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Mechanisms of Hybrid Governance: Administrative Committees in Non-Equity Alliances

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**Mechanisms of Hybrid Governance:
Administrative Committees in Non-Equity Alliances**

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Abstract

Recent research on the governance of hybrid organizational forms has investigated the contractual foundations of collaborations by examining how firms craft complex contracts as well as plan for changing circumstances during contract execution. We build upon and extend this research by considering the contractual delegation of authority to a dedicated structural interface for a collaboration. In particular, our theory suggests that partners are more likely to employ steering committees to help partners guide their interactions, address unanticipated contingencies that materialize, and mitigate incipient conflicts when partners have substantial needs for coordinated adaptation. An analysis of alliances in the biopharmaceuticals industry explicates the formal governance mechanisms that support high-tech partnerships and identifies determinants of the administrative structures firms utilize in contractual agreements to enhance their adaptive limits.

INTRODUCTION

Recent years have witnessed increased scholarly interest in the management literature in understanding how exchange partners design contracts to obtain mutual benefits (e.g., Parkhe, 1993; Luo, 2002; Anderson and Dekker, 2005; Carson, Madhok, and Wu, 2006; Reuer and Ariño, 2007; Mesquita and Brush, 2008; Lumineau and Malhotra, 2011). Despite partners’ efforts to specify extensive contracts for interfirm collaborations and despite firms’ capacity to learn how to craft complex formal agreements (e.g., Mayer and Argyres, 2004; Ryall and Sampson, 2009; Vanneste and Puranam, 2010), contracts face certain limits in their ability to deal with adaptation pressures emanating from changing circumstances surrounding a transaction. The adaptive limits of contracts can ultimately determine whether firms are able to create and appropriate value from an exchange relationship.

At the contracting stage, firms need to project their relationship into the future, and they face a basic tradeoff between detailed contracting for future contingencies versus maintaining the flexibility to adapt to changing circumstances (Macneil, 1977). This tradeoff is particularly acute for the exchange of intangible resources in high-technology partnerships (e.g., Elfenbein and Lerner, 2003). Firms experience escalating contracting costs as they design more provisions in greater detail to address potential challenges they can anticipate, even as the marginal benefits of increasing contractual complexity diminish. Coupled with the uncertainties surrounding such interorganizational exchanges, these contracting costs contribute to gaps in contracts and place limits on the ability of contracts to efficiently address firms’ *ex post* adaptation needs (Bajari and Tadelis, 2001; Januszewski Forbes and Lederman, 2009). Parties to the contract cannot address such gaps and adjust the exchange relationship to changing circumstances by using the same instruments available within their own firms, including well-developed systems of authority and administrative controls (e.g., fiat, career rewards and penalties). Thus, firms might either settle

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3 for less exhaustive agreements (Crocker and Reynolds, 1993), or they might incorporate other
4 contractual devices into an agreement to try to enhance its adaptive limits. For instance, extant
5 research has documented the importance of contractually stipulated *ad hoc* rules and procedures
6 for information sharing (e.g., Palay, 1984; Goldberg and Erikson, 1987). Partners can also
7 engage in contingency planning to address disturbances that might arise, and they can assign
8 particular decision rights to partners or specify processes or procedures to follow to handle
9 problematic contingencies (Mayer and Argyres, 2004; Argyres, Bercovitz, and Mayer, 2007).

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20 Alternatively, firms might enhance the adaptive limits of contracts in a structural fashion
21 by devising a dedicated interface between them to guide their interactions as well as address
22 contingencies and potential conflicts as they arise. In particular, the firms can contractually
23 establish a joint steering committee that resembles a board-like structure, yet with clearly
24 delineated authority over activities specified in the contract (Smith, 2005). Thus, such committees
25 derive their authority from contracts, and they also inherit select administrative control features
26 of hierarchical organizational structures. By unifying the locus of decision-making responsibility
27 and allowing for administrative fiat within a hybrid, such committees can improve upon the
28 adaptive limits of contracts and enhance the firms' ability to effect private ordering by preventing
29 and resolving disputes. In Williamson's (1991) terminology, such committees offer an
30 "administrative apparatus" (p. 280) to process information and make decisions, and they hold out
31 the promise to "orchestrate coordinated adaptation to unanticipated disturbances" (p. 279), even
32 in hybrid organizational forms that otherwise lack fiat or elaborate administrative controls.

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50 In this paper, we wish to investigate this facet of alliance governance and identify key
51 antecedents of such administrative committees in interfirm collaborations. Specifically, we
52 address two primary research questions: First, to what extent do steering committees feature in
53 the design of contracts for non-equity alliances? Second, how do specific transactional attributes
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of these alliances affect the inclusion of these steering committees in the design of contracts? Although prior research has acknowledged the existence of such administrative committees in hybrid organizational forms, these structures have not as yet been subject to systematic analysis and theoretically situated within the set of formal governance mechanisms for hybrids (e.g., Lerner and Merges, 1998; Robinson and Stuart, 2007; Hoetker and Mellewigt, 2009). This is the primary aim of this research.

Our theoretical approach builds upon the seminal work of Williamson (1991) as well as previous research on hybrids suggesting that administrative controls can facilitate coordinated adaptation in collaborative relationships between firms. In identifying antecedents of steering committees in non-equity alliances, we use these ideas to identify specific collaborative contexts in which partners stand to benefit from administrative structures to help partners guide their interactions, respond to unanticipated contingencies that materialize, and alleviate conflicts. The discriminating alignment principle we develop in specifying research hypotheses indicates that partners will benefit from such an adaptive decision-making structure when they face significant technological uncertainty, are responsible for interdependent activities that elevate anticipated coordination costs, and possess similar technological resources. However, given that the establishment of steering committees involves contracting costs that might later not be recouped during alliance execution, opportunity costs associated with management’s time, governance costs for partners, and even potential litigation risk, we anticipate that firms will be less likely to contract upon such committees when the need for coordinated adaptation is less consequential. We investigate these ideas in the context of non-equity alliances in the biopharmaceuticals industry.

This paper advances research on the governance of alliances in two main ways by explicating new facets of alliance contract design and hybrid governance. First, our theoretical

arguments and empirical analyses shed light on an alternative mechanism by which administrative controls can be established and carried out in hybrid organizational forms. Extant literature on interorganizational governance has long emphasized authority-based administrative controls that find their roots in partial ownership or residual control (e.g., Pisano, 1989; Oxley, 1997; Gulati and Singh, 1998). By contrast, we suggest that partners can also contractually stipulate that authority be delegated to a steering committee, which represents another type of administrative architecture that allows administrative controls to be incorporated into non-equity alliances. Second, we extend research on the “structural planning” aspect of contracts and the specification of administrative procedures and decision rights in contingency planning clauses (e.g., Palay, 1984; Argyres, Bercovitz, and Mayer, 2007) by emphasizing the dedicated administrative structures that firms might devise to enhance the adaptive limits of contracts. For the theory of the firm, our contribution lies in arguing and showing that exchange partners can infuse contingent authority over particular activities into hybrids, and by enhancing the adaptive limits of contracts they can at the margin avoid governance costs associated with more hierarchical organizational forms (Williamson, 1991). For alliances as hybrid organizational forms, this means the possibility for partners to utilize steering committees to incorporate authority and administrative controls into non-equity alliances without resorting to equity joint ventures. By distinguishing the administrative controls available to non-equity alliances, we identify a new dimension for conceptualizing hybrid organizational forms along the governance continuum based on their capacity for coordinated adaptation.

THEORETICAL BACKGROUND

Contracts are central to the organization and management of exchange relationships between firms (e.g., procurement agreements, R&D alliances, etc.). From the time firms arrive at an agreement to the time the contract is implemented and completed, various changes can occur

in the conditions surrounding a transaction. Maintaining continuity and mutually adjusting to changing circumstances are therefore key considerations for firms in structuring a contractual relationship at the outset. Transaction cost theory focuses on *ex post* adaptation problems in organizing economic exchange by means of contracts, and emphasizes the need to compare alternative contracting modes based on their efficiency in facilitating adaptation to disturbances that may upset exchange relationships (Williamson, 1975, 1985). Because contracts remain incomplete owing to the costs of identifying and negotiating appropriate responses to the full set of future circumstances, firms may incorporate specific contractual provisions to bring order and ensure commitment to the relationship when unforeseen contingencies arise, in order to pre-empt conflict and provide a basis for resolving disputes (e.g., Crocker and Reynolds, 1993; Battigalli and Maggi, 2002; Williamson, 2002). The extent to which a given contractual form can provide for cost-effective private ordering mechanisms therefore determines the degree to which the governance arrangement can align with the characteristics of a transaction and the contractual form can efficiently satisfy the parties' *ex post* adaptation needs.

Partner firms can employ several mechanisms to infuse order into a relationship and respond to contingencies. When decision rights are contractible, partners can *ex ante* allocate the authority to one of the partners to decide in the event of a contingency (e.g., Arrunada, Garricano, and Vazquez, 2001; Lerner and Merges, 1998). When the decision rights cannot be contracted for *ex ante*, partners can craft broad guidelines and procedures, or more specific responses that provide assistance to the parties making adjustments to contingencies (Argyres, Bercovitz and Mayer, 2007). Partners can also design structural interfaces that reduce information barriers to adaptation by allowing information sharing and joint decision-making (Palay, 1984). Such structural interfaces often occur as dedicated administrative committees, which are commonly observed in many industries, including chemicals, pharmaceuticals, electronics, and airlines (e.g.,

Deck and Strom, 2002; Laroia and Krishnan, 2005; de Man *et al.*, 2010).

The establishment of steering committees within contracts suggests partners foresee the need for adjustments but are unsure about the precise nature of the contingencies or required adjustments *ex ante*. For example, in a collaborative agreement between Pfizer and Neurocrine Biosciences to develop and market a treatment for insomnia, the contract states:

“[t]he Steering Committee shall address all of the significant and strategic issues within the purview of various Committees, and shall be responsible for resolving any issues referred by the Joint Operating Committee. The Steering Committee will be presented with updates on activities and achievements of the Committees and otherwise as provided below...”

In this case, the contract establishes the steering committee and stipulates its purview in resolving collaboration issues arising during the implementation of the contract. In a collaborative relationship between Xoma and Takeda Pharmaceuticals, the contract indicated that the steering committee was to approve the number of full-time equivalent employees working on the joint research program, select alternative product candidates in the event that the agreed-upon candidate is not effective, agree on whether to obtain third party licenses, and oversee quarterly reports from the partners. Executives we interviewed at one firm suggested that they institute a steering committee to handle gaps in the contract while establishing accountability within the alliance. Thus, these committees take on roles such as coordination, oversight and information sharing in alliances (e.g., Lavie, Lechner, and Singh, 2007; Robinson and Stuart, 2007; Kale and Singh, 2009), so a need exists to conceptually anchor them within the governance mechanisms supporting hybrid organizational forms and to understand their theoretical determinants.

Williamson's (1991) seminal paper provides a general framework for understanding the adaptive abilities of governance structures and for characterizing hybrid governance in particular. Specifically, he identifies incentive intensity, administrative controls, and the underlying contract regime as the principal dimensions of a governance structure that serve the adaptation needs of a

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transaction. For example, high-powered incentives along with low administrative control make markets relatively more efficient in promoting autonomous adaptation, whereas low-powered incentives combined with strong administrative controls make internal organization within a firm relatively more efficient in facilitating coordinated adaptation. Hybrids tend to possess intermediate levels of incentive intensity and administrative control and within limits promote both autonomous and coordinated adaptation. To the extent that the coordinated adaptation needs of a transaction surpass these limits, the transaction is more efficiently organized within the hierarchy of a standalone organization given its system of authority and administrative controls.

We conceptualize steering committees as instruments that formalize joint administrative control by both partners through a well defined, dedicated interface to promote adaptation in a coordinated way during contract implementation. The steering committees that partners include in contract designs can serve as means to structure their interactions and coordinate responses to contingencies that materialize. Steering committees can therefore be seen as an “administrative apparatus” (Williamson, 1991, p. 280) that enables the parties to “orchestrate coordinated adaptation to unanticipated disturbances” (p. 279), rather than having disturbances either strain hybrids or resorting to costly remedies involving third parties (e.g., arbitration, litigation). By providing a forum for partners to convene during the implementation of an agreement, steering committees can expand the adaptive limits of contractual hybrids by enabling the process of achieving mutual consent when potentially destabilizing contingencies arise.

Steering committees can perform several important functions in contractual, or non-equity, alliances to enhance coordinated adaptation. They can reduce information barriers by facilitating regular information exchanges to coordinate and adapt to disturbances (Barnard, 1938). By guiding partners’ interactions and having proximate decision-making authority to ratify and enforce decisions (Simon, 1947), steering committees can respond efficiently to

contingencies that surface and prevent minor conflicts from becoming larger disputes. Steering committees enable partners to manage bilateral dependencies by coordinating on boundary-spanning resource allocation decisions and altering agreed-upon project plans to fit the changing circumstances of a transaction (Williamson, 1991). Steering committees may also limit individuals' discretion and align their activities to project outcomes as the needs of the transaction change.

The functions of the steering committees we outline above can be observed in the specific responsibilities that firms delegate to steering committees through contracts. For example, Alnylam Pharmaceuticals and Cubist Pharmaceuticals formed a collaborative agreement signed in 2008 to develop a drug for treating respiratory virus. Their contract laid out the following mandates for the steering committee:

(1) "Manage and oversee the development and Promotion of the Product in the Territory pursuant to the terms of this Agreement." (2) "Review and make recommendations for revisions of any material amendments to the Promotion Plan within thirty (30) days after receipt thereof." (3) "Review the progress of the Development Committee and the Marketing Committee." (4) "...Resolve disputes, disagreements and deadlocks unresolved by the Development Committee and the Marketing Committee." and (5) "Review any development activities following FDA Approval, including responsibility for approving any Additional Development requested by either Party..."

This example suggests that steering committees perform some roles analogous to corporate boards (Jones, 2007), yet in non-equity alliances that lack such a unified locus of decision-making and fiat. Indeed, alliance governance research suggests that administrative control through a board of directors is a distinguishing feature of hybrid forms involving equity, namely joint ventures and minority equity partnerships (e.g., Pisano, 1989; Oxley, 1997; Reuer, Klijn, and Lioukas, 2014). We would instead emphasize that it is important to distinguish between two different sources of authority in hybrid governance forms. Ownership is one source of authority, as in equity-based hybrids, because it provides for board representation and residual control rights (e.g., Gatignon and Anderson, 1988; Hart, 1988). By contrast, in non-equity

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3 agreements, partners can establish a joint steering committee to which they delegate decision-
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5 making authority, the bounds of which are determined by the agreement between the partners.
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7 Despite the apparent similarity in their functions, committees in non-equity alliances differ from
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9 boards in equity alliances in important respects, however. For instance, rather than being
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11 empowered to decide on all matters that are residual to the contract, an administrative committee
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13 established by the contract may only decide on matters that are assigned to it by the contract. The
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15 contingent authority derived from the contract also distinguishes such committees from other
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17 joint committees established *ex post* or on an *ad hoc* basis to promote mutuality (e.g.,
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19 development, regulatory, etc.), and steering committees can have the authority to establish such
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21 committees. As a second illustration, steering committees owe their existence to efficiency
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23 considerations rather than legal mandate.
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29 Steering committees can be valuable instruments to collaborate under an incomplete
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31 contract, effect private ordering, and adapt to disturbances in a coordinated way, yet efficiency
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33 considerations suggest that partners will use them selectively. Steering committees entail
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35 contracting costs that might not be recouped if coordinated adaptation proves to be unnecessary,
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37 in addition to anticipated opportunity costs associated with management’s time during contracting
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39 and the execution of the agreement. For instance, negotiations must take up issues such as the
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41 bounds of authority, committee membership, responsibilities, procedures, etc. In our inspection
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43 of alliance contracts, it is evident that these are not boilerplate provisions as we see substantial
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45 heterogeneity in agreements concerning steering committees. In addition, because these
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47 structures are contractually embedded, parties also have to consider the risk and cost of litigation,
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49 if such committees are contracted for and not implemented as agreed. In the hypotheses
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51 developed below, we therefore wish to identify specific conditions under which partners decide to
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53 establish such an administrative committee to govern a non-equity alliance.
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RESEARCH HYPOTHESES

Following the discriminating alignment principle introduced above, more complex alliance transactions necessitate more complex governance structures that enable coordinated adjustments to unanticipated contingencies (Williamson, 1991). Accordingly, alliance research has emphasized the coordination adaptation requirements that governance structures fulfill, particularly for high-tech alliances subject to destabilizing conditions *ex post* (e.g., Pisano, 1989; Gulati and Singh, 1998). This research has therefore argued that introducing authority-based controls (afforded by equity alliances) is an important means for partners to govern their collaborative agreements, and we build on this work to identify antecedents to the choice of steering committees in non-equity alliances. In the hypotheses developed below, we identify several mechanisms through which administrative committees can promote efficiency. Specifically, they facilitate sequential decision-making to adapt collaborations, improve information processing and the coordination of alliance activities, and guide partners' interactions to manage access to know-how and address leakage concerns. Absent these needs for coordinated adaption, we expect that partner firms will be less likely to establish a steering committee to support the governance of a collaborative agreement.

Technological Uncertainty

Transaction cost theory identifies the uncertainty surrounding a transaction as a critical factor determining a contractual relationship's adaptation needs and hence its governance (e.g., Williamson, 1973). Received theory suggests that as the degree of uncertainty surrounding a transaction increases, boundedly-rational contracting parties encounter substantial challenges and costs in foreseeing potentially disruptive conditions and in designing appropriate responses to such contingencies in the agreement, thus leaving gaps in the contract and creating the need to adapt through sequential decision-making (Williamson, 1979).

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Scholars in economics and management have subscribed to the Knightian notion of uncertainty being the difficulty of predicting events in the future (Knight, 1921). In particular, the unpredictability of future events that originate in technological sources has been found to possess considerable power in explaining firms' governance choices (e.g., David and Han, 2004). Technological uncertainty is native to innovation intensive contexts because of the inherently uncertain nature of inventive activity (Nelson and Winter, 1977; Dosi, 1982). For example, technological uncertainty has been associated with the difficulty in predicting a future state about the arrival of new technologies, whether such changes are radical or more incremental (e.g., Walker and Weber, 1984; Robertson and Gatignon, 1998). Technological uncertainty can also be associated with the characteristics of a given technology, wherein the cause-effect relationships and the response options to events are imperfectly known (Milliken, 1987). It is uncertainty regarding cause-effect relationships and response options that is especially useful to conceptualize the technological uncertainty that affects alliance governance in the biopharmaceuticals sector, the setting of our analysis.

In high-tech collaborations, partners often do not know the complex interactions within and among various technical processes and their potential impact on collaborative outcomes (Fleming, 2001). In the context of biopharmaceutical alliances, this uncertainty finds its roots in the nature of the drug discovery and development process. It is well recognized that this process is inherently complex, spanning many years from initial synthesis to product launch and beyond (e.g., Berlin, Glasser, and Ellenberg, 2008; Kaitin and DiMasi, 2010). For instance, the complex biological processes and mechanisms at the center of such activities are highly unpredictable, poorly modeled, and vary across therapeutic areas (e.g., Henderson and Cockburn, 1994; Duyk, 2003; Hellerstein, 2008). As a consequence, firms can readily establish a drug's efficacy and safety in some cases such as antibiotics, where elimination of the pathogen clearly indicates the

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3 efficacy of the candidate drug under development, yet development activities in various stages
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5 are more prone to human interpretation and error in other therapeutic areas (e.g., psychotropic
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7 drugs which have to bridge the blood-brain barrier) (Danzon, Nicholson, and Pereira, 2005). For
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9 example, a lack of understanding of the underlying molecular mechanisms was indicated to be
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11 the main reason for the failure of Dimebon, a drug under development to treat Alzheimer's
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13 disease, during Phase 3 trials (Nature Medicine, 2010). Uncertainty about such mechanisms and
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15 the appropriate solutions that are available to deal with problematic contingencies presents
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17 substantial decision-making challenges for the alliance partners and allows for few, if any,
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19 programmed responses through the contract *ex ante*. Imperfectly known cause-effect
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21 relationships and response options necessitate successive stages of trial and error activity, which
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23 leads to the identification of new contingencies (Nelson, 1959). Coupled with the specialized
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25 competencies and knowledge sets partners provide (Teece, 1992), technological uncertainty
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27 therefore presents important adaptation challenges to an alliance.
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34 Steering committees with delegated decision-making authority represent a formal means
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36 of facilitating coordinated adaptation under these conditions. The steering committee is entrusted
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38 with the authority to make decisions and guide the activities of the alliance, so it becomes the
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40 focal point for engaging experts from both partners who provide interpretation and guidance as
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42 an input to decisions. Such unification of decision-making expertise facilitates the formulation of
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44 actions plan that account for the complementarities between partners and changing conditions of
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46 the collaboration. The steering committee functions as a communications center for the alliance,
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48 to which information about changing circumstances can be conveyed, thereby avoiding the costs
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50 of *ad hoc* communications with multiple individuals. Because participants of the alliance come
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52 from both partner organizations, communication from the steering committee can serve as the
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54 "last word" (Simon, 1947) for the purpose of the alliance's response to a particular contingency.
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Thus, the steering committee serves as a dedicated interface for the partners to develop and coordinate responses to unforeseen conditions, and it possesses authority to guide execution of new action plans when responding to emergent conditions. Thus, we posit:

Hypothesis 1: The likelihood that partners establish an administrative committee within a non-equity alliance is positively related to technological uncertainty.

Interdependence

The foregoing discussion has focused on the adaptation function of administrative structures to address technological uncertainty partners face, but collaborators also encounter coordination challenges due to task-related uncertainty associated with the assignment of tasks and the need to align partners’ actions (Gulati and Singh, 1998). The division of labor and specialization among individuals or organizational units increases coordination costs (Heath and Staudenmayer, 2000) because of the attendant rise in communication and information processing costs (Tushman and Nadler, 1978). Such challenges are accentuated in an alliance because organizational boundaries divide activities, increasing the complexity and heterogeneity of the task environment. For instance, partners may need to coordinate a wide range of functions or systems (e.g., jet engine development (Mayer and Teece, 2008)) or a wide range of specialist expertise (e.g., during drug discovery and development (Cockburn and Henderson, 2001)). Following a rich stream of research in organizational design, Gulati and Singh (1998) therefore associate anticipated coordination costs with the interdependence between alliance partners.

Thompson (1967) originally conceived of different levels of interdependence between units of an organization based on their activities’ input-output relationships. These three types of interdependence, in increasing degree of interdependence, are pooled, sequential, and reciprocal interdependence. Pooled interdependence between organizational units exists when the activities of each unit are discrete and have no direct input-output relationship. Sequential interdependence

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3 between organizational units entails a serial relationship such that the output of one unit's activity
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5 is the input of an activity in another unit. Finally, reciprocal interdependence means that inputs
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7 and outputs for the activities of any two units are mutually related, making necessary interactions
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9 particularly difficult to predict. Prior research has argued and shown that this classification has
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11 implications for alliance governance because the structuring of alliances should fit the level of
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13 interdependence and the anticipated coordination costs (Grandori, 1997; Gulati and Singh, 1998;
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15 Aggarwal *et al.*, 2011).
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20 The design of coordination mechanisms for an alliance must therefore account for the
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22 challenges and contingencies that arise with a higher level of interdependence between partners.
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24 The information processing and decision-making burdens an alliance experiences increase as
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26 activities become more interdependent. Partners might first turn to rules, routines, and plans to
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28 standardize interactions, provided these interactions are relatively stable and predictable (March
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30 and Simon, 1958; Thompson, 1967). However, when partners jointly engage in activities such as
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32 research and development, they create substantial problem-solving and task-related
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34 interdependencies, and the partners will need to rely on an interactive means of coordination and
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36 mutual adjustment to facilitate intensive communication and joint decision making (Thompson,
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38 1967; Adler, 1995). In such cases, coordination by authority relationships is better suited to
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40 manage recursive information flows and operate under conditions of incomplete and evolving
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42 information structures (e.g., Sanchez and Mahoney, 1996).
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48 A steering committee that oversees an alliance's activities can address heightened
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50 coordination needs and promote adjustment of collaborative relationships in several ways. First,
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52 this committee creates a platform or dedicated interface between the partners and facilitates high
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54 bandwidth information exchange and processing between them (Galbraith, 1974). With clearly
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56 delineated authority, it can also improve the efficiency of mutual adjustment by formalizing joint
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3 decision-making. In this way, the steering committee not only handles the communication
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5 burden, but it enables partners to set and change subgoals as well as decompose and assign
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7 activities within the domain of the alliance. Key decision makers from the partners can interact
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9 directly to keep abreast of the progress of various alliance activities and decide on responses to
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11 exceptions through joint reviews and updating plans. These functions of steering committees can
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13 also help partners prevent task conflicts or address them at an early stage before they become
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15 more serious. We therefore hypothesize:
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20 *Hypothesis 2: The likelihood that partners establish an administrative committee within a*
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22 *between partners.*
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24 **Technology Overlap**

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26 Another key source of adaptation concerns, particularly for high-tech collaborations, is the
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28 need to manage access to know-how and adapt to the leakage of knowledge (e.g., Kale *et al.*,
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30 2000; Oxley and Sampson, 2004). These challenges can vary over the course of a collaboration
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32 as partners interact and the alliance must draw upon their respective resources based on the
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34 changing needs of the collaboration. Absent a means to guide partners' interactions through an
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36 administrative apparatus, which can help effect private ordering as we have discussed, partners
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38 face the challenge of managing the limits of ongoing cooperation and can risk loss and diffusion
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40 of proprietary know-how. These adaptation concerns become particularly severe when the
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42 partners possess overlapping domains of technological expertise (e.g., Dushnitsky and Lenox,
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44 2005; Katila *et al.*, 2008). For example, the shared understanding of basic disciplines and
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46 absorptive capacity of employees raise the threat of the leaked knowledge being used to gain
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48 private benefits within the firm or in the labor market. The following excerpt from a SEC filing
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50 illustrates the importance of these concerns as well as the potential limitations of various
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52 institutional protections on knowledge in our empirical context of biopharmaceuticals:
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3 In all of our activities, we substantially rely on proprietary materials and information, trade secrets and
4 know-how to conduct research and development activities and to attract and retain collaborative partners,
5 licensees, and customers. Although we take steps to protect these materials and information, including the
6 use of confidentiality and other agreements with our employees and consultants in both academic and
7 commercial relationships, we cannot assure you that these steps will be adequate, that these agreements will
8 not be violated, or that there will be an available or sufficient remedy for any such violation, or that others
9 will not also develop the same or similar proprietary information (10K filings of Dyax Corporation, 2010).

10
11 Within alliances in particular, the leakage of knowledge can occur in several ways. For
12 example, because collaborative activities require communication and sharing of information, loss
13 of proprietary information can occur via knowledge codified in documents, blueprints, test/trials
14 data, or internal memos that the partners possess or create during the course of a collaboration
15 (Appleyard, 1996). In addition, partners may also inadvertently expose tacit know-how and
16 routines through the interaction and movement of personnel, and such problems also become
17 more severe when firms have overlapping domains of technological expertise (Oxley and
18 Sampson, 2004).

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20 While non-equity alliances lack some of the administrative controls of standalone
21 organizations to regulate access to critical resources as well as to respond to problematic
22 contingencies in a coordinated way (e.g., Williamson, 1991; Rajan and Zingales, 1998), steering
23 committees can help partners manage access to know-how and adapt to the leakage of
24 knowledge. Steering committees can exert their influence mainly because they possess the
25 authority by virtue of the contract to engage in organizing the alliances' activities, establishing
26 formal communication channels, coordinating on gaining approvals to employ specific resources
27 within the partner organizations, and jointly responding to exceptions. Just as boards in unitary
28 organizations have an impact on lower managerial levels, steering committees mainly operate by
29 formulating and implementing joint structures and procedures rather than through micro-level
30 interventions in day-to-day matters (e.g., Liebeskind, 1997). Specifically, as we have emphasized
31 in the previous section, the steering committee helps guide partners' interactions and can reduce

unstructured communications. For instance, by controlling the access to potential avenues for leakage such as information systems, laboratory samples, and test results, the steering committee can impose necessary structure to alleviate leakage of critical information. The steering committee provides a locus of decision-making that relies on experts from the partner organizations to provide on-going support, interpretation, and guidance as contingencies arise concerning the alliance’s resource needs and partners’ access to know-how. The steering committee can also act as the formal medium through which partnering firms can share information about, and respond by mutual consent to, unwarranted managerial discretion. Given that the concerns surrounding know-how access and leakage tend to magnify when firms have overlapping domains of technological expertise (e.g., Sampson, 2004b; Li *et al.*, 2008), we hypothesize that two partners having similar technological resources will be more likely to establish an administrative committee in a non-equity alliance:

Hypothesis 3: The likelihood that partners establish an administrative committee within a non-equity alliance is positively related to partners’ technology overlap.

METHODS

Sample and Data

We test these hypotheses using a dataset of alliances in the biopharmaceuticals industry. This industry provides an interesting and appropriate context for our investigation of alliance governance for several reasons. First, alliance activity in this industry has been very extensive and has attracted considerable research, so this focus is useful for comparative purposes. Second, while firms in high tech industries such as this collaborate to access other firms’ resources and capabilities (Arora and Gambardella, 1990; Rothaermel, 2001; Sampson, 2007; Anand, Oriani, and Vassolo, 2010), these alliances are often fraught with task uncertainties, coordination challenges, and leakage concerns (Katila and Mang, 2003; Hagedoorn and Hesen, 2007). Finally,

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3 this industry is extensively tracked, thus providing rich information about the mechanisms of
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5 hybrid governance.
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8 The core data come from Thomson Reuters' Recap ('Recap'), a consulting firm
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10 specializing in services to the biopharmaceuticals industry. Recap collates data on alliances from
11
12 various public sources, and it analyzes the corresponding alliance agreements, primarily from the
13
14 filings of companies with the Securities and Exchange Commission (SEC). A recent analysis
15
16 found the Recap database to be representative in its coverage of biopharmaceutical alliances
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18 (Schilling, 2009). To examine if Recap systematically offers contractual information for certain
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20 alliances, we compared the deal size of alliances (total dollars) with and without contract analysis
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22 and found an insignificant two-sample t-value (i.e., $t=0.28$). Several studies in management,
23
24 finance, and economics have used alliance data from Recap to conduct a variety of fine-grained
25
26 analyses of alliance contracts (e.g., Lerner, Shane, and Tsai, 2003; Adegbesan and Higgins, 2011).
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32 We enriched the alliance data from Recap with information from two other sources. First,
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34 we merged these data with information from the alliances module of Thomson Reuters' Securities
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36 Data Company (SDC) database, in order to track firms' prior alliances. We also obtained patent
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38 data from the US Patent and Trademarks Office (USPTO) and the National Bureau of Economic
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40 Research (NBER) and matched these data with the Recap dataset after tracking corporate
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42 histories and name changes.
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46 We focus on alliances formed during the 1990-2010 timeframe. The beginning of this
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48 period marks substantial growth in partnerships in the biopharmaceuticals industry (Roijakkers
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50 and Hagedoorn, 2006). We include non-equity alliances that are classified as research,
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52 development, co-development, co-promotion, collaboration, licensing, marketing, distribution,
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54 manufacturing or supply agreements, and individual alliances can involve more than one deal
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56 type as well as involve foreign partners. Given that unobserved factors that might lead firms to
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use a steering committee in a non-equity alliance might also influence their initial choice of a non-equity alliance versus an equity collaboration, we investigated whether our findings are subject to sample selection concerns, but we did not find evidence of sample selection bias for the models presented below (results available from the authors). In addition, in supplemental analyses noted below, we examine the sensitivity of the results for different subsamples of alliances. In order to be able to construct measures for firms' technological knowledge stocks and their similarity, we also consider those alliances for which both partners have patented at least once with the USPTO during the time period, leading to a final sample of 524 non-equity alliances. For every alliance in the sample, Recap designates the partner that is the principal source of R&D services or the technology as the R&D firm, and the other partner is denoted as the client firm. We focus on collaborations involving firms rather than public institutions such as universities. Our sample of alliances involves 525 unique firms, of which 305 are R&D firms and 220 are client firms. Additional descriptive information on the sample appears below.

Measures and Analysis

Dependent variable. Our primary interest lies in examining the determinants of whether or not partners contractually grant decision-making authority to a specialized administrative unit dedicated to the alliance. Accordingly, our dependent variable is an indicator for whether or not partners set up a steering committee for an alliance. Thus, *Steering committee* equals one when the contract establishes this committee, and zero otherwise. Because this dependent variable is binary, we specify probit models to test our hypotheses. In a number of supplementary analyses presented below, we also offer additional models to investigate the administrative controls firms use in their collaborations as well as to isolate administrative controls from incentives as another mechanism of hybrid governance.

Independent variables. Our first hypothesis concerns the effects of technological uncertainty on partners' use of steering committees, and we develop our measure of technological uncertainty based on our theoretical arguments about the uncertainty firms encounter about cause-effect relationships and their response options. Since our theoretical approach emphasizes coordinated adaptation needs during alliance implementation, we employ a measure of technological uncertainty that is closely related to the development process itself. For example, it is well recognized that drug development is an arduous and risky process, with development candidates failing at various stages of this process. As few as one in nine candidates ultimately gain approval in the US or Europe (e.g., Kola and Landis, 2004), though there is considerable variation in the failure rates across various therapeutic areas (e.g., Danzon, Nicholson, and Pereira, 2005). As we have noted, from a technological standpoint, firms' knowledge about the molecular mechanisms at play and the attendant cause and effect relationships vary across therapeutic areas (e.g., Henderson and Cockburn, 1994; DiMasi, 1995). Accordingly, variation arises in how well partners understand diseases in various therapeutic areas in how they can establish efficacy and safety during the trial and error development process. We therefore follow recent research and use heterogeneity in success rates across various therapeutic areas to capture the uncertainty partners face during alliance implementation. Specifically, we use clinical approval success rate estimates within therapeutic categories from DiMasi *et al.* (2010), and we take the reciprocal of these estimates (i.e., *Technological uncertainty*). DiMasi *et al.* (2010) employed an extensive dataset of 1738 new drug candidates that entered testing in the period spanning 1993 to 2004 to derive clinical approval success rates in therapeutic categories based on their classification in the IMS R&D Focus database. This database employs the Anatomical Therapeutic Chemical classification system from the World Health Organization (WHO) for coding therapeutic areas, which are matched to therapeutic areas for individual alliances provided

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by Recap. The extensiveness of DiMasi *et al.*'s (2010) data as well as the overlap with our sampling frame make these estimates an excellent source of information on the technological uncertainty firms confront.

The second hypothesis concerns the effects of the degree of interdependence between the partners on their use of steering committees. We operationalize this variable by classifying the alliance based on one of three types of interdependence (i.e., reciprocal, sequential, and pooled), using Thompson's (1967) original conceptualization of interdependence. Specifically, we used Thompson's (1967) definitions based on input-output relationships, and we also used the classification of alliances by Recap as it corresponds well with the partners' division of labor within and across the functions of research, development, manufacturing, and marketing. For example, agreements are classified within the "Collaboration" category if both the partners participate in research, development, and commercialization activities. Agreements are classified within the "Co-Development" category if both parties participate in development. The joint participation of partners in activities within the R&D function indicate reciprocal input-output relationships, so for these agreement types *Reciprocal interdependence* equals one, and zero otherwise. This coding scheme for reciprocal interdependence is conservative because we only consider alliances with shared upstream R&D activity, which often entails nonroutine activities, under reciprocal interdependence. In supplemental analyses, however, we also examined whether the interpretations would change if other alliance types were coded as reciprocal interdependence (results available from the authors). By contrast, Recap classifies agreements as "Research" or "Development" if one of the partners is performing those activities while downstream commercialization activities are left to the other partner. Clear designation of which partner carries out a given functional activity marks sequential interdependence and is also evident for those agreements classified as "Manufacturing" and "Co-Market" types. These four types of

alliances were therefore classified as *Sequential interdependence*, with the omitted category of pooled interdependence comprising licensing, marketing, promotion, and distribution agreements. We also determined that our interpretations are robust to the exclusion of certain alliances that are less common in our sample (e.g., co-marketing deals). In the event that an alliance is classified under multiple types, we code interdependence using the highest level, and subsample analyses discussed below examine the results for certain types of alliances.

Our final theoretical variable is the overlap of partners' technological resources (i.e., *Technology overlap*). We employ the angular measure introduced by Jaffe (1986), which has been extensively used in recent research on alliances to characterize the partners' technological resources and similarities in their foundational knowledge (e.g., Gomes-Casseres, Hagedoorn, and Jaffe, 2006; Li, Eden, Hitt, and Ireland, 2008). For this measure, the technological position of a firm is first determined by the distribution of a firm's patents across various patent classes. Each patent assigned to a firm is represented as a vector with one on the dimension of the original three-digit USPTO patent class and zero for the other patent classes, and we then aggregate these patent vectors at the firm level for each of the partners. *Technology overlap* is bound between zero and one, with values closer to one indicating greater overlap in partners' technological resources. Following the suggestion of Benner and Waldfoegel (2008), we account for all patents applied for by a partner before signing the alliance agreement. In robustness analyses, we also used a 7-year and 10-year time window before the focal alliance, and these overlap measures are highly correlated with our measure ($r > 0.91$, $p < 0.0001$) and lead to the same interpretations as those presented below.

Control variables. We include a series of controls for attributes of the firms entering into the alliance as well as for alliance characteristics that might be related to the aforementioned independent variables or the administrative controls firms use in collaborative agreements.

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Representatives from a pharmaceutical firm we interviewed indicated to us how steering committee decisions are made on a case-by-case basis for alliances, and our inspection of individual firms and collaborative agreements in our sample confirmed the presence of significant heterogeneity across transactions within firms. Nevertheless, at the firm level we first control for the alliance experience of both partners since companies might learn to manage alliances better with experience and might require less hierarchical governance mechanisms for their alliances (e.g., Anand and Khanna, 2000; Colombo, 2003; Hagedoorn *et al.*, 2009). Specifically, we measure *Alliance experience of R&D firm* and *Alliance experience of client firm* as the number of previous alliances in which the partner engaged before the focal alliance (Hoang and Rothaermel, 2005). To construct these experience measures, we relied on a merged dataset of alliance deals that is the union of the Recap and SDC databases. We also control for the knowledge stocks of both of the partners, in part because firms with significant knowledge stocks in R&D possess the absorptive capacity to coordinate knowledge transfer through alliances (Veugelers, 1997; Dushnitsky and Lenox, 2005). We measure *Knowledge stock of R&D firm* and *Knowledge stock of client firm* as forward citation-weighted patent counts of the patents owned by the partners prior to the formation of the focal alliance (Argyres and Silverman, 2004; Hall *et al.*, 2005). As a robustness test, we also used the depreciated sum of patent applications (e.g., Dushnitsky and Lenox, 2005) in the seven-year window before the alliance. Given the skewness we observed for the knowledge stock as well as experience measures, we used logarithmic transformations for these variables.

At the alliance level, we first control for the size of the alliance. Larger alliances are more likely to require more oversight and coordination by the partners, just as larger organizations require formal mechanisms for decision ratification (Fama and Jensen, 1983; Lehn *et al.*, 2009). The greater the number of researchers deployed on various projects and the need to track their

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3 progress to make contingent resource allocations, the greater are the informational requirements
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5 of such alliances. We measure *Deal size* as the maximum possible payments contracted upon for
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7 the life of the alliance agreement (Robinson and Stuart, 2007), employing a logarithmic
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9 transformation as a remedy for positive skewness.
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13 Next, we account for other governance mechanisms, such as the complexity of the
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15 contract governing the alliance. An elaborate contract between the partners that incorporates
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17 adequate provisions such as various safeguards and contingency plans can mitigate *ex post*
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19 hazards. We therefore add a control for *Contract length*, measured as the byte size of the contract
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21 analysis by Recap (Robinson and Stuart, 2007). In supplemental analyses, we also used a count
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23 of the number of provisions that are specified in the contract, and we found that both measures
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25 yield similar results and are positively correlated ($r=0.55$, $p<0.001$). Partners can also mitigate
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27 certain exchange hazards through suitable incentive structures. Consistent with the idea of
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29 modeling incentives as output contingent payments (Bolton and Dewatripont, 2005), we include
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31 *Incentive payments*, measured as milestone payments as a percent of total deal value. To capture
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33 relational supports for the collaborative agreements, we included a control for the number of prior
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35 relationships between the partners. Previous research suggests that prior partnerships can
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37 encourage the development of trust between partners and thereby mitigate the threat of
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39 opportunism (Gulati, 1995; McEvily *et al.*, 2003) as well as facilitate the development of
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41 interorganizational routines that can address coordination and communication problems in
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43 alliances (Zollo, Reuer, and Singh, 2002). We measure *Prior ties* by counting the number of prior
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45 partnerships between the alliance partners (Gulati *et al.*, 2009) and use a logarithmic
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47 transformation. We noted that prior ties between partnering firms are present in 13 percent of our
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49 sampled observations, but we noted it was very uncommon for firms to use a steering committee
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51 across all of their ties (i.e., only 2 cases). In supplemental analysis, we also incorporated a
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control for whether firms had a steering committee in a prior tie, and we found that the interpretations presented below continued to hold.

Finally, we controlled for a number of potential sources of unobserved effects. We differentiated deals between two biotechnology firms versus a biotechnology firm and pharmaceutical company by including an indicator variable, *Biotech-biotech deal* (Lerner *et al.*, 2003). We also distinguished alliances involving partners from different countries from domestic alliances by including a dummy variable, *Cross-border alliance* (Gulati, 1995). We account for the stage of the technology’s development when partners enter into the collaborative agreement since contracting problems can be more severe in the early part of the development cycle (Lerner and Malmendier, 2010). Contractual incompleteness can increase the importance of administrative structures as *ex post* governance mechanisms in high-tech collaborations, and task uncertainty and the attendant coordination needs might also vary with the stage of the alliance in the development cycle (Rothaermel and Boeker, 2008). Thus, we control for these effects and other unobserved phase-related effects through a series of dummy variables (*Phase fixed effects*). We also incorporated a series of fixed effects for the focal therapeutic indication for the alliance (*Therapeutic area effects*) (Macher and Boerner, 2006), its technological domain (*Technology area effects*) (Adegbesan and Higgins, 2011), and the year in which the collaborative agreement was signed (*Time fixed effects*). We also separately investigated a time trend and confirmed that usage of steering committees is increasing in our sample period, all else equal.

RESULTS

Table 1 presents descriptive statistics and a correlation matrix. We note that a steering committee is present in 33 percent of the agreements. The average size of the sampled deals was \$106 million, or \$199 million for deals with steering committees and \$60 million for collaborative agreements without steering committees (i.e., $t=7.21$, $p<0.001$). The coordination

requirements of the sampled alliances were generally significant, with 44 percent having reciprocal interdependence and 31 percent sequential interdependence. Steering committees were present in 69 percent of the alliances with reciprocal interdependence and 23 percent of the alliances with sequential interdependence ($p < 0.001$), whereas only 11 percent of alliances with pooled interdependence had a steering committee. Client firms with more alliance experience and greater technological knowledge stocks were more likely to enter into larger deals as well as collaborations having reciprocal interdependence (all $p < 0.001$). Less than half of the alliances involved collaborations between biotech firms (e.g., 39 percent) and roughly half were cross-border collaborations.

*** *Insert Table 1 here* ***

Table 2 presents probit estimation results for the determinants of the presence or absence of steering committees. Since some client firms and R&D firms are involved in more than one alliance, we report robust standard errors using two-dimensional clustering for both partners (Cameron, Gelbach, and Miller, 2006). There are fewer unique client firms ($n=220$) compared to R&D firms ($n=305$) for our sample, so we also clustered residuals at the client firm level and obtained the same interpretations as those presented here. Model 1 presents a baseline specification consisting of the control variables, and Models 2 to 4 augment the baseline model with the theoretical variables. Model 5 presents the full specification, which we use to discuss marginal effects, using the average of the marginal effects based upon the observed values of all of the covariates.

*** *Insert Table 2 here* ***

Our first hypothesis posited that partners are more likely to put in place a steering committee to facilitate coordinated adaptation when facing greater technological uncertainty. The positive and significant coefficient of the technological uncertainty variable in Models 2 and 5

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provides strong support for H1 (both $p<0.001$). We find that a ten basis point decrease in the approval success rate (e.g., from the average success rate of 19.5 percent to that for oncology (19.4 percent)) increases the predicted probability of partners employing a steering committee by 15.2 percent on average.

Our second hypothesis suggested that collaborations involving higher levels of interdependence are more likely to use steering committees, given their greater anticipated coordination costs. In Models 3 and 5, reciprocal interdependence between partners has a positive and highly significant effect on the choice of steering committee ($p<0.001$), and the effect of sequential interdependence is marginally significant ($p<0.10$). A comparison of the parameter estimates for reciprocal and sequential interdependence suggests that reciprocal interdependence exerts a greater influence than sequential interdependence ($p<0.01$). In support of H2, the results show that partners tend to employ a steering committee the higher is the interdependence between the partners. The predicted probability of partners employing a steering committee increases by 58.5 percent as interdependence increases from pooled to reciprocal. In supplemental analyses to address the potential effects of heterogeneous alliance types, we restricted our sample to collaborations involving an R&D component and found that alliances involving reciprocal interdependence were more likely to use a steering committee ($p<0.01$), again providing support for H2.

Our final hypothesis suggested that overlap in partners' technological resources will be positively related to their use of a steering committee. Estimates from Models 4 and 5 show that the likelihood of using a steering committee increases in partners' technology overlap ($p<0.05$), lending support to H3. A one standard deviation increase in technology overlap increases the predicted probability of partners employing a steering committee by 13 percent on average, starting from a base of 32.8 percent. We also considered two alternative mechanisms behind

these findings. First, it is possible that coordination of knowledge transfers becomes more important as technology overlap is smaller and thereby necessitates an administrative committee, yet we find that steering committees are more likely when technology overlap is high. Second, a nonmonotonic relationship might exist between technology overlap and the likelihood of partners using a steering committee for other reasons. For instance, a partner might have a reduced incentive to appropriate knowledge when technology overlap is substantial, despite its greater ability to appropriate, suggesting an inverted U-shaped relationship (Sampson, 2004b). Inclusion of a quadratic term for technology overlap did not yield evidence of nonmonotonic effects, or diminished use of steering committees at high levels of technology overlap. It would therefore be interesting to consider whether the relative importance of reduced incentives to misappropriate at high levels of technology overlap might be more pronounced and have consequences for administrative committees in more specific circumstances. Below we also examine how firms might use incentives rather than administrative controls in response to their adaptation needs.

Finally, the results for some of the controls are also noteworthy. For instance, consistent with the coordinated adaptation needs likely to be manifest in larger and cross-border deals, positive coefficients are evident for these two variables. In additional subsample analyses, we also estimated a model for domestic alliances and found support for the same hypotheses as discussed above. The results also demonstrate that steering committees are also more likely in deals involving pharmaceutical firms. While definitive conclusions for biotech-pharma versus biotech-biotech collaborations are not possible, this finding is broadly consistent with the “swimming with the sharks” hypothesis, or that biotech firms perceive and respond to appropriation hazards when collaborating with firms possessing complementary downstream capabilities (Katila, Rosenberg, and Eisenhardt, 2008). We also observe that steering committees are less likely for deals involving greater incentives through milestone payments.

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Given that partners negotiate such incentives along with the delegation of administrative controls to a steering committee at the contracting stage, we also wanted to simultaneously model and further disentangle these two main dimensions of governance (Williamson, 1991). To do so, we constructed a dummy variable for incentive payments and estimated a bivariate probit model, and several interesting findings stand out (estimation results appear in Table 3). First, estimates for the steering committee equation in the bivariate probit model are very similar in sign and significance as those presented earlier.

*** *Insert Table 3 here* ***

Second, and consistent with expectations, the marginal effects and significance of all our hypothesized variables are greater in the steering committee equation than the incentives equation. For instance, the estimated coefficients for the interdependence and technology overlap variables are positive and significant in the steering committee equation, but not in the incentives equation. It might be difficult for firms to craft sufficient incentives under these conditions, and coordination concerns can remain even if incentives are aligned (Camerer and Knez, 1996). Moreover, we see that while alliance partners do contract on output in the presence of technological uncertainty ($p<0.05$) (e.g., Prendergast, 2002), the marginal effect of technological uncertainty is on average 1.8 times as large in the steering committee model compared to the incentives model.

Third, some variables are significant in the incentives model that are not in the model for steering committees. As one example, alliance agreements are less likely to use milestone payments when the partners have prior ties ($p<0.01$), but such previous agreements do not appear to have a bearing on the presence of steering committees. Finally, the correlation of disturbances across the two models is insignificant ($p=0.72$), indicating that unobservables affecting the

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3 presence of incentive payments do not have an impact on the likelihood that the partners establish
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5 a steering committee in the contract.
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8 Detailed examination of the contracts revealed that partners sometimes use a functional
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10 committee (e.g., research, development, commercialization, or other committee), even when a
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12 steering committee is not established (i.e., 28 percent of the cases), and sometimes augment the
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14 steering committee with the initial establishment of a functional committee (i.e., 17.5 percent).
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16 Given this heterogeneity in administrative structures, we checked the robustness of our results to
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18 a number of alternative specifications of the dependent variable. For example, we estimated
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20 ordered probit models for a dependent variable that takes on a value of 1 when only a functional
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22 committee is present, and 2 when a steering committee is present. We also characterized the
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24 alliance's hierarchy in a more fine-grained way using additional ordered values for the dependent
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26 variable: (1) a committee structure that includes just a project team, (2) one or more functional
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28 committees are present, (3) a steering committee only is present, and (4) a steering committee and
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30 one or more functional committees exist. For these alternative model specifications, we found the
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32 same interpretations as discussed above that support increased usage of administrative controls
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34 and hierarchy as a response to collaborative agreements' coordinated adaptation needs. We also
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36 noted that both alliance partners are evenly represented in the steering committees, and one
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38 executive mentioned to us that the key for appointments is not necessarily a "title for title match,
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40 but a responsibility for responsibility match." For our full sample of alliances, when a steering
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42 committee is established in the contract, the steering committee has 4 members in 30 percent of
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44 the alliances, 6 members in 55 percent of the cases, and 8 members in 9 percent of the alliances.
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46 In supplementary analyses of the determinants of the size of the steering committee, we find that
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48 firms add more members to the committee when facing technological uncertainty or heavy
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coordination needs, but that technology overlap determines whether or not a committee is used rather than its size.

DISCUSSION

Contributions and Implications

In this paper, we address how partners can design contracts for interfirm alliances in order to address a tradeoff between the need for detailed contracting for the future and the need to retain flexibility to adapt to changing circumstances (e.g., Macneil, 1977). In order to explicate a new mechanism that can enhance the adaptive limits of contracts, we draw upon the seminal work of Williamson (1991) and build upon this research to argue that parties can design dedicated administrative interfaces that bring select features of hierarchies into hybrids. These committees can help partners guide their interactions, address unanticipated contingencies that surface, and mitigate incipient conflicts, so the establishment of steering committees can be valuable when partners have significant needs for coordinated adaptation. Empirical evidence on the antecedents of steering committees in non-equity alliances in the biopharmaceuticals industry provides support for this theory. Specifically, we show that high-tech alliances are more likely to establish steering committees when these collaborative agreements are subject to greater technological uncertainty, higher anticipated coordination costs due to interdependent collaborative activities, and greater challenges due to similarities in partners’ knowledge resources. Taken together, our findings contribute to a better understanding of the particular conditions that call for such an architecture to govern contractual agreements.

By theoretically situating these administrative committees within the set of formal governance mechanisms for hybrids, this paper makes several contributions to the literatures on interfirm contracts, strategic alliances, and the theory of the firm more broadly. Recent research has investigated how firms might devise ways of enhancing the adaptive limits of contracts, and

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3 we complement this stream of research on the contractual foundations of alliances. For example,
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5 recent research explains how partners engage in contingency planning to identify possible
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7 disturbances to a collaborative agreement and then assign decision rights or specify processes and
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9 procedures to handle these contingencies (e.g., Mayer and Argyres, 2004; Argyres, Bercovitz, and
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11 Mayer, 2007). Our study identifies a structural solution firms might employ to enhance the
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13 adaptive limits of contracts, and we suggest that by contractually delegating authority to a
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15 dedicated administrative interface for an alliance, partners can respond to unanticipated
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17 contingencies that arise and coordinate their activities to address minor conflicts in collaborative
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19 activities and potentially stave off more serious disputes.
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24 In broad terms, we therefore also advance the literature on the “structural planning”
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26 function that contracts can fulfill in interorganizational relationships (Palay, 1984). The empirical
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28 finding that partner firms are more likely to use steering committees for complex contracts is
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30 consistent with the idea that steering committees can provide support in coordinating the initial
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32 execution of complex agreements and in guiding partners’ interactions over time as conditions
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34 change. Future research would therefore be valuable that examines the relationships between
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36 steering committees and particular contract design parameters in more fine-grained terms (e.g.,
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38 specific decision rights, contingency planning clauses, *ex post* safeguards, value capturing rights,
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40 etc.) (e.g., Lerner and Merges, 1998; Argyres, Bercovitz, and Mayer, 2007; Ryall and Sampson,
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42 etc.) (e.g., Lerner and Merges, 1998; Argyres, Bercovitz, and Mayer, 2007; Ryall and Sampson,
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44 2009; Vanneste and Puranam, 2010; Adegbesan and Higgins, 2011).
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48 The organizational governance literature has long recognized the significance of
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50 administrative controls to facilitate coordinated adaptation, but in alliance research these
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52 administrative controls have generally been attributed to equity alliances rather than non-equity
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54 alliances as the two primary hybrid organizational forms (e.g., Geringer and Hebert, 1989;
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56 Pisano, 1989; Colombo, 2003). For instance, joint ventures possess boards *de jure* as a seat of
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authority over a separate business due to partners’ shared ownership (Oxley, 1997; Hewitt, 2005), whereas non-equity alliances naturally lack such a unified locus of decision-making responsibility. By contrast, we suggest that steering committees can begin to fill this void for non-equity alliances, promote information sharing and dispute resolution in contractual agreements (Williamson, 1991), and thereby address firms’ coordinated adaptation needs for this type of collaborative agreement.

These observations carry several critical implications for literature on the various discrete governance structures within the hybrid portion of the markets-hierarchies continuum. Given that administrative controls and incentives are the two main governance instruments available to alternative organizational forms (Williamson, 1991), it becomes evident that the canonical equity-nonequity taxonomy suffers from the general problem that equity alliances simultaneously exhibit greater incentive alignment through shared ownership as well as greater administrative control through a joint board, compared to non-equity alliances. As a consequence, studies in this research stream cannot readily draw inferences on the determinants of administrative controls versus incentives in collaborative agreements, and our study contributes by unpacking these governance mechanisms. In addition, by focusing on steering committees as a neglected facet of the governance of non-equity alliances and by emphasizing how steering committees facilitate coordinated adaption, we are able to make unique and granular distinctions between hybrid organizational forms along the governance continuum. For instance, previous research has suggested that firms can build the incentive alignment properties that typify equity alliances within non-equity alliances through mutual hostages in bilateral contractual agreements (Oxley, 1997). We complement this research by demonstrating that the formal governance of non-equity alliances is not only a matter of incentive alignment – firms can also bring in administrative controls through steering committees to facilitate coordinated adaptation in non-equity alliances.

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3 We conclude that non-equity alliances with steering committees can have governance features
4 that are more hierarchical in nature than non-equity alliances supported by incentives through
5 mutual hostages. By separating administrative controls and incentives in our analyses, we are
6 able to isolate the transaction attributes that require the administrative controls afforded by
7 steering committees, and we begin to map the mechanisms of alliance governance with firms'
8 particular adaptation needs.
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12 While our research focuses specifically upon the governance of non-equity alliances, it
13 also has some implications for the theory of the firm more broadly. Williamson (1991) compares
14 hybrids to other discrete governance structures (i.e., hierarchies and markets) and argues that the
15 adaptive limits of hybrids are evident under high uncertainty. For instance, hybrids are portrayed
16 as lacking the fiat that is a defining feature of hierarchies, so hybrids can be inefficient in the
17 presence of disturbances to the extent that hybrids must rely on mutual consent or third-party
18 adjudication (e.g., arbitration, litigation) under contractual incompleteness. We suggest that
19 steering committees in non-equity alliances begin to address some of these limitations of this
20 organizational form that Williamson (1991) identifies. Using his terminology, steering
21 committees provide some rudimentary "administrative apparatus" (p. 280) to process information
22 and effect private ordering. Steering committees enable firms to infuse contingent authority into
23 contractual agreements that otherwise are devoid of administrative structure and allow partners to
24 "orchestrate coordinated adaptation to unanticipated disturbances" (p. 279), even if these
25 organizational forms are not as elastic as alternatives such as internal organization or a jointly
26 owned business governed by a board of directors. For executives contemplating an alliance and
27 crafting its governance mechanisms, our arguments and findings therefore suggest that executives
28 might consider whether a non-equity alliance supported by a steering committee is adequate to
29 cope with disturbances, or whether the costs of more hierarchical organizational forms (e.g.,
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equity joint ventures or even internal organization) are warranted given a need for more elaborate administrative controls (e.g., auditing advantages, career rewards and penalties in superior-subordinate relationships, etc.) to facilitate coordinated adaptation.

Limitations and Future Research

Our study has several limitations that extensions can address, and we would like to highlight several avenues for future research. First, our analysis focuses upon alliances in the biopharmaceuticals industry, in which firms are involved in complex forms of collaborative activity that may have unique contracting conditions. It would therefore be useful to examine the administrative committees we study in other industries in order to probe the generalizability of our findings for other types of interfirm agreements. In addition, in other collaborative contexts different antecedents of steering committees might exist, including the complexity of a product or service within a collaborative agreement (Singh, 1997), the threat of opportunism when partners compete in common end markets (e.g., Oxley and Sampson, 2004), the need to coordinate partners' different resources and capabilities in horizontal collaborations (e.g., Sampson, 2004b), or the number of parties engaging in multi-partner alliances (e.g., Gong *et al.*, 2007; Leiponen, 2008; Dokko and Rosenkopf, 2010; Li *et al.*, 2012). Furthermore, in other collaborative contexts, firms might also implement substitute solutions to formal governance mechanisms, such as designing modularity for outsourcing agreements for software development (Tiwana, 2008).

Second, our study investigates alliance structuring decisions only at the inception of the collaborative agreement, so it would be interesting to examine alliance dynamics using longitudinal research methods. While we are interested in the establishment of steering committees and the bounded authority that is delegated to them at the contracting stage, partners might make decisions about the existence, structure, or responsibilities of steering committees during the implementation of the alliance as conditions change. Similarly, partners might alter

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3 the functional committees and project teams that report to a steering committee as an alliance
4 evolves, and all of these decisions might be made in concert with changes in the allocation of
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6 certain control rights and other formal governance mechanisms supporting a collaboration (e.g.,
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8 Reuer *et al.*, 2002; Lerner *et al.*, 2003). Research on how steering committees carry out their
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10 responsibilities during alliance implementation might also consider the different types of control
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12 they use to govern collaborations over time (e.g., Chen *et al.*, 2009).
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18 Third, our research has focused on individual alliances and their coordinated adaptation
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20 needs, but research opportunities also exist in studying alliance governance at different levels.
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22 For example, given the expertise that attorneys have regarding dispute resolution and contingency
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24 planning in particular (Argyres and Mayer, 2007), it would be valuable to consider the role of a
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26 firm's attorneys and outside counsel in the establishment of steering committees. While we have
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28 conducted our analyses of the existence, structure, and size of administrative committees at the
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30 alliance level, it would also be interesting to study the individuals who serve on steering
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32 committees to better understand the composition of these administrative structures and the
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34 specific ways that members intervene in collaborative agreements. These research opportunities
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36 also point to the value of obtaining primary data through surveys or fieldwork to enrich
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38 understanding of the structure and functioning of these governance mechanisms for hybrids.
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44 Finally, our study explicitly focuses on the antecedents of these governance mechanisms
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46 rather than their consequences. Given that partners establish these administrative committees
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48 under these conditions we have identified, it would be useful to investigate how such mechanisms
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50 of governance affect specific collaborative outcomes, including new products launched or
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52 knowledge transfers (e.g., Nerkar and Roberts, 2004). Thus, future research on the performance
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54 or other implications of steering committees would be valuable to establish the economic
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56 importance of these governance decisions (e.g., Mjoen and Tallman, 1997). It would also be
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interesting to consider the more immediate behavioral consequences of administrative committees in non-equity alliances in addressing partners’ coordinated adaptation needs. As one example, it would be worthwhile to examine whether and how the steering committees potentially shape the incidence and resolution of conflicts between partners. Such investigations might also join recent research on the ways that different formal and relational governance mechanisms potentially complement or substitute each other (e.g., Poppo and Zenger, 2002; Puranam and Vanneste, 2009). For instance, it would be valuable to determine whether the administrative mechanisms we study promote the development of informal governance mechanisms such as trust, or undermine them. We hope that this study encourages additional research on administrative mechanisms in interfirm collaborations as an important yet neglected aspect of alliance governance and management.

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TABLE 1
Descriptive Statistics and Correlation Matrix ^a

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Steering Committee	1.00														
2 Technological Uncertainty	0.14	1.00													
3 Reciprocal Interdependence	0.33	0.01	1.00												
4 Sequential Interdependence	-0.12	-0.01	-0.62	1.00											
5 Technology Overlap	0.22	0.07	0.18	-0.17	1.00										
6 Alliance Experience of Client Firm	0.20	0.02	0.33	-0.05	0.16	1.00									
7 Alliance Experience of R&D Firm	-0.00	-0.13	0.00	-0.07	-0.02	-0.10	1.00								
8 Knowledge Stock of Client Firm	0.20	-0.02	0.27	-0.04	0.16	0.74	-0.10	1.00							
9 Knowledge Stock of R&D Firm	0.03	-0.04	-0.08	-0.02	0.10	-0.16	0.48	-0.15	1.00						
10 Deal Size	0.44	0.18	0.44	-0.15	0.30	0.43	-0.02	0.36	0.01	1.00					
11 Contract Length	0.36	0.11	0.35	-0.14	0.08	0.24	-0.06	0.23	-0.05	0.50	1.00				
12 Incentive Payments	0.01	0.14	0.03	0.00	0.06	0.05	0.03	-0.00	0.07	0.13	0.06	1.00			
13 Prior Ties	0.03	-0.10	0.05	-0.02	-0.05	0.16	0.16	0.14	0.07	0.01	0.08	-0.08	1.00		
14 Biotech-Biotech Deal	-0.05	-0.08	-0.02	-0.11	0.08	-0.27	-0.07	-0.33	-0.05	-0.02	0.02	0.04	-0.03	1.00	
15 Cross-Border Alliance	0.09	0.04	-0.01	0.07	0.06	-0.10	-0.07	-0.17	-0.04	-0.00	-0.03	0.01	-0.03	-0.19	1.00
Mean	0.33	6.57	0.46	0.31	0.37	3.13	2.19	5.70	3.01	3.29	3.05	0.52	0.17	0.19	0.44
Standard Deviation	0.47	3.79	0.49	0.46	0.32	1.37	1.04	3.36	2.67	1.84	0.55	0.59	0.53	0.39	0.50

^a N=524. p<0.05 in bold.

TABLE 2
Determinants of Steering Committees ^a

Variables	(1)	(2)	(3)	(4)	(5)
Technological Uncertainty		7.365*** (1.707)			7.593*** (1.868)
Reciprocal Interdependence			0.796** (0.247)		0.830*** (0.246)
Sequential Interdependence			0.415† (0.234)		0.451† (0.231)
Technology Overlap				0.505* (0.231)	0.527* (0.235)
Alliance Experience of Client Firm	-0.137† (0.077)	-0.146† (0.077)	-0.181* (0.077)	-0.137† (0.067)	-0.187* (0.078)
Alliance Experience of R&D Firm	-0.078 (0.076)	-0.074 (0.076)	-0.090 (0.075)	-0.090 (0.079)	-0.080 (0.075)
Knowledge Stock of Client Firm	0.068* (0.032)	0.065* (0.031)	0.064* (0.033)	0.057† (0.033)	0.048 (0.033)
Knowledge Stock of R&D Firm	0.028 (0.028)	0.028 (0.029)	0.034 (0.029)	0.015 (0.028)	0.023 (0.029)
Deal Size	0.259*** (0.067)	0.262*** (0.068)	0.221*** (0.066)	0.246*** (0.068)	0.209** (0.068)
Contract Length	0.724** (0.239)	0.737** (0.238)	0.621** (0.236)	0.767** (0.249)	0.679** (0.242)
Incentive Payments	-0.445* (0.226)	-0.484* (0.227)	-0.384† (0.225)	-0.427† (0.231)	-0.400† (0.229)
Prior Ties	0.029 (0.103)	0.023 (0.101)	0.050 (0.101)	0.050 (0.104)	0.069 (0.100)
Biotech-Biotech Deal	-0.277 (0.199)	-0.314† (0.201)	-0.312 (0.209)	-0.334† (0.201)	-0.418† (0.217)
Cross-Border Alliance	0.357** (0.137)	0.350* (0.137)	0.340* (0.142)	0.324* (0.136)	0.298* (0.142)
Phase Fixed Effects [‡]	8.22	7.49	8.99	9.29	9.10
Therapeutic Area Effects [‡]	15.09*	30.29***	17.53*	13.63†	28.68***
Technology Area Effects [‡]	7.54	7.82†	7.95†	8.61†	10.22*
Year Fixed Effects [‡]	50.71***	52.93***	49.01***	49.32***	50.83***
Constant	-4.584*** (0.871)	-42.475*** (8.909)	-4.512*** (0.844)	-4.773*** (0.914)	-43.784*** (9.727)
Log Likelihood	-231.62	-227.76	-225.45	-229.46	-219.26
Wald χ^2	190.43***	204.90***	192.86***	190.33***	198.09***

^a N=524. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. Clustered robust standard errors in parentheses.

[‡] χ^2 values for tests of joint significance of fixed effects.

TABLE 3
Bivariate Probit Estimation Results ^a

Variables	Steering Committee	Incentive Payments	Steering Committee	Incentive Payments
Technological Uncertainty			7.465*** (1.780)	4.502* (2.064)
Reciprocal Interdependence			0.857*** (0.242)	0.052 (0.210)
Sequential Interdependence			0.456* (0.227)	-0.152 (0.212)
Technology Overlap			0.543* (0.230)	-0.155 (0.239)
Alliance Experience of Client Firm	-0.142† (0.076)	0.091 (0.076)	-0.193* (0.077)	0.081 (0.079)
Alliance Experience of R&D Firm	-0.073 (0.076)	-0.088 (0.082)	-0.082 (0.076)	-0.086 (0.084)
Knowledge Stock of Client Firm	0.068* (0.032)	-0.042 (0.035)	0.048 (0.033)	-0.040 (0.036)
Knowledge Stock of R&D Firm	0.025 (0.028)	0.049 (0.033)	0.020 (0.029)	0.051 (0.035)
Deal Size	0.250*** (0.067)	0.324*** (0.056)	0.200** (0.067)	0.333*** (0.056)
Contract Length	0.713** (0.247)	0.062 (0.162)	0.666** (0.249)	0.039 (0.159)
Prior Ties	0.062 (0.108)	-0.421** (0.145)	0.099 (0.102)	-0.474** (0.158)
Biotech-Biotech Deal	-0.319 (0.197)	0.452* (0.223)	-0.456* (0.217)	0.457* (0.225)
Cross-Border Alliance	0.372** (0.139)	-0.147 (0.149)	0.308* (0.144)	-0.128 (0.156)
Phase Fixed Effects [‡]	7.87	13.92*	13.20*	15.10*
Therapeutic Area Effects [‡]	15.50*	19.32**	32.17***	21.26**
Technology Area Effects [‡]	8.11†	12.69*	11.08*	11.47*
Year Fixed Effects [‡]	51.39***	361.65**	51.42***	335.95***
Constant	-4.619*** (0.867)	-0.271 (0.577)	-43.256*** (9.293)	-23.211* (10.590)
Rho	0.018 (0.094)		-0.024 (0.097)	
Log Likelihood	-448.85		-432.88	
Wald χ^2	288.37***		299.85***	

^a N=524. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1. Clustered robust standard errors in parentheses.

‡ χ^2 values for tests of joint significance of fixed effects.