Organization Science

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

Hybrid Administrative Interfaces: Authority Delegation and Reversion in Strategic Alliances

Marvin Hanisch, Jeffrey J. Reuer, Carolin Haeussler, Shivaram V. Devarakonda

To cite this article:
Marvin Hanisch, Jeffrey J. Reuer, Carolin Haeussler, Shivaram V. Devarakonda (2023) Hybrid Administrative Interfaces: Authority Delegation and Reversion in Strategic Alliances. Organization Science

Published online in Articles in Advance 10 Aug 2023

. https://doi.org/10.1287/orsc.2023.1687

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

ORGANIZATION SCIENCE
Articles in Advance, pp. 1–23
ISSN 1047-7039 (print), ISSN 1526-5455 (online)

Hybrid Administrative Interfaces: Authority Delegation and Reversion in Strategic Alliances

Marvin Hanisch,[a,b,*] Jeffrey J. Reuer,[c] Carolin Haeussler,[b] Shivaram V. Devarakonda[d]

[a] Department of Innovation Management & Strategy, University of Groningen, 9747 AE Groningen, Netherlands; [b] School of Business, Economics and Information Systems, University of Passau, 94032 Passau, Germany; [c] Leeds School of Business, University of Colorado, Boulder, Colorado 80309; [d] Department of Management, Tilburg University, 5037 AB Tilburg, Netherlands

*Corresponding author

Contact: m.hanisch@rug.nl, https://orcid.org/0000-0003-4787-1957 (MH); jeffrey.reuer@colorado.edu, https://orcid.org/0000-0002-1397-8134 (JJR); Carolin.Haeussler@Uni-Passau.De, https://orcid.org/0000-0002-3505-010X (CH); s.v.devarakonda@tilburguniversity.edu, https://orcid.org/0000-0002-6679-3512 (SVD)

Received: July 9, 2020
Revised: November 27, 2021; January 30, 2023
Accepted: March 25, 2023
Published Online in Articles in Advance: August 10, 2023

https://doi.org/10.1287/orsc.2023.1687

Abstract. Steering committees are pivotal for governing complex collaborations by consensus to facilitate coordination and knowledge sharing. Although consensus-based governance promotes mutuality, it can also cause deadlocks, stalling expeditious decision making. We examine the conditions under which alliance partners delegate decision-making authority to steering committees as well as the conditions under which authority over discordant matters can be relocated to one of the alliance partners. We argue that joint coordination concerns increase the likelihood of authority delegation, whereas the higher costs and stakes associated with decision stalemates provide grounds for authority reversion. Empirical analyses of strategic alliances in the biopharmaceutical industry support our arguments. Our paper demonstrates the versatility of contractually defined administrative interfaces in alliance governance, allowing partners to coordinate bilaterally and adapt hierarchically as and when required.

Keywords: alliance governance • administrative control • authority • R&D alliances • steering committee • dispute resolution

Introduction

Research on alliances has devoted substantial attention to understanding the organizing mechanisms that enable firms to cope with the challenges of working with self-interested partners in uncertain environments (e.g., Oxley 1997, Das and Teng 1999, Carson et al. 2006, Schepker et al. 2014). This research views alliances as hybrid organizational forms founded in incomplete contracts to serve firms' strategic goals (Hagedoorn et al. 2000), and thereby examines the contractual provisions and governance instruments that enable partners to address their coordination and control considerations (Pisano 1989, Lerner and Merges 1998). For instance, building on the idea that administrative control is a distinctive feature of organizational governance that enables coordinated adaptation (Williamson 1991), alliances scholars have sought to understand how partners can design, and benefit from, administrative control interfaces that support alliances (Oxley and Wada 2009, Albers et al. 2016).

A key mechanism for jointly governing partnerships is the steering committee (Albers et al. 2016), which, in contractual alliances, is the principal administrative interface staffed by representatives from the partnering firms (Robinson and Stuart 2007, Reuer and Devarakonda 2016). Steering committees do not exist by default as a statutory matter, as in the case of boards for incorporated organizations. Instead, they are contractually established, with the structure and the purview of their administrative control derived from the rules partners codify in the alliance contract itself. Committees usually designate an equal number of representatives from each partner and pair this symmetry with decision making based on consensus. Through consensus, committees can equitably attend to partners' concerns that arise during the execution of alliances. However, to the extent that committee members fail to converge in their views, deadlocks can arise, rendering committees ineffective in their adaptation mandate. To avert the disruptive effects of deadlocks, partners contemplating authority delegation also contend with the task of foreseeing the conditions causing stalemates and crafting escalation mechanisms to address them efficiently (Williamson 2000). In order to address potential decision impasses that may surface, partners can agree to revert

authority over decisions to one partner to avoid prolonged and costly resolution, including the use of third-party adjudication (i.e., arbitration and litigation).

The objective of our study is to investigate the factors that underpin the specification of authority delegation to, and authority reversion from, steering committees. Because delegation and reversion are not features endemic to contract-based alliances, understanding the underlying trade-offs they present for partners' coordination and control concerns is essential to their design to promote efficiency in alliance agreements. These trade-offs emerge from partners agreeing to relinquish hierarchical control to facilitate bilateral coordination at the alliance level but restore hierarchical control to address dysfunctional decision impasses (Williamson 1991, Hart and Moore 2008). To explicate these trade-offs, we focus on the antecedents of delegation and reversion. We contend that factors driving coordination concerns shape authority delegation, whereas factors driving the stakes and costs associated with decision stalemates influence authority reversion. This analysis of the design features of administrative control interfaces in alliances thus enhances our understanding of the conditions that determine the extent and bounds of authority delegation.

Our theoretical framework builds on transaction cost theory to suggest that higher coordination requirements increase the partners' tendency to endow the steering committee with more decision-making authority (Gulati and Singh 1998, Dekker 2004, Phene and Tallman 2012, Walter et al. 2012). We also suggest that alliance partners agree on contingent authority reversion from the steering committee to the partners' organizational hierarchy to avoid inefficient stalemates. We test our predictions using a unique data set of strategic alliance contracts from the biopharmaceutical industry. We find that broad alliance scope and high levels of task interdependence between the alliance partners—both indicators of an increased need for coordination—increase the likelihood that partners endow steering committees with enhanced decision-making authority. Furthermore, alliances that are large in financial scale and subject to substantial competitive intensity—both critical indicators of the stakes and costs inherent in stalemates—rely to a greater extent on the contingent reversion of authority from the steering committee to the hierarchy of the partner organizations.

In identifying the antecedents of authority delegation and authority reversion in alliances, we extend an emerging stream of research on the design of steering committees (Reuer and Devarakonda 2016). Our analysis uncovers and explains the considerable variation in the authority delegated to the steering committee (e.g., decision-making rules and subject matter jurisdiction). We thus clarify the bounds of administrative authority in hybrid organizational forms in which partnering organizations contractually invest authority in a bilateral administrative interface—a decision that entails a loss of hierarchical control for a gain in bilateral coordination through consensus. Most importantly, we underscore contractually specified authority reversion as a mechanism to simulate hierarchical fiat in a hybrid form of governance, wherein fiat is otherwise absent. This bilateral mechanism is distinct from the default of trilateral dispute resolution mechanisms (i.e., arbitration and litigation) proposed in extant theorizing in that it resituates authority in one of the partner organizations and thus, affords partners with a contingent path out of a critical bilateral decision impasse (Williamson 1991). What emerges from this nuanced perspective is a far more refined view of the potential merits and drawbacks of sophisticated administrative control mechanisms in contractual alliances, as well as an improved understanding of how partners address concerns of coordination and control via authority delegation and reversion in their contractual agreements.

Theoretical Framework

A major challenge for alliance partners is the design of adequate governance mechanisms that support partnerships to achieve their desired goals (Kale and Singh 2009). Given that alliance partners cannot foresee and contractually provide for all future contingencies, they are likely confronted with future events that require coordinated adaptation (Masten and Crocker 1985, Argyres et al. 2007). The governance challenge becomes especially pertinent in nonequity alliances because nonhierarchical organizational forms cannot replicate the administrative controls available to unitary firms or joint ventures (Williamson 1991, Oxley 1997, Reuer et al. 2014). In response, firms can devise a means of pushing out the coordinated adaptation limits of alliances by establishing steering committees that function as structural interfaces between the partnering organizations (Smith 2005, Robinson and Stuart 2007). By providing a platform for exchanging information and discussing strategic decisions and exigencies, steering committees can help the partners to coordinate activities and to adapt their relationship to changing circumstances (Reuer and Devarakonda 2016). Steering committees can fulfill these functions more effectively if they are formally endowed with the authority to make decisions, in addition to serving as an information processing mechanism. In this sense, steering committees can be seen as being analogous to boards in equity joint ventures (Kumar and Seth 1998). However, unlike boards, which owe their origins to the laws governing corporations and come vested with the residual rights of control, steering committees are artefacts of the contract and are animated by the mutually agreed rules specified therein. As a result, partners delegate authority over particular decisions in a bounded manner via the contract to a steering committee, and

other decisions are then subject to ratification by the partners.

Both partners can therefore agree to assign part of their sovereign decision rights to steering committees to create a forum for internal deliberations and facilitate localized adaptation in a coordinated way. Steering committees can therefore exercise administrative control over alliance activities by virtue of the authority granted to them in the contract. Thus, partners can stipulate the extent to which they delegate authority to the steering committee as well as the extent to which the committee can irrevocably hold on to this authority when contingencies arise, so partners contract upon the bounds they set on delegated authority. Although employees of one partner organization are not obliged to follow directives from employees of the other partner, they are bound to obey directives endorsed by the steering committee and act accordingly. The following example from an alliance agreement between Dermira and UCB Pharma illustrates the contractual delegation of authority to these administrative interfaces.

> The JSC [Joint Steering Committee] *shall have the responsibilities and authority allocated to it in this Section 4 and elsewhere in this Agreement*, but shall not have the right to interpret, modify, amend, vary and/or waive compliance of any of the provisions of this Agreement [emphasis added].

Given that the steering committee derives its existence and authority from the contractual agreement of the involved partners, the extent to which authority is delegated to the steering committee varies considerably across alliances. The locus of delegated authority conveys the idea that parties can choose to enshrine in the contract where decision-making authority over alliance activities resides, as well as how it traverses from parties to the joint administrative interface and back. Thus, the scope of authority of steering committees can range from solely serving as a formal platform for information exchange and review to functioning as a powerful interface with total control over all activities that fall within its purview. Hence, a steering committee's authority can range from reviewing and monitoring activities to approving decisions in a formal manner. The more decision-making authority is handed down to steering committees, the more actively they can engage in alliance management and affect partners' abilities to achieve coordination. As one illustration, consider the following contract clause from an alliance between Sanofi and Regulus, which defines a steering committee with extensive decision-making authority.

> The JSC [Joint Steering Committee] will be responsible for the overall planning and execution of the Research Program and the *approval* and oversight of the R&D Plan. The JSC will (i) *evaluate* the data generated by the Parties in the course of carrying out the R&D Plan, (ii) *discuss and resolve* any overarching issues or *significant changes* in the R&D Plan, (iii) recommend project prioritization within the R&D Plan, (iv) *make project progression decisions and resource allocation decisions* in accordance with the R&D Plan, (v) *make revisions* to the R&D Plan as necessary and (vi) consistent with Article 7 of the Agreement, review and *approve all public communications* and disclosures, including but not limited to data presented at external meetings and journals on the joint Research Results. Except for amendments to the R&D Plan (as adopted in accordance with this charter and the Agreement), in no event will the JSC have the power or authority to amend any provision of the Agreement [emphasis added].

However, it is also important to point out that, in exercising their decision-making authority, steering committees are constrained by the internal deliberation rules under which they are mandated to operate. Steering committees are typically composed of an equal number of members from each party representing their respective organizations' interests. In our sample of 632 alliances, for example, only three alliances have steering committees with an unequal number of representatives. Because the representatives of each organization are bound by the interests of their respective organizations, the committee has to reach mutual agreement on critical matters, which can sometimes be arduous. In the absence of natural escalation mechanisms that can efficiently resolve deadlocks, committee-level decision making can potentially morph into a protracted negotiation between committee members representing the partners and therefore, inhibit responses to emergent contingencies. By necessity, the design of administrative interfaces entails the definition of rules by which the committees operate as well as an appreciation of the prospects for impeded consensus that would call for them to yield their authority. To incorporate escalation mechanisms into a hybrid governance structure that lacks them as a matter of course, as in unitary hierarchies, alliance partners can revert final decision-making authority from the steering committee to the organizational hierarchy of one of the alliance partners. The following example from the same alliance contract between Sanofi and Regulus illustrates the process of authority reversion from the steering committee to one of the partners in case a deadlock arises within the steering committee.

> If the JSC [Joint Steering Committee] is unable to decide by a majority vote on any issue within the scope of its authority and duties, then the JSC will promptly raise such issue to each Parties co-chairperson on the JSC, and such co-chairs will have 10 days to mutually agree on how to resolve such issue. If the co-chairs are unable to resolve such issue within the 10 day period, then such issue will be brought to each Party's Senior Representatives, or their designees. The Senior Representatives will have 10 days to mutually agree on how to resolve such issue. If the Senior Representatives are unable to resolve such issue within the 10-day period, then, subject to the

> express limitations set forth in the Agreement and in Paragraph 9 below, *such issue will be finally resolved by the Senior Representative of Sanofi, and such resolution will be binding on Sanofi and Regulus* [emphasis added].

When defining the locus of delegated authority in an alliance, the partners, therefore, face an important trade-off. By delegating authority to the steering committee, alliance partners relinquish unilateral decision-making authority in favor of a bilateral decision-making approach to enhance coordination and to induce the partners to adapt in a cooperative way. However, unconditional delegation may also increase the risk and costs of stalemates and potentially even opportunistic holdup. To circumvent this potential problem of deadlocks, alliance partners can ex ante agree to condition the delegation of authority to steering committees, such that the emergence of deadlocks on particular topics will allow one of the partners to supersede the authority of the steering committee. In other words, the partners can compensate for the absence of an escalation mechanism naturally present in a unitary hierarchy by specifying the contingent reversion of authority on particular matters. Such contractually predefined escalation procedures are efficient compared with the alternative of leaving such matters entirely to the steering committee and then resorting to costly third-party intervention in the event a decision impasse degenerates into a dysfunctional dispute. Of course, when final decision-making authority rests with a partner, it can weaken the incentives for any bilateral adjustment, prompting parties to shade on their respective commitments (Hart and Moore 2008). Further, to the extent that these escalation mechanisms require careful planning at the contracting stage itself, partners are likely to engage in this exercise when the alliance conditions are such that the benefits of authority reversion outweigh the potential costs of maladaptation.

We propose two drivers of this calculus for the delegation of authority and its contingent reversion: the benefits of coordination weighed against the costs of deadlocks. Whereas the delegation of authority to the steering committee is subject to coordination considerations between the partners, the contingent reversion of authority to the partner organizations is driven by the stakes and costs of failing to achieve common ground for making bilateral adjustments. With regard to coordination concerns, we follow prior alliance governance research that has highlighted the coordination challenges that arise from working together on a wide array of functional activities (i.e., vertical alliance scope) and the interconnectedness (i.e., interdependence) of those activities (Ryu et al. 2018). In terms of deadlock concerns, we consider the stakes and costs that larger alliances entail (i.e., dedicated investments in the alliance) and that arise from expected rivalry between firms working in similar technologies or on solutions for the same problem (i.e., competitive intensity) that requires partners to achieve efficient resolution of any decision impasses that might emerge during alliance implementation.

Antecedents of Authority Delegation

Alliance Scope.

The set of activities partners specify as falling within the scope of the alliance is an important source of governance concerns for contracting parties because it determines the challenges partners are likely to encounter when they work together to achieve their mutually agreed-upon goals (Oxley and Sampson 2004, Li et al. 2008). For generating the desired value, the alliance may encompass activities that belong to distinct and specialized functions of the value chain in which partners possess particular expertise (Khanna 1998, Inkpen 2000). Depending on the nature of the project, the functional, or vertical, scope of alliances can vary considerably, ranging from a focused effort in a specific function (e.g., research) to a broad program that spans several parts of the value chain (Khanna 1998, Khanna et al. 1998). In the context of research and development (R&D) alliances in particular, the primary purpose of the alliance may either remain confined to upstream R&D activities or extend downstream to encompass manufacturing and marketing activities.

The functional scope of an alliance raises several important concerns that need to be addressed through appropriate governance design. When alliance activities cover multiple functions in the value chain, conducting tasks under the alliance program creates the need for interactions that simultaneously cut across both organizational boundaries as well as functional boundaries. It is more difficult for partners to specify clearly their rights and obligations in such partnerships, and broad-scope alliances entail multiple points of contact that need to be coordinated and worked out over time (Borys and Jemison 1989, Oxley and Sampson 2004). Left unmonitored, an opportunistic partner can exploit the multiple points of contact to engage in strategic learning behavior to imperil the knowledge and even the competitive position of a partner (Khanna et al. 1998). Anticipating these consequences, partners are likely to direct these crossfunctional, crossorganizational interactions using an administrative framework that not only develops and implements the rules of engagement over time but also supervises whether such rules are adhered to or not. By delegating decision-making authority to a steering committee, partners can craft a tailored response to crossfunctional exchange needs as and when they arise during alliance implementation. In delegating authority to a steering committee, partner representatives can also remain alert to, and adapt to, any opportunistic exploitation by a partner. Steering committees can, therefore, play an active role in facilitating the management of alliances with a broader scope. We therefore propose the following hypothesis.

Hypothesis 1. *The likelihood that alliance partners contractually delegate decision-making authority to steering committees is positively related to alliance scope.*

Interdependence. Related concerns of coordinated adaptation arise from the linkages among the tasks that partners undertake during the course of collaboration. The distribution of tasks across partners' organizational units is determined by the division of labor between partners. For example, achieving alliances' goals may require partners to specialize in particular activities of the value chain or to distribute some or all activities evenly between partners (Haeussler and Higgins 2014). The attendant interdependencies in the actions of partners create work-related uncertainties and pose coordination challenges to partners.

The extent of interdependence between partners can be characterized using the taxonomy developed by Thompson (1967) based on the workflow between units. Thompson's framework identified three types of interdependence—pooled, sequential, and reciprocal—that represent an ascending order of the degree of dependency of one unit on others to complete the allocated task. Per this scheme, reciprocal interdependence between partners indicates a highly contingent pattern of decisions and actions among units, which require more formalized forms of coordination to bring about mutual adjustment. The contingent nature of tasks can impact the information processing demands, as in reciprocal interdependence, creating the need for specialized mechanisms for coordination (Galbraith 1973, Tushman and Nadler 1978). In the context of boundary-spanning relationships, formalized structures can support the segmentation and unification of tasks and facilitate information flows to accommodate diverse administrative environments of the partner firms (Gulati et al. 2005). Conversely, when the task structure is not highly contingent, coordination can occur through programmed responses, regardless of the number of interacting agents (Puranam et al. 2012).

To support the coordination needs of the alliance arising from reciprocal interdependence, partners can devise and put in place authority systems that embed coordination in an administrative context (Gulati and Singh 1998). In particular, alliance partners can address this need by delegating decision-making authority to the steering committee, meaning that alliance-related decisions are made through discussions and mutual approval within this dedicated administrative interface (Smith 2005). In this manner, the partners establish more hierarchy in the alliance to reduce information costs and promote coordination of alliance activities (Gulati and Singh 1998, Dekker 2004). Thus, if alliance activities are more interdependent, partners are more likely to use the steering committee not only as a forum for information sharing but also, as an interface vested with decision-making authority in order to foster coordinated adaptation without resorting to intervention and guidance by executives in the partner organizations.

Hypothesis 2. *The likelihood that alliance partners contractually delegate decision-making authority to steering committees is positively related to the level of reciprocal interdependence between the partners.*

Antecedents of Authority Reversion

The previous hypotheses underscore the benefits of contractually delegating authority in a bounded manner to steering committees to support coordinated adaptation between partners. Conferred with decision rights and staffed by members from both partners, steering committees facilitate alliance execution by responding to the adaptation concerns indigenous to the alliance. However, when members' minds do not meet on appropriate adaptive responses, decision impasses can ensue. Committee members locked in a decision stalemate may reconcile their positions to the extent that they are equipped with the information to take cognizance of the damaging consequences to the focal alliance activity. However, such information and inducements to consider the ramifications of the decisions on other aspects of the partners' organizations are absent by design. In other words, steering committees may fail to internalize the externalities of their decisions on both partner organizations (Segal 1999, Bester 2009). In the biopharmaceutical industry, these externalities derive from the significant potential for spillovers across projects, which can have a significant effect on overall firm value (e.g., Ding and Eliashberg 2002, Girotra et al. 2007), as well as spillovers across firms that carry out related programs (Cockburn and Henderson 1994). The concerns arising from the steering committees' failure to internalize are different from the coordination concerns native to the alliance underscored in the previous hypotheses. When drafting contracts, boundedly rational managers are likely to take an organization-wide view to estimate the severity of deadlocks and hence, the need for a safety valve. We first highlight the features of steering committees that inherently limit them from internalizing decision externalities and then identify the conditions which test these limits, compelling partners to opt for authority reversion.

One critical feature that can weigh down committees is that they are bilateral decision bodies that function by consensus. This feature can hinder coordinated adaptation because the search for consensus at the committee level can break down and create an impasse. Another critical feature is that they are composed of a small number of individuals with distinct expertise. This feature can hinder coordinated adaptation because the search for optimal adjustments at the committee level can fail because of gaps in members' joint expertise and

the stickiness of related knowledge (Szulanski 1996, Cockburn and Henderson 2001). These features will necessarily place limits on the efficient use of authority delegated to the steering committee. In conventional organizations in which fiat is featured, disagreements over decisions and mismatches in decision expertise naturally get resolved by default by escalating to a higher level in the hierarchy. Analogously in the case of interorganizational agreements, partners can devise an escalation mechanism that restores efficient adaptation.

Partners can partly replicate escalation in conventional organizations by contractually agreeing to revert authority to one of the partners. Whereas such escalation happens by default, or as a matter of course, within organizations, in alliances spanning organizations it must be instituted contractually. Just as authority delegation is a matter of deliberate design, authority reversion is a design concern that also carries with it efficiency implications. Specifically, partners can designate a partner as the final authority on specific matters delegated to the steering committee. In this way, inefficient stalemates resulting from the different expectations of the members of the committee can be avoided. It can also reduce the costs of disagreement compared with the alternative resolution of disputes by third parties through arbitration or litigation. Nevertheless, careful consideration must be given when curtailing delegation via reversion, as this can curb the initiative of the steering committees to engage in the search for solutions that maintain the adaptive efficiency of the alliance (Aghion and Tirole 1997). It can also lead to the counterparty shading in its efforts tied to the decisions (Hart and Moore 2008). The hypotheses consider the factors that encourage partners to revert authority delegated to the steering committee. These factors characterize the decision-making contexts in which the benefits of reversion, originating in better internalization of the externalities at alliance-level choices, outweigh the costs of reversion.

Dedicated Investments. The costs and risks of decision impasses discussed are associated with the scale of financial investments dedicated to the partnership. An increase in project size can result in a concomitant increase in bilateral dependencies because the amount of capital committed to the alliance impacts not only the share of partners' resources associated with the alliance but also, the portion of their organizational value originating from the alliance. Accordingly, steering committees exercise authority over alliance-level decisions that might also have substantial implications for other activities and investments of the partners.

Committees grapple with decisions related to selecting projects; allocating resources; and assessing technical, commercial, and manufacturing feasibility. In large-scale projects in the biopharmaceutical industry, for instance, these decisions involve multiple stages of the discovery and development process or multiple candidate therapies (DiMasi and Grabowski 2007, Arora et al. 2009). In addition, committees have to decide in a setting where "time is money" because patents offer protection over a limited period of time, much of which is consumed by the development process before approval (Grabowski and Vernon 1986). For example, speeding up the development process even by one day can substantially impact sales as high as $10 million per day for a blockbuster drug (Needleman 2001). Consequently, partners have an interest in efficiently addressing deadlocks in the steering committee.

Disagreements at the committee level can occur for several reasons. First, committee members may differ in their priors regarding the decision problem because of their particular expertise. Second, they may also differ in the information they possess to assess the situation. Finally, they may also differ in their individual preferences regarding the appropriate course of action. All three reasons can impede consensus because committee members hold divergent views on representing and structuring the decision problem and search for solutions (Day and Lord 1992, Nickerson and Zenger 2004). Resolution of these disagreements may require complementary expertise and information (Fama and Jensen 1983), which can be arduous and time consuming to transfer to the committee level (Garicano and Wu 2012). Under these conditions, partners may let direction substitute for the transfer of knowledge (Demsetz 1988); that is, they may agree to specify ex ante an escalation path for the authority delegated to the committee (Garicano 2000). Thus, we suggest that the mechanism of authority reversion is more likely implemented in the contract when significant dedicated investments are made in the partnership.

Hypothesis 3. *The likelihood that a contract allows for final decision-making authority to revert from steering committees to the organizational hierarchy is positively related to dedicated investments.*

Competitive Intensity. A steering committee's capacity to provide coordinated adaptation can also be tested because of the competitive intensity that is anticipated by the partners. Intense competition confronting the alliance puts pressure on partners to maintain flexibility to respond to new developments in a timely fashion (Bourgeois and Eisenhardt 1988, Eisenhardt 1989, Ross and Wieland 1996). Competitive pressure on alliance partners increases if many rival firms work on similar technologies or try to find and offer solutions for the same problems (Kogut 1989, Silverman and Baum 2002). The pressures are particularly acute when partners are racing with other firms to develop new therapies and obtain regulatory approvals for products to

earn monopoly rents (e.g., Reinganum 1982, Marshall and Parra 2019). In particular, lagging behind the competition in terms of product introduction may incur additional costs to demonstrate relative added value over the existing product and dampen profitability prospects (Roberts 1999, Wuyts et al. 2004). Particularly for the client firms responsible for financing and commercializing products developed by the alliance, delays arising from a decision impasse can prove costly.

New therapies in biopharmaceuticals go through a sequence of well-defined stages before ultimately reaching the market (DiMasi 2002). This structure not only allows firms to anticipate the potential rivalry but also, continually supplies them information to (re-)evaluate their project pipelines. Faced with a crowded field downstream, steering committees have to contemplate the implications of spillovers along both the technological dimension as well as the product market dimension, which often tend to conflict with each other (Bloom et al. 2013). Whereas the product approvals that competitors receive can discourage the continuation of similar investments (e.g., Rao 2020), research breakthroughs competitors make in similar or related areas can encourage investments to benefit from those new developments and complement other research projects (Cockburn and Henderson 1994). For instance, in a related study, Krieger (2021) finds that firms exhibit a high sensitivity to failure news from competitors operating within the same market and technology. Such news can lead to a significant increase in the likelihood of firms terminating drug development projects. As competition intensifies, firms may require greater agility to adapt, with potential ramifications for their partners involved in joint projects. In these tense situations, committee decisions regarding alliances that have significant implications for firms' pipelines can create conflicting interests among committee members representing their partners. Although a steering committee's authority is limited only to the individual project under its purview, several of its decisions can impact the partners' respective project pipelines (Chan et al. 2007). Specifically, members may be informed about the implications for their parent firm but are uninformed about the implications for the partner. Such asymmetries can weaken the conditions for compromise, thus impeding consensus. In addition, strategic interdependencies arising elsewhere in the R&D pipeline because of the substitutive or complementary nature of products and technologies can compel a firm to opt for alliance-level commitments that do not align with its partner's assessment (Sengul et al. 2012, Ethiraj and Zhou 2019). Although committee members may strive for compromise by educating others about their respective strategic considerations at the pipeline level, the information processing demands of integrating disparate knowledge can be unduly inefficient when competitors are pursuing rival products (Nickerson and Zenger 2004). By allowing a partner to have the final say after the steering committee has foundered in overcoming an impasse, partners can address a deadlock efficiently and be more responsive when the competitive intensity is high (cf. Kownatzki et al. 2013). We therefore posit the following hypothesis.

Hypothesis 4. *The likelihood that a contract allows for final decision-making authority to revert from steering committees to the organizational hierarchy is positively related to competitive intensity.*

Methods

Data and Sample

We tested our hypotheses using a sample of strategic alliance contracts in the biopharmaceutical industry. This industry provided an appropriate context for our study because alliances are of vital strategic importance for pharmaceutical and biotechnology firms to gain access to new technologies and to secure the necessary resources for the time- and cost-intensive drug development process (Hagedoorn 2002, Vassolo et al. 2004, DiMasi et al. 2010). The contracts for our study were retrieved from BioScience Advisors, a service provider with a large database of alliance contracts in the biopharmaceutical industry. The database includes contracts filed with the Securities and Exchange Commission (SEC) as well as contracts obtained via Freedom of Information Act filings in the United States and is thus comparable with the Recap database (now known as Cortellis Deals Intelligence), which has been used in related research (Schilling 2009). We obtained a set of 1,606 contracts that were negotiated between 2005 and 2015. In total, 195 contracts were excluded because they were licensing agreements with universities, and another 180 contracts were excluded because they were supply, service, or distribution agreements rather than strategic alliances. Another 30 contracts had to be excluded because we were unable to obtain important firm-level information or because relevant parts of the contract were redacted (e.g., payments terms), an option that firms have when filing the document with the SEC. Our final sample consists of 1,201 dyadic alliances; of those, 632 alliances had a steering committee, and 569 alliances did not. Furthermore, we obtained data on firm-level information through SDC Platinum and firms' historic websites (archive.org).

Dependent Variables: Authority Delegation and Authority Reversion

For our alliances with a steering committee, we created two binary dependent variables to capture the delegation of authority to the steering committee and the reversion of authority to the organizational hierarchy. Authority delegation means that the alliance partners endow the steering committee with decision-making authority as opposed to using the steering committee

primarily as an information exchange interface. In turn, authority reversion occurs if the partners choose to grant one of the parties final decision-making rights in case of a deadlock in the steering committee versus relying solely on third-party dispute resolution via arbitration or litigation.

To measure *authority delegation*, we constructed a binary variable that takes the value one if the steering committee is endowed with strategic decision-making authority over alliance activities and zero otherwise. The decision-making authority that is transferred to the steering committee is clearly defined in the alliance contract, allowing us to determine whether a steering committee has decision-making authority on a specific issue or not. For example, if the contract indicated that the steering committee had to approve an R&D plan, we considered this a delegation of decision-making authority to the committee. However, if the steering committee is only allowed to review the R&D plan periodically, we code this as no delegation of authority, as the actual decision on the R&D plan would be made elsewhere than in the steering committee itself. We crossvalidated our interpretation of the contractual terms through interviews with practitioners from the biopharmaceutical industry. In agreement with our coding, steering committees with decision-making authority take a decidedly more active role in alliance management than steering committees whose primary purpose is to facilitate information exchange. One interviewee said that weak, or less formal, steering committees without real decision-making authority can resemble "coffee parties" because important decisions are made independently by the alliance partners outside of the committee. In supplementary analyses, we also examined the delegation of authority to the steering over particular tasks (e.g., research, clinical trials, and commercialization activities) to provide additional insights on the specific types of decision-making authority that partners contractually grant to the steering committee and to explore the heterogeneity in the administrative controls that partners put to use in alliances. In our main analyses, our binary measure of authority delegation is one if the steering committee has decision-making authority over one (or more) of the alliance tasks. To ensure the validity and reliability of our coding, every contract was coded by two independent coders who were unaware of the research question. The coding of both raters was highly consistent; the Krippendorff alphas for decision-making authority regarding research, clinical trials, and commercialization activities were 0.93, 0.98, and 0.93, respectively. Inconsistencies between the two raters were discussed with the authors and resolved through mutual discussions.

Our second dependent variable, *authority reversion*, is a binary variable that takes a value of one if final decision-making authority rests with one of the partners in case the steering committee faces a deadlock and zero otherwise. In the latter case in the absence of authority reversion, partners will routinely need to resort to trilateral dispute resolution to address ongoing conflicts (i.e., arbitration or litigation). The escalation mechanisms for steering committees are clearly outlined in the alliance contracts. In the event of a deadlock, contractually defined rules governing the functioning of the steering committee can remove a decision from the domain of the steering committee and revest the final authority for that decision with one of the alliance partners. In our supplementary analyses, we also examined whether the reversion of authority in this way—often termed *casting vote*, *tiebreaking vote*, *final decision-making authority*, or *final say* in practice—relates to particular tasks, such as research, clinical trials, or downstream activities such as commercialization.[1] For our main analyses, the binary variable authority reversion is one if authority reverts for any of the alliance tasks. We obtained Krippendorff alphas for authority reversion regarding research, clinical trials, and commercialization of 0.97, 1.00, and 0.97, respectively, which indicates high agreement between both raters. Again, inconsistencies in the coding were discussed and resolved.

Independent Variables

The first set of explanatory variables relates to the need for coordination. To measure *alliance scope*, we built on Oxley and Sampson (2004) and used the number of value-generating activities that are covered by the alliance. We refined the original measure, which distinguishes between R&D-only alliances and R&D alliances with commercialization activities, to our context of biopharmaceutical alliances by also accounting for the intermediate step of clinical trials and regulatory approval. Consequently, we created two binary variables: one variable for R&D alliances with clinical trials and another variable for R&D alliances with clinical trials and commercialization activities. Pure research alliances serve as our omitted reference category. We also note that the combination of research alliances with commercialization and no clinical trial activities did not occur in our data.[2]

For *reciprocal interdependence*, we replicated the measure proposed by Reuer and Devarakonda (2016), a binary variable that captures whether alliance activities are carried out jointly. For this purpose, we relied on BioScience Advisors' classification of collaborative agreements designated as "Co-Development." Thus, our binary indicator equals one if the alliance partners jointly develop the focal compound and zero otherwise. Reciprocal interdependence is particularly high in this case because the alliance partners rely on each other's input to push development forward. In line with Reuer and Devarakonda (2016), we also added a binary indicator for *sequential interdependence* that captures alliances in which partners independently

perform certain upstream and downstream activities. A typical example would be an alliance in which a biotechnology company performs research activities (upstream) and the pharmaceutical company is responsible for clinical trials and commercialization (downstream). The omitted reference category is pooled interdependence, which includes pure licensing and commercialization agreements, for which interdependence is lowest.

Our second set of variables captures the stakes and costs of decision impasses that can necessitate authority reversion. As a proxy for *dedicated investments*, we calculated the logarithmic sum of up-front payments, the maximum future milestone payments, and license fees. These contractually defined payments are a critical part of the negotiations and are specifically tied to the focal alliance (Crama et al. 2008, Kotha et al. 2018). Through these payments, the client commits to compensate the research unit for past and future R&D investments (Robinson and Stuart 2007). The size of these payments often exceeds several hundred million U.S. dollars and thus, represents a major strategic commitment for the client firm and an essential source of funds for the research unit (Lerner and Merges 1998, Lerner and Malmendier 2010). Importantly, higher values of *dedicated investments* are associated with the expected costs of failure to achieve common ground for making bilateral adjustments. It is noteworthy that in our specific empirical context, the investments made are unilateral in the sense that the client firm finances the R&D activities of the research unit (see Foss and Weber 2016 for a discussion). Thus, although the client firm provides financial support, the research unit contributes primarily intangible assets, such as R&D knowledge and expertise.

Our measure of *competitive intensity* is based on the concentration of firms conducting clinical trials in the same disease area as the focal alliance, which is likely to pose a competitive threat to the alliance. More specifically, for each alliance, we identified the focal disease area targeted (e.g., hepatitis C) and then calculated the concentration of firms undertaking clinical trials (i.e., industry sponsors) in the same disease area in the five years prior to the alliance formation. We also used one- and three-year windows as robustness checks and obtained qualitatively similar findings. As a measure of concentration, we inverted a Herfindahl–Hirschman-type index so that higher values in the range from zero to one indicate more intense rivalry (i.e., the clinical trials in a given disease area are less concentrated on a single firm or a few firms). Although the Herfindahl–Hirschman index was originally used to measure competition in an industry, it has been applied to a variety of contexts to measure the concentration of skills, experience, or products in a particular field (e.g., Narayanan et al. 2009, Aggarwal and Wu 2015, Byun et al. 2018). We obtained data from the public registry of clinical trials in the United States, which is accessible through ClinicalTrials.gov. The database provides, among other items, the disease areas, the names of the sponsors, and the start dates of the trials in a structured format. Clinical trial registration is mandatory for firms and investigators in general operating in or outside the United States, so the data provide a comprehensive picture of the competitive landscape in the biopharmaceutical industry. To calculate the competition index, we first standardized the disease names in the ClinicalTrials.gov database (e.g., cancer, tumor, and neoplasm are synonyms) and then classified each alliance using the list of diseases reported in the ClinicalTrials.gov database. Information about the target area is disclosed in the alliance agreement (usually in the "Definitions" section) and in the corresponding press release.

Control Variables

We controlled for an array of potentially confounding factors relating to technological aspects, firm characteristics, and transactional attributes. First, we controlled for *technological uncertainty*, which has been argued to be a major driver for interorganizational governance choices. Similar to Reuer and Devarakonda (2016), we classified the disease area and phase of development of the focal molecule in the alliance as described in the contract and used the probabilities calculated by DiMasi et al. (2010) that a molecule in a given disease area and phase of development transitions to the next phase of clinical development. In addition, we added clinical phase, therapeutic area, and technology fixed effects in the regressions (Azoulay 2004).[3] These controls alleviate the potential concern that some technologies or indications may be more complex than others and require different levels of coordination between the partners.

We further controlled for the partners' *technology overlap*, which is the patent portfolio similarity measure developed by Jaffe (1986), a commonly used metric in the alliance literature (Oxley and Sampson 2004, Li et al. 2008). Partners with similar technologies can evaluate each other's contributions more easily, which reduces information asymmetries and facilitates coordination between the partners. At the same time, the risk of involuntary knowledge spillovers increases if the partners work in closely related areas, leading to a heightened ability of a partner to misappropriate knowledge.

Relatedly, we controlled for each partner's *knowledge stock* because a more extensive knowledge base improves the potential technological contributions and absorptive capacities of the partners and thus, the ability to benefit from a joint decision-making process via the steering committee. We operationalized knowledge stock as the logarithmic value of the forward citation-weighted number of patents that the partners owned prior to forming the focal alliance (Henderson et al. 1998, Argyres and Silverman 2004).

Moreover, we included control variables for partner-specific and general alliance experience (Hoang and Rothaermel 2005). Higher alliance experience decreases the need for coordinated adaptation because the partners can anticipate more contingencies based on their experience derived from other alliances and define explicit remedies in the contract. In particular, we included the *number of prior ties*, which is the log-transformed number of prior engagements between the alliance partners (Gulati 1995, Hoetker 2005). In a similar vein, we controlled for the partners' general *alliance experience* by using the logarithmic value of the number of previous alliances that each partner had formed before entering the focal alliance (Hoang and Rothaermel 2005). To construct this measure, we relied on data by BioScience Advisors and complemented this information through Informa Pharma Intelligence.

In addition to these technology-specific and partner-related considerations, we also incorporated some important alliance characteristics in the control structure. Prior research has shown that partner asymmetries can have important implications for alliance contract design (Lui and Ngo 2004). The reason is that larger firms differ substantially from smaller firms in their decision-making processes and organizational routines. Moreover, these asymmetries are indicative of differences in bargaining power. To account for this, we included *partner asymmetry* in the model, which is the difference in the number of employees of the partners divided by the number of employees of the larger firm.

Given the increased coordination challenges that exist when alliances are international, we added a binary control variable for *crossborder alliances*, which is one for international alliances and zero for alliances between organizations from the same country (Gulati 1995, Gulati and Singh 1998).

We also distinguished alliances formed between biotechnology firms and those involving pharmaceutical clients. Biotechnology firms are typically more resource constrained, and this can shape the types of alliances in which they engage as well as the design of these collaborations. Hence, our binary control variable *biotech-biotech alliance* is one if both partners are biotechnology firms and zero otherwise (Lerner et al. 2003).

Following prior research, we included a binary variable for minority equity relationships that may exist between the partners (*equity participation*). The reason is that equity holders can potentially influence the decision-making process in the partner's organization through channels outside the contractually defined administrative control structures (Pisano 1989).

We also included a control variable for the *contract's length* as a broad indicator for transactional complexity. We operationalized this variable as the number of words in a given contract. Finally, we use year fixed effects to account for potential changes in contract design over time as well as general market conditions.

Results

We begin with a brief exploration of descriptive findings for the dependent variables—the contractual delegation of authority to the steering committee and the contingent reversion of authority from the steering committee to the organizational hierarchy of one of the partners (see Table 1); 59% of the sampled steering committees have the authority to make alliance-related decisions, which means that the alliance partners contractually transfer decision-making authority from themselves to the steering committee. Conversely, in the remaining 41%, the steering committee is not equipped with the authority to make decisions but rather, reviews and monitors the contractually defined alliance activities. For a more granular view, we also explored the variance in our dependent variables with respect to different functional areas. As we will detail in the next section devoted to supplementary analyses, we distinguished the locus of delegated authority with regard to research activities, clinical trials management, and commercialization. In our sample, 54% of the steering committees are responsible for approving research activities (*JSC approves research*). Moreover, we observed that 32% of the steering committees are responsible for approving clinical trials activities (*JSC approves clinical trials*), and 27% are responsible for deciding on commercialization activities (*JSC approves commercialization*).

In addition to the variation regarding the committees' decision-making authority, we observed substantial heterogeneity in partners' escalation mechanisms for steering committees. Our data indicate that in 32% of the cases, disputes related to matters within the purview of the steering committee are resolved through final decision-making authority allocated to one of the alliance partners (*authority reversion*) as opposed to relying on other remedies, such as third-party dispute resolution (i.e., arbitration or litigation). Interestingly, we also noticed that alliance partners sometimes define different dispute resolution mechanisms for specific areas of decision making. For example, there are instances in which the steering committee generally resorts to arbitration for dispute resolution except if the dispute concerns research activities, in which case one of the partners has the final say. In our sample, 26% of the steering committees revert final decision-making authority for research-related matters (*authority reverts for research*), 16% revert authority for clinical trials issues (*authority reverts for clinical trials*), and 13% revert authority for commercialization matters (*authority reverts for commercialization*). Thus, the data indicate rich heterogeneity in the delegation and reversion of authority in our sampled alliances.

For our main model, we estimated a bivariate probit model to allow for the possibility that the disturbances of the equations for authority delegation and authority

Table 1. Descriptive Statistics and Correlations

Variables	Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *Delegation of Authority*	0.59	—	0	1	1.00									
(2) *Reversion of Authority*	0.32	—	0	1	**0.57**	1.00								
(3) *JSC Approves Research*	0.54	—	0	1	**0.90**	**0.54**	1.00							
(4) *Authority Reverts for Research*	0.26	—	0	1	**0.50**	**0.86**	**0.55**	1.00						
(5) *JSC Approves Clinical Trials*	0.32	—	0	1	**0.57**	**0.36**	**0.56**	**0.33**	1.00					
(6) *Authority Reverts for Clinical Trials*	0.16	—	0	1	**0.36**	**0.62**	**0.35**	**0.61**	**0.63**	1.00				
(7) *JSC Approves Commercialization*	0.27	—	0	1	**0.50**	**0.24**	**0.40**	**0.15**	**0.44**	**0.26**	1.00			
(8) *Authority Reverts for Commercialization*	0.13	—	0	1	**0.32**	**0.56**	**0.27**	**0.41**	**0.33**	**0.51**	**0.64**	1.00		
(9) *Research and Clinical Trials Alliance*	0.04	—	0	1	0.01	−0.01	0.02	−0.02	−0.01	−0.06	**−0.08**	−0.05	1.00	
(10) *Research, Clinical Trials, and Commercialization Alliance*	0.9	—	0	1	**0.09**	**0.11**	**0.09**	**0.10**	**0.11**	**0.11**	**0.12**	**0.11**	**−0.61**	1.00
(11) *Sequential Interdependence*	0.25	—	0	1	−0.06	0.04	−0.05	0.05	−0.07	−0.02	**−0.17**	**−0.09**	**0.12**	−0.06
(12) *Reciprocal Interdependence*	0.49	—	0	1	**0.20**	−0.00	**0.19**	0.00	**0.16**	0.02	**0.25**	**0.08**	−0.06	**0.13**
(13) *Dedicated Investments*	16.57	6.13	0	21.92	**0.09**	**0.15**	**0.13**	**0.15**	0.04	0.07	0.02	0.07	**−0.22**	**0.23**
(14) *Competitive Intensity*	0.79	0.2	0.4	0.99	**0.09**	**0.27**	**0.09**	**0.22**	0.02	**0.18**	0.05	**0.17**	−0.04	**0.09**
(15) *Technology Overlap*	0.32	0.35	0	1	**0.10**	0.06	**0.11**	0.03	**0.09**	0.01	**0.11**	**0.08**	−0.05	0.05
(16) *Technological Uncertainty*	0.49	0.32	0	0.92	0.03	0.02	**0.11**	**0.11**	−0.00	−0.03	**−0.08**	−0.06	**0.09**	−0.03
(17) *Knowledge Stock of Client*	4.16	3.27	0	11.79	**0.09**	0.06	**0.11**	0.04	−0.01	−0.03	0.03	0.01	−0.01	−0.04
(18) *Knowledge Stock of Research Unit*	4.28	3.59	0	11.84	−0.01	**−0.08**	−0.01	**−0.09**	−0.02	−0.06	−0.02	−0.07	−0.06	−0.01
(19) *Alliance Experience of Client*	4.09	2.07	0	7.63	**0.11**	0.06	**0.14**	**0.08**	0.04	−0.01	−0.01	−0.04	−0.03	−0.02
(20) *Alliance Experience of Research Unit*	2.42	1.56	0	7.16	−0.04	−0.04	−0.07	−0.06	−0.02	−0.02	0.04	0.00	**−0.11**	0.05
(21) *Number of Prior Ties*	0.24	0.49	0	2.4	0.06	0.03	0.06	0.06	0.06	0.06	**0.11**	0.04	−0.07	0.04
(22) *Partner Asymmetry*	0.87	0.27	0	1	0.05	0.01	0.06	0.05	0.08	0.05	−0.02	−0.05	−0.00	−0.02
(23) *Crossborder Alliance*	0.61	—	0	1	−0.08	−0.08	−0.08	−0.06	**−0.09**	−0.08	−0.05	**−0.09**	−0.08	0.07
(24) *Biotech-Biotech Alliance*	0.06	—	0	1	−0.03	0.04	−0.05	0.02	0.02	**0.08**	0.04	**0.11**	0.06	−0.06
(25) *Equity Participation*	0.21	—	0	1	0.07	**0.09**	**0.08**	**0.10**	0.04	**0.13**	**0.09**	**0.15**	−0.02	0.08
(26) *Contract Length*	31.82	17.47	5.08	145.84	**0.16**	**0.09**	**0.17**	0.06	**0.16**	**0.10**	**0.21**	**0.12**	**−0.14**	**0.18**

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
(11) *Sequential Interdependence*	1.00															
(12) *Reciprocal Interdependence*	**−0.56**	1.00														
(13) *Dedicated Investments*	−0.01	0.07	1.00													
(14) *Competitive Intensity*	0.05	0.05	**0.11**	1.00												
(15) *Technology Overlap*	**−0.10**	**0.20**	**0.15**	0.08	1.00											
(16) *Technological Uncertainty*	**0.09**	−0.00	**0.12**	0.02	−0.01	1.00										
(17) *Knowledge Stock of Client*	−0.06	**0.23**	**0.19**	0.01	**0.34**	**0.09**	1.00									
(18) *Knowledge Stock of Research Unit*	**−0.11**	**0.11**	**0.12**	−0.00	**0.40**	−0.01	0.06	1.00								
(19) *Alliance Experience of Client*	−0.06	**0.28**	**0.29**	0.03	**0.27**	**0.11**	**0.47**	**0.09**	1.00							
(20) *Alliance Experience of Research Unit*	**−0.12**	**0.10**	−0.05	0.01	**0.20**	**−0.12**	0.05	**0.44**	0.02	1.00						
(21) *Number of Prior Ties*	**−0.13**	**0.11**	−0.01	−0.00	0.06	0.04	−0.04	0.07	0.00	**0.11**	1.00					
(22) *Partner Asymmetry*	0.01	**0.11**	**0.11**	−0.02	0.04	0.05	**0.21**	**0.10**	**0.34**	0.04	−0.04	1.00				
(23) *Cross-Border Alliance*	−0.01	−0.02	0.01	0.04	−0.05	**−0.13**	0.07	−0.06	0.02	−0.00	**−0.12**	0.07	1.00			
(24) *Biotech-Biotech Alliance*	0.02	−0.04	0.04	0.04	0.08	0.05	0.01	0.07	−0.07	0.05	0.04	**−0.09**	**−0.18**	1.00		
(25) *Equity Participation*	**−0.11**	0.05	0.06	0.04	−0.06	**0.11**	−0.06	−0.04	**−0.08**	**−0.09**	0.00	0.03	**−0.09**	**0.09**	1.00	
(26) *Contract Length*	**−0.20**	**0.37**	**0.26**	0.06	**0.14**	−0.02	**0.21**	**0.11**	**0.28**	**0.11**	0.08	**0.12**	**−0.10**	0.02	**0.11**	1.00

Notes. $n = 632$. $p < 0.05$ is in bold. SD, standard deviation.

reversion are correlated and to enhance the efficiency of estimates as a consequence. We opted for this conservative estimation technique because questions related to the locus of delegated authority could be negotiated as a bundle and would, therefore, be partially interdependent.

Table 2 presents the estimation results. The bivariate probit model estimates the probability that the steering committee has decision-making authority on any given issue as well as the probability that authority reverts to the partners in case of a deadlock. The results of Model 1 and Model 3 for the control variables are estimated jointly in the bivariate probit model, as are the full specifications that include the main independent variables in Model 2 and Model 4, which are the models we interpret. We cluster the standard errors both at the contracting dyad level and additionally, at the partner firm level because firms may be involved in multiple alliances.

In our first two hypotheses, we argue that coordination concerns are associated with the likelihood of authority delegation. Specifically, Hypothesis 1 predicts a positive relationship between alliance scope and the

Table 2. Bivariate Probit Regression Results

	Authority delegation		Authority reversion	
Variables	Model 1	Model 2	Model 3	Model 4
Research and Clinical Trials Alliance		0.81*		1.36**
		(0.39)		(0.44)
Research, Clinical Trials, and Commercialization Alliance		0.44†		1.09***
		(0.24)		(0.29)
Sequential Interdependence		0.16		0.02
		(0.16)		(0.17)
Reciprocal Interdependence		0.52**		−0.07
		(0.16)		(0.17)
Dedicated Investments		0.08		0.24*
		(0.08)		(0.10)
Competitive Intensity		0.09†		0.37***
		(0.05)		(0.05)
Technology Overlap	0.17**	0.14*	0.14*	0.08
	(0.06)	(0.07)	(0.06)	(0.05)
Technological Uncertainty	0.02	−0.01	0.10	0.02
	(0.08)	(0.08)	(0.08)	(0.09)
Knowledge Stock of Client	0.07	0.07	0.09	0.10
	(0.06)	(0.07)	(0.06)	(0.06)
Knowledge Stock of Research Unit	−0.04	−0.05	−0.16*	−0.16*
	(0.07)	(0.08)	(0.07)	(0.07)
Alliance Experience of Client	0.02	−0.02	0.04	0.03
	(0.07)	(0.08)	(0.08)	(0.09)
Alliance Experience of Research Unit	−0.04	−0.03	0.02	0.05
	(0.07)	(0.07)	(0.07)	(0.07)
Number of Prior Ties	0.08	0.05	0.02	0.05
	(0.05)	(0.06)	(0.08)	(0.08)
Partner Asymmetry	0.02	0.03	−0.02	−0.01
	(0.07)	(0.07)	(0.07)	(0.07)
Crossborder Alliance	−0.21*	−0.20†	−0.23*	−0.30*
	(0.11)	(0.11)	(0.11)	(0.12)
Biotech-Biotech Alliance	−0.48	−0.42	0.03	−0.06
	(0.30)	(0.34)	(0.30)	(0.30)
Equity Participation	0.22†	0.15	0.34*	0.30*
	(0.13)	(0.14)	(0.14)	(0.15)
Contract Length	0.20**	0.11	0.10	0.10
	(0.07)	(0.07)	(0.06)	(0.06)
Phase fixed effects[a]	6.574	4.529	6.574	4.529
Therapeutic area fixed effects[a]	84.20***	64.84***	84.20***	64.84***
Technology area fixed effects[a]	34.30*	33.94*	34.30*	33.94*
Year fixed effects[a]	35.72*	25.38	35.72*	25.38
Log likelihood	−610.9	−562.4	−610.9	−562.4

Notes. $n = 632$. Clustered robust standard errors are in parentheses. Models 1 and 3 as well as Models 2 and 4 were estimated jointly.
[a]The χ^2 values are for tests of joint significance of fixed effects.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; †$p < 0.1$.

delegation of decision-making authority to the steering committee, which is supported by the positive coefficient estimate for *research and clinical trials alliance* ($p = 0.039$) and *research, clinical trials, and commercialization alliance* ($p = 0.069$). Alliances that encompass research activities and clinical trials are 26.7% more likely to delegate authority to the steering committee compared with research-only alliances. Furthermore, for alliances that have an even broader scope and include research, clinical trials, and commercialization activities, the average probability of delegating authority is 14.5% higher compared with pure research alliances. In sum, a large increase in the scope of an alliance that spans upstream and downstream activities can increase the likelihood of delegation

by up to 41.2%. As a robustness check, we also investigated whether alliances involving research along with clinical trials and/or commercialization activities are more likely to feature authority delegation to the steering committee (Oxley and Sampson 2004), and we found this to be the case ($p < 0.001$).

Similarly, Hypothesis 2 predicts a positive relationship between the partners' level of interdependence and the likelihood of delegating decision-making authority to the steering committee. In support of this prediction, we find a positive estimated coefficient for *reciprocal interdependence* ($p = 0.001$). Alliances with *reciprocal interdependence* have a 17.1% higher average probability of transferring decision-making authority to the steering committee than partners with low (*pooled*) interdependence. As might be expected, *sequential interdependence* in which partners independently perform certain activities is not statistically significant in our models.

Hypotheses 3 and 4 propose that high stakes and costs associated with decision impasses will lead to authority reversion. In particular, Hypothesis 3 suggests that the higher the dedicated investments in the partnership, the costs of deadlocks will be greater for the partners, resulting in a higher likelihood of authority reversion. In line with Hypothesis 3, the results indicate that higher *dedicated investments* are positively related to the probability that final decision-making authority rests with one of the partner organizations if the committee members cannot reach agreement ($p = 0.016$). A one-standard deviation increase in *dedicated investments* leads, on average, to a 6.9% increase in the probability of authority reversion.

Finally, Hypothesis 4 suggests that high anticipated downstream competition will increase the likelihood that authority will be reverted from the steering committee to one of the partners. Consistent with this hypothesis, we find that *competitive intensity* is positively associated with the probability of authority reversion ($p < 0.001$). A one-standard deviation increase in *competitive intensity* increases the average probability of authority reversion by 10.7%.

Apart from the main results, some of the control variables also show interesting patterns. For instance, *technology overlap* is positively related to authority delegation ($p = 0.023$). This correlation complements our arguments regarding the influence of *competitive intensity*. Whereas competition represents a form of external pressure on the alliance, *technology overlap* is a stimulus for rivalry because the partners face heightened concerns regarding involuntary knowledge misappropriation and spillover effects (Oxley and Sampson 2004). Consequently, the partners may wish to exercise more control over alliance-related decisions and better monitor the flow of information across organizational boundaries. This can be achieved by using the steering committee as a joint decision-making body.

Moreover, our results indicate that our two proxies for alliance scope are positively related to authority reversion ($p = 0.006$ and $p < 0.001$). Prior research has noted that alliances with broad scope not only entail higher coordination requirements but also, raise concerns about knowledge misappropriation and unintended spillovers (Reuer et al. 2002, Ryu et al. 2018). Alliance partners may respond to such concerns by agreeing on authority reversion as a mechanism to retain contingent control over critical matters within one organization. In this manner, the parties can benefit from the coordinative benefits afforded by the steering committee while safeguarding bilateral decision-making processes through contingent authority reversion. In this regard, authority reversion may be seen as a contingent control mechanism in alliances.

We performed two additional analyses to investigate the robustness of our main results and to further explore the heterogeneity in authority delegation and reversion. Because the decisions to form a steering committee, delegate decision-making authority to it, and possibly revert authority are contingent on each other, we specified a sequential logistic regression to account for the nested structure of our data (Buis 2011, Fox 2015). This model allows us to test hypotheses across transitions between the three decision stages given that the entire model is estimated simultaneously. In our case, the model accounts for the fact that the formation of a steering committee is a necessary precondition for the delegation of authority, which in turn, precedes the choice to revert authority. Hence, the model yields the contributions of each of these three transitions. Another advantage of this model is that it accounts for potential selection issues related to the formation of a steering committee.

Table 3 presents the results of the sequential logit model estimating the probability of forming a steering committee and the probability that the steering committee has decision-making authority on any given issue as well as the probability that authority reverts to the partners in case of a deadlock. In this type of model, Models 1, 3, and 5, which contain the control variables, and then the full specifications in Models 2, 4, and 6 are estimated jointly. As before, we clustered the standard errors at both the contracting dyad level and the partner firm level. We also note that the estimates for the sequential logit model are based on a larger sample because this model also takes into account the decision to form a steering committee in the first place, and consequently, the sample for model estimation also contains alliances that have not incorporated a steering committee. The results of the sequential logit regression are largely consistent with those of the bivariate probit regression shown in Table 2.

Table 3. Sequential Logit Regression Results

	JSC formation		Authority delegation		Authority reversion	
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Research and Clinical Trials Alliance		1.33*		1.65*		3.30**
		(0.54)		(0.73)		(1.17)
Research, Clinical Trials, and Commercialization Alliance		1.09***		1.06*		2.65***
		(0.33)		(0.48)		(0.80)
Sequential Interdependence		1.35***		0.47		−0.09
		(0.24)		(0.33)		(0.45)
Reciprocal Interdependence		2.66***		1.23***		−0.88*
		(0.36)		(0.30)		(0.43)
Dedicated Investments		0.27†		0.17		0.74**
		(0.14)		(0.16)		(0.28)
Competitive Intensity		−0.84***		0.09		0.93***
		(0.13)		(0.10)		(0.15)
Technology Overlap	−0.12	−0.16	0.32**	0.26*	0.14	−0.02
	(0.12)	(0.13)	(0.12)	(0.13)	(0.16)	(0.17)
Technological Uncertainty	0.30**	0.31*	0.09	0.03	0.23	0.04
	(0.11)	(0.14)	(0.16)	(0.17)	(0.19)	(0.22)
Knowledge Stock of Client	0.06	0.10	0.14	0.14	0.15	0.17
	(0.13)	(0.14)	(0.13)	(0.14)	(0.17)	(0.17)
Knowledge Stock of Research Unit	0.05	0.10	−0.11	−0.11	−0.31†	−0.35†
	(0.12)	(0.13)	(0.15)	(0.16)	(0.17)	(0.19)
Alliance Experience of Client	0.71***	0.59***	0.13	0.01	0.17	0.22
	(0.14)	(0.14)	(0.16)	(0.17)	(0.21)	(0.23)
Alliance Experience of Research Unit	−0.34**	−0.28*	−0.11	−0.08	0.06	0.21
	(0.11)	(0.12)	(0.14)	(0.15)	(0.17)	(0.19)
Number of Prior Ties	−0.10	−0.12	0.13	0.12	−0.05	0.02
	(0.10)	(0.13)	(0.12)	(0.13)	(0.23)	(0.22)
Partner Asymmetry	0.12	0.05	0.05	0.07	−0.11	−0.06
	(0.10)	(0.12)	(0.14)	(0.15)	(0.16)	(0.17)
Crossborder Alliance	0.74***	0.89***	−0.31	−0.34	−0.25	−0.51
	(0.21)	(0.24)	(0.23)	(0.23)	(0.30)	(0.32)
Biotech-Biotech Alliance	−0.12	−0.10	−0.80	−0.76	0.92	0.56
	(0.34)	(0.43)	(0.61)	(0.63)	(0.71)	(0.76)
Equity Participation	−0.09	0.06	0.39	0.31	0.71†	0.70†
	(0.29)	(0.31)	(0.26)	(0.27)	(0.39)	(0.42)
Contract Length	1.73***	1.27***	0.56***	0.35*	0.14	0.12
	(0.27)	(0.28)	(0.17)	(0.17)	(0.14)	(0.18)
Phase fixed effects[a]	17.14*	6.664	17.14*	6.664	17.14*	6.664
Therapeutic area fixed effects[a]	114.8***	98.94***	114.8***	98.94***	114.8***	98.94***
Technology area fixed effects[a]	46.66*	39.09†	46.66*	39.09†	46.66*	39.09†
Year fixed effects[a]	49.25*	41.10†	49.25*	41.10†	49.25*	41.10†
Log likelihood	−1,150	−1,006	−1,150	−1,006	−1,150	−1,006
Wald χ^2	269***	376.6***	269***	376.6***	269***	376.6***

Notes. $n = 1{,}201$. Clustered robust standard errors are in parentheses. Models 1, 3, and 5 as well as Models 2, 4, and 6 were estimated jointly.
[a]The χ^2 values are for tests of joint significance of fixed effects.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; †$p < 0.1$.

In our main analysis, we initially focused on the binary choices of whether the steering committee has decision-making authority and whether authority can revert to the organizational hierarchy contingent on a deadlock in the steering committee. We also explored the sensitivity of our findings with regard to the subject domains of authority delegation and reversion. In particular, we distinguished three important functional activities that are central to the drug development process in the pharmaceutical industry. The first area relates to research activities. This includes the approval of the development plan or decisions relating to the prioritization of target molecules. The second area, clinical trials, refers to the arduous testing and approval process that drugs need to undergo before they can be launched in the market. Finally, commercialization refers to the production

and sale of drugs after they have received regulatory approval.

To account for this variance in the scope of decision making, we built an index ranging from zero to three, where zero means that the steering committee has no decision-making authority, one means that the steering can decide in one area, two refers to two decision-making areas, and three means that the steering committee makes decisions in all three areas. Similarly, we constructed an index from zero to three indicating for how many areas authority reverts to the hierarchy. We estimated a conditional mixed process model using two ordered probit regressions as link functions. The results are shown in Table 4 and corroborate our main analysis; the direction

Table 4. Ordered Probit Regression Results

	Degree of authority delegation		Degree of authority reversion	
Variables	Model 1	Model 2	Model 3	Model 4
Research and Clinical Trials Alliance		0.64*		0.56
		(0.30)		(0.36)
Research, Clinical Trials, and Commercialization Alliance		0.48**		0.35†
		(0.18)		(0.20)
Sequential Interdependence		0.02		−0.04
		(0.14)		(0.14)
Reciprocal Interdependence		0.41**		−0.30*
		(0.14)		(0.15)
Dedicated Investments		0.03		0.28**
		(0.08)		(0.09)
Competitive Intensity		0.05		0.22***
		(0.05)		(0.04)
Technology Overlap	0.22***	0.20***	0.05	0.03
	(0.05)	(0.06)	(0.06)	(0.06)
Technological Uncertainty	0.03	0.02	0.07	0.03
	(0.07)	(0.08)	(0.07)	(0.07)
Knowledge Stock of Client	0.00	−0.00	0.03	0.03
	(0.06)	(0.06)	(0.07)	(0.06)
Knowledge Stock of Research Unit	−0.09	−0.09	−0.14*	−0.16*
	(0.06)	(0.06)	(0.06)	(0.07)
Alliance Experience of Client	−0.01	−0.05	−0.06	−0.09
	(0.07)	(0.07)	(0.08)	(0.09)
Alliance Experience of Research Unit	−0.02	−0.01	0.02	0.05
	(0.05)	(0.06)	(0.06)	(0.07)
Number of Prior Ties	0.08	0.07	−0.01	0.00
	(0.06)	(0.06)	(0.08)	(0.08)
Partner Asymmetry	0.04	0.05	−0.00	0.02
	(0.06)	(0.06)	(0.06)	(0.07)
Crossborder Alliance	−0.15	−0.16	0.03	−0.02
	(0.10)	(0.10)	(0.11)	(0.11)
Biotech-Biotech Alliance	−0.23	−0.19	0.26	0.12
	(0.29)	(0.30)	(0.23)	(0.23)
Equity Participation	0.22†	0.18	0.27†	0.20
	(0.13)	(0.13)	(0.15)	(0.15)
Contract Length	0.24***	0.19**	0.05	0.05
	(0.06)	(0.06)	(0.06)	(0.06)
Phase fixed effects[a]	7.371	2.466	7.371	2.466
Therapeutic area fixed effects[a]	59.44**	62.49***	59.44**	62.49***
Technology area fixed effects[a]	44.02***	41.70**	44.02***	41.70**
Year fixed effects[a]	45.95***	55.02***	45.95***	55.02***
Log likelihood	−1,350	−1,313	−1,350	−1,313
Wald χ^2	463.8***	802.1***	463.8***	802.1***

Notes. $n = 632$. Clustered robust standard errors are in parentheses. Models 1 and 3 as well as Models 2 and 4 were estimated jointly.
[a]The χ^2 values are for tests of joint significance of fixed effects.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; †$p < 0.1$.

and significance for the coefficients of the main variables are in line with the bivariate probit estimation results in Table 2 and show the same or stronger statistical significance.

For a more differentiated examination of the delegation and reversion of authority in alliances, we estimated disaggregate models that permit investigation of the locus of delegated authority for the three main functional areas (e.g., research, clinical trials, commercialization) using separate sequential logit models. For each nested model, the two dependent variables take the value of one if authority for a given functional area is delegated or reverted and zero otherwise. The estimation results appear in Table 5 and are generally consistent with our main analysis for research activities and clinical trials. However, we find that for commercialization activities, our proxies for alliance scope and dedicated investments yield insignificant results. A plausible explanation for these findings is that the coordination and control considerations we have highlighted for upstream activities become less salient for downstream activities when the uncertainties related to drug development are mostly resolved and the parties can rely on more standardized and highly regulated processes to commercialize the product (Dunlap-Hinkler et al. 2010).

A potential threat to the validity of our arguments relates to omitted variable bias. Despite our extensive control structure, there could be unobserved factors that simultaneously drive our independent and dependent variables. To test whether an omitted variable, if included in the regression, would overturn our results, we followed previous studies and estimated the degree to which an omitted variable would need to correlate with our main independent and dependent variables to invalidate the inferences in the foregoing discussion (Frank 2000, Gamache et al. 2019). To implement this so-called impact threshold of confounding variables (ITCV) test, we used two probit regressions, one for each dependent variable, and otherwise, implemented the model shown in Table 2. According to the results, an omitted variable would have to be correlated at 0.392 or higher with *authority delegation* and the alliance scope variable *research and clinical trials alliance* to invalidate our inference using a 5% significance threshold. Similarly, an omitted variable would have to show a correlation of 0.351 or higher with *reciprocal interdependence* and *authority delegation* to overturn our results. Because the highest correlation among our control variables related to authority delegation is 0.16 (*contract length*), it seems unlikely that an unobserved variable would change our results to such an extent that our conclusions with regard to the main effects of alliance scope and interdependence would become invalid. However, our second proxy for alliance scope, *research and clinical trials and commercialization alliance*, shows less stability, and an omitted variable would only need to exhibit a correlation of 0.181 to invalidate our inference relative to the omitted category of pure research agreements.

Turning to authority reversion, the ITCV test indicates that an omitted variable would have to correlate at 0.204 with *authority reversion* and *dedicated investments* to invalidate the inference. With regard to *competitive intensity*, the correlation would have to be at 0.535. The highest observed correlation among the control variables is *contract length*, which has a correlation of 0.09 with authority reversion and correlations of 0.26 and 0.06 with *dedicated investments* and *competitive intensity*, respectively. These findings provide additional confidence that the results presented are not spurious.

Discussion

In this paper, we aimed to unpack some of the sophisticated administrative control instruments firms use in alliances. More specifically, we sought to understand the conditions that determine when alliance partners delegate decision-making authority to administrative interfaces and the conditions that shape when decision-making authority is reverted back to one of the partner firms. Previous literature has shown that administrative interfaces in the form of steering committees are contractually designed to enhance coordinated adaptation (e.g., Reuer and Devarakonda 2016, Devarakonda and Reuer 2018). However, steering committees can be impeded by deadlocks because of divergent views of partners, thus impairing the efficient execution of alliances. Such divergence arises naturally in organizational decision making, but conventional organizations have a built-in remedy in the form of escalation to the top of the organization where formal authority resides and fiat is exercised (Baker et al. 1999). By contrast, administrative interfaces in alliances owe their provenance to the contract and are instruments of the contract. Accordingly, it is essential that the contract design also contemplates the escalation mechanisms that redirect authority away from the steering committee when required, thus providing a self-contained remedy (Williamson 1991). Doing so can help parties avert disagreements that stall collaborative activities and potentially mutate into full-blown conflicts that require costly third-party intervention.

Just as authority delegation to administrative interfaces is a carefully crafted governance mechanism, so too is authority reversion with its unique trade-offs. Drawing on organizational economics, we suggested that the net benefit calculation turns on two opposing considerations; although reversion provisions may lower disagreement costs, they may result in the loss of initiative for the steering committee to sustain the alliance along an efficient path. An indiscriminate inclusion of reversion provisions can upset this balance and render the steering committee ineffective in fulfilling its coordinated adaptation function.

Table 5. Disaggregate Sequential Logit Regression Results

	Research						Clinical trials						Commercialization					
	JSC formation		Authority delegation		Authority reversion		JSC formation		Authority delegation		Authority reversion		JSC formation		Authority delegation		Authority reversion	
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Research and Clinical Trials Alliance		1.36* (0.54)		1.74* (0.77)		1.87† (1.09)		1.35* (0.54)		1.90† (0.97)		5.64* (2.49)		1.34* (0.55)		−0.13 (1.08)		45.74 (38.70)
Research, Clinical Trials, and Commercialization Alliance		1.10*** (0.33)		1.08* (0.51)		1.90** (0.73)		1.11*** (0.33)		1.72** (0.64)		6.50*** (1.77)		1.10*** (0.33)		0.93 (0.74)		36.29 (147.81)
Sequential Interdependence		1.34*** (0.24)		0.32 (0.35)		0.19 (0.50)		1.34*** (0.24)		0.19 (0.35)		−2.04* (0.83)		1.35*** (0.24)		−0.04 (0.44)		−2.95* (1.37)
Reciprocal Interdependence		2.65*** (0.36)		0.95** (0.32)		−0.54 (0.47)		2.65*** (0.36)		0.89** (0.33)		−2.60** (0.92)		2.66*** (0.35)		1.54*** (0.42)		−3.11* (1.48)
Dedicated Investments		0.27* (0.14)		0.23 (0.18)		0.73* (0.30)		0.26† (0.14)		0.01 (0.17)		0.69* (0.32)		0.26† (0.14)		−0.03 (0.19)		0.56 (0.67)
Competitive Intensity		−0.84*** (0.13)		0.12 (0.10)		0.72*** (0.15)		−0.82*** (0.13)		−0.03 (0.13)		1.05*** (0.22)		−0.82*** (0.13)		−0.06 (0.15)		1.38*** (0.42)
Technology Overlap	−0.12 (0.12)	−0.16 (0.13)	0.37** (0.13)	0.31* (0.14)	0.10 (0.17)	−0.02 (0.18)	−0.12 (0.12)	−0.16 (0.13)	0.44** (0.14)	0.41** (0.14)	0.05 (0.24)	0.02 (0.26)	−0.12 (0.12)	−0.16 (0.13)	0.48** (0.17)	0.47** (0.18)	0.85* (0.35)	1.39* (0.61)
Technological Uncertainty	0.30** (0.11)	0.32* (0.13)	0.37* (0.16)	0.31† (0.17)	0.48* (0.22)	0.41† (0.23)	0.30** (0.11)	0.32* (0.14)	0.10 (0.16)	0.07 (0.17)	−0.08 (0.30)	0.02 (0.30)	0.30** (0.11)	0.31* (0.14)	−0.25 (0.18)	−0.27 (0.20)	0.00 (0.40)	−0.23 (0.55)
Knowledge Stock of Client	0.07 (0.13)	0.10 (0.15)	0.17 (0.13)	0.17 (0.14)	−0.00 (0.18)	−0.02 (0.19)	0.06 (0.13)	0.09 (0.15)	−0.14 (0.17)	−0.14 (0.17)	0.10 (0.23)	−0.03 (0.29)	0.07 (0.13)	0.10 (0.15)	−0.04 (0.16)	−0.06 (0.18)	0.33 (0.36)	0.34 (0.39)
Knowledge Stock of Research Unit	0.05 (0.11)	0.09 (0.13)	−0.02 (0.15)	−0.01 (0.15)	−0.42* (0.18)	−0.43* (0.20)	0.05 (0.12)	0.10 (0.13)	−0.14 (0.15)	−0.12 (0.15)	−0.35 (0.26)	−0.33 (0.29)	0.05 (0.12)	0.10 (0.13)	−0.28† (0.16)	−0.25 (0.18)	−0.81* (0.37)	−1.29* (0.57)
Alliance Experience of Client	0.71*** (0.14)	0.60*** (0.14)	0.21 (0.16)	0.09 (0.17)	0.28 (0.21)	0.33 (0.22)	0.71*** (0.14)	0.60*** (0.14)	0.03 (0.18)	−0.04 (0.18)	0.02 (0.30)	0.27 (0.35)	0.70*** (0.14)	0.58*** (0.14)	−0.12 (0.17)	−0.28 (0.19)	0.26 (0.41)	0.38 (0.59)
Alliance Experience of Research Unit	−0.34** (0.11)	−0.27* (0.12)	−0.25† (0.13)	−0.22 (0.14)	0.15 (0.21)	0.24 (0.23)	−0.35** (0.11)	−0.28* (0.12)	−0.13 (0.15)	−0.12 (0.15)	0.04 (0.29)	0.08 (0.33)	−0.35** (0.11)	−0.28* (0.12)	0.05 (0.16)	0.02 (0.17)	0.21 (0.40)	0.37 (0.64)
Number of Prior Ties	−0.10 (0.10)	−0.12 (0.12)	0.10 (0.12)	0.10 (0.13)	0.02 (0.23)	0.05 (0.22)	−0.10 (0.10)	−0.12 (0.13)	0.06 (0.12)	0.04 (0.12)	0.12 (0.25)	0.05 (0.27)	−0.10 (0.11)	−0.12 (0.13)	0.26 (0.16)	0.20 (0.15)	−0.39 (0.30)	−0.72† (0.38)
Partner Asymmetry	0.12 (0.10)	0.05 (0.12)	0.01 (0.14)	0.04 (0.15)	0.00 (0.18)	0.01 (0.20)	0.12 (0.10)	0.05 (0.12)	0.27† (0.15)	0.29† (0.16)	0.18 (0.33)	0.24 (0.44)	0.12 (0.10)	0.07 (0.12)	−0.09 (0.17)	−0.07 (0.19)	−0.54 (0.38)	−0.32 (0.50)
Crossborder Alliance	0.74*** (0.21)	0.89*** (0.24)	−0.27 (0.23)	−0.32 (0.23)	−0.02 (0.31)	−0.13 (0.32)	0.74*** (0.22)	0.89*** (0.24)	−0.28 (0.24)	−0.32 (0.25)	−0.36 (0.50)	−0.45 (0.55)	0.74*** (0.21)	0.89*** (0.24)	−0.04 (0.27)	−0.07 (0.28)	−2.01*** (0.60)	−2.68** (0.93)
Biotech-Biotech Alliance	−0.13 (0.34)	−0.13 (0.42)	−0.99† (0.60)	−1.01 (0.63)	1.10 (0.77)	0.73 (0.79)	−0.11 (0.34)	−0.11 (0.42)	−0.10 (0.54)	0.03 (0.56)	2.69** (0.87)	2.64* (1.05)	−0.15 (0.35)	−0.15 (0.43)	−0.16 (0.63)	0.07 (0.65)	1.60 (1.01)	1.15 (1.24)
Equity participation	−0.10 (0.29)	0.05 (0.31)	0.48† (0.27)	0.39 (0.28)	0.76* (0.38)	0.77* (0.39)	−0.11 (0.29)	0.03 (0.31)	0.12 (0.33)	0.07 (0.34)	2.09*** (0.62)	2.20** (0.74)	−0.10 (0.29)	0.05 (0.30)	0.62† (0.34)	0.51 (0.33)	1.77** (0.55)	1.71** (0.65)
Contract length	1.73*** (0.27)	1.28*** (0.27)	0.53** (0.16)	0.35* (0.17)	0.03 (0.14)	−0.03 (0.16)	1.75*** (0.28)	1.30*** (0.29)	0.51*** (0.14)	0.38* (0.15)	0.09 (0.23)	−0.09 (0.28)	1.73*** (0.28)	1.28*** (0.28)	0.73*** (0.16)	0.52** (0.16)	0.06 (0.23)	0.11 (0.24)

Table 5. (Continued)

Variables	Research						Clinical trials						Commercialization					
	JSC formation		Authority delegation		Authority reversion		JSC formation		Authority delegation		Authority reversion		JSC formation		Authority delegation		Authority reversion	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18
Phase fixed effects[a]	20.35*	8.865	20.35*	8.865	20.35*	8.865	21.54*	10.28	21.54*	10.28	21.54*	10.28	19.71*	13.60	19.71*	13.60	19.71*	13.60
Therapeutic area fixed effects[a]	149.5***	136.2***	149.5***	136.2***	149.5***	136.2***	126.2***	130.1***	126.2***	130.1***	126.2***	130.1***	180.2***	228.5***	180.2***	228.5***	180.2***	228.5***
Technology area fixed effects[a]	66.65***	55.78***	66.65***	55.78***	66.65***	55.78***	65.40***	64.86***	65.40***	64.86***	65.40***	64.86***	41.99*	47.46**	41.99*	47.46**	41.99*	47.46**
Year fixed effects[a]	57.15**	52.82**	57.15**	52.82**	57.15**	52.82**	84.49***	68.02***	84.49***	68.02***	84.49***	68.02***	58.31**	79.46***	58.31**	79.46***	58.31**	79.46***
Log likelihood	−1,121	−995	−1,121	−995	−1,121	−995	−984.7	−866.8	−984.7	−866.8	−984.7	−866.8	−924.9	−793.7	−924.9	−793.7	−924.9	−793.7
Wald χ^2	270.5***	377.3***	270.5***	377.3***	270.5***	377.3***	267.4***	369.7***	267.4***	369.7***	267.4***	369.7***	263***	369***	263***	369***	263***	369***

Notes. n = 1,201. Clustered robust standard errors are in parentheses. The respective Models 1, 3, and 5; 2, 4, and 6; 7, 9, and 11; 8, 10, and 12; 13, 15, and 17; and 14, 16, and 18 were estimated jointly.

[a]The χ^2 values are for tests of joint significance of fixed effects.

$^*p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^{+}p < 0.1$.

The conditions that tilt the net benefits in favor of reversion derive from features of steering committees that inherently limit them (i.e., they are consensus-driven bodies with limited information processing capacity). These features of steering committees serve them well when decisions are localized to the alliance context but also constrain committees when broader risks and costs from decision impasses are involved. To the extent that the alliance setting demands balancing localized bilateral coordination needs along with firm-wide ramifications of decisions, authority reversion is indicated.

We built on this underlying tension shaping administrative controls and the structural interfaces supporting alliances to understand the mechanisms underlying authority delegation and reversion. Our empirical results support the core idea that authority delegation and reversion are driven by two considerations. On the one hand, we find that alliance partners tend to delegate decision-making authority to the steering committee when coordination considerations become more important. On the other hand, our results also show that partners are more inclined to allow for the reversion of authority when decision externalities raise the stakes and stalemates become costly.

This paper joins recent advances in alliance research, which have highlighted the benefits of dedicated administrative structures in facilitating coordinated adaptation in strategic alliances (Reuer and Devarakonda 2016, Devarakonda and Reuer 2018). We build upon and extend this line of research by drawing attention to the fact that steering committees can come at the cost of potentially lengthy decision making and the risk of deadlock, as the steering committee operates outside the established unified chains of command of the partner organizations. As a result, alliance partners are challenged to provide a means of overcoming impasses that could potentially jeopardize the adaptation benefits offered by steering committees. Our findings suggest that the ability to withdraw and shift decision-making authority in certain situations can be one such mechanism. As such, we highlight contractually specified authority reversion as a mechanism to simulate hierarchical fiat in a hybrid form of governance, where fiat is otherwise absent. In addition, our study also differentiates and explains the heterogeneous nature of steering committees, which could form the basis for more nuanced perspectives on administrative controls that can be integrated into contractual alliances as well as on the consequences of alliance governance (Hoetker and Mellewigt 2009, Devarakonda and Reuer 2018). Alliance research has long suggested that governance in the case of nonequity alliances is largely a matter of devising appropriate incentives, where administrative controls become available in the case of equity alliances, such as joint ventures that feature separate organizations with dedicated boards of directors (e.g., Oxley 1997). Our theory and evidence on the benefits, and limits, of authority

delegation to administrative structural interfaces in alliances highlight the sophisticated instruments of administrative control that are available to partners forging nonequity alliances.

Our findings, therefore, emphasize the complexity as well as richness of formal governance supports upon which collaborators rely, and we emphasize that they can creatively and effectively draw upon different auxiliary legal regimes and institutions. For instance, in alliances as hybrid organizational forms, not only can partners resort to third-party adjudication by arbitration (from the neoclassical contract law tradition), they can also rely on formal contractual provisions and the shadow of litigation (from the classical contract law tradition) as well as institute internal dispute resolution machinery and the contingent use of fiat (from the forbearance tradition) that is more commonly associated with organizational hierarchies (Williamson 1991). We therefore submit that firms are not limited to the governance solutions commonly associated with the discrete governance structures arrayed along the markets-hierarchies continuum. Rather, they can pick and mix from a varied array of governance regimes, and there is substantial scope for bespoke arrangements to enhance the adaptive capacity of alliances. We delved into one mechanism but consider it as a promising avenue for future research to examine other ways that alliance partners might address unanticipated contingencies, incipient disputes, and coordination challenges, whether through contingency planning or the development of other processes and procedures (Palay 1984, Mayer and Argyres 2004, Argyres et al. 2007). For example, it would be interesting to examine the contractual delegation of authority, and the potential for authority reversion, alongside other means of dealing with disputes, whether termination rights (e.g., Lerner and Malmendier 2010, Weber et al. 2011) or resorting to intervention by third parties, such as arbitral tribunals or the court system (e.g., Bonn 1972, Lumineau and Oxley 2012). Such work could also investigate how firms learn to craft and execute complex formal agreements involving these governance mechanisms and determine the extent to which firms are able to push out the adaptation limits of alliances as hybrid organizational forms (Ryall and Sampson 2009, Vanneste and Puranam 2010).

We see the current paper as an essential step in our understanding of how authority instruments can be crafted in forms of governance outside the conventional hierarchy of the firm (Sengul et al. 2012, Dobrajska et al. 2015). Given the interest in examining decision rights in a broad range of other types of economic exchanges, such as franchising (Arruñada et al. 2001), joint ventures (Groot and Merchant 2000, Johnson et al. 2002), and venture capital (Kaplan and Strömberg 2003), it would be valuable to investigate the locus of delegated authority in these and other interorganizational relationships. For instance, veto rights are negotiated in joint ventures (Hewitt 2005, Shishido et al. 2015, Singleton 2017), where expectations for consensus tend to be lower given that unequal representation on boards is common and partners have residual control rights. Although some research has looked at coordination and control mechanisms in joint ventures (Mjoen and Tallman 1997, Kumar and Seth 1998, Reuer et al. 2014), the question of authority delegation and reversion seems intriguing in the context of joint ventures where board and equity structures provide an additional layer of administrative control, and firms may still opt for steering committees and other structures to achieve coordination benefits. Studying the interdependencies between equity stakes, boards, and steering committees might reveal new insights into the structural features of these collaborative arrangements as well as the substitutive and/or complementary nature of different governance mechanisms. More broadly, this suggests an opportunity to advance understanding and theory about authority in various interorganizational settings other than the specific context of our research.

Future research could build upon this study in many fruitful ways, and we close by highlighting several attractive possibilities. In this paper, we focus on the specific context of the biopharmaceutical industry, which is characterized by a high intensity of collaboration between actors along the pharmaceutical value chain. However, the increasing frequency of collaboration along the value chain is not unique to the biopharmaceutical industry but can also be observed in many other industries, such as software and automotive. The trade-offs we examine are grounded in the real costs and the opportunity costs firms face when developing and taking new technologies to market. These trade-offs are not unique to the biotechnology industry but are present in several sectors (e.g., semiconductors, information technology, etc.) where product and process development concerns vie with time-to-market concerns (e.g., Macher 2006). Although we believe our findings are generalizable beyond the biopharmaceutical context, we consider it worthwhile to explore other industry contexts, such as information technology, where coordination concerns and pressures to make timely decisions may be different (Elfenbein and Lerner 2003) to gain a more nuanced view on potential boundary conditions on the determinants of contractual delegation and reversion of authority. In particular, industries with high "clock speed" (Nadkarni and Narayanan 2007), such as semiconductors, may be under increased pressure to adapt in the face of rapid innovation and therefore, opt for authority reversion by default. Therefore, it would be interesting to examine competitive dynamics in a crossindustry setting that exhibits more variance and likely more diverse governance choices.

Moreover, we focus on the case of dyadic relationships. Yet, the problems of joint decision making and potential

deadlocks are exacerbated in multipartner settings, which might require more sophisticated forms of administrative control structures to deal with the lack of fiat inherent to nonequity relationships (Li et al. 2012). Considerations surrounding the appropriate bilateral and trilateral dispute resolution mechanisms can also magnify in international contexts (Pinkham and Peng 2017), so future research that devotes attention to the institutional contexts of collaboration would be worthwhile as well. This line of research could also be linked to the emerging literature on ecosystem governance (Jacobides et al. 2018) and network-level digital governance (Goldsby and Hanisch 2022, Hanisch et al. 2023) to examine how incumbents orchestrate governance across a large number of partner firms and how these governance structures are interconnected and linked to cope with the complementary, systemic nature of technology developments. Understanding where firms locate decision-making authority in interfirm networks could not only advance governance theory but also contribute to a better understanding of the theory of the firm more generally.

Extending the ideas in this paper, future research could delve into the implications of the locus of delegated authority in alliances whether for innovation or other performance outcomes (e.g., Hoetker and Mellewigt 2009, Hoang and Rothaermel 2010) or for more proximate outcomes, such as trust and the continuity of relationships (e.g., Faems et al. 2008). Such work could investigate not only whether certain authority structures enhance the coordinated adaptation of alliances but also, whether and when they are subject to certain inefficiencies compared with fiat and hierarchical governance or other means of resolving disputes through third-party intervention. For example, we would expect that steering committees with more extensive authority would positively influence joint R&D outcomes in general but perhaps at the cost of slower decision-making processes in the event that disturbances arise. Along related lines, given that we have examined the degree to which authority is contractually delegated to steering committees and the contingent reversion of authority is granted in contracts, it would be valuable to conduct fieldwork on alliance implementation in order to be able to examine the actual decision making by steering committees, the roles of particular members, the degree to which deadlock occurs, whether authority is actually reverted to partners in particular decision domains, and whether any incentive consequences of the potential for reversion shape cooperation in alliances. Research in directions such as these could contribute new insights on the rich array of governance mechanisms firms might use to support their technology partnerships and alliances more generally.

Acknowledgments

The authors acknowledge the helpful comments of Senior Editor Metin Sengul, three anonymous reviewers, and participants at the Academy of Management Annual Meeting and Strategic Management Society Conference as well as seminar participants at the University of Passau and Tilburg University. The authors would also like to thank Mark Edwards and Inna Shtargot for providing access to the contract database of BioScience Advisors, which is now part of Evaluate Ltd.

Endnotes

[1] For consistency with our theoretical foundation of transaction cost theory, we studied only the choice between authority reversion and trilateral dispute resolution but did not consider the assignment of final decision-making rights to one partner versus another. In interviews with practitioners leading up to the study, we were told that final decision-making authority typically rests with the more technically competent or experienced partner. In our sample, in 67.3% of the cases, authority reverts to the client firm. That allocation may also depend on the nature of the activity. For example, in research activities, it is common for the research unit to have the final say, whereas in commercialization activities, it is the client firm. The partner-specific allocation of authority reversion could be an interesting opportunity for future research. For instance, the property rights approach (e.g., Grossman and Hart 1986, Hart and Moore 1990, Elfenbein and Lerner 2012, Haeussler and Higgins 2014) could highlight new considerations that shape decision rights allocations, such as differential marginal productivities in various alliance activities.

[2] Alternatively, we also considered a continuous measure of alliance scope by summing the binary indicators for each activity covered by the alliances (i.e., research + clinical trials + commercialization). Although this measure increases the variance of the variable and combines the binary indicators into a single measure, it also implicitly assumes that each activity contributes equally to the alliance scope. Because some activities may have a greater impact on scope than others (i.e., they are not equidistant), we decided to use the binary indicators in the main results.

[3] We identified technology classes through the data provided by BioScience Advisors and complemented missing data after consulting industry experts, who helped us refine the original classification from BioScience Advisors. The 13 categories are as follows: activators/inhibitors, antimicrobial, chemotherapy, devices, diagnosis/targeting, genes, stem cell therapy, hormones, immunotherapy, implantation, topical agents, vaccines, and vectors. Similar to the identification of technology classes, we obtained the following 20 therapeutic classes: cardiovascular conditions, dermatological conditions, digestive diseases, endocrinological disorders, eye conditions, genetic disorders, genitourinary disorders, immunological disorders, infectious-bacterial diseases, infectious-fungal diseases, infectious-viral diseases, inflammatory response, mental and behavioral disorders, metabolic disorders, musculoskeletal disorders, neoplasms, neurological disorders, nutritional diseases, pain, and respiratory conditions.

References

Aggarwal VA, Wu B (2015) Organizational constraints to adaptation: Intrafirm asymmetry in the locus of coordination. *Organ. Sci.* 26(1):218–238.

Aghion P, Tirole J (1997) Formal and real authority in organizations. *J. Political Econom.* 105(1):1–29.

Albers S, Wohlgezogen F, Zajac EJ (2016) Strategic alliance structures: An organization design perspective. *J. Management* 42(3):582–614.

Argyres NS, Silverman BS (2004) R&D, organization structure, and the development of corporate technological knowledge. *Strategic Management J.* 25(89):929–958.

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

Arora A, Gambardella A, Magazzini L, Pammolli F (2009) A breath of fresh air? Firm type, scale, scope, and selection effects in drug development. *Management Sci.* 55(10):1638–1653.

Arruñada B, Garicano L, Vázquez L (2001) Contractual allocation of decision rights and incentives: The case of automobile distribution. *J. Law Econom. Organ.* 17(1):257–284.

Azoulay P (2004) Capturing knowledge within and across firm boundaries: Evidence from clinical development. *Amer. Econom. Rev.* 94(5):1591–1612.

Baker GP, Gibbons R, Murphy KJ (1999) Informal authority in organizations. *J. Law Econom. Organ.* 15(1):56–73.

Bester H (2009) Externalities, communication and the allocation of decision rights. *Econom. Theory* 41(2):269–296.

Bloom N, Schankerman M, van Reenen J (2013) Identifying technology spillovers and product market rivalry. *Econom. J.* 81(4):1347–1393.

Bonn RL (1972) Arbitration: An alternative system for handling contract related disputes. *Admin. Sci. Quart.* 17(2):254–264.

Borys B, Jemison DB (1989) Hybrid arrangements as strategic alliances: Theoretical issues in organizational combinations. *Acad. Management Rev.* 14(2):234–249.

Bourgeois LJ III, Eisenhardt KM (1988) Strategic decision processes in high velocity environments: Four cases in the microcomputer industry. *Management Sci.* 34(7):816–835.

Buis ML (2011) The consequences of unobserved heterogeneity in a sequential logit model. *Res. Soc. Stratification Mobility* 29(3):247–262.

Byun H, Frake J, Agarwal R (2018) Leveraging who you know by what you know: Specialization and returns to relational capital. *Strategic Management J.* 39(7):1803–1833.

Carson SJ, Madhok A, Wu T (2006) Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Acad. Management J.* 49(5):1058–1077.

Chan T, Nickerson JA, Owan H (2007) Strategic management of R&D pipelines with cospecialized investments and technology markets. *Management Sci.* 53(4):667–682.

Cockburn I, Henderson RM (1994) Racing to invest? The dynamics of competition in ethical drug discovery. *J. Econom. Management Strategy* 3(3):481–519.

Cockburn IM, Henderson RM (2001) Scale and scope in drug development: Unpacking the advantages of size in pharmaceutical research. *J. Health Econom.* 20(6):1033–1057.

Crama P, Reyck BD, Degraeve Z (2008) Milestone payments or royalties? Contract design for R&D licensing. *Oper. Res.* 56(6):1539–1552.

Das TK, Teng B-S (1999) Managing risks in strategic alliances. *Acad. Management Perspect.* 13(4):50–62.

Day DV, Lord RG (1992) Expertise and problem categorization: The role expert processing in organizational sense-making. *J. Management Stud.* 29(1):35–47.

Dekker HC (2004) Control of inter-organizational relationships: Evidence on appropriation concerns and coordination requirements. *Accounting Organ. Soc.* 29(1):27–49.

Demsetz H (1988) The theory of the firm revisisted. *J. Law Econom. Organ.* 4(1):141–161.

Devarakonda SV, Reuer JJ (2018) Knowledge sharing and safeguarding in R&D collaborations: The role of steering committees in biotechnology alliances. *Strategic Management J.* 39(7):1912–1934.

DiMasi JA (2002) The value of improving the productivity of the drug development process: Faster times and better decisions. *PharmacoEconomics* 20(3):1–10.

DiMasi JA, Grabowski HG (2007) The cost of biopharmaceutical R&D: Is biotech different? *Managerial Decision Econom.* 28(4–5): 469–479.

DiMasi JA, Feldman L, Seckler A, Wilson A (2010) Trends in risks associated with new drug development: Success rates for investigational drugs. *Clinical Pharmacology Therapeutics* 87(3):272–277.

Ding M, Eliashberg J (2002) Structuring the new product development pipeline. *Management Sci.* 48(3):343–363.

Dobrajska M, Billinger S, Karim S (2015) Delegation within hierarchies: How information processing and knowledge characteristics influence the allocation of formal and real decision authority. *Organ. Sci.* 26(3):687–704.

Dunlap-Hinkler D, Kotabe M, Mudambi R (2010) A story of breakthrough vs. incremental innovation: Corporate entrepreneurship in the global pharmaceutical industry. *Strategic Entrepreneurship J.* 4(2):106–127.

Eisenhardt KM (1989) Making fast strategic decisions in high-velocity environments. *Acad. Management J.* 32(3):543–576.

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

Elfenbein DW, Lerner J (2012) Exclusivity, contingent control rights, and the design of internet portal alliances. *J. Law Econom. Organ.* 28(1):45–76.

Ethiraj SK, Zhou YM (2019) Fight or flight? Market positions, submarket interdependencies, and strategic responses to entry threats. *Strategic Management J.* 40(10):1545–1569.

Faems D, Janssens M, Madhok A, van Looy B (2008) Toward an integrative perspective on alliance governance: Connecting contract design, trust dynamics, and contract application. *Acad. Management J.* 51(6):1053–1078.

Fama EF, Jensen MC (1983) Separation of ownership and control. *J. Law Econom.* 26(2):301–325.

Foss NJ, Weber L (2016) Moving opportunism to the back seat: Bounded rationality, costly conflict, and hierarchical forms. *Acad. Management Rev.* 41(1):61–79.

Fox J (2015) *Applied Regression Analysis and Generalized Linear Models*, 3rd ed. (SAGE Publications, Thousand Oaks, CA).

Frank KA (2000) Impact of a confounding variable on a regression coefficient. *Sociol. Methods Res.* 29(2):147–194.

Galbraith JK (1973) Power and the useful economist. *Amer. Econom. Rev.* 63(1):1–11.

Gamache DL, McNamara G, Graffin SD, Kiley JT, Haleblian J, Devers CE (2019) Impression offsetting as an early warning signal of low CEO confidence in acquisitions. *Acad. Management J.* 62(5):1307–1332.

Garicano L (2000) Hierarchies and the organization of knowledge in production. *J. Political Econom.* 108(5):874–904.

Garicano L, Wu Y (2012) Knowledge, communication, and organizational capabilities. *Organ. Sci.* 23(5):1382–1397.

Girotra K, Terwiesch C, Ulrich KT (2007) Valuing R&D projects in a portfolio: Evidence from the pharmaceutical industry. *Management Sci.* 53(9):1452–1466.

Goldsby CM, Hanisch M (2022) The boon and bane of blockchain: Getting the governance right. *Calif. Management Rev.* 64(3):141–168.

Grabowski HG, Vernon JA (1986) Longer patents for lower imitation barriers: The 1984 Drug Act. *Amer. Econom. Rev.* 76(2):195–198.

Groot TL, Merchant KA (2000) Control of international joint ventures. *Accounting Organ. Soc.* 25(6):579–607.

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

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

Gulati R, Singh H (1998) The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Admin. Sci. Quart.* 43(4):781–814.

Gulati R, Lawrence PR, Puranam P (2005) Adaptation in vertical relationships: Beyond incentive conflict. *Strategic Management J.* 26(5):415–440.

Haeussler C, Higgins MJ (2014) Strategic alliances: Trading ownership for capabilities. *J. Econom. Management Strategy* 23(1):178–203.

Hagedoorn J (2002) Inter-firm R&D partnerships: An overview of major trends and patterns since 1960. *Res. Policy* 31(4):477–492.

Hagedoorn J, Link AN, Vonortas NS (2000) Research partnerships. *Res. Policy* 29(4–5):567–586.

Hanisch M, Goldsby CM, Fabian NE, Oehmichen J (2023) Digital governance: A conceptual framework and research agenda. *J. Bus. Res.* 162:1–13.

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

Hart OD, Moore J (2008) Contracts as reference points. *Quart. J. Econom.* 123(1):1–48.

Henderson RM, Jaffe AB, Trajtenberg M (1998) Universities as a source of commercial technology: A detailed analysis of university patenting, 1965–1988. *Rev. Econom. Statist.* 80(1):119–127.

Hewitt I (2005) *Joint Ventures*, 3rd ed. (Sweet & Maxwell, London).

Hoang H, Rothaermel FT (2005) The effect of general and partner-specific alliance experience on joint R&D project performance. *Acad. Management J.* 48(2):332–345.

Hoang H, Rothaermel FT (2010) Leveraging internal and external experience: Exploration, exploitation, and R&D project performance. *Strategic Management J.* 20(3):734–758.

Hoetker G (2005) How much you know vs. how well I know you: Selecting a supplier for a technically innovative component. *Strategic Management J.* 26(1):75–96.

Hoetker G, Mellewigt T (2009) Choice and performance of governance mechanisms: Matching alliance governance to asset type. *Strategic Management J.* 30(10):1025–1044.

Inkpen AC (2000) A note on the dynamics of learning alliances: Competition, cooperation, and relative scope. *Strategic Management J.* 21(7):775–779.

Jacobides MG, Cennamo C, Gawer A (2018) Toward a theory of ecosystems. *Strategic Management J.* 39(8):2255–2276.

Jaffe AB (1986) Technological opportunity and spillovers of R&D: Evidence from firms' patents, profits, and market value. *Amer. Econom. Rev.* 76(5):984–1001.

Johnson JP, Korsgaard MA, Sapienza HJ (2002) Perceived fairness, decision control, and commitment in international joint venture management teams. *Strategic Management J.* 23(12):1141–1160.

Kale P, Singh H (2009) Managing strategic alliances: What do we know now, and where do we go from here? *Acad. Management Perspect.* 23(3):45–62.

Kaplan SN, Strömberg P (2003) Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *Rev. Econom. Stud.* 70(2):281–315.

Khanna T (1998) The scope of alliances. *Organ. Sci.* 9(3):340–355.

Khanna T, Gulati R, Nohria N (1998) The dynamics of learning alliances: Competition, cooperation, and relative scope. *Strategic Management J.* 19(3):193–210.

Kogut B (1989) The stability of joint ventures: Reciprocity and competitive rivalry. *J. Indust. Econom.* 38(2):183–198.

Kotha R, Crama P, Kim PH (2018) Experience and signaling value in technology licensing contract payment structures. *Acad. Management J.* 61(4):1307–1342.

Kownatzki M, Walter J, Floyd SW, Lechner C (2013) Corporate control and the speed of strategic business unit decision making. *Acad. Management J.* 56(5):1295–1324.

Krieger JL (2021) Trials and terminations: Learning from competitors' R&D failures. *Management Sci.* 67(9):5525–5548.

Kumar S, Seth A (1998) The design of coordination and control mechanisms for managing joint venture-parent relationships. *Strategic Management J.* 19(6):579–599.

Lerner J, Malmendier U (2010) Contractibility and the design of research agreements. *Amer. Econom. Rev.* 100(1):214–246.

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

Lerner J, Shane H, Tsai A (2003) Do equity financing cycles matter? Evidence from biotechnology alliances. *J. Financial Econom.* 67(3): 411–446.

Li D, Eden L, Hitt MA, Ireland RD (2008) Friends, acquaintances, or strangers? Partner selection in R&D alliances. *Acad. Management J.* 51(2):315–334.

Li D, Eden L, Hitt MA, Ireland RD, Garrett RP (2012) Governance in multilateral R&D alliances. *Organ. Sci.* 23(4):1191–1210.

Lui SS-Y, Ngo H (2004) The role of trust and contractual safeguards on cooperation in non-equity alliances. *J. Management* 30(4):471–485.

Lumineau F, Oxley JE (2012) Let's work it out (or we'll see you in court): Litigation and private dispute resolution in vertical exchange relationships. *Organ. Sci.* 23(3):820–834.

Macher JT (2006) Technological development and the boundaries of the firm: A knowledge-based examination in semiconductor manufacturing. *Management Sci.* 52(6):826–843.

Marshall G, Parra Á (2019) Innovation and competition: The role of the product market. *Internat. J. Indust. Organ.* 65:221–247.

Masten SE, Crocker KJ (1985) Efficient adaptation in long-term contracts: Take-or-pay provisions for natural gas. *Amer. Econom. Rev.* 75(5):1083–1093.

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

Mjoen H, Tallman SB (1997) Control and performance in international joint ventures. *Organ. Sci.* 8(3):257–274.

Nadkarni S, Narayanan VK (2007) Strategic schemas, strategic flexibility, and firm performance: The moderating role of industry clockspeed. *Strategic Management J.* 28(3):243–270.

Narayanan S, Balasubramanian S, Swaminathan JM (2009) A matter of balance: Specialization, task variety, and individual learning in a software maintenance environment. *Management Sci.* 55(11): 1861–1876.

Needleman P (2001) The IRI medalist's address: From a twinkle in the eye to a blockbuster drug. *Res. Tech. Management* 44(6): 38–41.

Nickerson JA, Zenger TR (2004) A knowledge-based theory of the firm—The problem-solving perspective. *Organ. Sci.* 15(6):617–632.

Oxley JE (1997) Appropriability hazards and governance in strategic alliances: A transaction cost approach. *J. Law Econom. Organ.* 13(2):387–409.

Oxley JE, Sampson RC (2004) The scope and governance of international R&D alliances. *Strategic Management J.* 25(89):723–749.

Oxley JE, Wada T (2009) Alliance structure and the scope of knowledge transfer: Evidence from U.S.-Japan agreements. *Management Sci.* 55(4):635–649.

Palay TM (1984) Comparative institutional economics: The governance of rail freight contracting. *J. Legal Stud.* 13(2):265–287.

Phene A, Tallman SB (2012) Complexity, context and governance in biotechnology alliances. *J. Internat. Bus. Stud.* 43(1):61–83.

Pinkham BC, Peng MW (2017) Overcoming institutional voids via arbitration. *J. Internat. Bus. Stud.* 48(3):344–359.

Pisano GP (1989) Using equity participation to support exchange: Evidence from the biotechnology industry. *J. Law Econom. Organ.* 5(1):109–126.

Puranam P, Raveendran M, Knudsen T (2012) Organization design: The epistemic interdependence perspective. *Acad. Management Rev.* 37(3):419–440.

Rao A (2020) Strategic research and development investment decisions in the pharmaceutical industry. *Marketing Sci.* 39(3): 564–586.

Reinganum JF (1982) A dynamic game of R and D: Patent protection and competitive behavior. *Econom. J.* 50(3):671–688.

Reuer JJ, Devarakonda SV (2016) Mechanisms of hybrid governance: Administrative committees in non-equity alliances. *Acad. Management J.* 59(2):510–533.

Reuer JJ, Klijn E, Lioukas CS (2014) Board involvement in international joint ventures. *Strategic Management J.* 35(11):1626–1644.

Reuer JJ, Zollo M, Singh H (2002) Post-formation dynamics in strategic alliances. *Strategic Management J.* 23(2):135–151.

Roberts PW (1999) Product innovation, product-market competition and persistent profitability in the U.S. pharmaceutical industry. *Strategic Management J.* 20(7):655–670.

Robinson DT, Stuart TE (2007) Financial contracting in biotech strategic alliances. *J. Law Econom.* 50(3):559–596.
Ross WH, Wieland C (1996) Effects of interpersonal trust and time pressure on managerial mediation strategy in a simulated organizational dispute. *J. Appl. Psych.* 81(3):228–248.
Ryall MD, Sampson RC (2009) Formal contracts in the presence of relational enforcement mechanisms: Evidence from technology development projects. *Management Sci.* 55(6):906–925.
Ryu W, McCann BT, Reuer JJ (2018) Geographic co-location of partners and rivals: Implications for the design of R&D alliances. *Acad. Management J.* 61(3):945–965.
Schepker DJ, Oh W-Y, Martynov A, Poppo L (2014) The many futures of contracts. Moving beyond structure and safeguarding to coordination and adaptation. *J. Management* 40(1):193–225.
Schilling MA (2009) Understanding the alliance data. *Strategic Management J.* 30(3):233–260.
Segal I (1999) Contracting with externalities. *Quart. J. Econom.* 114(2): 337–388.
Sengul M, Gimeno J, Dial J (2012) Strategic delegation: A review, theoretical integration, and research agenda. *J. Management* 38(1): 375–414.
Shishido Z, Fukuda M, Umetani M (2015) *Joint Venture Strategies. Design, Bargaining, and the Law* (Edward Elgar Publishing, Cheltenham, UK).
Silverman BS, Baum JAC (2002) Alliance-based competitive dynamics. *Acad. Management J.* 45(4):791–806.
Singleton S (2017) *Joint Ventures and Shareholders' Agreements* (Bloomsbury, London).
Smith DG (2005) The exit structure of strategic alliances. *Univ. Illinois Law Rev.* 1:303–317.
Szulanski G (1996) Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management J.* 17(S2):27–43.
Thompson JD (1967) *Organizations in Action. Social Science Bases of Administrative Theory* (McGraw-Hill, New York).
Tushman ML, Nadler DA (1978) Information processing as an integrating concept in organizational design. *Acad. Management Rev.* 3(3):613–624.
Vanneste BS, Puranam P (2010) Repeated interactions and contractual detail: Identifying the learning effect. *Organ. Sci.* 21(1):186–201.
Vassolo RS, Anand J, Folta TB (2004) Non-additivity in portfolios of exploration activities: A real options-based analysis of equity alliances in biotechnology. *Strategic Management J.* 25(11):1045–1061.
Walter J, Kellermanns FW, Lechner C (2012) Decision making within and between organizations: Rationality, politics, and alliance performance. *J. Management* 38(5):1582–1610.
Weber L, Mayer KJ, Macher JT (2011) An analysis of extendibility and early termination provisions: The importance of framing duration safeguards. *Acad. Management J.* 54(1):182–202.
Williamson OE (1991) Comparative economic organization: The analysis of discrete structural alternatives. *Admin. Sci. Quart.* 36(2): 269–296.
Williamson OE (2000) The new institutional economics: Taking stock, looking ahead. *J. Econom. Literature* 38(3):595–613.
Wuyts S, Dutta S, Stremersch S (2004) Portfolios of interfirm agreements in technology-intensive markets: Consequences for innovation and profitability. *J. Marketing* 68(2):88–100.

Marvin Hanisch is an assistant professor in the Department of Innovation Management & Strategy at the University of Groningen. His research focuses on the governance mechanisms in interorganizational settings, such as strategic alliances, and in digital contexts, such as open-source software communities and blockchain networks. He is coaffiliated with the University of Passau and is a visiting lecturer at Maynooth University and the Free University of Berlin.

Jeffrey J. Reuer is the Guggenheim Endowed Chair and a professor of strategy and entrepreneurship at the Leeds School of Business, University of Colorado. He received his PhD from Purdue University. His research uses organizational economics to investigate firms' external corporate development activities and growth options (e.g., strategic alliances, international joint ventures, acquisitions, and initial public offerings).

Carolin Haeussler holds the Chair of Organization, Technology Management and Entrepreneurship at the University of Passau. Since May 2020, she has been a member of the Commission of Experts for Research and Innovation appointed by the German Federal Government. Her research focuses on innovation management and entrepreneurship, particularly how research progress is continuously changing the world of life and business. She studies interfaces at which this happens and how they can be optimized.

Shivaram V. Devarakonda is an associate professor of management at Tilburg School of Economics and Management, Tilburg University. He received his PhD from Purdue University. His research interests include cooperative strategies, organizational governance, and innovation.