Boundary spanner relational behaviour and organizational control in supply chain relationships

Abstract

Boundary spanner relational skills are considered critical in the successful management of buyer–supplier relationships and may help avoiding high costs of more formal inter-organizational controls. Yet, the influence of partners' boundary spanners on effective supply chain collaboration has had much less inquiry than the influence of broader inter-organizational controls. We use survey data of 200 buyer–supplier relationships to examine how these individual and organizational control mechanisms influence the performance effects of interfirm collaborations that vary in scope of activities undertaken. Findings show that collaborative scope as well as boundary spanner relational skills and inter-organizational controls are positively associated with performance. The effect of collaborative scope on firm performance, however, also depends on both mechanisms but in opposite directions: while the influence of collaborative scope on performance is enhanced by inter-organizational controls, a partner's boundary spanner relational skills has a negative moderating effect, indicating that such skills contribute more to the effective management of collaborations of narrow scope than those of broader scope.

Keywords: buyer–supplier relations, boundary spanners, relational skills, inter-organizational control, collaboration scope, firm performance

1. Introduction

In buyer–supplier collaborations, firms use inter-organizational and relational controls to address cooperation and coordination concerns in order to enhance collaborative and firm performance (Anderson, Christ, Dekker, & Sedatole, 2015). Inter-organizational controls are chosen and implemented at the firm level. They include formal mechanisms such as contracts, organizational structures, target setting, and feedback or performance management systems (Anderson et al., 2015; Dekker, 2004; Huang, Cheng, & Tseng, 2014; Mahama, 2006), and their goal is to enhance the likelihood of achieving objectives through collaboration and thereby fostering performance. Relational controls refer to the extent to which exchanges are governed by social relations, informal structures, and self-enforcement (Cao & Lumineau, 2015). Contrary to formal mechanisms, relational controls are not directly chosen, designed or implemented. They are built step by step during repeated exchanges. Trust and relational norms (e.g., flexibility, solidarity, information exchange) are two main relational control mechanisms discussed in the literature (Liu, Luo, & Liu, 2009; Szczepański & Światowiec-Szczpańska, 2012). Some foundational level trust and relational norms, for instance based on reputation or past experiences, is considered necessary to initiate a new collaboration. But both trust and norms mainly develop through social ties among individuals, which emerge and grow during collaborations (Zaheer, McEvily, & Perrone, 1998).

Although most of the process relies on individuals, scholars usually adopt an organizational level of analysis to examine relational controls (Dong, Zhenzhong, & Zhou, 2017). Such an organizational level provides an aggregate view of relational controls across groups of individuals that reflect an organizational view and are assumed to collectively hold certain levels of trust and relational norms. This can lead to ambiguous results (Zhang, Wu, & Henke, 2011), all the more because the way that inter-individual trust and shared norms transfer to the organization is far from self-evident (Tangpong, Hung, & Ro, 2010; Zaheer et al., 1998). In this paper, we examine how firms' reliance on inter-organizational and relational controls is associated with the performance effects derived from supply chain collaboration. In examining the influence of relational controls, we particularly focus on the role of boundary spanners who are the individuals in charge of inter-organizational relationships (Zhang et al., 2011). Boundary spanners are critical for managing interfirm collaboration. Through repeated

interactions, they come to share representations and information, manage conflicts, solve joint problems, develop knowledge, and so forth (e.g. Tangpong et al., 2010). To perform these functions, boundary spanners need strong relational skills, including traits such as being frank, honest, open, available, adaptable, likeable, agreeable, fair, polite, proactive, tolerant, compassionate, benevolent, and even having a sense of humor (Doney & Cannon, 1997; Jap, 1999; Lussier, Grégoire, & Vachon, 2017; Tangpong et al., 2010; Walter, 1999). Although these individual qualities seem crucial for effective collaboration, prior research on inter-organizational control has predominantly focused on control choices and relational controls at the firm level, largely ignoring the effects of boundary spanners' relational skills (Dekker, 2016). By integrating this firm-level perspective on controls with a lower level of analysis, as suggested by Tangpong et al. (2010), the current study takes the relational skills of partners' boundary spanners into account in the success of collaboration. We particularly focus on relational skills of partner firms' boundary spanners, who are at the basis of developing relational controls with the partner firm, and on inter-organizational controls employed during the relationship (i.e., the setting of targets, evaluation of achievements, and feedback and follow-up meetings).[1] The underlying assumption is that partners' relational skills influence the need for control and that trusting a partner's boundary spanners can offset the costs of implementing more formal inter-organizational controls. The key objective of this study is to examine these interrelations between boundary spanner relational skills and inter-organizational control and their influence on performance.

In examining these influences, we consider the effects of a critical relationship characteristic, namely its scope in terms of breath and depth of activities undertaken in the collaboration (Mishra, Chandrasekran, & MacCormack, 2015). Broad collaborations cover several activities across the value chain, and depth reflects the intensity of collaboration on those activities. Prior research suggests that collaborations with a greater scope have a greater potential to influence firm performance (Smith, Callagher, & Huang, 2014), are of greater strategic importance (Reuer & Arino 2007), but also entail a greater need for control (Dekker, Ding, & Groot, 2016). The most intensive collaborations with the

[1] We note that boundary spanners involved in managing a relationship are often not the same individuals who were involved in initiating, negotiation and (contractually) establishing a relationship. Similarly, the inter-organizational controls that we study are broader than those contractually established at the outset of a relationship and involve practices employed during the relationship (e.g., not only target setting that may be part of the contract but also meetings to evaluate performance, provide feedback and discuss progress).

greatest control requirements thus are those where partners collaborate deeply on a wide range of activities. We accordingly examine whether the performance effects of collaboration scope vary with boundary spanners' relational skills and use of inter-organizational controls, both individually and in combination. By testing the moderating effects of both individual and inter-organizational forms of control across relationships of varying scope, we fill a gap in extant research on the value of these controls across different settings. Particularly, we aim to contribute the academic literature on the management of interfirm collaboration by reconciling two streams of research on both inter-organizational and individual-level controls, and exploring a key condition that determines their relative value in effectively managing interfirm relationships. Our research is also important to practice as it provides insights to managers regarding how and when in their supply chain relationships they can apply organizational mechanisms or rely on key boundary spanners to enhance performance.

To test our expectations, we collect survey data from 200 French firms about their relationship with a supply chain partner. Data analysis confirms that collaboration scope relates positively to firm performance, but also that this influence depends on the relational skills of supply chain partners' boundary spanners and on the inter-organizational controls in place. Boundary spanners' relational skills have a positive direct effect on firm performance, but negatively moderate the effect of collaboration scope. In contrast, inter-organizational controls have positive direct and moderating effects on firm performance. We find no evidence of additional interaction effects between boundary spanners' relational skills and inter-organizational controls, suggesting that the identified moderating effects on performance are additive. These results thus indicate that the relational skills of supply chain partners' boundary spanners are particularly valuable in narrow scope collaboration. However, this positive impact is reduced when collaboration scope increases. Indeed, a broader scope may generate additional much complexity that individuals may not be able to manage effectively. In such settings of increasing collaboration scope, inter-organizational controls thus appear to be relatively more beneficial for collaboration.

This study aims to extend our understanding of control in supply chains in three main ways. First, we highlight the prominent role of boundary spanners in interfirm collaboration and recognize that they are keystones of developing relational controls. As we demonstrate, effective reliance on business

partners' boundary spanners depends on the scope of the collaboration. Second, by moving beyond a perspective that views interfirm control as either organizational or individual, we show how both inter-organizational controls and individual-level relational controls are implied in the management of supply chain relationships. Third, rather than analyzing when different modes of control interact (see Cao & Lumineau, 2015), we consider the collaborative scope to capture heterogeneity in firm–partner collaborative efforts across value chain activities, such that we can assess the performance implications of collaboration scope and both the relative and joint influence of different types of controls.

2. Conceptual background

2.1. Inter-organizational controls and boundary spanners' relational skills: a mixed-level model

Two control issues characterize buyer–supplier collaboration: appropriation concerns and coordination requirements (Dekker, 2004). Appropriation concerns result from the divergence of interests between parties that may lead them to engage in opportunistic behavior or free-ride instead of to cooperate (Liu et al., 2009). Parties are uncertain whether their expectations will be achieved, whether the partner will act in the interest of the collaboration, and whether the value of the collaboration will be fairly distributed. Coordination requirements result instead from the risk of non-alignment across collaborative activities. The activities of each partner must be coherent to achieve the desired outcomes. To minimize risks associated with these requirements and create favorable collaborative conditions, firms rely on various controls, which can be broadly classified into two categories: inter-organizational controls and relational controls. The bulk of the literature has emphasized a firm-level analysis and organizational mechanisms (e.g., Cao & Lumineau, 2015), instead of a relational governance perspective integrating the individual level. We here adopt such an approach to understand how firms can rely on relational controls in the management of a relationship.

Inter-organizational controls include all the formal mechanisms designed and implemented by an organization to deal with appropriation concerns and coordination requirements. Studies adopting a transactional perspective have typically examined the use of specific investments and formal contracts (Dekker, Sakaguchi, & Kawai, 2013). We adopt a broader perspective rooted in organizational control

theory (Bedford, Malmi, & Sandelin, 2016; Malmi & Brown, 2008) suggesting that organizational control mechanisms consist of all devices that are used to ensure that behaviors and decisions are consistent with the organization's objectives. In Malmi and Brown's (2008) framework, they include governance and organizational structures, policies and rules, planning, measurement and rewards systems. In the same mindset, inter-organizational controls include organizational mechanisms that enable to achieve control in exchange relationships such as through joint targets, operational reviews, feedback mechanisms, and dedicated collaborative practices (e.g., joint training, shared seminars). For instance, collaborating supply chain partners may agree on targets for cost reduction, quality enhancement and reliability, put in place practices to monitor and discuss achievements on activities and their outcomes, and organize joint training sessions and seminars to exchange knowledge, enhance skills and socialize. In combination or separately, these mechanisms can reduce control issues and create conditions for effective supply chain relationships (Dekker, 2004; Lumineau & Henderson, 2012). Prior studies of inter-organizational controls often address the initial phases of collaboration and *ex ante* formal mechanisms, such as the partner selection process and contract design that can reduce transactional risks (e.g., Liu et al., 2009). Yet, risks and challenges identified in the initial phase may persist, placing demands on control means also after the contract is settled. Quantitative analyses of post-contractual controls are less common, however, and studies that include the effects of such controls on performance are even fewer (Dekker et al., 2013, 2016; Wacker, Yang, & Sheu, 2016). To fill this gap, we adopt an organizational perspective on control and consider organizational mechanisms used during the management of the collaboration.

Relational controls, often considered from a perspective anchored in social and relational exchange theory (Cao & Lumineau, 2015), mainly involve trust and relational norms (Liu et al., 2009), which are mutually connected (Szczepanski & Światowiec-Szczpańska, 2012). Both trust and relational norms relate to informal cultures and systems and derive from repeated interactions between individuals, face-to-face discussions, shared ideas, personal initiatives, closeness, liking, and, more generally, socially embedded relationships that constitute the social capital of firms (Cao & Lumineau, 2015; Carey, Lawson, & Krause, 2011; Ferguson, Paulin, & Bergeron, 2005; Nicholson, Compeau, & Sehti, 2001). Relational controls depend therefore critically on individuals' abilities to interact,

personal qualities, social connections, and personal initiatives (Dong et al., 2017; Li, Xie, & Teo, 2010; Liu et al., 2009).[2] In many studies, the characteristics of relational controls are attributed to firms, while in essence they come from individuals who act on behalf of their firm. This resulting cross-level issue has been viewed as potential threat to the validity of the findings of studies (Tangpong et al. 2010). This has also led to calls for studies that examine how individuals affect the collaboration and its firm-level outcomes (Cai, Jun & Yang, 2017; Dekker, 2016; Hohenschwert & Geiger, 2015; Zhang et al., 2011). Numerous studies have already considered critical characteristics of the individuals involved in interfirm relationships, in particular in marketing and supply chain management (e.g. Cai et al., 2017; Carr & Smeltzer, 2000; Crosby, Evans & Cowles, 1990; Doney & Cannon, 1997; Eltantawy, Giunipero & Fox, 2009; Giunipero, Denslow & Eltantawy, 2005; Giunipero & Pearcy, 2000; Grawe, Daugherty, & Ralston, 2015; Palmatier, Scheer & Steenkamp, 2007). We focus here on the relational skills of a partner firm's boundary spanners who are assigned by their firm to manage exchanges with the external environment—mainly other organizations. Relational skills are skills, namely abilities gained by practice and knowledge (Carr & Smeltzer, 2000) that through their deployment create and shape positive relationships between boundary spanners (Walter, 1999). They are interpersonal skills signaling the predisposition of an individual boundary spanner to be likable, to behave in a tolerant, empathetic, supportive, compassionate, and loyal way (Borg & Johnston, 2013; Doney & Cannon, 1997; Giunipero & Pearcy, 2000; Palmatier et al., 2007; Tangpong et al., 2010). They are also communication skills (Borg & Johnston, 2013; Carr & Smeltzer, 2000; Giunipero & Pearcy, 2000; Zhang, Wu, & Henke, 2015), behavioral skills such as the ability to work in a team, to follow-up, to be flexible, and proactive (Carr & Smeltzer, 2000; Giunipero & Pearcy, 2000), and more broadly management skills such as the abilities to behave ethically, listen, communicate effectively, and be creative in problem solving (Monczka, Handfield, Giunipero & Patterson, 2016). These relational skills can be considered strategic so long they play an integrative role in designing and implementing the firm's strategic plan towards its partners (Eltantawy et al. 2009). In cooperative contexts, boundary spanners' relational skills facilitate communication, support joint problem solving,

[2] Dong et al. (2017), for instance, examine interpersonal quanxi in Chinese B2B relationships as determinants of relational governance between firms.

resolve conflicts harmoniously, foster benevolence, commitment and long-term orientation, better relationship quality, reduce opportunism and ultimately can enhance collaborative and firm performance (Crosby et al., 1990; Eltantawy et al., 2009; Grawe et al., 2015; Tangpong et al., 2010; Zhang et al., 2011; Zhang et al., 2015).

We focus particularly on the relational skills of business partners' boundary spanners as basis of the focal firm's reliance on relational control. Their deployment of relational skills should send a positive signal to the focal firm's boundary spanners that control problems are alleviated. Similar to the idea that relying on trust can provide a low cost control solution, relying on the relational behavior of a partner's boundary spanners could be a low cost and nonetheless effective control solution. Not only relying on boundary spanners with well-developed relational skills is efficient, as compared to costly formal control mechanisms (Li et al., 2010), but it might also prevent from endangering the quality of the relationship by imposing more formal organizational controls (such as based on performance expectations and evaluations).

Considering the costs and diversity of control mechanisms available to managers, a critical question is when firms rely on boundary spanners' relational skills and on inter-organizational controls to effectively manage collaborative relationships. In the next section we argue that collaboration scope determines the need for different controls in order to realize potential cooperative benefits.

2.2 Collaboration scope

Any decision about relying on inter-organizational controls or on boundary spanners' relational skills must be made in accordance with the characteristics of the collaboration that generate a demand for control (Anderson et al., 2015; Cai et al., 2017; Giunipero et al., 2005). Collaboration scope is a key characteristic for buyer–supplier relationships that determines collaboration structure and need for supply chain integration (Leuschner, Rogers & Charvet, 2013; Mishra et al., 2015), and particularly the coordination and appropriation challenges to be managed (Dekker et al., 2016). Broader scope collaboration provides firms with greater potential to extract benefits from their collaborative relationships, but also expose them to greater risks and interdependencies to be managed. The notion of scope has been defined in different ways, or sometimes is not defined at all. Early scholars defined

it as the number of technologies or functional activities involved in collaboration (e.g., Zinn & Parasuraman, 1997). Khanna, Gulati, & Nohria (1998) consider relative scope to characterize the extent to which partners' activities overlap and contribute to similar or asymmetric knowledge. It also has been used to characterize the extent to which innovative projects involve the creation of new technology rather than the application of existing technology (Sampson, 2004). Oxley & Sampson (2004) concentrate on what they call the most accessible dimension of alliance scope, in terms of conceptual clarity and data availability: its functional or vertical scope, reflecting the extent to which partners combine multiple and sequential value chain activities (e.g., R&D, manufacturing, marketing) within an alliance. This activity-based focus (or breadth) appears in Lioukas, Reuer, & Zollo (2016, p. 167)'s work too, who note that "broad-scope alliances involve a large number of activities." Some studies examine both breadth and depth of collaboration (e.g., Hora & Dutta, 2013), considering these as separate dimensions that describe the extensiveness and extent of concentration of the partnership. In contrast, other scholars consider the intensity of cooperation as part of scope (e.g., Trigo & Vence, 2012; Zinn & Parasuraman, 1997), with the idea that a broad scope particularly provides a managerial problem when firms work intensively on a range of different activities.[3]

For this study, we follow the latter conceptualization and define scope to capture both the breadth and depth of the collaboration. A broad scope implies diverse activities (such as R&D, logistics, production and marketing) are undertaken in the collaboration (Mishra et al., 2015; Zinn & Parasuraman, 1997). It relates to the choice of partner firms with which the focal firm can perform various value chain activities jointly, under the umbrella of the collaboration, or else in isolation (Lioukas et al., 2016). A deep scope corresponds to the intensity of the collaboration, linked to the extent to which the partners collaborate within each function or activity (Zinn & Parasuraman, 1997). Collaborations of greater scope (i.e., broader and deeper collaboration) are more complex to manage, because they involve dealing to a greater extent with both coordination and cooperation issues. Therefore, Mishra et al. (2015) highlight the need to investigate how firms design structures to ensure effective performance in collaborations of greater scope. Smith et al. (2014) also recognize that,

[3] Dahlquist & Griffith (2017) also more broadly consider 'collaborative magnitude' that involves the breath of firms' commitments complementary actions, and specific investments.

despite extensive research into cooperation, the inconsistent findings leave the nature of the link between scope and performance unclear. We thus formulate hypotheses to associate collaboration scope, control mechanisms, and firm performance, taking the basic position that collaborations of a greater scope provide a greater potential to enhance firm performance, but that the strength of this effect will depend on the control mechanisms relied upon.

3. Hypothesis development

3.1. The moderating effect of boundary spanners' relational skills

A crucial factor that can enhance cooperation and coordination between buyers and suppliers is the presence of socialization or relational processes (Cao & Lumineau, 2015). Such processes increase relationship quality, through improved information sharing, smoother problem solving, and restraints on unethical uses of power (Mahama, 2006). In accordance with social exchange theory and relational views (Dyer & Singh, 1998), researchers affirm positive effects of trust and relational norms (Liu et al., 2009), organizational virtuousness (Cameron, Leutscher, & Calarco, 2011), and relational governance (Wacker et al., 2016) on performance. Yet, the role of individual boundary spanners in buyer–supplier relationships, who are at the basis of relational controls, deserve greater attention (Tangpong et al., 2010). This holds particularly for the complex link between the relational qualities of boundary spanners and firm performance. Zhang et al. (2011) conceive of boundary spanning capabilities as facilitators of organizational trust; Tangpong et al. (2010) focus on the benefits of an interactionist perspective that combines organizational relational norms and individual agent cooperativeness to reduce opportunism in buyer–supplier relationships. In line with these contributions, we assume that relational skills of the partners' boundary spanners can exert a direct positive effect on performance. Relational skills create "personal chemistry" (Taylor, 2005) between boundary spanners of both firms and help them formulate reciprocal expectations and enhance mutual adaptation. If unforeseen events arise, relational skills enable them to solve problems quickly and still achieve performance targets (Liu et al., 2009). However, the relative benefits of such relational skills in collaborative relationships of varying scope is less clear, and based on our review of the literature we develop two competing hypotheses on the interrelations with collaborative scope.

When the collaborative intensity of the relationship is greater, firms are exposed to greater risk, and more complex, larger transactions that entail greater risk also lead firms to rely on partners they consider more trustworthy and competent (Dekker et al., 2013, 2016). Because firm trustworthiness is favored by intense communications between boundary spanners who are readily available and capable of offering explanations (Zhang et al., 2011), the need for such qualitative interactions should increase with the scope of the collaboration. That is, these qualitative interactions should help boundary spanners coordinate, implement action plans, resolve problems or conflicts, explain their interests to each other, fairly share collaborative benefits, and prevent opportunistic behavior that would be even more harmful due to the intensity of the collaboration (Dekker et al., 2016; Tangpong et al., 2010). From this perspective, relational skills of partners' boundary spanners should facilitate qualitative interactions between the boundary spanners of both sides, and thus, we formulate the following hypothesis:

H1a. Boundary spanners' relational skills positively moderate the relationship between collaboration scope and firm performance.

A competing line of thought to the above results is in an opposite prediction. With an increasing scope, the number and intensity of activities included in the exchange increases, as does the number of boundary spanners involved in the interactions. To the extent that boundary spanners engage in different but interdependent tasks, their relational skills would be advantageous for ensuring coordination efforts. The activities span many different functions (e.g., purchasing, R&D, engineering, after sales service), however, each with specific task and goals, across partner organizations. Therefore, each boundary spanner likely exploits his or her relational skills to achieve the goals of the collaboration and his or her firm, even though inter-functional coordination (such as provided through inter-organizational controls as discussed below) is what is truly needed. This argument parallels Oliva and Watson's (2011) point that in increasingly differentiated organizations, supply chain planning requires a broader cross-functional reach to realize integration. As Håkansson & Lind (2004) point out, in socially embedded networks, some employees interact and collaborate intensively with employees in the other company, to the extent that they might even form subgroups with distinct

cultures. In collaborations of extensive scope though, the presence of several local subgroups with distinct routines and relational norms could prove a barrier to effective coordination. More generally, when collaboration increases in scope, a greater degree of coordination and cooperation across functions and activities will be required, and relying on boundary spanner relational skills may be insufficient to realize such coordination. Consequently, the value of boundary spanners' relational skills would be relatively greater in collaborations of narrow scope than in those of broad scope where inter-organizational controls may play a more prominent role. Accordingly, we provide an opposing hypothesis by anticipating a negative moderating effect of boundary spanners' relational skills on the relationship between collaborative scope and firm performance. This negative moderating effect indicates that in collaborations of greater scope, the positive influence of boundary spanners' relational skills will be weaker than in collaborations of limited scope. Thus, we predict as competing hypothesis to H1a that:

H1b. Boundary spanners' relational skills negatively moderate the relationship between collaboration scope and firm performance.

3.2. The moderating effect of inter-organizational controls

Control mechanisms within organizations aim at resolving three key problems (e.g., Bedford et al., 2016): goal alignment (i.e., cooperation), adaptability, and integration (i.e., coordination). Inter-organizational controls aim for similar objectives with a clear emphasis on cooperation and coordination requirements. For example, a formal contract grants firms legal safeguards and options for sanctioning uncooperative behaviors. It also allows each party, through the contracting process, to make its expectations and assumptions explicit, which should mitigate the risk of misunderstanding or mismatch (Lumineau & Henderson, 2012). Contractual mechanisms reduce opportunism and favor relationship performance (Dahlquist & Griffith, 2017; Liu et al., 2009); operational performance measurement systems enhance product quality, on-time delivery, and cost savings (Mahama, 2006); and organizational mechanisms such as target setting, operational reviews and feedback are associated with collaborative advantage, better quality relationships, and overall performance (Cao & Zhang, 2011). Prior empirical findings thus lead us to assume that inter-organizational controls facilitate

performance. However, designing and implementing such controls is not a "context-free" process (Liu et al., 2009), and prior research indeed indicates that their use varies with characteristics of collaborative relationships that favor greater use of controls (e.g., Dekker et al., 2013, 2016).

In collaborative relationships of limited scope, reliance on inter-organizational controls may remain limited as compared to larger scope collaboration (Zinn & Parasuraman, 1997). Narrow scope collaboration may also be well managed by partners' boundary spanners, reducing the need for broader organizational control mechanisms. Direct interactions among boundary spanners enable proximity, and working closely together helps partner firms cooperate (Dekker et al., 2016). Thus, in this setting extensive (costly) inter-organizational controls may not be needed. In contrast, when controls pertain to a coordination context (larger scope collaborations), they provide a framework that can facilitate interactions, information sharing, adaptations, and integration. They give individual boundary spanners enhanced information, which can clarify task expectations, improve decision making, ensure a focus on organizational goals, respond to variations in the external environment, and enable better coordination (Bedford et al., 2016). This creates conditions for cross-functional integration to be realized (e.g., Oliva & Watson, 2011), also across organizational boundaries. For example, target-setting and feedback processes create space for interactions that enable boundary spanners to learn about the expertise and expectations of their partner, establish standardized communication and routines, and ensure coherence across organizations. Therefore, when the collaboration scope increases, inter-organizational controls can effectively facilitate coordination processes across the different activities undertaken. We thus propose:

H2. Use of inter-organizational controls positively moderates the relationship between collaboration scope and firm performance.

3.3. Interrelationships between boundary spanner relational skills and inter-organizational controls

While the prior hypotheses predict how boundary spanner relational skills and inter-organizational controls moderate the effects of collaboration scope on firm performance, they may

also interact in the management of the relationship and influencing performance.[4] For instance, boundary spanners often are involved in the implementation and execution of inter-organizational controls (e.g., by taking part in target setting, evaluation and feedback meetings). This provides a connection between the individual or 'micro-level' and organizational level mechanisms used to achieve control and integration (cf. Oliva & Watson, 2011). Greater relational skills may enhance the effectiveness of inter-organizational controls, for instance, through achieving better quality targets and feedback on performance. Relational skills can also help overcoming the limits of inter-organizational controls and to attain a mutually acceptable resolution of conflicts when they occur. At the same time, inter-organizational controls can provide the opportunity for boundary spanners to reveal and activate their relational skills. These effects would result in a positive interrelation between the mechanisms. However, inter-organizational controls (e.g., targets, evaluation, feedback and structures) that involve more formalization and involvement of more participants from both partner firms may also limit boundary spanners in effectively using their skills and limit their influence in managing the relationship. Enhanced relational skills of a partner's boundaries spanners may also lead firms to invest less in costly organizational controls if these would be seen as redundant or even counter-productive. These effects would result in a negative interrelation between the mechanisms.

While these arguments provide tension to the interrelationship of the two mechanisms, we follow the argument that high-skilled boundary spanners can enhance the effectiveness of inter-organizational controls and *vice versa*. This expectation is in line with the broader finding in the literature that formal governance is positively related to relational governance (Cao & Lumineau, 2015). Thus, we predict a positive interaction on performance:

H3. Boundary spanners' relational skills and inter-organizational controls are positively interrelated in influencing firm performance.

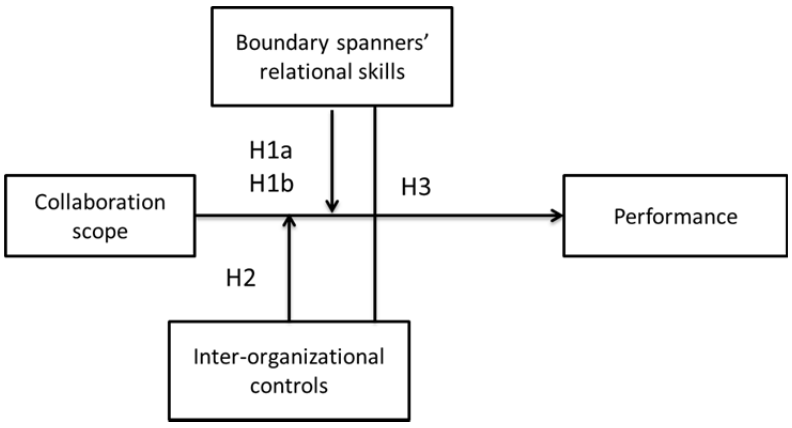
Prior research indicates that the interrelationship between relational and formal governance mechanisms can vary across different contexts (Cao & Lumineau, 2015). In line with this and the prior

[4] More generally, studies have examined complementary and substitutive relationships between relational and formal controls (Dahlquist & Griffith, 2017; Huang et al., 2014).

hypotheses, we expect the two mechanisms and their interrelationship to become of greater importance with greater relationship scope. Accordingly, we examine in the empirical tests both the interaction of the two mechanisms as well as their interaction with collaboration scope to assess if, how and when they interrelate.

Figure 1 summarizes the conceptual model and hypotheses developed to be tested.

Figure 1. Theoretical model



4. Methods

4.1. Data collection

In order to test our hypotheses, data were obtained via the European Center for Enterprise and Innovation (THESAME) and its Think Tank PEAK®[5], which functions to support the development and promotion of collaborative relationships in supply chains. A web-based survey invitation was sent to a sample of 2,000 French buyer and supplier firms in the French Auvergne Rhône-Alpes region; the second largest region after Paris in terms of Gross Domestic Product, and the 8th in Europe. Restricting the geographical area of the data collect is a common practice to ensure homogeneous conditions of the survey (e.g., Niskanen & Niskanen, 2010), which decreases the potential effects of extraneous variables.

An email that detailed the objectives of the study was sent to each firm's CEO. In the invitation, CEOs were asked to forward the questionnaire to the most qualified boundary spanner in their

[5] PEAK stands for Purchasing European Alliance for Knowledge. The survey was prepared and sent out by an independent firm, Socrates (http://socratesonline.com/), on behalf of PEAK.

organization, who could evaluate an on-going, important collaboration with the firm's main supplier or customer. This request was to ensure that the survey would be completed and returned only by well-informed key respondents. This process and the focus on a strategic partner echoes the methodology followed by Zhao, Huo, Selen, & Yeung (2011), who suggest it is an adequate way to study collaborative supply chain issues. Knowing that both customer and supplier firms would be sampled, the questions were formulated by PEAK sufficiently broad to be relevant for both parties.[6] In the analysis we, however, also include the position of the responding firm to control for potential differences in relationships between constructs.

After two reminder messages, 232 responses were received (11.6% response rate), of which 200 were usable and without any missing data, resulting in an effective response rate of 10%. Compared with prior online supply chain collaboration studies (e.g., Cao & Zhang, 2011; Narayanan, Narasimhan, & Schoenherr, 2015), and given the nature of the process that asked CEOs to forward the survey, this rate is satisfactory. In line with the request to forward the survey to the most qualified respondent, the majority of CEOs did not complete the survey themselves (those that did typically worked at smaller firms), and job titles of most respondents related to purchasing manager or officer (for buyers), and key account managers (for suppliers). Table 1 contains details about the sample characteristics.

[6] For instance, in the measurement of performance derived from the collaboration, both buyers and suppliers are concerned about margins, delivery, quality, innovation and the development of competencies. To assess measurement similarity across the two groups, we also ran the factor analyses reported in Table 2 separately for buyers and suppliers, and obtained similar results in terms of factor structures and item loadings.

Table 1: Sample characteristics

Variables	(n=200)
Firm size	
small (10-249 employees)	20.5%
medium (250-4.999 employees)	29.0%
large (>5.000 employees)	50.5%
*Firm position in the supply chain**	
Supplier firms	37%
Buyer firms	63%
Length of the relationship (12.56 years average)	
0-5 years	10.5%
5-15 years	26.5%
More than 15 years	63%
Respondent experience in relationship (5.89 years average)	
0 to 4 years	53.5%
5 to 15 years	30.5
More than 10 years	16%
Respondent job title / company position	
CEO / President / General Director	11%
Manager of buyer-supplier relationship	74%
Purchaser / key account manager	12%
Other	3%
Industry	
Manufacturing	83.2%
Service	16.8%

* Firm position (supplier or buyer) was considered in reference to the firm's status with its main partner as reflected on in the survey.

4.2. Common method bias

The survey data for this study were collected from the most qualified respondent in the organization. This focus on the best informed respondent can reduce concerns about common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In addition, the procedures and statistical tests recommended by Krishnan, Martin, & Noorderhaven (2006) were used to mitigate this risk. The first procedural remedy aims to reduce respondents' tendency to offer socially desirable responses or acquiesce when crafting their responses; specifically, the respondents' anonymity was carefully protected (Podsakoff et al., 2003), which was noted on the introductory web page of the online survey. Second, to minimize item ambiguity (Tourangeau, Rips, & Rasinski, 2000), a pre-test of the survey was conducted in order to adjust or replace any ambiguous questions. Third, after obtaining the data we conducted Harman's one-factor test, which is based on the idea that substantial common method bias exists if a single or general factor accounts for most of the variance when all the variables are

entered together (Podsakoff et al., 2003). We ran an unrotated principal component analysis on all the measurement items used in the model. Four factors emerged with eigenvalues greater than 1, suggesting that common method bias is not a problem. Finally, we comment that even if some common method bias is present, this is unlikely to increase the likelihood of finding evidence for our hypotheses as these require estimating interactions between constructs which cannot be artefacts of such bias (Siemsen, Roth, & Oliveira, 2010).

4.3. Variable measurement

As described in more detail below, we relied on prior studies to select from the survey measurement scales for the key constructs included in our hypotheses. Since for each construct multiple items are used for measurement, we used maximum likelihood (ML) factor analysis to evaluate construct measurement.[7] For each construct, the results confirm a one-factor solution, and Cronbach Alpha values indicate adequate reliability. We then created summated scales for each construct to be used for the hypothesis tests. This procedure has two specific benefits. First, it provides a means to overcome measurement error, at least to some extent. By using average or typical responses to a set of related variables, we reduce the measurement error that might occur for single questions. Second, it represents multiple aspects of a concept in a single measure (Hair, Black, Babin, & Anderson, 2014). Table 2 reports all measures.

4.3.1. Independent variable

Following Mishra et al. (2015), the scope of the collaboration was measured by capturing the depth and breadth of the collaboration on five value chain activities: R&D, logistics, production, marketing/distribution, and after-sales (see also Dekker et al., 2016). Respondents indicated the intensity of collaboration on each activity (captured on a 10-point Likert scale). We take the mean of the sum of scores to create a measure of the scope of the collaboration (SCOPE). The Cronbach alpha value (.882) indicates adequate reliability and ML factor analysis (variance explained 68.10%) affirms the unidimensionality of the construct with high loadings and test scores (KMO = .842; Bartlett's test

[7] Survey items were related to prior studies, but no existing scales were used for measurement. Therefore, we use exploratory factor analysis to assess measurement properties of scales.

χ^2 = 318.35, df = 10, p = .000). We used one other item in the questionnaire, which asked for a global perception of the degree of collaboration (from 1 to 10), to conduct an additional validity test. The positive correlation (r = .49, p < .01) supports the idea that a greater scope of the collaboration is also associated with a perception of more intensive collaboration.

4.3.2. Moderating variables

The boundary spanners' relational skills (BSRS) construct reflects the relational behavior of the people in charge of the relationship (Zhang et al., 2011). As indicated, we focus on the partner's boundary spanners, as the development of relational controls essentially depends on the business partner's boundary spanners. An additional benefit of this measurement is that it avoids judgment and perception bias towards the boundary spanner's own relational skills (since the firm's boundary spanner is the respondent). We used six items from the survey that pertain to the informant's judgment of the abilities of the partner's boundary spanners to: (1) help the firm move forward, (2) help the firm develop competencies, (3) explain and justify their decisions, (4) be reliable, (5) be transparent in their dealings, and (6) exhibit solidarity in case of difficulties. These items relate most closely to the relational skills as reviewed in the theory section and specifically relate to how the partner firm's boundary spanners interact with and influence the focal firm.[8] In particular, the question addresses boundary spanners' exposed abilities to engage in relational behaviors that support development of relational control. Each item used a 10-point Likert scale (1 = "Strongly disagree" to 10 = "Totally agree"). The Cronbach alpha value (.915) indicates high reliability, and ML factor analysis (variance explained 64.47%) affirms the unidimensionality of the construct with high loadings and adequate test scores (KMO = .895; Bartlett's test χ^2 = 789.08, df = 15, p = .000). Similar to the assessment of SCOPE, we used additional variables to conduct validity tests, which items relate to key relational control mechanisms (Cao & Lumineau, 2015). First, the positive correlation with an item evaluating

[8] These items align well with similar measures used by Cameron et al. (2011). We recognize that the six items used to measure the construct do not fully cover the span of skill identified in the literature section. The survey included several other items about broader characteristics or 'virtuous' of partners' boundary spanners. We only selected those items that directly assessed how the partner's boundary spanners interact with and influence the focal firm as this is key to how relational skills are assessed in the specific relationship. Adding to the construct measurement two more general items about the boundary spanners' (1) competence to manage the relationship, and (2) initiatives to maintain and improve the relationship, provides similar results as reported.

the level of trust with the partner firm confirms the idea that boundary spanners' relational skills create the conditions for trust to develop (r = .81; $p < .01$). Second, the measure correlates positively with an item that captures how the climate of the relationship allows to adequately handle conflicts (r = .75; $p = .000$), again providing evidence of construct validity.

The inter-organizational control (IOC) construct consists of four survey items, which stem from commonly used measures in interfirm control research of control mechanisms that support on-going collaboration (Dekker et al., 2013; Draulans, deMan, & Volberda, 2003). The first item captured the extent to which the relationship was based on joint targets (Jap, 1999), which set the performance expectations for partners to be realized. The second item captures use of feedback meetings to evaluate satisfaction regarding partners' relationship expectations, which enables to assess and discuss performance on the joint targets set, and to agree on adjustments if necessary. The third item captures use of follow-up meetings on common projects, which allows for monitoring progress of and coordination about joint activities undertaken. The last item captures the use of mechanisms that foster joint action such as seminars with suppliers and joint training. Each item used a 10-point Likert scale (for the first item: 1 = "Strongly disagree" to 10 = "Totally agree"; for the other items: 1 = "Never" to 10 = "Systematically"). The Cronbach alpha value (.706) is lower than for the BSRS construct but still indicates acceptable reliability, and ML factor analysis (variance explained 54.27%) affirms the unidimensionality of the construct with high loadings and test scores (KMO = .719; Bartlett's test χ^2 = 152.76, df = 6, $p = .000$).[9] As additional validity test, we correlated the construct with an item pertaining to establishing a shared IT system with the partner. Managing common activities through shared IT systems signals organizational commitment and investments in collaboration, and indeed the correlation is positive and significant (r = .30, $p < .01$).

4.3.3. Dependent variable

We assessed economic, operational, and strategic dimensions of performance (PERF) with five survey items measured on a 10-point Likert-type scale (1 = "Strongly disagree" to 10 = "Strongly agree"). Respondents specifically evaluated how the collaboration benefits the firm's overall

[9] We note that the differences in reliability of the BSRS and IOC constructs can generate differences in the power to detect direct and moderating influences on performance.

performance by enabling it to improve on-time delivery and quality of the products and services that it offers (Mahama, 2006), innovate (Griffith & Zhao, 2015), develop firm competencies (Li et al., 2010), and maximize margins (Sedatole, Vrettos, & Widener, 2012).[10] Similar to prior studies on the performance effects of supply chain relationships, this construct captures both financial and non-financial elements of performance. The Cronbach alpha value (.898) indicates high reliability, and ML factor analysis (variance explained 71.51%) affirms the unidimensionality of the construct with high loadings and test scores (KMO =.854; Bartlett's test $\chi^2 = 565.18$, df = 10, $p = .000$). The high factor loadings of both the financial and non-financial performance items indicate these elements are strongly related. We conduct construct validity tests using two additional survey items that asked for an overall evaluation of the relationship with the partner in terms of mutual benefits and the firm's achievement of expectations (Li et al., 2010). The respective correlations with PERF ($r = .71$, $p < .01$; $r = .74$; $p < .01$) confirm that better performance derived from the collaboration is associated with a more positive evaluation of these aspects.

[10] A sixth survey item about performance impact captured how the collaboration influenced the management of joint projects. As this item did not relate to firm performance, we excluded it from construct measurement.

Table 2: Measurement scales and descriptive statistics

Construct and measurement items	Means (SD)	Loading (variance explained)	Cronbach alpha
SCOPE *Extent of collaboration on value chain activities*		(68.10%)	.882
R&D	6.86 (2.08)	.697	
Logistics	6.93 (2.29)	.878	
Production	6.95 (2.02)	.826	
Marketing/distribution	6.11 (2.55)	.849	
After-sales	6.09 (2.48)	.849	
IOC *Inter-organizational controls*		(54.27%)	.706
Joint targets	7.02 (1.96)	.775	
Follow-up meetings on common projects	8.23 (1.62)	.744	
Feedback meetings to evaluate relationship expectations	7.58 (2.02)	.778	
Mechanisms to foster joint action (e.g. joint seminars, training)	6.23 (2.31)	.641	
BSRS *Boundary spanner relational skills*		(70.35%)	.915
Help us move forward	6.87 (1.94)	.857	
Help us develop our competencies	6.44 (2.13)	.856	
Explain and justify their decisions	7.05 (1.84)	.794	
Are reliable	7.71 (1.75)	.819	
Are transparent in dealings	6.76 (2.04)	.825	
Show solidarity in case of difficulties	7.15 (2.01)	.879	
PERF *Performance*		(71.51%)	.898
The collaboration allows to			
…improve on-time delivery	7.26 (1.86)	.889	
…improve quality of the offers	6.69 (1.90)	.848	
…innovate	5.56 (2.26)	.837	
…develop competencies	6.77 (1.87)	.830	
…maximize margins	6.42 (2.08)	.822	

4.3.4. Control variables

We control for firm size, as captured by the number of employees. Three groups distinguished in the survey capture small (10–249 employees), medium (250–4999), and large (+5000) firms. Firm size can influence collaborative scope, as resource constraints can inhibit smaller firms engage in collaborations of greater scope. Following prior research on relational controls in buyer–supplier collaborations, we also control for the age of the relationship (Doney & Cannon, 1997), as this can influence perceptions of such controls and its performance. We capture Age as the logarithm of the number of years since the beginning of the relationship. We also control for the experience of the respondent in the relationship (Experience) captured by the logarithm of the number of years of personal involvement. More experienced respondents may have better knowledge of the relationship, but could also have different views on the influence of relational skills of partners' boundary spanners

that they have been exposed to longer. Perceptions of performance can differ based on the firm's position in the supply chain (Ambrose, Marshall, & Lynch, 2010), and partner dependencies (Mishra, Sharma, Kumar, & Dubey, 2016). Therefore, we control for the firm's position in the supply chain (0 = supplier, 1 = buyer) and for the dependencies between the firms as captured by the difficulty of replacing the partner (Firm dependence), and the difficulty of being replaced by the partner (Partner dependence) (Li et al., 2010). Finally, we control for firms' industry participation by differentiating between firms active in service industries (0) versus manufacturing industries (1).

Table 3 shows descriptive statistics and variable correlations, as well as the square root of the Average Variance Extracted (AVE) of the multi-item constructs. The variable correlations suggest that multicollinearity is unlikely to be a concern, and indeed variance inflation factors of our regression analyses are all below 2, reinforcing this conclusion. For each multi-item construct, the diagonal on Table 3 shows that the square root of the AVE is greater than its correlations with the other model variables, supporting discriminant validity (Fornell & Larcker, 1981).

Table 3 – Construct means, standard deviations, and correlations

Variables	**Mean**	**sd**	**1**	**2**	**3**	**4**	5	6	7	8	9	10
1. SCOPE	5.59	2.10	.822									
2. IOC	7.26	1.45	.407***	.737								
3. BSRS	6.99	1.64	.431***	.684***	.839							
4. PERF	6.54	1.69	.505***	.668***	.780***	.846						
5. Firm size	2.30	0.78	.167**	.164**	.016	.050	-					
6. Relationship age	2.45	0.46	.043	-.048	-.018	-.018	.166**	-				
7. Experience	1.55	0.63	-.018	-.077	.091	-.017	-.446***	.250***	-			
8. Firm position	0.63	0.48	.152**	.098	-.026	.068	.476***	.034	-.423***	-		
9. Firm dependence	6.02	2.15	.135*	.175**	.204***	.159**	.043	.074	-.070	.062	-	
10. Partner dependence	5.89	2.14	.143**	.173**	.166**	.190***	-.124*	.150**	.231***	-.222***	.348***	-

The diagonal reports the square root of the Average Variance Extracted (AVE) of multi-item constructs, and the off-diagonal coefficients are Pearson correlations.
***, **, * indicate that correlations are significant at the 0.01, 0.05, and 0.10 level (two-tailed), respectively.

5. Results

We followed the process regression procedure for SPSS (Hayes, 2018) to examine each hypothesis and analyze the moderating effects using a pick-a-point approach for each interaction term, with a bootstrap analysis with 5,000 replications. In the procedure, variables are mean-centered before calculating the interaction terms and being entered into the analysis.

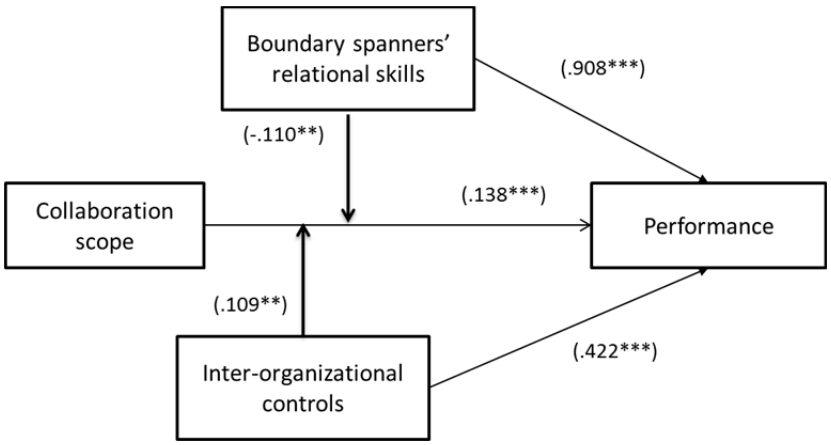
Table 4 reports the results of the model estimations, and Figure 2 provides a graphical representation of the main results. Model 1 in Table 4 first presents the moderating effects of the two control mechanisms on the effects of collaboration scope, and Model 2 adds the interaction between them, as well as the three-way interaction with collaboration scope. As the estimations show, consistent with expectations, collaboration scope relates positively to performance ($p < .01$). This supports the idea that collaborations that involve a greater number of value chain activities, which partners collaborate on more intensively, provide firms greater potential to benefit in terms of enhanced delivery, quality, competence development, innovation, and profit margins. More extensive collaborations thus create the conditions for positive returns. Second, inter-organizational controls, which include joint targets, follow-up meetings, feedback reviews, and arrangements that foster joint action, are positively associated with firm performance derived from collaboration ($p < .01$). Similarly, the presence of boundary spanners with high levels of relational skills relates positively to firm performance ($p < .01$). These significant direct effects confirm that more successful supply chain relationships are characterized by a greater presence of inter-organizational controls as well as skilled boundary spanners involved in managing the relationship.

Table 4: Model estimations and hypothesis tests

	Model 1					Model 2				
				95% conf.					95% conf	
	ß	*p*	t-value	Lower	Upper	ß	*p*	t-value	Lower	Upper
Constant	6.954	.000	14.152	5.785	8.085	6.937	.000	13.906	5.755	8.043
SCOPE	.136	.001	3.924	.053	.222	.138	.002	3.084	.044	.238
IOC	.418	.000	4.010	.213	.637	.422	.000	3.958	.208	.632
BSRS	.895	.000	8.360	.678	1.108	.908	.000	8.021	.673	1.130
SCOPE*BSRS	-.099	.039	-2.083	-.190	-.003	-.110	.040	-2.065	-.222	-.006
SCOPE*IOC	.113	.015	2.449	.009	.209	.109	.025	2.266	.000	.202
BSRS*IOC						.040	.631	.481	-.100	.237
SCOPE*BSRS*IOC						.000	.991	-.012	-.043	.051
Firm size	-.173	.120	-1.563	-.459	.098	-.178	.116	-1.578	-.481	.097
Relationship age	.131	.459	.7419	-.281	.535	.135	.450	.757	-.264	.559
Experience	-.290	.213	-2.035	-.130	.047	-.046	.202	-1.280	-.137	.042
Firm position	.170	.056	.977	-.016	.157	.072	.068	1.835	-.016	.155
Firm dependence	-.044	.043	-1.250	-.601	.023	-.286	.049	-1.984	-.585	.019
Partner dependence	.074	.330	1.921	-.182	.516	.189	.298	1.043	-.176	.571
Industry	-.197	.365	-.908	-.651	.287	-.188	.391	-.859	-.656	.312
R^2	.69					.69				
F value	34.751					29.530				

Reported coefficients are standardized coefficient (ß).

Figure 2: Empirical results



***p<0.01 ; ** p<0.05.

Regarding the hypotheses, the findings provide evidence in support of H1b that predicts a negative moderating effect of BSRS on the relationship between scope and performance The negative coefficient (ß = -.110, $p < .05$) indicates that the positive influence of boundary spanners' relational skills decreases when the scope of the supply chain collaboration increases. H2 is corroborated as inter-organizational controls positively influence the association between collaborative scope and performance (ß = .109, $p < .05$).[11] This supports the idea that inter-organizational controls are particularly valuable in collaborations of greater scope, where the more intense collaboration across multiple activities demands a greater ability to coordinate and control than reliance on skilled boundary spanners could provide. Instead, in such settings characterized by greater complexity, practices (such as targets, joint meetings, feedback) to foster joint action can enhance relationship management.

The results of Model 2 further show that the two- and three-way interactions between BSRS and IOCs, and between SCOPE, BSRS and IOCs are not significant. This suggests there are no additional (conditional) interrelationships between the two control mechanisms, or that the competing effects identified in developing H3 cancel each other out. Thus, we conclude there is no clear evidence in favor of H3. Regarding the control variables, we observe a marginally significant effect of firm position ($p < .10$), with buyers reporting on average more favorable performance outcomes of their

[11] We note again that particularly the moderating effects of IOC may be attenuated due to its lower measurement reliability (α=.706) relative to the BSRS construct (α=.915).

reported relationships with suppliers than suppliers indicated for their relationships with buyers. Additionally, firm dependence shows a negative coefficient on performance ($p < .05$), indicating that more dependent firms are less able to extract value from their supplier chain relationships. Overall, the model estimations indicate that the influence of collaborative scope on firm performance varies in different ways with both boundary spanners' relational skills and inter-organizational controls, while there is no evidence of additional interactions between these mechanisms.

6. Discussion and conclusion

6.1. Theoretical implications

Motivated by commentary that the way that in interfirm relations inter-individual trust and shared norms transfer to the organizational level is far from self-evident (Tangpong et al., 2010; Zaheer et al., 1998), we examine the performance effects of boundary spanners' relational skills. Particularly, we are interested in the conditions under which such relational skills, which are at the basis of relational controls between firms, are most beneficial for effective relationship management, and when use of (more costly) inter-organizational controls is desirable. Our survey data support the belief that both boundary spanners' relational skills and inter-organizational controls can contribute to the performance effects derived from interfirm collaboration. However, as the scope of the collaboration increases in terms of diversity and intensity of activities jointly conducted, the marginal impact of boundary spanners' relational kills decreases. Thus, reliance on the relational skills of a business partners' boundary spanners may not be sufficient when there is a need to manage and coordinate increasingly complex collaboration, and which benefits from an increasing use of inter-organizational controls. This is not to say that skilled boundary spanners would be favored less in complex collaborations; instead, in this setting, their positive impact reduces, which reduction can be compensated by greater reliance on inter-organizational controls that allow firms better to align interests, coordinate and adjust when necessary. In the debate on the costs and benefits of controls for supporting effective supply chain relations, these findings also suggest that, in the presence of highly skilled individuals, narrow scope collaboration may do well with limited reliance on inter-

organizational controls, until it grows in scope and complexity which changes the cost-benefit tradeoff for these controls.

This study aims to make three main contributions to the literature. First, we focus on the key role of boundary spanners in buyer–supplier relationships and how their relational skills contribute to the effective management of these relationships. We compare the performance-impact of boundary spanner relational skills with that of inter-organizational controls, which prior literature has emphasized more, to address the question under which conditions reliance on these elements is most beneficial. Particularly, we show that the returns to relational skills of a business partner's boundary spanners are greater in narrow-scope collaborations, while inter-organizational controls particularly help enhancing the benefits derived from collaboration of greater scope. Our findings thus indicate when boundary spanners relational skills can help offsetting investment in costly inter-organizational controls. They further indicate when the value of such control investments increases, which is when the greater scope of a relationship makes it too complex to rely primarily on the relational skills of dedicated individuals.

Second, most studies on formal and informal modes of inter-organizational control adopt an organizational-level view, with a blurred frontier for measuring trust and relational norms. We instead provide a mixed-level of analysis, accounting for the boundary spanner level, which is the foundation for developing relational control between partners, as well as the organizational level (inter-organizational controls). With our mixed-level analysis, we address the interplay between organizational mechanisms and "relational governance" on both organizational and individual levels, which are intricate and tightly linked. While scholars have debated the interrelationships between such controls (see Cao & Lumineau, 2015), we shift the focus to the conditions under which these mechanisms contribute to enhanced performance (Lumineau & Henderson, 2012).

Third and related to this, we provide new insights into when reliance on the relational skills op business partners' boundary spanners or inter-organizational controls contributes to performance. Prior research has considered factors such as the length or type of relationship. We instead consider its scope, which prior research has found to create demands for interfirm controls that can mitigate performance risks by facilitating coordination and mutual adaptation (Dekker et al., 2016). To the best

of our knowledge though, no prior empirical research has analyzed these elements of collaboration scope, boundary spanner relational skills and inter-organizational controls in conjunction. Our findings contribute a nuanced perspective on social exchange perspectives and relational views of interfirm relationships (Dyer & Singh, 1998), by indicating that relational skills may limit the need for more formal controls in particular when such skills of individuals are sufficient to deal with the complexity of the relationship. This changes, however, when complexity rises to a point where relational skills themselves are no longer sufficient and more formal controls are needed to delimit, formalize and coordinate the numerous interactions. This result is in line with arguments that collaborative relationships of greater scope can become complex and difficult to manage, such that they require more coordination through formal controls that allow firms to harmonize processes linked to the various interactions and effectively execute collaborative tasks (Dekker et al., 2016; Mishra et al., 2015; Narayanan et al., 2015).

6.2. Managerial implications

Overall, our findings highlight the value of boundary spanner relational skills and inter-organizational controls in supply chain relationships. For managers, in understanding how these elements contribute to interfirm control and performance, it is imperative to understand the nature of the relationship within which they are deployed. While both may contribute to enhancing the benefits derived from interfirm collaboration, the extent to which they do critically depends on the scope of the collaboration. Therefore, managers seeking for ways to improve the performance effects of collaboration can do so by paying close attention to these choices throughout the alliance management process. Relying on a partner's skilled boundary spanners can be the low cost solution, as this can avoid – at least in part – the often high costs of formal controls, and may generate sufficient control particularly in narrow scope collaborations. However, to achieve effective collaboration this also implies a need for the focal firm to be cautious in selection for and placing within the relationship boundary spanners who possess similar skills and maintain similar values.

Our results also indicate that managers' choices to invest in inter-organizational controls such as target setting, monitoring and evaluation processes, and socialization mechanisms like joint seminars

and training, can become of increasing importance when collaboration scope is expanding. While in this case skilled boundary spanners are obviously still valuable, our results indicate that their favorable influence on performance decreases, while the use of inter-organizational controls enhances performance. For managers, this result also implies that, in considering how and how much (constrained) resources to dedicate to a relationship, it is critical to consider its characteristics relative to those of other ones in their portfolio. This requires not only considering and contrasting its strategic importance to the firm, but also its scope and associated complexity that place demands on controls. Given that larger firms often maintain a considerable number of relationships with external organizations, this can be a non-trivial though important managerial task.

6.3. Limitations and suggestions for further research

As in any study, this study is subject to several limitations, especially in relation to the available data, which requires some caution in assessing the results. Our sample is based on the French Auvergne Rhône-Alpes region, which features extensive industrial activity and innovativeness; as a result, our findings might not generalize to other regions with different industrial characteristics. Further studies with larger samples also could reveal the impact of other contingency factors than collaboration scope, such as whether an industry is technology intensive, emergent or traditional, hierarchical, or marked by strict vertical relationships (e.g., automotive, defense). Similarly, studies could incorporate other characteristics of relationships that capture risks and thus the need for control, such as asset specificity, uncertainty, transaction frequency, and task interdependencies (Anderson et al., 2015).

In examining relational skills, we focus on the boundary spanners of the exchange partner, as they form the basis for the joint development of relational controls. A more complete view of relational skills and the development of trust and relational norms, however, could be obtained by also incorporating the firm's own boundary spanners. And while we focus on relational skills that are oriented towards fruitful collaboration, a broader assessment of boundary spanners skills could also incorporate those skills that enable them to extract value from the relationship and partner. Although our study emphasizes the value and benefits of relational behavior derived from enhanced relational

skills, a broader conceptualization could also point to risks of collaborating with highly skilled counterparties (who may also be skilled in value appropriation), and the additional controls that may be required in such settings to maintain a mutually beneficial relationship. A related limitation stems from the available survey measures. Our measure of relational skills covers most underlying individual virtues that support good cooperation and specifically capture boundary spanners' ability to engage in relational behaviors related to interaction and communication with the focal firm. However, a more comprehensive measure of inter-organizational controls might encompass additional elements, including those related to contractual and formal aspects. This could facilitate analyses of different types of controls (e.g., contractual and organizational, or outcome and behavior based), and their use and impacts across different stages of the relationship (e.g., initial vs. the ongoing relationship). Similarly, the measurement of firm performance could be extended, including more dimensions of particularly financial (e.g., cost, revenue) but also non-financial performance, as well as objective measurements of those dimensions. Finally, concerns may arise when examining effects on (self-reported) firm performance, as the estimates by responsible boundary spanners may to some extent suffer from respondent bias, common method bias and survival bias (e.g., high performing relationships with skilled boundary spanners and adequate controls are more likely to survive, affecting the correlation between these factors). In the data collection procedures, precautions were taken aimed at avoiding respondent and common method bias, and the nature of our research question required examination of existing relationships. However, even if these potential sources of bias would affect the estimated direct effects, it is unlikely that our hypothesis tests suffer from them since estimated moderation effects would not be systematically influenced by such bias (Siemsen et al., 2010).

Despite these limitations, our arguments and empirical findings add to our understanding of when and how boundary spanners' relational skills and inter-organizational controls contribute to the benefits derived from interfirm collaboration. With our findings, we extend previous work on the control of interfirm relationships, as well as on the partnership characteristics that are relevant in understanding the performance impact of the mix of control choices that firms make. Despite their frequency in industrial life, there is yet much to be learned about buyer–supplier relationships and

their control. The rapid evolution of technologies and newly emerging industrial fields will likely make these questions of even greater importance; e.g., modes of control need to adapt to changing balances of power, especially if contractors experience increasing dependence on major equipment manufacturers or suppliers. Because negotiation behavior and power issues among organizations are fundamental forms of social interaction and exchange that are essentially located with the individuals acting at the boundaries of organizations, we hope the current research opens the way for future research in this important field.

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