teaching award and has been a distinguished teacher every year since 2012. She received her Ph.D. from Columbia Business Schools.

Deniz Yavuz has five years of work experience in corporate banking and project finance. He also worked as a consultant to multinational organizations, investment banks, and corporations. His research papers have been published in the *Journal of Financial Economics*, *Review of Financial Studies*, *Review of Finance*, and *Organization Science*. He received the John and Mary Willis Young Faculty Scholar Award in 2011 and the Distinguished Teacher Award every year since 2010. Yavuz was at Washington University in St. Louis and Arizona State University before joining Purdue University.

Jeffrey J. Reuer is the Guggenheim Endowed Chair and a professor of strategy and entrepreneurship at the University of Colorado. His research uses organizational economics to investigate firms' corporate development activi-

ties. Recent projects are on the governance and design of alliances and applications of information economics to strategy, entrepreneurship, and international business.

Todd Zenger is the N. Eldon Tanner Professor of Strategy and Strategic Leadership at the David Eccles School of Business at the University of Utah and holds the University of Utah designation as presidential professor. He received his Ph.D. from UCLA. He recently published *Beyond Competitive Advantage: How to Solve the Puzzle of Sustaining Growth While Creating Value* (HBR Press, 2016). His research interests include corporate strategy, strategic leadership, and organization design.