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Duplat, Valérie; Coeurderoy, Régis; Hagedoorn, John

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Contractual governance and the choice of dispute-resolution mechanisms: Evidence on technology licensing

Valérie Duplat[a,*], Régis Coeurderoy[b,c], John Hagedoorn[d,e]

[a] *Vrije Universiteit Amsterdam, School of Business and Economics, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands*
[b] *ESCP Europe, Avenue de la République 79, 75543 Paris Cedex 11, France*
[c] *Université catholique de Louvain, Louvain-la-Neuve, Belgium*
[d] *Royal Holloway University of London, School of Management, TW20 0EX Egham (Surrey), United Kingdom*
[e] *UNU-MERIT, Maastricht University, Boschstraat 24, 6211 AX Maastricht, The Netherlands*

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ABSTRACT

In fast-paced and knowledge-intensive environments, licensing partnerships can be powerful levers for market expansion. Research on the management of technology-oriented licenses has nonetheless pointed out the risks of corrosive disputes caused by conflicting interests or misunderstandings among licensing partners. The choice made *ex ante* on mechanisms for resolving potential disputes is of prime importance in the execution of licensing exchanges. Although the legal literature has widely emphasized the advantages of arbitration towards litigation, public ordering remains the "default" option in managers' eyes. By adopting a transaction cost economics logic, our study explores the conditions under which licensing partners may prefer arbitration over public ordering during the contractual-design phase. In accordance with our theoretical arguments, findings show that the occurrence of arbitration provisions increases when the coordination orientation adopted by licensing partners is extensive. In situations where both monitoring and coordination orientations are simultaneously extensive, results reveal a greater propensity to prefer arbitration over public ordering. Our research therefore supports the view that corporate decision-makers tend to favor the conciliatory stance and compromising awards typically associated with arbitration, only when exchanges are expected to be highly coordinative. Their preference for arbitration over litigation is magnified when the coordination orientation develops alongside the monitoring orientation.

1. Introduction

Due to the risks of knowledge misappropriation (Arora and Fosfuri, 2000; Oxley, 1997; Teece, 1986) and the uncertainties surrounding the commercialization and implementation of non-proprietary technology (Nelson and Winter, 1982; Pisano, 1989), managing licensing exchanges requires anticipation of conflicting interests and of potential corrosive disputes. It is essential to craft appropriate remedies for mitigating those disputes. In this regard, the choice of dispute-resolution mechanisms made at the outset of licensing exchanges can play a key strategic role in the governance of the partnership by disciplining licensing partners' behavior and enforcing their contractual commitments. Scholars in law have highlighted the numerous advantages of referring disputes, and especially disputes on technological matters, to arbitration rather than public courts (*e.g.*, Arnold et al., 1991; Mills, 1996). Despite the various advantages of arbitration, prior empirical studies have provided evidence that arbitration provisions are not systematically included in inter-firm partnerships (Drahozal and Hylton, 2003; Eisenberg and Miller, 2007; Hagedoorn and Hesen, 2009). Managers do not seem to consider this private mechanism as a "default" option and tend instead to favor public litigation (Hylton, 2005; Stipanowich, 2014).

Our study primarily aims at understanding this paradox by examining managers' rationality and their decision criteria when assessing alternative ordering systems. We develop and propose a systematic and empirical framework, grounded in the transaction cost perspective, which predicts the conditions under which the advantages of public courts overcome those of arbitration from a managerial point of view. In technology-oriented licensing, partners are torn between safeguarding the appropriation value and openly collaborating. They face these same contradicting imperatives when assessing the ordering systems. On the one hand, the expectation of severe damages and coercive awards is essential for disciplining the exchange and sanctioning deviation from contractual obligations. On the other hand, more nuanced

settlements and a win-win stance signal a willingness to "work things out" and to foster realignment of each party's actions and interests beyond disputes (Lumineau and Oxley, 2012). Although arbitration can be valuable because it enables partners to accommodate adaptation *ex post* in an amicable way (Friedman, 1965; Williamson, 1979), it may be perceived as ill-suited and not coercive enough in managers' eyes due to its conciliatory approach (Drahozal and Ware, 2010; Stipanowich and Lamare, 2014). To unravel how partners balance the features of public ordering and arbitration, we therefore endeavor to disentangle control concerns from coordination concerns. We appraise the threat of opportunism as perceived by decision-makers through the inclusion of monitoring provisions in licensing contracts. Requirements for collaboration and interdependent actions *ex post* are evaluated based on the extent of coordination provisions included in those contracts.

We contend that, from a managerial point of view, public courts may be perceived as more suitable in situations where moral hazards and risks of knowledge and asset misappropriation are salient. Judges' awards tend to be more severe than arbitrators' awards (Macneil, 1974, 1978; Williamson, 1985). Legal scholars and practitioners acknowledge the conciliatory and win-win stance usually adopted by arbitrators (Friedman, 1965; Stipanowich and Lamare, 2014). Such a stance may not be favorable or suitable in situations where concerns for opportunism prevail. It can however be sought when the licensing partnership involves significant inter-partner coordination over time. To test our arguments, we assembled a detailed survey sample of technology licensing exchanges for which we collected data on technology-based and exchange attributes, contract design and the selected dispute-resolution mechanism. Our empirical findings reveal first that arbitration is favored in the presence of an extensive coordination orientation that reflects the need for joint efforts and interdependencies. In contrast, our findings do not provide evidence of a direct impact of a monitoring orientation on firms' preference for public courts. However, as expected we do find that the willingness to "work things out" amicably and to benefit from the expertise of arbitral judges overcomes possible needs for severe sanctions when licensing contracts are simultaneously characterized by significant monitoring and coordination orientations. Stated differently, in highly collaborative licensing exchanges, the monitoring provisions tend to magnify rather than inhibit partners' preferences for arbitration over litigation.

Our study first contributes to the remarkably scant research on dispute-resolution choices in the managerial and organizational literature. Lumineau and Malhotra (2011), Malhotra and Lumineau (2011) and Lumineau and Oxley (2012) examined actual dispute-resolution choices once disputes surface. By focusing on decisions made *ex ante*, it is possible to study the extent to which partner firms perceive either public courts or arbitration as more suitable for inducing appropriate behaviors *ex post*, and for handling conflicts that could arise along the way.

We also contribute to research that distinguishes the control functions of contractual agreements from the coordination functions (*e.g.*, Gulati and Singh, 1998). Our study explores their joint influence, in particular. We show that contracts with an arbitration provision are projected to be of a "coordinative" nature *ex post*, while those referring exclusively to public courts are simple exchanges, typically executed under the shadow of severe possible sanctions in case of non-compliance. We explore a case of "trilateral governance" (*i.e.*, the licensor, the licensee, and the arbitrator) as introduced by Williamson (1979). Since the evocation of third parties by Williamson (1979), the contribution provided by those parties in exchanges has received extremely limited attention (Nooteboom, 1999). Our study expands on the proposition that arbitrators act as gap fillers and help to ensure continuation of the exchange beyond disputes.

2. Theory and hypotheses

2.1. Why include an arbitration provision in partnership contracts? A review of key arguments for the selection of the dispute-resolution mechanism

Public courts and contract law are key institutions that allow voluntary exchanges to take place. They provide general rules that shape post-contractual behaviors and they induce parties to credibly commit to their contractual obligations by imposing legal sanctions (Cooter and Rubinfeld, 1989; Llewellyn, 1931). Despite the support offered by public institutions, transaction cost economics disputes the assertion that public ordering is efficacious in empowering any contract. Under certain conditions, contracting parties may prefer arbitration. Arbitration has long been recognized as a private resolution mechanism that may temper tensions when disputes arise (Bonn, 1972). The arbitral forum is essentially outside the public legal system (Friedman, 1965), and it provides an alternative set of rules and enforcement procedures (Hylton, 2005).

Arbitrators are selected on the basis of their expertise in the focal subject matter (Bernstein, 2001; Bonn, 1972; Sternlight and Resnik, 2005), as well as their reputation for integrity and fairness (Stipanowich and Lamare, 2014). Parties can also decide on the site of dispute resolution, the laws that will govern their dispute, the number of arbitrators, and the process by which arbitrators are appointed (Leeson, 2008). Arbitrators are not bound by the usual courtroom rules of evidence nor by legal precedent. They often reach a decision regarding a particular dispute based on the norms of fair commercial practice and trade customs (Bonn, 1972).

Arbitration is therefore typically characterized as more flexible than the public system (Coulson, 1965). Parties voluntarily decide to refer their dispute to at least one impartial third person and agree to be bound by the decision of that person. A losing party has little leeway to appeal (Bonn, 1972). Given the limited possibility of appeal, arbitration tends to compare favorably with public court litigation in terms of speed and economy (Bonn, 1972; Drahozal, 2008; Pinkham and Peng, 2017).[1] In addition, as arbitration is a private process, it makes unfavorable publicity less likely.

In contractual exchanges, tensions and disputes can emanate from two main categories of impediments: opportunistic behaviors (Williamson, 1985), or misunderstandings and collaboration failures (Gulati et al., 2005). In terms of alleviating opportunism *ex post*, partners may perceive the public system as more dissuasive than arbitration. Indeed, public judges tend to adopt a more adversarial position and to deliver severe punitive damages (Cooter and Rubinfeld, 1989). The adversarial mindset, in which each party tries to win as much of the stakes as possible, prevails in trials. The efficacy of public systems in allocating the responsibility for performance shortfalls depends however on judges' abilities to verify the information related to the exchange and to ascertain whether the disputing parties have acted in accordance with the contractual terms (Greif, 2005; Williamson, 1985). The information required for making such a judgment may not be readily accessible in public courts.

Although the threat of adjudicating possible disputes through public courts can discipline behaviors and mitigate the occurrence of disputes overall (Shavell, 1995), litigation may not be perceived as suitable for exchanges calling for fruitful and smooth collaboration beyond disputes. In this regard Macneil (1962, p. 525) noted that "arbitration is often a more satisfactory system for handling alleged breaches if the contractual relations of the parties are of a continuing nature." Arbitrators have a tendency to evenly allocate responsibilities for damages rather than offering total victory to one party. Also, given the expertise

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[1] Speed and cost effectiveness are also explained by the fact that arbitrators have different incentives from judges when resolving disputes (Drahozal and Hylton, 2003).

of arbitrators as well as the flexibility offered by arbitration proceedings, arbitrators may deliver more nuanced outcomes than a judge (Bernstein, 2001; Drahozal and Hylton, 2003). As stated by Johnson et al. (2002), arbitrators can base their decisions on information that might not be admissible in public courts, such as the firms' behaviors over time and probabilistic patterns. Although arbitration may be viewed as appropriate for adjusting an exchange *ex post* and filling possible contractual gaps, damage measures may be perceived as less satisfactory (Bernstein, 2001).

Consequently, the two fora do not share the same presumption of exchange continuity beyond disputes, and they differ in their ability to deliver a settlement. Such discrepancies explain the link between public ordering and simple exchanges. First, in simple and discrete exchanges, there are no significant relations that need to be preserved beyond possible disputes. By definition, partner identity is treated as irrelevant and resources can be readily deployed to other exchanges (Klein et al., 1978; Williamson, 1991). Second, in such exchanges, the information needed for settling disputes is likely to be readily accessible to courts and disputes can be resolved on the basis of the contract's content. Therefore, defection from the original agreement can often be efficiently deterred by public courts and their promise of legal sanctions (Macneil, 1962; Williamson, 1991).

Establishing the greater perceived suitability of one resolution mechanism over the other is more difficult when exchanges are of a more relational nature, however. In what follows, we theoretically explore how contractual orientations adopted by licensing partners in response to anticipated moral hazards and coordination challenges are likely to influence the choice of dispute-resolution mechanism.

2.2. The choice of arbitration in licensing contracts: research hypotheses

Licensing is a particular type of collaboration, characterized by an important asymmetry in the nature of partners' contributions and of their moral hazards (Arora, 1995; Aulakh et al., 1998). It offers the advantage of employing valuable complementary assets owned by a firm – the licensee – in the commercialization and implementation of another firm's – the licensor – proprietary technology (Arora and Ceccagnoli, 2006; Teece, 1986). Like in any other form of partnership, control and coordination concerns may co-exist. This dichotomy faced by partners has been widely studied in the literature on inter-organizational exchanges: the fear of misappropriation of assets and knowledge by the trading parties on the one hand; and the difficulties of fruitfully collaborating and adjusting actions on the other hand (*e.g.*, Dekker, 2004; Gulati et al., 2005; White and Lui, 2005). In the pursuit of desirable outcomes, the choice of dispute-resolution mechanisms – arbitration *versus* public court – plays a key role. The two mechanisms are indeed not equally suited for preventing or handling disputes caused by control or coordination matters. Our framework therefore presents appropriation concerns and coordination requirements as powerful concepts in explaining the choice of dispute-resolution mechanisms. We also investigate the effect of their co-existence on the likelihood of finding an arbitration provision.

2.2.1. Monitoring orientation

In licensing exchanges, moral hazards from the licensor's point of view relate mostly to the chances that the licensees "invent around" patents or misuse confidential information (*e.g.*, Laursen et al., 2017; Oxley, 1997). If a substantial part of the exchanged knowledge is tacit, it can be difficult to legally protect against unintended leakage (Oxley, 1997; Teece, 1986). The licensees may also free-ride and contribute less than agreed on when commercializing the licensed technology (Bergen et al., 1992). Furthermore, technology may evolve in unexpected ways and the key performance metrics might change, making pre-specified targets and benchmarks less relevant. This increases the potential for shirking, contributing less than agreed, misappropriating resources or outcomes, or exploiting a superior bargaining position (Aulakh et al.,

1998). On the licensee's side, great uncertainty can surround the implementation of the technology while important marketing- or manufacturing-related specific investments may be required (*e.g.*, Somaya et al., 2010). Licensees face concerns about whether they will be able to obtain adequate returns for their valuable complementary assets (Arora and Ceccagnoli, 2006; Somaya et al., 2010). Specific investments required to implement the licensed technology pave the way for hold-up situations (Klein et al., 1978; Williamson, 1985). When technology-based and exchange attributes make licensing partners particularly vulnerable to counterparties' behaviors, provisions aimed at enhancing compliance with expectations are negotiated (Das and Teng, 2000; Heide, 1994). Monitoring provisions can focus on the licensees' performance in terms of technology commercialization, and may also concern the quality of the products delivered on the market or of the industrial and R&D installations (Dekker, 2004; Ittner et al., 1999). Provisions for monitoring behaviors imply reporting and checking activities, written notice of any departure from the agreement, accounting examination, cost control or quality control (Das and Teng, 1998). While these provisions are costly to draft and implement, they lead to superior verifiability, and greater ease of demonstrating and penalizing non-compliance (Carson et al., 2006; Holmström, 1979; Parkhe, 1993).

When partners emphasize explicit monitoring provisions as a means to deter likely dilatory tactics, incentives are created for firms to defend their own behaviors and to question the appropriateness of others' actions (De Dreu et al., 2006). These provisions enable partners to mitigate each other's tendencies to pursue self-interest (Williamson, 1985). In such a context, the public court may be perceived as a more suitable forum for settling possible disputes as it is more inclined than arbitration to deliver severe settlements and to deter opportunism (Antia et al., 2013; Drahozal and Hylton, 2003). The prospect of severe damage awards and termination of the relationship is likely to be needed for disciplining the exchange and preventing deviation from contractual obligations when moral hazards are non-negligible. Despite the numerous advantages of arbitration, managers may, therefore, remain reluctant to agree to it. By choosing litigation, partners increase the chances of disputes being prevented or severe punitive remedies being imposed on the wrongdoer if disputes surface. Public courts indeed place great emphasis on the rights of the parties and advance the interests of the "rightful" parties against the interests of the others. Arbitration offers more regard for parties' business relationships (Wang, 2014).

Moreover, partners are likely to be confident in the ability of public judges to deal with disputes thanks to the information collected through monitoring activities, and the likelihood of early detection of shirking, misappropriation, or hold-up situations. Although judges may not have the technical and market expertise of arbitrators, those monitoring activities give them a privileged access to the information needed to comprehensively evaluate cases and deliver settlements (*i.e.*, formal and explicit contractual terms but also documented proof accompanying initial contracts). Based on the information collected through monitoring, they can judge whether or not parties acted in good faith. To ensure efficient enforcement, it must indeed be certain that public courts do not excuse parties that could have relatively easily taken action to avoid violating the contractual commitments (Joskow, 1977). If not, opportunistic or inefficient risk-taking behaviors might increase. Consequently, by including monitoring provisions as a means to hinder devious tactics, licensing partners increase the ability of public courts to comprehend disputes, and they magnify the chances that the rules of contract law and the letter of the original contract will be strictly followed and enforced (Hylton, 2005; Macneil, 1974, 1978). Hence, we hypothesize that:

Hypothesis 1. The greater the extent of the monitoring orientation in licensing contracts, the lower the likelihood of including an arbitration provision.

2.2.2. Coordination orientation

As stated earlier, managing moral hazards is only one function of the licensing contract design. Besides those moral hazards, coordination challenges become vivid when the licensing transaction implies an exchange of tacit knowledge or when interdependent tasks are expected (Gulati and Singh, 1998; Gulati et al., 2005). Licensing exchanges may sometimes imply significant joint efforts in such areas as R&D, manufacturing, and marketing (Hagedoorn et al., 2008). In some cases, the division of labor is indeed straightforward—the licensor focuses on technology development and the licensee concentrates on its commercialization (Teece, 1986). However, when licensing goes beyond the mere granting of the right to use a patent, interfaces and processes for decomposing tasks and coordinating interactions are needed (Artz and Brush, 2000). These interfaces tend to be unique and specific to the focal exchange (Mesquita and Brush, 2008). Also, adjustments in each party's actions, possibly due to changing conditions or needs among the parties, may be required over time. "Cognitive" limitations in the transfer of technology to another organizational context impose significant costs and adaptation (Arora and Gambardella, 1994). In order to pursue desirable outcomes and overcome collaboration failures, provisions may serve to offer a framework for communication and interaction. Firms tend to respond to the expected need for coordination by crafting provisions aimed at devising ways for effecting transfers (Mellewigt et al., 2007; Reuer and Ariño, 2007), exchanging information (Argyres and Mayer, 2007), or engaging in joint planning (Carson et al., 2006). These provisions are used to coordinate tasks across organizational boundaries through planning, program rules and standard operating procedures (Gulati, 1995; Gulati and Singh, 1998; White, 2005). They can also define some of the cornerstones of licensing partners' communication, such as frequency, timeline and content (Anderson and Dekker, 2005). By doing so, coordination provisions promote the development of common knowledge and homogeneous expectations (Faems et al., 2008; Mooi and Ghosh, 2010). Protocols and decision mechanisms can be designed to achieve concerted actions. They foster the recognition of changes in exchange conditions, and the generation of coordination responses to such changes.

Despite efforts to guard against future contingencies that could threaten cooperation, exchanges can still become the subject of disputes (Mohr and Spekman, 1994). Given the relational specificity implied by extensive coordination and the sunk costs such coordination represents, the presumption of an exchange's continuity that prevails while settling disputes in a private forum should drive a preference for arbitration. Arbitrators tend to approach disputes in the spirit of compromise (Drahozal and Ware, 2010; Williamson, 1985), and they can tailor settlements not only to foster the realignment of interests but also to result in the adjustment of each party's actions. Moreover, arbitration enables partner firms to avoid unfavorable publicity about disputes or leaks of confidential information (Macneil, 1962), and to circumvent the delays that are endemic to court proceedings (Perlman and Nelson, 1983). These latter characteristics should be highly valued by partners engaging in an exchange that involves extensive coordination.

A higher occurrence of arbitration can also be explained by the difficulties associated with drafting express provisions for close interactions (Grossman and Hart, 1983; Hadfield, 1994). The required level of care and effort needed for fruitful coordination can hardly be covered by precise contract terms. In fact, somewhat vague terms, such as "best efforts" and "reasonableness," are commonly used (Hagedoorn and Hesen, 2009). Thanks to their expertise, arbitrators should be perceived as better equipped than public judges to interpret implied and difficult-to-contract aspects. While arbitrators are not always industry experts, they tend to be more industry savvy than public judges (Drahozal, 2008). Furthermore, the flexibility of the arbitration proceedings enables them to consider evidence concerning business trends or the

quality of outputs (Sternlight and Resnik, 2005), and to reach a decision based on trade customs (Bonn, 1972). Therefore, we hypothesize that:

Hypothesis 2. The greater the extent of the coordination orientation in licensing contracts, the greater the likelihood of including an arbitration provision.

2.2.3. Joint effects of monitoring and coordination orientations

Since monitoring and coordination orientations are expected to influence the propensity to rely on arbitration in opposite ways, one may wonder which of the two effects will prevail when both types of provisions are extensively used in a licensing contract. It is not rare to find exchanges where in addition to incentive conflicts or the threat of knowledge leakage, failures of adaptation arise as partners read and react to signals differently (Williamson, 1991). It can then happen that extensive monitoring and coordination provisions are simultaneously included in licensing contracts to deter opportunism and facilitate collaboration. Prior studies on contractual governance show that coordination provisions tend to foster behavioral norms of flexibility, solidarity and information exchanges (Poppo and Zenger, 2002). Flexibility and solidarity enable firms to grant concessions in the short term more often, as any resulting imbalances are expected to be adjusted and reciprocated in the longer term (Dore, 1983). Norms of information exchange concerning actions and plans foster intention transparency. The licensor should therefore worry less about spending time and resources on monitoring and checking whether the licensing partner is fulfilling its contractual commitments (Dyer and Chu, 2003). However, in the presence of extensive coordination provisions, we observe in reality that monitoring provisions may still be included. An important know-how sharing or manufacturing/marketing assistance requirement indeed gives partners more opportunities for misappropriating new skills or gleaning trade secrets.

As highlighted in prior studies (Dekker, 2004; Mesquita and Brush, 2008), the effects of monitoring provisions may vary with the magnitude of the coordination concerns expected. Rather than essentially being used for easing coercive solutions, clearly articulated monitoring provisions may inspire the confidence necessary for close collaboration. They narrow the severity and domain of risk (Poppo and Zenger, 2002) and guarantee objectivity and provision of a track record of the other's performance, behaviors and skills (Das and Teng, 1998). When monitoring provisions are extensive, licensing partners may therefore be more willing to closely collaborate and to overcome their cognitive limitations.

In highly coordinative exchanges, the market and technical expertise of the arbitrators is likely to be highly valued as they are expected to intelligently and comprehensively judge possible dilatory behaviors. Even if the monitoring contractual orientation tends *a priori* to suggest suspicion of hidden agendas, public courts may not be well-equipped to guarantee the fairness and correctness of punitive damages due to the relational nature of the exchange and the contractual gaps (Greif, 2005; Williamson, 1985). This is broadly explained by the court's formal and inflexible proceedings and the lack of expertise required for interpreting and executing coordination-related terms. Major delays associated with public litigation are also expected to occur given the complexity of the exchange at stake (Perlman and Nelson, 1983). These delays may jeopardize the inter-partner relationship overall. Arbitration should therefore be preferred over litigation when both monitoring and coordination orientations are highly present. It better preserves the continuity of highly collaborative exchanges beyond disputes. This line of thought aligns with research suggesting that, in highly coordinative exchanges, control provisions are used for facilitating collaboration rather than instilling an adversarial and punitive stance. For coordination to succeed and effective adaptation to take

place, obtaining extensive rights to monitor partners' actions, behaviors and outputs may be a prerequisite (Baker et al., 1994; Gulati et al., 2005). Hence:

Hypothesis 3. The greater the extent of the monitoring and coordination orientations in licensing contracts, the greater the likelihood of including an arbitration provision.

3. Methods

3.1. Sampling and data collection

We obtained data from a survey on technology licensing. In order to identify a target population for the survey, we relied on a list provided by Agoria, the Belgian trade association for technology-oriented firms.[2] The list contained 1946 firms that were members or non-members of the association. We conducted an exploratory study, including six semi-structured field interviews, with Agoria's representatives prior to administering the questionnaire.[3] Given its high level of legitimacy among technology-oriented firms in Belgium and the size of its membership, Agoria's support positively influenced the response rate (Dillman, 2007).

Agoria helped us identify key informants, as the association regularly updates its list of contacts and their positions. Questionnaires were sent to each contact deemed relevant for our study. We explicitly asked each executive to redirect the questionnaire if he or she felt that other individuals in the organization were more knowledgeable on the subject of licensing. Our electronic survey package included a letter that was written, signed, and sent by Agoria, as well as a customized cover letter. Two to five follow-up messages per firm were transmitted by email and phone. The use of key informants is considered an appropriate method for obtaining data on inter-organizational exchanges due to the absence of detailed information in secondary data sources and the confidential nature of contractual information in general (e.g., Carson, 2007). In order to reduce single-informant bias, we asked respondents to indicate their function (e.g., chief executive officer, chief financial officer, R&D department manager, intellectual property (IP) department manager, or legal department head). From these functions, we can infer that the informants were well positioned to provide the requested information (Kumar et al., 1993).

To build our questionnaire, we used Dillman's (2007) total design method. We first relied on items developed in previous studies on alliances and licensing (e.g., Artz and Brush, 2000; Aulakh et al., 1998; Bessy and Brousseau, 1998; Parkhe, 1993; Provan and Skinner, 1989), which we adapted when necessary on the basis of pre-testing discussions and interviews with managers, lawyers, technology-oriented consultants, Agoria representatives, and other academics. In order to encourage responses, we followed up with supplemental phone calls (Dillman, 2007), and respondents were assured of confidentiality and access to the study's findings. The initial response rate was 14.8% (289 responses). In 171 surveys, the respondents noted that their firms had not negotiated licensing contracts. However, the other 118 surveys were completed by respondents who indicated that their firms had engaged in technology licensing. We asked these respondents to answer the rest of the questions based on a technology licensing agreement that was still active and representative of the licensing activities conducted by their firms. This approach is consistent with other scholars' attempts to build detailed databases on inter-organizational partnerships (e.g., Simonin, 2004). After accounting for responses with missing data, the final sample consists of 106 licensing transactions. The 106 responses

used in our statistical analyses refer to a total of 89 firms. The firms in our sample are of various sizes: 34.0% have 100 or less employees; 25.4% have between 101 and 500 employees; and 40.6% have more than 500 employees. Licensing activities typically relate to metal products (13.2%), electronic products, machinery and equipment (44.3%) and ICT services (13.2%). Contracts are mostly international: 55.7% are European and 27.4% involve North American partners. The partners are Japanese in seven cases; Chinese in three cases; and Thai, Russian, Pakistani, Australian, or Algerian in the remaining cases. The sample includes eight cases of domestic (Belgian) licensing contracts. Experience in licensing is also diverse: 15.7% of respondent firms have only negotiated out-licensing, 48.3% have only negotiated in-licensing, and 36.0% have negotiated both types of licensing. Moreover, 34.8% of the firms have licensing or IP departments. The questionnaire was completed by a licensor in 38 cases and by a licensee in 68 cases.[4] Difference of means tests (t-test) provide no evidence of systematic differences in the way licensors and licensees completed the questionnaire. To further ascertain that the side – licensor *versus* licensee – of the respondents would not influence our estimations, we reproduced them by including a dummy variable equal to one when the respondent was a licensor and zero otherwise. Findings do not change as a consequence of this inclusion.

Several tests were performed to ascertain the quality of our data. We analyzed the potential for response bias by comparing early and late respondents under the assumption that late respondents are more similar to non-respondents than early respondents are to non-respondents (Armstrong and Overton, 1977). The data collection was completed within four months. We consider as early responses those obtained within the first three weeks of the survey administration (32.2% of our sample). Late responses are those obtained after two months of data collection (34.0%). Comparative tests for independence reveal no differences in the sectoral distributions of early and late respondent firms ($\chi^2 = 3.2$, n.s.) or the geographical distributions of their licensing partners ($\chi^2 = 22.8$, n.s.). In addition, we examined whether there are any significant differences between early and late respondents for all of the variables in our models. We found no evidence that our data are subject to response bias. Furthermore, retrospective biases may occur: 34 transactions were negotiated up to two years prior to the survey administration (32.1% of our sample), 57 were negotiated between three and ten years before the survey administration (53.8%), and 15 were negotiated more than ten years before the survey administration (14.2%).[5] We performed one-way of variance (ANOVA) with Bonferroni multiple-comparison tests and compared the means for each of our model variables obtained in the three license age categories. This test is selected as our variable (i.e., license age) counts more than two categories. These tests do not reveal major statistical differences across the three sub-samples. In order to further control for possible retrospective biases, we undertook a Barlett's test for equal variance. Overall, the Barlett's statistics obtained for the model variables confirm that the assumption of similar variance between the three sub-samples is not violated. Finally, we control for common method bias by running a Harman's one-factor test. After loading all of the items used in our study into a factor analysis and examining the unrotated factor solution,

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[2] The sectors represented by the association are: aerospace, industrial automation, electronics, mechanical and mechatronic engineering, automobiles, metals and materials, assembly and cranes, plastics, building products, information and communication technologies, and metal fabrication.
[3] Details are available upon request.

[4] Some firms participated only as a licensor or as a licensee, while others negotiated both in- and out-licensing transactions. When the respondent indicated that his/her firm had exclusively been a licensor, we asked him/her to describe one of the out-licensing transactions. Similarly, if the firm had exclusively been a licensee, we asked the respondent to select an in-licensing transaction. In situations where the respondent mentioned that his/her firm negotiated more out-licensing than in-licensing, he/she was asked to describe one out-licensing partnership, and *vice versa*. In cases where firms had negotiated as many out-licensing partnerships as in-licensing partnerships, the respondent could pick either one or the other. Respondents had the opportunity to describe more than one licensing partnership if they so desired.
[5] Procedural precautions were undertaken by explicitly asking the respondent to "describe one specific licensing agreement, still active, and representative of the licensing agreements concluded by their firm."

Table 1
Contractual orientations (promax factor pattern).[a]

Provisions	Percentage of licensing contracts including each provision	Monitoring (Factor 1)	Coordination (Factor 2)
Supervision of the licensee's products by the licensor	12.3%	**0.91**	− 0.22
Supervision of the licensee's industrial and R&D installations by the licensor	9.43%	**0.61**	0.49
Reporting the results of technical and commercial tests undertaken by the licensee to the licensor	16.0%	**0.54**	0.33
Training of the licensee's personnel by the licensor	23.6%	− 0.19	**0.78**
Transfer of technical improvements made by the licensor to the licensee	14.2%	0.01	**0.90**
Licensee's use of the licensor's trademark	56.6%	0.47	**0.67**
Transfer of marketing test data and other commercial data from the licensor to the licensee	42.5%	0.14	**0.78**
Technical assistance and consultancy services provided by the licensor to the licensee	56.6%	− 0.35	**0.69**
Eigenvalue		1.58	3.81
Proportion of variance explained		0.20	0.48

Bold print indicates the largest factor loadings for each contract dimension.
[a] N = 106.

we found that five factors had eigenvalues of more than one and that 14.0% of the variance was explained by the first factor. Cumulatively, the five factors explained 56.3% of the variance. As no single dominant factor emerged, this test suggests that common method variance is not a significant problem in our data (Podsakoff and Organ, 1986).

3.2. Model specification and measurements

3.2.1. Model

We opted for a two-stage regression model enabling us to accommodate three main aspects. First, the monitoring and coordination contractual orientations represent choice variables that are not randomly assigned across the sample. According to the existing literature, contractual orientations are determined by technology-based and exchange attributes. Estimating the influence of monitoring and coordination on the choice of dispute-resolution mechanisms through a simple probit regression may cause serious endogeneity issues in the econometrics of contracts (*e.g.*, Mellewigt et al., 2007). Second, decisions on contract design are likely to be made simultaneously (Argyres et al., 2007; Bercovitz and Tyler, 2014). It is essential to jointly model those decisions and take the cross-equation correlation of errors into account (Greene, 2011). Finally, although the three contractual decisions (*i.e.*, monitoring, coordination and arbitration) are determined during the negotiation phase, our conceptual model suggests a sequence of matters discussed throughout the negotiation process (Das and Teng, 2001). It positions decisions related to organizing and implementing the exchange (*i.e.*, monitoring and coordination) before those related to possible disputes (*i.e.*, arbitration) (Macneil, 1962). This sequence of matters is consistent with the seminal paper of Macneil (1962) according to which there is an important distinction to make between arbitration provisions and other provisions. It also coincides with the logic adopted by Lumineau and Henderson (2012) according to which a cooperative contractual approach favors a "win-win" solution in resolving disputes, while an emphasis on safeguards and monitoring rules allows but also encourages partners to foster their own rights and opt for severe sanctions.

We employ a two-stage and endogenous model and test a system of equations simultaneously. The two first-stage equations are jointly predicted as functions of the transaction characteristics, along with instrumental variables that help identify the equations (Hamilton and Nickerson, 2003). In the second-stage equation, we include the same attributes as those present in the first-stage equations. The propensity to include arbitration provisions may also be directly impacted by technology-based and exchange attributes (*e.g.*, Drahozal and Hylton, 2003). However, instruments are omitted in the second-stage equation to econometrically identify the first-stage equations. Given the need to jointly model our three equations and allow the error terms to be correlated across these equations, we adopt the conditional mixed process (CMP) estimation developed by Roodman (2011). Since in some cases

we obtained multiple responses per firm, our CMP estimation accounts for possible interdependencies by clustering observations and using robust standard errors (Greene, 2011).[6]

3.2.2. Dependent variable

Arbitration. This variable is equal to one if independent arbitrators were contractually nominated and/or if both parties contractually agreed to settle their conflict before a private entity (*e.g.*, chamber of commerce, sector union, or chamber of arbitration). It is equal to zero otherwise.

3.2.3. Explanatory variables

The items and contract provisions used to compute the two contractual orientations—*monitoring* and *coordination*—were identified in prior work (*e.g.*, Anderson and Dekker, 2005; Vanneste and Puranam, 2010). They were adapted to the licensing context based on the licensing literature (*e.g.*, Aulakh et al., 2013; Brousseau et al., 2007), and on pre-testing discussions and interviews. These contract provisions relate to roles, controls and safeguards, rights assignment, and IP protection (see Table 1). Survey respondents were asked to indicate whether each provision was included in the licensing contract.

We use a factor analysis, which enables us to determine whether our data and the licensing setting fit with the contractual dimensions already established in prior empirical studies. This dichotomy of provisions builds on prior work (Anderson and Dekker, 2005; Bercovitz and Tyler, 2014; Lui and Ngo, 2004; Lumineau and Henderson, 2012; Malhotra and Lumineau, 2011; Mesquita and Brush, 2008; Reuer and Ariño, 2007; Vanneste and Puranam, 2010). Given the dummy nature of the contractual provisions, we must determine the tetrachoric correlations between provisions (Schumacker and Beyerlein, 2000). We provide the results of a principal components factor analysis after an oblique rotation in Table 1. We opt for promax because the resulting components may be correlated (Hair et al., 2006). Factors are retained if their corresponding eigenvalues exceed one. Given our sample size, factor loadings of 0.60 and higher are considered significant for interpretative purposes (Hair et al., 2006). The factor analysis yields a well-behaved solution with items typically loading on a single factor. There are no significant cross-loadings and the loadings are greater than 0.60, except for one that is equal to 0.54. Two factors are considered, which together represent 67.0% of the total item variance. In accordance with the factor analysis, the variables *monitoring* and *coordination* are obtained by summing three provisions associated with monitoring and five provisions associated with coordination.

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[6] Four firms described two licensing exchanges, three firms described three licensing exchanges, and two firms described four licensing exchanges.

3.2.4. Technology-based and exchange attributes

A first category of variables captures the technological characteristics of the licensing exchange. First, we consider the *tacitness of the transferred technology* and measure it using a scale adapted from Simonin (1999, 2004). The two survey questions investigated whether: (i) the licensed technology was easily codified (*e.g.*, in blueprints, instructions or formulas) and (ii) the licensed technology was more explicit (*i.e.*, easy to explain and describe to others) than tacit. These two items were recorded on a five-point Likert scale ranging from one ("Strongly disagree") to five ("Strongly agree") and reverse-coded. Cronbach's alpha for this scale is 0.81. Tacitness should impact both the occurrence of opportunism and the difficulties of collaborating. Tacit knowledge is difficult to legally protect from unintended leakage (Oxley, 1997; Teece, 1986). It also tends to be difficult to communicate to an outside firm (Rosenkopf et al., 2001). Given their technical expertise and the flexibility of the proceeding, arbitrators should be better equipped than public judges to assess the extent, content and value of the tacit knowledge involved in a dispute (*e.g.*, Arnold et al., 1991).

Second, we include the *specific investments made by the licensee*. To compute this variable, we used three survey questions (Artz and Brush, 2000; Reuer and Ariño, 2007): (i) whether the technical skills required for the licensing partnership were unique, (ii) the difficulty the licensee would have in redeploying the people and facilities serving the licensing partnership for other uses, and (iii) the licensee's non-recoverable investments. Respondents were asked to use five-point Likert scales ranging from "Not at all" to "To a great extent" for the first item, and from "Negligible" to "Substantial" for the second and third items. Cronbach's alpha is 0,73. These investments are sunk costs that require enhanced contractual safeguards and remedies due to risks of hold-up (Artz and Brush, 2000). The specificity of these investments should favor dispute-resolution mechanisms, like arbitration, that preserve the continuity of the exchange beyond disputes (Lumineau and Oxley, 2012; Williamson, 1985). Third, we include a variable named *observability of the licensee's behavior,* which focuses on whether the licensor could easily: (i) monitor and control the performance of the licensee in terms of royalties, sales, or production volume, and (ii) monitor and control how the licensee uses the licensor's proprietary knowledge. The items were measured using five-point Likert-type scales ranging from "Strongly disagree" to "Strongly agree." The Cronbach alpha coefficient is 0.88. When it is difficult to observe counterparties' contribution, non-disclosure of information is likely to occur either purposefully or otherwise (Williamson, 1985). As shown in previous studies, contractual provisions tend be more extensive when behaviors are difficult to verify (*e.g.*, Alchian and Demsetz, 1972). The expertise of the arbitrators as well as their ability to rely on business trends, norms and customs for judging the fairness of firms' practices or the quality of outputs should be highly valued when observability is limited (Bernstein, 2001). Fourth, in order to assess the *technological capabilities required by the licensor to develop the technology,* we used the following item: to develop this technology, the licensor had to invest significantly in experienced and trained skilled human resources (Simonin, 1999). Respondents were asked to use a five-point Likert scale ranging from "Not at all" to "To a great extent." Harhoff and Reitzig (2004) state that the exposure of patented technology to opposition is more likely if the patent right is perceived to be a weak one with respect to its degree of novelty or its inventive step. When skills and capabilities at the root of the technology developed are highly valuable and unique, there is less chance of related-patents being exposed to opposition (Lanjouw and Schankerman, 2001). The licensee tends to be more willing to make the required investments if the risks that the product or service using the patented technology is withdrawn from the market remain limited. The resulting secured setting and the expected gains may form the basis for collaboration and lead to extensive use of amicable dispute-resolution mechanisms like arbitration.

The next two technology-based variables relate to the characteristics of the licensing transaction itself. We first control for the exclusivity of the licensing exchange. To measure *exclusivity*, we use a

dummy variable that is equal to one if the licensee is granted monopolistic use of the technology within a territory or field of use, and for a certain time period. It is zero otherwise.[7] The granting of exclusivity rights is the most critical hostage mechanism used in the licensing context (Aulakh et al., 2010; Somaya et al., 2010). Given the damages associated with early termination of an exclusive license, one might expect mutual adjustments to take place when disturbances surface. Furthermore, thanks to the restriction on the number of licensees, the licensor should more easily monitor the licensee's actions (Aulakh et al., 2010) and be less burdened by dealing with potential competition between licensees coexisting in the same territory (Arora and Fosfuri, 2003). Public ordering should here be perceived as more suitable for preventing or handling possible disputes that cannot be contained internally despite the exclusivity granted. Opting for the public court and its severe sanctions may dissuade counter-productive actions and ward off disputes that could not be accommodated internally and amicably. We also control for the *license's scope* by computing a variable equal to one when joint efforts in manufacturing or marketing are expected, to two when joint manufacturing and marketing efforts are both expected, and to zero otherwise. These scope decisions have important implications for the extent to which licensing partners expose valuable marketing- or manufacturing-related knowledge and know-how to each other (Hagedoorn et al., 2008; Oxley and Sampson, 2004). The extent of coordination and more intimate face-to-face contact necessary to achieve success increases (Gulati and Singh, 1998; Kogut and Zander, 1992) and uncertainty raises the costs of monitoring and assessing partners' behavior (Pisano, 1989). Due to these in-depth interlinkages, arbitrators might be better equipped than public judges to understand the issues at hand (Bonn, 1972; Hagedoorn and Hesen, 2009). Moreover, in embedded licensing more than in standard licensing, a prospect of partnership continuity beyond possible disputes should play a positive role in favoring amicable resolution of conflicts.

Our final technology-based variable corresponds to the *patent-rights index* developed by Park (2008). Since all respondent firms were located in Belgium and the respondents were licensees or licensors, we opt to include the index in the licensing partners' – rather than respondent firms' – country. This is equivalent to accounting for the distance between Belgian partners and foreign partners in terms of institutional quality for international deals. A low *patent-rights index* tends to trigger more opportunism and contractual hazards in licensing as it makes it easier to develop peripheral technology (Aulakh et al., 2013; Hennart, 1991). In weakly protective environments with poor patent right indexes, opting for an arbitration forum enables to secure fair and efficient resolution of disputes and to prevent knowledge misappropriation (Leeson, 2008). It offers the opportunity to engineer *ex ante* transparent, detailed, and commonly understood rules that permit partners to achieve clarity about enforcement *ex post* as well as mitigate perceptions of unfairness.

Besides the technology-based variables listed above, we also include exchange-specific characteristics found in prior research to be key drivers for contractual and dispute-resolution decisions. First, we include a variable that captures the collaborative history between licensing partners. *Prior ties* is a dummy variable set equal to one when the partners had ties prior to the described license. It is set equal to zero in the absence of a prior tie or when the option "I don't know" was selected.[8] In line with prior studies (*e.g.*, Gulati, 1995; Uzzi, 1997), we expect that these ties will mitigate coordination and monitoring

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[7] As a robustness check, we create a categorical variable named *specific investments made by the licensor*, which takes the value of zero if the license is non-exclusive (66.0%), of one if the license is exclusive and the licensor's technological capabilities remain below its mean value of 3 (15.1%), and of two if the license is exclusive and the licensor's technological capabilities are greater than its mean value of 3 (18.9%). The results remain stable, as explained in footnote 9.

[8] As a robustness check, we ran the regressions without including observations in which the option "I don't know" was selected (*i.e.*, 15 observations). We obtain similar results which are available upon request.

concerns thanks to the trust generated and the routines developed. Overall, the existence of prior ties should reduce the occurrence of disputes. By opting for dilatory tactics, partners would indeed risk the loss of the idiosyncratic and collaborative routines they developed together over time (Pisano, 1989). It is likely that, in order to foster the bilateral method for handling disputes or to avoid dilatory tactics, licensing partners prefer litigation over arbitration. The threat of severe sanctions imposed by public courts can dissuade counter-productive actions and disputes that could not be accommodated internally despite the existence of prior ties.

Second, we asked respondents whether their firm and the licensing partner firm belonged to the same sector. The values for this variable, *same sector,* are equal either to zero (*i.e.*, different sector) or one (*i.e.*, same sector). Although belonging to the same sector might ease inter-partner coordination, it simultaneously exacerbates the monitoring requirements to avoid unintended leakage by direct competitors (Hagedoorn et al., 2008; Oxley and Sampson, 2004). Severe sanctions delivered by public courts should be preferred to amicable rules for preventing or resolving disputes that arise along the way between competitors.

Third, we account for the legal assistance provided by external experts during the contractual-design phase. Our variable, *legal assistance,* is set equal to one if firms used experts with legal and technical expertise in contractual or IP matters when negotiating their licensing contracts. It is set equal to zero otherwise. These experts are likely to positively influence their clients' propensity to resolve disputes privately through arbitration (Sampson, 2003). They tend to resort to approaches that, they believe, will ensure the greatest degree of control over process and results, and the least likelihood of a disastrous outcome for their clients. If the worst case does happen, those experts must be able to cover themselves by justifying the choice they made (Stipanowich, 2014). Fourth, we consider the heterogeneity in licensing firms' ability to craft and engage in partnership contracts (Kale et al., 2002). In order to proxy the level of internal capabilities, we use information about the size of the licensors. Prior research on technology partnerships has made use of this size measure to predict the propensity to engage in cooperation (*e.g.*, Harrigan, 1988; Lokshin et al., 2011) and to assess the ability to maintain partnership stability (Osborn and Baughn, 1990). Larger firms have more abundant resources (including legal resources) (Bagley, 2008) and should run a lower risk of losing control over their proprietary knowledge (Hagedoorn et al., 2008). If, despite these internal capabilities, disputes arise, larger licensors may be more inclined to prefer a strongly sanctioning forum to settle the dispute. To compute this variable, we assign licensor firms to one of five categories based on the number of employees: (i) 100 or fewer employees; (ii) between 101 and 250 employees; (iii) between 251 and 500 employees; (iv) between 501 and 1000 employees; and (v) more than 1000 employees.

Finally, we capture possible regulatory changes over time that may hinder or encourage arbitration (Stipanowich and Lamare, 2014) by controlling for the *license's age.* Based on the year of negotiation of the licensing contracts, we create three main categories: up to two years; between three and ten years; and older than ten years. The legal literature is quite expansive concerning the changes in either arbitration or litigation procedures over time (*e.g.*, Stipanowich and Lamare, 2014). These preferences and trends may in turn influence our predictions.

In order to properly specify our model, we also include three instrumental variables in the first-stage equations. The instrument *arm's length licensing* is included in the monitoring equation. This variable equals one if the licensing partner is located in Belgium or the Netherlands, and zero otherwise. Geographical proximity limits travel time and costs and so can ease the monitoring of exchanges (Berry et al., 2010). In particular, it facilitates the observation of counterparts' behaviors and the implementation of formal monitoring processes. We do not expect geographical proximity to influence the two other

independent variables. Rather than the geographical distance between the licensing partners' countries, it is the quality of their institutional environment (such as the patent-rights index) which influences the preference for arbitration over litigation. In order to avoid navigating through a foreign court system that does not guarantee fair processes, licensing partners may agree to refer their potential disputes to an arbitral forum (*e.g.*, Dasgupta, 2003; Lew, 2009; Roth, 2006). Nor do we expect any influence of the arm's length variable on the requirement for more or fewer coordination provisions; the reasons for obtaining more coordination provisions are rooted in firms' cognitive capabilities required by the transaction itself and the nature of the technology transferred.

We include in the coordination equation a measure of *technology intensity* for identification purposes. Our variable is set equal to one if the respondent firm falls into a low-tech service-based sector, two into a low-or medium-tech manufacturing sector, three into a high-tech manufacturing sector, and four into a knowledge-intensive service-based sector. We use the Statistical Classification of Economic Activities in the European Community (NACE) Rev. 2 codes (two-digit level) for the respondent firms' sectors. This measure refers to the likelihood of improvements in technology, rendering the licensed technology obsolete (Robertson and Gatignon, 1998). Contingency planning and well-crafted coordination mechanisms that specify, for instance, the content and schedule of inter-partner communication enable partners to more efficiently absorb external changes (Vlaar et al., 2007). We do not expect the obsolescence rate of the technology to affect the choice between arbitration and public courts. Rather than the technology intensity, it is the industry itself and its patent trends which we believe influence the need for monitoring and arbitration decisions. Depending on the industries, new products may or may not comprise numerous, separately patentable elements. If the product is simple – *i.e.*, based on relatively few and independent patentable elements, even if very high-tech – it will be associated with easy protection. The effectiveness of patents differs across industries and technical fields (*e.g.*, Lanjouw and Schankerman, 2001).

Finally, the variable *third assistance in identifying a licensing partner* is included in the first-stage equation aimed at predicting the extent of coordination provisions. When firms search for assistance from third parties in selecting licensing partners, they value the ability of those third parties to obtain information through their network position. They also value their ability to combine all the information obtained to craft promising and original collaboration projects (Hargadon and Sutton, 1997; Walsh and Ungson, 1991). Such third parties solicited at the outset of collaboration tend to emphasize the need for coordination routines and for accurate expectations with regard to the skills and efforts to be deployed (Daft, 1978; Weick, 1976). These third parties are not expected to influence the extent of monitoring provisions or the choice in favor of arbitration. Advice on the choice between arbitration and litigation is sought at a later contractual stage. Also, given the backgrounds, roles and functions of the third parties at the outset of collaborations, it is unlikely that they emphasize the control and monitoring side of possible collaborations (Bercovitz and Tyler, 2014).

Three tests are performed to ascertain the statistical reliability of our three instruments. First, the Amemiya-Lee-Newey test for over-identification is performed on the variable coordination since we count two instruments for a single instrumented variable. The test does not reject the null hypothesis (*i.e.*, valid instrument) (*p*-value = 0.70). Second, the Kleibergen-Paap rk LM statistics, used as a test for under-identification, is obtained for monitoring as the model counts one single instrument for this instrumented variable. The test does not reject the null hypothesis (*i.e.*, instrument is valid) (*p*-value = 0.32). Third, the weak-instruments problem arises when the correlation between the endogenous regressors and the excluded instruments are nonzero but small. In order to ascertain that this problem of weak identification is not present, we use the "rule of thumb" of Staiger and Stock (1994) according to which the *F*-statistics should be at least 10. The Cragg-

Table 2
Descriptive statistics.[a]

	Mean	STD	Min	Max
1. Arbitration	0.27	0.45	0	1
2. Monitoring	0.38	0.68	0	3
3. Coordination	1.93	1.49	0	5
4. Tacitness	3.48	1.11	1	5
5. Specific investment	3.32	0.98	1	5
6. Observability	3.41	1.11	1	5
7. Technological capabilities	3.41	1.25	1	5
8. Exclusivity	0.34	0.48	0	1
9. License's Scope	0.25	0.49	0	2
10. Patent-rights index	4.51	0.53	2.2	4.88
11. Prior ties	0.16	0.37	0	1
12. Same sector	0.74	0.44	0	1
13. Legal assistance	0.35	0.48	0	1
14. Licensor's size	2.74	1.76	1	5
15. License age	1.82	0.66	1	3
16. Arm's-length licensing	0.15	0.36	0	1
17. Technology intensity	2.09	0.93	1	4
18. Third assistance	0.07	0.27	0	1

[a] N = 106.

Donald Wald F-statistics in our case are 12.5 and 12.6 respectively for coordination and monitoring.

4. Results

We report the number of observations, means, standard deviations and minimum and maximum values for the variables included in the regression models in Tables 2 and 3.

Overall, 27.4% of the licensing contracts in our sample include an arbitration provision. This percentage is consistent with the corresponding figures reported by Eisenberg and Miller (2007), as well as those reported by Anderson and Dekker (2005). The likelihood of finding an arbitration provision is particularly low in domestic licensing (12.5%), while it is 25.5% in Europe (excluding Belgium), and 34.5% and 28.6% when North American and Japanese partners are involved respectively. In the international setting, arbitration may offer a "neutral" forum such as the International Court of Arbitration or the American Arbitration Association.

Table 4 presents five CMP regression models in which the dependent variables are monitoring and coordination in the first-stage equations, and arbitration in the second-stage equation. Model I corresponds to the baseline model. It estimates the direct effects of transaction and exchange attributes on monitoring, coordination and arbitration simultaneously. In Model II and Model III, contractual orientations are introduced individually in the arbitration equation. In Model IV, the two contractual orientations – monitoring and coordination – are included in the second-stage equation. After controlling for the direct effects of transaction and exchange attributes on arbitration, findings obtained in this model support one of our first two hypotheses (Model IV in Table 4). Hypothesis 1, which predicts a negative relationship between the extent of the monitoring orientation and the likelihood of including an arbitration provision, does not receive support. Hypothesis 2, which covers the positive effect of an extensive coordination orientation on partner firms' propensity to include an arbitration provision, is supported ($\beta = 0.51$; $p < 0.05$).

In order to test our third hypothesis, we examine the interactive effect of monitoring and coordination provisions on the occurrence of arbitration. We explore whether and how the presence of coordination provisions affects the relationship between monitoring provisions and arbitration, and whether and how monitoring provisions influence the coordination provisions-arbitration relationship. As shown in Model V in Table 4, the significant interaction effect suggests that the marginal effect of monitoring orientation is dependent on the extent of

coordination orientation and *vice versa* ($\beta = 0.39$; $p < 0.05$). This last finding is supported by the figure below (Fig. 1). It illustrates that with a greater extent of monitoring provisions, the positive relationship between coordination and arbitration increases. When the coordination orientation is negligible, however, the monitoring provisions tend to reduce the occurrence of arbitration provisions in our sample.

Overall, our models gain in robustness when the coordination orientation is added in the second-stage equation aimed at predicting the occurrence of arbitration provisions (*i.e.*, Wald Chi2 is higher). As far as the atanh-rho coefficients are concerned, a significant coefficient implies that common unobserved factors tend to increase errors for both equations. In other words, the unobserved factors influencing the dependent variables are correlated. In all our models, the atanh-rho coefficients are not statistically significant (Table 4). Besides the atanh-rho, the Wald test of exogeneity also reveals that the null hypotheses – monitoring and coordination may be treated as exogenous – cannot be rejected (p-value = 0.16 for monitoring, p-value = 0.20 for coordination).

Compared to the linear OLS estimation, probit coefficients shown in Table 4 require cautious interpretation due to the non-linearity of probit models (Ai and Norton, 2003; Hoetker, 2007). Marginal effects tell how much a change in an independent variable changes the probability of the focal outcome (*i.e.*, of including an arbitration provision), while the other variables remain unchanged. Results for the marginal effects obtained for Model IV reveal that an increase in the extent of coordination provisions by one standard deviation from its mean leads to an increase in the probability of having arbitration in licensing contracts by 13.3% ($p < 0.05$) on average with the other covariates held at observed sample values. Concerning the interaction effect obtained from Model V, holding coordination constant for every value of monitoring between 0 and 3, we observe that the marginal effects of coordination (where coordination is at its mean) respectively reach 11.1% ($p < 0.10$) when monitoring equals zero, 15.3% ($p < 0.01$) when monitoring equals one, 16.3% ($p < 0.01$) when monitoring equals two and 16.5% ($p < 0.05$) when monitoring equals three. The pattern of marginal effects supports the positive moderating effect.

The results for several of the control variables included in the second-stage equation are notable. In the full model (Model V in Table 4), it appears first that, as expected, when exclusivity rights are granted, public ordering prevails for adjudicating disputes that cannot be contained internally despite the presence of critical mutual hostages ($\beta = -1.05$; $p < 0.05$).[9] Second, a shared history of collaborations tends to reduce the likelihood of opting for arbitration ($\beta = -1.72$; $p < 0.01$). Third, licensing partners from the same sectors are less inclined to prefer arbitration over public ordering ($\beta = -0,61$; $p < 0.05$). This finding also supports our expectations. Finally, legal assistance from expert third parties increases the likelihood of an arbitration provision ($\beta = 0.99$; $p < 0.05$). Lawyers may encourage firms to avoid public litigation and instead favor private dispute-resolution mechanisms (Lumineau and Oxley, 2012).

5. Discussion and conclusions

In this study, we investigated firms' decisions to include or exclude arbitration provisions when they negotiate inter-organizational and market-based contracts. We primarily aimed at understanding why, despite the numerous advantages of the arbitration mechanism over public litigation, managers do not seem to consider this private

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[9] After replacing our variables *technological capabilities* and *exclusivity* by the alternative variable *specific investments made by the licensor* in our models, we do not notice changes in the findings. More precisely, this computed variable does not significantly influence the extent of monitoring and coordination provisions included in the licensing contract. It does however negatively influence the occurrence of an arbitration provision ($p < 0.01$). This latter result supports the findings obtained while considering the variable exclusivity alone.

Table 3
Correlation matrix.[a]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Arbitration	1.00																	
2. Monitoring	−0.03	1.00																
3. Coordination	0.20*	0.29**	1.00															
4. Tacitness	−0.01	0.05	−0.16	1.00														
5. Specific investment	0.18†	0.08	0.28**	0.01	1.00													
6. Observability	0.07	0.14	0.20*	0.17†	0.35***	1.00												
7. Technological capabilities	0.02	0.09	0.21*	−0.12	0.47***	0.08	1.00											
8. Exclusivity	−0.17†	0.01	−0.02	−0.01	−0.05	−0.05	0.04	1.00										
9. License's Scope	0.12	0.09	0.42***	−0.22*	0.25*	0.16†	0.22*	−0.03	1.00									
10. Patent-rights index	−0.01	−0.40***	−0.14	0.08	0.02	−0.05	0.17†	−0.07	−0.03	1.00								
11. Prior ties	−0.21*	0.14	−0.08	0.21*	0.04	0.07	−0.14	−0.04	−0.01	−0.13	1.00							
12. Same sector	−0.02	0.05	0.26**	−0.01	0.15	0.01	0.14	0.02	0.21*	−0.05	0.03	1.00						
13. Legal assistance	0.13	−0.06	−0.05	0.17†	0.03	0.22*	−0.08	0.27**	0.08	−0.08	0.11	−0.01	1.00					
14. Licensor's size	−0.09	−0.07	0.02	0.08	0.03	0.10	0.11	−0.20*	0.04	0.10	0.07	0.10	−0.10	1.00				
15. License age	−0.09	0.09	−0.02	0.24*	−0.05	−0.11	−0.02	0.07	−0.01	−0.08	−0.15	0.03	−0.07	0.07	1.00			
16. Arm's-length licensing	−0.02	−0.20*	−0.11	0.08	0.12	0.21*	0.03	0.09	0.11	0.13	0.17†	−0.17†	0.19*	−0.07	−0.21*	1.00		
17. Technology intensity	−0.06	−0.07	−0.30**	−0.09	0.08	−0.06	−0.17†	0.18†	−0.14	−0.13	0.01	0.03	0.14	−0.16	0.21*	−0.10	1.00	
18. Third assistance	0.15	−0.00	0.20*	−0.04	0.12	0.11	0.02	0.17†	0.07	−0.21*	0.07	0.01	0.24*	−0.16†	0.08	−0.02	0.13	1.00

[a] N = 106.
† p < 0.10.
* p < 0.05.
** p < 0.01.
*** p < 0.001.

Table 4
Determinants of arbitration provision (CMP regression models).[a]

	I Monit.	I Coord.	I Arbi.	II Monit.	II Coord.	II Arbi.	III Monit.	III Coord.	III Arbi.
Monitoring						0.13 (1.45)			0.51* (0.21)
Coordination									0.14 (0.14)
Tacitness	0.07 (0.05)	−0.02 (0.11)	0.11 (0.15)	0.07 (0.05)	−0.02 (0.11)	0.10 (0.18)	0.07 (0.05)	−0.03 (0.11)	0.24 (0.19)
Specific investments by the licensee	−0.03 (0.06)	0.28† (0.15)	0.38* (0.20)	−0.03 (0.06)	0.27† (0.15)	0.38* (0.20)	−0.03 (0.06)	0.29* (0.15)	−0.16 (0.16)
Observability of licensee's behavior	0.11* (0.05)	0.15 (0.13)	−0.08 (0.15)	0.11* (0.05)	0.15 (0.13)	−0.09 (0.20)	0.11* (0.05)	0.15 (0.13)	−0.11 (0.14)
Technological capabilities of the licensor	0.11* (0.04)	0.00 (0.12)	−0.08 (0.13)	0.11* (0.04)	0.00 (0.12)	−0.09 (0.21)	0.11* (0.04)	−0.01 (0.12)	−0.85 (0.42)
Exclusivity	0.05 (0.13)	0.03 (0.29)	−0.89* (0.43)	0.05 (0.12)	0.03 (0.29)	−0.89* (0.41)	0.05 (0.13)	0.08 (0.30)	−0.29 (0.47)
License's scope$_{\text{manuf or market}}$	0.33† (0.19)	1.38*** (0.32)	0.49 (0.40)	0.33† (0.19)	1.38*** (0.32)	0.46 (0.60)	0.33† (0.20)	1.42*** (0.32)	0.28 (0.73)
License's scope$_{\text{manuf and market}}$	−0.33* (0.16)	0.00 (0.44)	0.36 (0.92)	−0.33 (0.16)	0.00 (0.44)	0.40 (1.04)	−0.33* (0.16)	0.01 (0.44)	0.17 (0.29)
Patent–rights index	−0.48** (0.18)	−0.25 (0.16)	−0.07 (0.28)	−0.48** (0.18)	−0.25 (0.16)	−0.01 (0.84)	−0.48** (0.18)	−0.25 (0.16)	−1.56* (0.56)
Prior ties	0.31(0.21)	−0.31(0.31)	−1.78*** (0.49)	0.31(0.21)	−0.31(0.31)	−1.80* (0.53)	0.31 (0.21)	−0.29 (0.31)	−0.44 (0.29)
Same sector	−0.07 (0.12)	0.54† (0.30)	−0.21 (0.31)	−0.07 (0.12)	0.54† (0.30)	−0.20 (0.30)	−0.07 (0.12)	0.53†(0.31)	0.84* (0.42)
Legal assistance	−0.19 (0.14)	−0.34 (0.25)	0.75† (0.41)	−0.19 (0.14)	−0.34 (0.26)	0.77 (0.50)	−0.19 (0.14)	−0.38 (0.26)	−0.11 (0.09)
Licensor's size	−0.04 (0.04)	−0.01 (0.08)	−0.11 (0.10)	−0.04 (0.03)	−0.01 (0.08)	−0.10 (0.10)	−0.04 (0.03)	−0.00 (0.08)	−0.45 (0.31)
License age$_{3-10}$	0.14 (0.14)	0.09 (0.28)	−0.46 (0.31)	0.14 (0.14)	0.09 (0.28)	−0.48 (0.34)	0.14 (0.14)	0.14(0.27)	−0.68 (0.50)
License age$_{>10}$	0.05 (0.20)	0.32 (0.48)	−0.56 (0.53)	0.06 (0.20)	0.32 (0.48)	−0.56 (0.53)	0.05 (0.20)	0.36 (0.48)	
Arm's length	−0.36*** (0.10)			−0.36*** (0.10)			−0.36*** (0.10)		
Technology intensity		0.42** (0.13)			0.42** (0.13)			0.43** (0.14)	
Third assistance for partner identification		1.22*** (0.35)			1.23*** (0.35)			1.34*** (0.33)	
Intercept	1.72* (0.82)	1.95† (1.02)	−0.64 (1.44)	1.72* (0.82)	1.95† (1.02)	−0.86 (3.20)	1.72* (0.82)	1.93* (1.01)	−1.63 (1.58)
Wald chi2	401.25			421.50			503.78		
Atanh-Rho$_{\text{arb-monit}}$	0.15			0.13			−0.50		
Atanh-Rho$_{\text{arb-coord}}$	−0.04			−0.11			−0.13		
Atanh-Rho$_{\text{monit-coord}}$	0.14			0.14			0.15		
Log pseudolikelihood	−287.64			−287.64			−285.80		
Prob > Chi2	0.00			0.00			0.00		

	IV Monit.	IV Coord.	IV Arbitration	V Monit.	V Coord.	V Arbitration
Monitoring			−0.04 (1.30)			−1.15 (1.44)
Coordination			0.51* (0.21)			0.44† (0.24)
Monitoring × Coordination						0.39* (0.17)
Tacitness	0.07 (0.05)	−0.03 (0.11)	0.15 (0.17)	0.07 (0.05)	−0.03 (0.11)	0.13 (0.18)
Specific investments by the licensee	−0.03 (0.06)	0.29* (0.15)	0.24 (0.20)	−0.03 (0.06)	0.29* (0.15)	0.25 (0.20)
Observability of licensee's behavior	0.11* (0.05)	0.15 (0.13)	−0.15 (0.20)	0.11* (0.05)	0.15 (0.13)	−0.17 (0.19)
Technological capabilities of the licensor	0.11* (0.04)	−0.01 (0.12)	−0.11 (0.19)	0.11* (0.04)	−0.01 (0.12)	−0.13 (0.19)
Exclusivity	0.05 (0.13)	0.08 (0.30)	−0.85* (0.40)	0.05 (0.13)	0.09 (0.30)	−1.05* (0.42)
License's scope$_{\text{manuf or market}}$	0.33 (0.19)	1.42*** (0.32)	−0.29 (0.58)	0.33† (0.19)	1.43*** (0.33)	−0.47 (0.55)
License's scope$_{\text{manuf and market}}$	−0.33* (0.16)	0.01 (0.44)	0.27 (0.84)	−0.33* (0.16)	0.01 (0.44)	0.26 (0.87)
Patent–rights index	−0.48** (0.18)	−0.25 (0.16)	0.15 (0.75)	−0.48** (0.18)	−0.26 (0.16)	0.08 (0.75)
Prior ties	0.31 (0.21)	−0.29 (0.31)	−1.56* (0.57)	0.31 (0.21)	−0.29 (0.31)	−1.72** (0.63)
Same sector	−0.07 (0.12)	0.53† (0.31)	−0.44 (0.28)	−0.07 (0.12)	0.53* (0.31)	−0.61* (0.30)
Legal assistance	−0.19 (0.14)	−0.38 (0.26)	0.83† (0.51)	−0.19 (0.14)	−0.38 (0.26)	0.99* (0.49)
Licensor's size	−0.04 (0.04)	−0.00 (0.08)	−0.11 (0.09)	−0.04 (0.03)	−0.00 (0.08)	−0.06 (0.10)
License age$_{3-10}$	0.14 (0.14)	0.14 (0.27)	−0.44 (0.35)	0.14 (0.14)	0.14 (0.27)	−0.61 (0.36)
License age$_{>10}$	0.05 (0.20)	0.36 (0.48)	−0.67 (0.50)	0.05 (0.20)	0.36 (0.47)	−0.78 (0.52)
Arm's length	−0.36*** (0.10)			−0.36*** (0.10)		
Technology intensity		0.43** (0.14)			0.42** (0.14)	
Third assistance for partner identification		1.34*** (0.33)			1.34*** (0.33)	
Intercept	1.72* (0.82)	1.93† (1.01)	−1.56 (2.93)	1.72* (0.82)	1.97† (1.01)	−0.87 (2.91)

Table 4 (*continued*)

	IV			V	
	Monit.	Coord.	Arbitration	Monit.	Arbitration
Wald chi2	501.84			492.72	
Atanh-Rho$_{arb-monit}$	−0.50			−0.53	
Atanh-Rho$_{arb-coord}$	−0.10			−0.22	
Atanh-Rho$_{monit-coord}$	0.15			0.15	
Log pseudolikelihood	−285.77			−283.88	
Prob > Chi2	0.00			0.00	

[a] N = 106. Robust standard error in parentheses.
† p < 0.10.
* p < 0.05.
** p < 0.01.
*** p < 0.001.
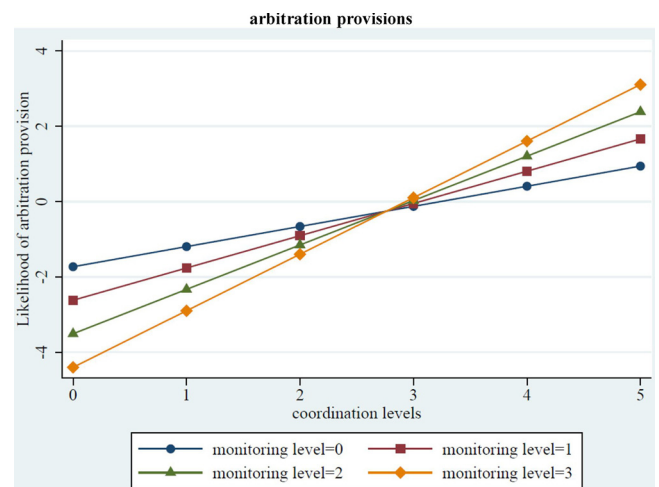
Fig. 1. Joint effect of monitoring and coordination orientations on the likelihood of arbitration provisions.

mechanism as a "default" option. To this end, we considered the role played by both coordination and monitoring orientations adopted by corporate decision-makers when drafting licensing contracts. On the basis of data on technology licensing, we found that the occurrence of an arbitration provision increases when contracts emphasize a co-ordination orientation that reflects an extant requirement for joint efforts and task interdependency *ex post*. We did not find, however, that the occurrence of arbitration provisions, when considered alone, decreases when the monitoring orientation included for deterring moral hazards is non-negligible. At this stage, we admit that our results suggest that the information brought about by monitoring can probably favor both public courts and arbitration to the same extent. The joint effect of monitoring and coordination orientations suggests, indeed, that partners perceive arbitration as better suited than public ordering for handling and preventing disputes when both types of provisions are extensive. In accordance with our theoretical predictions, these results imply that we must consider the complex architecture of contractual governance (Faems et al., 2008; Malhotra and Lumineau, 2011) if we wish to understand the decision-making process behind choices of dispute-resolution mechanisms.

Our main contribution relates to the comparative approach for the choice of dispute-resolution mechanisms. In their seminal contributions, Macneil (1974, 1978) and Williamson (1985, 1991) state that distinct governance modes require distinct ordering systems for their efficient execution and enforcement. They explain the discrepancies characterizing these systems (*i.e.*, classical, neoclassical, and for-bearance), and the reasons why each system may or may not be suited for enforcing and facilitating generic governance modes (*i.e.*, market, hybrid, and internal organization). Rather than considering broad categories of governance, we propose a more refined approach by distinguishing among the monitoring and coordination characteristics of governance modes. Our findings support this fine-grained approach and reveal that public ordering is preferred in simple and discrete exchanges where there are no significant relations to be preserved beyond disputes and public judges can strictly apply the letter of the original contract. On the other hand, arbitration corresponds to a trilateral "governance" mechanism that fosters the re-alignment of interests and objectives following disputes. Arbitration is preferred in exchanges characterized by a non-negligible need for coordination. Consequently, our results show that the trade-offs that take place when opting for either public or private ordering tend to parallel the two key impediments to cooperation: the threat of exploitation and the possibility of coordination failures.

Furthermore, we extend nascent research related to the joint effect of contractual provisions – monitoring and coordination in particular –

on subsequent decisions. We observe in practice a high occurrence of highly coordinative licensing exchanges in which both orientations are prevalent. Findings reveal an interesting interactive effect from which we can infer the influence of monitoring and coordination on one another in the choice of dispute-resolution mechanisms. They show that monitoring provisions magnify firms' inclination to prefer the arbitral forum over public courts in the presence of extensive coordination provisions. This suggests that monitoring – and more broadly control – provisions may be used as a means to ease and support collaboration rather than as coercive solutions (Gulati and Singh, 1998). The presence of clearly articulated monitoring terms may inspire the confidence needed for close collaboration (Baker et al., 1994). By aligning interests thanks to enhanced monitoring activities, licensing partners may be more willing to closely collaborate and to overcome their cognitive limitations. This finding tends to highlight the different functions and roles of monitoring provisions along with the nature of the partnership. Prior research on arbitration provisions in franchising suggests a positive relationship between monitoring and the use of litigation (Antia et al., 2013; Drahozal and Hylton, 2003). Monitoring may therefore serve as a coercive tool. In licensing however, the need for coordination over time is likely to be comparatively more extensive than in franchising. In essence, technology licensing contracts are inherently incomplete due to the extent of tacit knowledge, the difficulties of protecting IP, or the uncertainty and contingencies surrounding the commercialization and implementation of non-proprietary technology. Monitoring might then help to support the needed coordination in more relational licensing exchanges.

Our study therefore complements recent research that distinguishes the control functions of contractual agreements from their coordination functions (*e.g.*, Gulati and Singh, 1998) by exploring the manner in which alternative ordering systems are expected to empower contracts. We also contribute to the trilateral "governance" concept introduced by Williamson (1979). Williamson (1979, p. 237) notes that "… third-party assistance in resolving disputes and evaluating performance often has advantages over litigation in serving these functions of flexibility and gap filling…" Thus far, the assistance provided by third parties has been understudied (Nooteboom, 1999). Our study provides theoretical and empirical insights into when arbitrators are perceived as necessary active gap fillers and amicable arrangers. Our arguments therefore follow Buchanan (1975, p. 229), who suggests that the arbitrator is "… the outsider who tries to work out compromises among conflicting claims…" Williamson (1985, p. 193) also argues that the arbitrator is an "institutional design specialist." By opting for arbitration and trilateral governance *ex ante*, strategic decision-makers gain *ex post* the procedural flexibility that contractual gaps demand and avoid too much rigidity (Macneil, 1978). Arbitration can be viewed as an "external" administrative apparatus used for settling disputes in coordinative market-based exchanges.

Finally, we complement the legal literature on arbitration. Cooter and Rubinfeld (1989) and Stipanowich (2014) point out the differences between the interests of lawyers and those of their clients in most legal disputes. While building on the legal literature and its demonstration of the advantages and disadvantages of private and public dispute resolution, we offer a synthetic, testable framework rooted in transaction cost economics logic, and driven by corporate decision-makers' concerns and considerations: *Si Vis Pacem, Para Bellum*. The selection of the dispute-resolution forum is a strategic tool that can be used either for dissuasion if the chosen forum acts as a credible threat against opportunistic behaviors, or as a signal of partners' willingness to "work things out." By adopting the transaction as the unit of analysis, rather than performing cross-country or cross-industry analyses as is usually done in legal studies, we provide further insights into managers' reluctance to rely on arbitration. Given the risk at stake when engaging in interfirm partnerships, arbitration cannot be depicted as "the" optimal dispute-resolution mechanism to use under any circumstances.

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