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The role of regulatory focus and trustworthiness in knowledge transfer and leakage in alliances

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ABSTRACT

This study investigates the overlooked phenomenon of the role of heterogeneous individuals in understanding knowledge transfer between partners in strategic alliances. We advance the current understanding about the role of boundary spanners in knowledge transfer between partner firms by proposing that the regulatory focus of boundary spanners is a key antecedent of promoting tacit knowledge transfer and preventing knowledge leakage in alliances. Furthermore, we investigate how the perception of partner trustworthiness moderates the role of regulatory focus. Our findings, based on a survey of 142 firms indicate that boundary spanners' promotion focus and perceived partner trustworthiness have direct positive effects on tacit knowledge transfer. The interaction of prevention focus and trustworthiness has a positive effect on transfer of tacit knowledge and a negative effect on knowledge leakage.

1. Introduction

Knowledge transfer between firms, especially the transfer of tacit knowledge, requires close personal interaction to ensure that the knowledge is correctly understood (Holste & Fields, 2010). Therefore, personal interaction and communication act as an effective mechanism to transfer 'sticky' and tacit knowledge across organizational interfaces (Kale, Singh, & Perlmutter, 2000; Marsden, 1990; Von Hippel, 1982). The role of boundary spanners, or alternately named as 'interface employees, ' 'gatekeepers,' or 'alliance managers', for effective transfer of knowledge between alliance partners has emerged as an important research theme (Albers, Wohlgezogen, & Zajac, 2016; Tushman & Scanlan, 1981; Zhao & Anand, 2009). However, we have scant knowledge of how boundary spanners' psychological traits may influence knowledge transfer. In this study, we expand our understanding of how individuals' psychological factors affect knowledge transfer in alliances.

Current studies on knowledge transfer in alliances focus on issues such as the importance of the firms' cultural distance (Sarala, Junni, Cooper, & Tarba, 2016), the strategic fit between the firms (Douma, Bilderbeek, Idenburg, & Looise, 2000), the tacitness of knowledge (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004; Inkpen, 2000), and use of governance mechanisms (Dyer & Singh, 1998; Hoetker & Mellewigt, 2009). However, recent studies start to investigate how individual-level attributes can serve as the foundation for knowledge transfer, such as managers' learning focus, personal experience, and personal networks (Foss, Husted, & Michailova, 2010; Park & Harris, 2014; Paruchuri & Eisenman, 2012). Felin and Hesterly (2007) argue that knowledge is the primary resource underlying new value creation, and individuals are the source of new value and locus of knowledge. Scholars who specify an organization or any kind of collective unit as the key level of analysis implicitly attribute homogeneity to the individual level of analysis, which, in reality, is the most heterogonous level (Felin & Hesterly, 2007). As stated by Simon (1985, p. 303), "nothing is more fundamental in setting our research agenda and informing our research methods than our view of the nature of the human beings whose behavior we are studying."

Scholars argue that boundary spanners can facilitate knowledge transfer in alliances. For example, boundary spanners play the important role of mitigating and leveraging tensions between different organizational teams (Mudambi & Swift, 2009), creating trust between organizations (Currall & Judge, 1995; Zaheer, McEvily, & Perrone, 1998), and reducing negotiation costs (Richter, West, Van Dick, & Dawson, 2006). Most previous studies focus primarily on boundary-spanning functions, such as information gathering and processing, external representation, and agency (Aldrich & Herker, 1977; Perrone, Zaheer, & McEvily, 2003; Tushman & Scanlan, 1981). However, recent research suggests that individuals' personal psychological traits are relevant in their boundary spanning activities, such as self-monitoring,

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mentalizing skills, neuroticism, and other personality factors (Bendersky & Shah, 2013; Oh & Kilduff, 2008; Qiu & Haugland, 2018; Tasselli, Kilduff, & Menges, 2015). Among personal characteristics, individuals' motivation is suggested to be associated with their willingness to interact with others and engage in knowledge transfer and realize task achievement (Gagné, 2009; Osterloh & Frey, 2000; Reinholt, Pedersen, & Foss, 2011). We follow this line and emphasize boundary spanners' different goal orientations in terms of their regulatory focus and the impact of regulatory focus on knowledge sharing and knowledge safeguarding in alliances.

Regulatory focus theory (Higgins, 1997, 1998) originates from psychology and refers broadly to an individual's tendency to either achieve positive outcomes (promotion focus) or avoid negative outcomes (prevention focus). The theory has received increased attention in both marketing and management (Das & Kumar, 2010; Hmieleski & Baron, 2008; Tuncdogan, Boon, Mom, Van Den Bosch, & Volberda, 2017). Regulatory focus shapes people's behavior and performance based on their motivational needs. For example, a strong promotion-focused person can be highly productive in a R&D context as his/her motivation is aligned with innovative performance (Lanaj, Chang, & Johnson, 2012), while a strong prevention-focused person will be more aligned with work requiring careful analysis of the consequences of different strategic actions. By drawing on regulatory focus theory, we propose that boundary spanners' focus on promotion and prevention works as two mechanisms that influence knowledge transfer outcomes in alliances.

Previous literature provides considerable evidence that trusting relationships lead to better inter-firm collaboration and greater knowledge transfer (Becerra, Lunnan, & Huemer, 2008; Inkpen & Tsang, 2005; Levin & Cross, 2004; Olsen, Haugland, Karlsen, & Husøy, 2005).In addition to our focus on boundary spanners' regulatory focus, we will link trustworthiness to regulatory focus. The objective of the study is to investigate whether boundary spanners' goal orientations toward promotion versus prevention affect how they perform their roles related to knowledge transfer and knowledge safeguarding, and how these two different orientations interact with perceived partner trustworthiness. In this way, the study investigates the mechanisms by which boundary spanners' regulatory focus may affect higher-level knowledge transfer outcomes in alliances.

The study contributes to increased knowledge of the roles boundary spanners and their interactions across firm boundaries play in ensuring successful management of inter-firm knowledge transfer. A dyadic or firm-to-firm perspective with a limited focus on individual factors has dominated the alliance literature. By studying boundary spanners' different goal orientations, we highlight the importance of individuals and individual characteristics for transferring knowledge and avoiding unintended knowledge leakage between firms.

2. Theory and hypotheses

2.1. Knowledge transfer and knowledge leakage in alliances

Knowledge transfer, defined as accessing and acquiring knowledge, skills, and competencies from partner firms, is recognized as a key factor for forming alliances due to the importance of knowledge and information for value creation (Grant & Baden-Fuller, 2004; Hamel, 1991; Khanna, Gulati, & Nohria, 1998; Kogut & Zander, 1992). The motives of firms entering an alliance can range from merely access to the knowledge to fully acquire and integrate the partner's knowledge (Grant & Baden-Fuller, 2004; Hamel, 1991). A firm's ability to internalize knowledge obtained from outside actors largely affects its competitive advantage (Dyer & Singh, 1998). On one hand, knowledge can be explicit and easy to codify and transfer, such as technical know-how, information about manufacturing processes, and specific operating rules and guidelines (Inkpen & Dinur, 1998). On the other hand, knowledge that is shared between alliance partners is often tacit. Tacit knowledge is difficult to codify, it is not intuitive, often unarticulated, and not embedded in standardized and tailored processes and therefore difficult to acquire and exploit (Becerra et al., 2008). Tacit knowledge is highly contextual, personal, and difficult to transfer across firm boundaries. Such knowledge is often communicated and shared through active involvement and close personal interactions by both sender and recipient (Dhanaraj et al., 2004; Inkpen & Tsang, 2005).

Despite the benefits of accessing knowledge through alliances, such learning may be risky when firms cannot entirely control or protect their critical know-how by preventing it from being discovered by their partners (Khanna et al., 1998; Norman, 2004; Ribeiro Soriano & Parker, 2012). The risk of knowledge spillover, known as knowledge leakage, can be viewed as a negative outcome of collaborative learning (Heiman & Nickerson, 2004). Knowledge leakage is defined as "the extent to which the focal firm's private knowledge is intentionally appropriated by or unintentionally transferred to partners beyond the scope of the alliance agreement" (Jiang, Li, Gao, Bao, & Jiang, 2013, p. 984). Knowledge leakage is likely to occur if the knowledge owner cannot clearly separate the knowledge that is intended to be shared from the knowledge that is not intended to be shared, or if an alliance partner intentionally attempts to acquire private knowledge that is not intended for sharing. This can happen because it may be difficult for firms to circumscribe, monitor, and codify all knowledge that is intended to be shared within specific alliances and to separate this from the knowledge that the firm wants to protect (Dussauge, Garrette, & Mitchell, 2000). Knowledge leakage can be an obstacle to long-term cooperation, especially in relationships that are characterized by a high level of closeness (Mohr & Sengupta, 2002; Reuer, Zollo, & Singh, 2002). Therefore, it is necessary to implement safeguarding mechanisms in alliances to reduce potential knowledge leakage (Jiang et al., 2013).

2.2. Boundary spanners, regulatory focus, and trustworthiness

Although inter-firm knowledge transfer takes place at the firm or inter-firm level, it originates from individuals' behaviors, perceptions, and attitudes (Gupta, Tesluk, & Taylor, 2007). Heterogeneous individuals' knowledge aggregates and emerges at the group, organizational, and alliance levels through interactions and exchanges among individuals and groups. As Simon (1991, p. 125) argues, "all organizational learning takes place inside human heads; an organization learns in only two ways: by the learning of its members or by ingesting new members who have knowledge the organization didn't previously have". Therefore, we expect individual level factors to affect both knowledge sharing and knowledge leakage.

To understand the impact of heterogeneous individuals and their characteristics on a firm's ability to acquire and learn new knowledge, we focus on boundary spanners (Tushman & Scanlan, 1981). The boundary spanners from each alliance partner interact and communicate with one another to offer knowledge and solutions, they exchange information among the partners, and they act as agents for their organizations (Albers et al., 2016; Schotter, Mudambi, Doz, & Gaur, 2017; Tang, Qiu, & Zhang, 2018). They make important decisions about alliance-related issues, and they often have dense, far-reaching networks with other firms and individuals, thereby linking seemingly unconnected clusters of knowledge (Grigoriou & Rothaermel, 2014; Levina & Vaast, 2005). Boundary spanners can improve coordination not only statically, "in terms of functions such as agreement formulation and activity monitoring," but also dynamically, in terms of functions such as "identification and adjustment to changing conditions and uncertainties" (Albers et al., 2016, p. 593). On one side, boundary spanners must engage in knowledge sharing activities, and on the other side, they must prevent unintended leakage of critical knowledge. Moreover, close interaction between a large number of boundary spanners across partner firms increases knowledge transparency and openness, which may result in unintended and unwanted knowledge leakage.

In revealing how boundary spanners manage and balance these two concerns (facilitating knowledge transfer and preventing knowledge leakage), we focus on boundary spanners' goal orientation. We draw upon regulatory focus theory (Higgins, 1997, 1998) and propose that boundary spanners' focus on promotion versus prevention affects their roles of knowledge sharing and knowledge safeguarding. Regulatory focus theory highlights individuals' self-regulation mechanisms (Higgins, 1997). Self-regulation refers to the process by which people seek to align themselves with appropriate goals or standards (Brockner & Higgins, 2001). Regulatory focus is based on the idea that self-regulation to fulfill one's need for nurture is fundamentally different from self-regulation to fulfill one's security needs (Higgins, 1997). A focus on promotion is activated by nurture-related needs, strong ideals, and gain/no-gain situations. People with a strong focus on promotion are sensitive to positive outcomes, and they try to realize results matching their desired positive outcomes (Higgins, 1997). In contrast, a focus on prevention is activated by security needs, strong oughts, and loss/non-loss situations. People with a strong prevention focus are sensitive to the presence of negative outcomes, and they try to avoid their undesired negative outcomes (Higgins, 1997). In sum, promotion-focused people are driven by hopes, wishes, and aspirations, while prevention-focused people are driven by duties, responsibilities, and obligations (Higgins, 1997).

Regulatory focus theory argues that people pursue goals or situate themselves in relation to desirable or undesirable outcomes (Boesen-Mariani, Gomez, & Gavard-Perret, 2010). Those who are promotion-focused eagerly pursue goals and actions to realize gains and successes (Lockwood, Jordan, & Kunda, 2002). They show a high motivation to accomplish tasks that are framed in terms of promotion (Shah, Higgins, & Friedman, 1998), and they focus on strategies that are aimed at achieving desired outcomes (Higgins, 1997). Promotion-focused people regard change positively, entertain more hypotheses (Liberman, Idson, Camacho, & Higgins, 1999), and are more creative (Friedman & Förster, 2001). However, they may tend to delay pursuing their goals because they view them more as ideas (Freitas, Liberman, Salovey, & Higgins, 2002). In contrast, prevention-focused people strive to avoid negative outcomes, show high motivation when tasks are framed in terms of prevention (Shah et al., 1998), and focus on strategies that prevent negative outcomes (Higgins, 1997). Prevention-focused individuals value stability, wish to avoid false hypotheses (Liberman, Molden, Idson, & Higgins, 2001), and are less creative (Friedman & Förster, 2001). They tend to pursue goals more quickly to meet minimum standards because they consider goals a necessity (Freitas et al., 2002).

As a motivational theory of goal pursuit, regulatory focus is becoming prominent in studying managerial practice and organization studies (e.g Das & Kumar, 2010; McMullen, Shepherd, & Patzelt, 2009; Tuncdogan et al., 2017). There have been numerous studies demonstrating the effect of regulatory focus in the working context (Brockner & Higgins, 2001; Rietzschel, 2011; Tuncdogan et al., 2017). For example, Tuncdogan et al. (2017) argue and find that management teams' promotion focus is associated with their novelty, eagerness to learn, and willingness to take risk, which relates positively to the unit's exploratory innovation. In contrast, they also find that management teams' prevention focus has marginal negative effect on exploratory innovation. Moreover, regulatory focus is highly relevant to various work behaviors and attitudes, such as organizational citizenship behavior, innovative performance, task performance, and so on (Lanaj et al., 2012).

Individuals' regulatory focus have been studied both as a stable individual characteristic termed as chronic regulatory focus and as a motivational state induced by the specific context termed temporary regulatory focus (Boesen-Mariani et al., 2010; Higgins, 1997). If we consider regulatory focus a stable characteristic, it originates from an individual's socialization and interpersonal relations since infancy (Higgins, 1997). Conversely, if we consider regulatory focus as temporary, it is influenced by specific contexts and situations and can be activated by certain needs and how a message or situation is framed (Boesen-Mariani et al., 2010; Higgins, Roney, Crowe, & Hymes, 1994). Higgins (1998) argues that individuals can be socialized with both types of regulatory focus. An individual's interactions with other people can involve different types of regulatory focus, and he or she will learn to use different types of regulatory focus at different times, depending on the situation and the people involved (Higgins, 1998). In this study, we expect that a boundary spanner's regulatory focus in the working context of one specific alliance is relative stable and does not change too much during the cooperation period. Since we are studying ongoing alliances, it is reasonable to assume some degree of alliance stability that it less likely to cause a high pressure for changing regulatory focus.

A number of previous studies find that trustworthiness is one of the most important factors affecting knowledge sharing in strategic alliances (e.g., Becerra et al., 2008; Levin & Cross, 2004; Zhang & Zhou, 2013). Trustworthiness concerns one's willingness to be vulnerable to another's action (Mayer, Davis, & Schoorman, 1995). Although our primary focus is on the role of boundary spanners' goal orientations in promoting knowledge transfer and avoiding knowledge leakage, we include trustworthiness as a firm-level variable in order to exploit possible interactions between boundary spanners' individual characteristics and firm-level variables. Boundary spanners do not operate in isolation, but in a firm-level context, and by including what previous studies find to be an important firm-level antecedent of knowledge transfer, we explore possible links and interactions between the individual and firm levels.

In developing our hypotheses, we will first address the direct effects of promotion and prevention on tacit knowledge transfer and knowledge leakage, and thereafter, we discuss how prevention and promotion can interact with trustworthiness in facilitating tacit knowledge transfer and avoiding knowledge leakage.

2.3. The role of boundary spanners' regulatory focus on tacit knowledge transfer and knowledge leakage

Regulatory focus provides insight into how people make decisions. In an inter-firm knowledge transfer context, boundary spanners play key roles in ensuring that their firms achieve their objectives. They facilitate an efficient cooperation process and make decisions on daily issues. Their regulatory focus influences their willingness to share knowledge, especially tacit knowledge, and influences their sensitivity to potential knowledge leakage. Studying regulatory focus can thus enhance our understanding of how boundary spanners make decisions related to their boundary-spanning activities in alliances.

The boundary spanners representing each alliance partner are usually involved in extensive interactions and communications, and their regulatory focus influences these interactions. As pointed out above, people with a focus on promotion are motivated by nurture-related needs, strong ideas, and gain/no-gain situations, and they are sensitive to positive outcomes (Higgins, 1997). They can accept high risks, they are driven by their own ideals, and they have a strong desire to achieve their goals. Thus, they focus on what can be gained by moving forward rather than what they can lose (Higgins, 1987). Promotion-focused people pay attention to large goals, such as maximizing a firm's return in a risk–return dilemma (McMullen et al., 2009).

Promotion-focused boundary spanners are thus assumed to be willing to share information and build close relationships with partner firms. Obstfeld (2005) argues that individuals who actively introduce dissimilar individuals and facilitate action among others will be more involved in combinative activities that lead to innovation than those who do not. They are "in a state of eagerness" and want "to ensure hits and insure against errors of omission" (Higgins, 1998, p. 25). We, therefore, argue that promotion-focused boundary spanners are motivated by achieving alliance success, and they actively communicate and share knowledge. They are also likely to be actively engaged in tacit knowledge transfer as transfer of tacit knowledge is often a key factor in

ensuring successful value creation in alliances. Therefore, promotion-focused boundary spanners are likely to make decisions directed toward maximizing the value of knowledge transfer activities in an alliance. By acting in this way, they can positively promote tacit knowledge transfer.

Hypothesis 1a. Boundary spanner's promotion focus has a positive effect on tacit knowledge transfer in alliances.

Conversely, prevention-focused individuals are "in a state of vigilance", and they tend to make decisions that "attain correct rejections and avoid errors of commission" (Higgins, 1998, p. 25). Prevention-focused individuals have a propensity for ensuring non-loss situations, avoiding risk, and preventing negative outcomes (Higgins et al., 2001). According to Grant and Higgins (2003), individuals with a prevention focus are cautious, act carefully, and try to avoid losses or negative outcomes. They are motivated by security needs, they are sensitive to undesired outcomes, and they are less likely to take risks (Crowe & Higgins, 1997; Higgins, 1997). They perceive actions and behavior without gains as positive risks and actions and behavior with possible losses as negative risks. They also have more intense emotions when it comes to avoiding potential losses than with regard to realizing outcomes without gains. Therefore, they are more eager to avoid failure by "minimizing the "risk" of a risk–return dilemma" (McMullen et al., 2009, p. 162).

According to Bryant and Dunford's (2008) discussion about people's decision-making in risky situations, prevention-focused individuals tend to make decisions that differ from those made by promotion-focused individuals. Prevention-focused individuals are driven by their own rules and are inclined toward fulfilling their duties, obligations, and responsibilities (Higgins, 1987). By assessing and predicting whether an alliance partner may engage in acquiring private knowledge, prevention-focused boundary spanners can, by their decisions and actions, create safeguards against knowledge leakage. Therefore, we suggest that boundary spanners' self-regulation through a focus on prevention can function as a safeguard against knowledge leakage.

Hypothesis 1b. Boundary spanner's prevention focus has a negative effect on knowledge leakage in alliances.

2.4. The interaction of regulatory focus and trustworthiness on tacit knowledge transfer and knowledge leakage

Empirical studies find that trustworthiness is positively correlated with the focal firm's willingness to share knowledge and especially tacit knowledge with the recipient firm (Becerra et al., 2008). In their review paper, Cao and Lumineau (2015) find that trust, jointly with contracts and relational norms, improves alliance performance and reduces opportunism. Trust is central to building effective communication, and knowledge sharing requires the partners to communicate frequently during the collaboration process in order to understand each other's interests and intentions (Lucas, 2005). We focus on trustworthiness at the organizational or inter-firm level in order to link the individual level variable of regulatory focus to an organizational level variable with a well-documented effect on knowledge transfer.

Since trustworthiness affects tacit knowledge transfer (Becerra et al., 2008), we further expect that trustworthiness will interact positively with a promotion focus. Promotion-oriented boundary spanners working within a trusting alliance environment may be inclined to pursue their goal orientations to a larger extent than promotion-oriented boundary spanners working within an alliance environment characterized by a low level of trustworthiness. In other words, the level trustworthiness within the alliance may serve as a facilitator for how boundary spanners are able to pursue their own motivational goals. Therefore, we suggest that trustworthiness will further strengthen the positive effect of promotion focus on tacit knowledge transfer.

Hypothesis 2a. Partner trustworthiness strengthens the positive effect of boundary spanner's promotion focus on tacit knowledge transfer in alliances.

Researchers suggest that trust can also serve as a safeguarding mechanism (Gulati & Singh, 1998). Das and Teng (2001) amplify how trust and norms increase partners' confidence in one another, and thereby effectively reduce the partners' concerns for possible losses due to opportunism. However, the empirical results are less clear regarding the role of trustworthiness in preventing knowledge leakage (Jiang et al., 2013; Ribeiro Soriano & Parker, 2012). Empirical studies find that trustworthiness reduces the fear of opportunistic behavior, but trust may not be a sufficient mechanism to safeguard against knowledge leakage (Jiang et al., 2013; Parker, 2012). Parker (2012) finds an insignificant effect of relational or trust-based governance on knowledge leakage, while Jiang, Bao, Xie, and Gao (2016) find that competence trust is an effective safeguard against knowledge leakage, and that a moderate level of goodwill trust will also work as a safeguard against knowledge leakage. In line with the findings of previous studies on the role of trustworthiness, we propose a complementary effect of partner trustworthiness and prevention focus on preventing knowledge leakage.

Hypothesis 2b. Partner trustworthiness strengthens the negative effect of boundary spanners' prevention focus on knowledge leakage in alliances. (Fig. 1)

3. Methodology

3.1. Sample and data collection

We collected survey data from firms representing different industries in Norway, such as oil and gas, biotechnology, electricity and energy, and aquaculture. We identified our target firms from members of the Federation of Norwegian Industries (Norsk Industri) and listed firms on 'Proff.no.' We excluded firms that were registered as having less than two employees. The Federation of Norwegian Industries is a nationwide organization for companies within the manufacturing and process industries and has more than 2,400 member companies. Proff.no is an online supplier of company information, such as financial and accounting information, board of directors, CEOs, and so on.

First, we telephoned the firms and asked whether the company had a strategic alliance. In this case a strategic alliance will be any kind of cooperative agreement aimed at the development, manufacturing, or distribution of new products with another company. We reached 1,012 companies by phone. If the firm had a strategic alliance, we then asked if the company was willing to participate in a survey and was willing to identify a boundary spanner (key informant) who had in-depth knowledge of the entire alliance cooperation process. Two hundred and twenty-nine firms answered that they had strategic alliances and agreed to participate in the survey. A large number of the contacted firms did not have strategic alliances. Furthermore, many firms refused to participate because of their busy schedules, some firms were not interested in the survey, some firms refused to participate due to confidentiality concerns, and some responses were lost when the secretary/reception forwarded our call to the responsible person.

We emailed an electronic questionnaire to the 229 firms that agreed

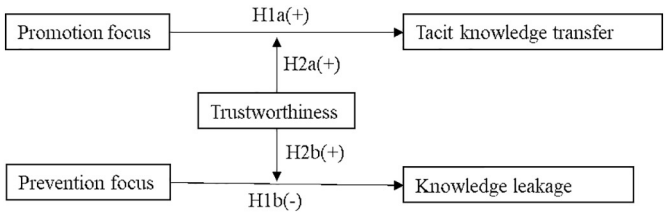

Fig. 1. Conceptual model.

to participate in the survey. We received 181 completed questionnaires after three rounds of reminders (emails and phone calls). Three questionnaires were deleted because the respondents had completed them too quickly and they were judged as careless responses. Of the 178 usable responses, 142 were answered by alliance managers, alliance coordinators, lead engineers, project managers, or main contact persons. In our sample, individuals holding positions such as those in HR, accounting, and sales were not defined as boundary spanners, and the 36 responses that were not completed by boundary spanners were excluded from the analyses.

We received responses from firms in various industries, such as pharmaceutical and biotechnology, oil/gas and marine technology, aquaculture, and machinery and construction. Most firms are medium to small, the median number of employees is 45.5. New product development, production and delivery of finished products, and research and development are the primary motives for alliance formation for most firms. The contract types of the collaboration are mainly written contract only describing the intentions with the cooperation and detailed written contract describing each firm's rights and responsibilities. Only four firms have detailed written contracts with additional ownership possessions in each other's firms. Table 1 gives an overview of the respondent firms.

3.2. Measures

All independent and dependent variables (but not the control variables) were measured by seven-point Likert-type rating scales anchored by "strongly disagree" and "strongly agree". Measures of independent and dependent variables are presented in Appendix A. We followed Churchill Jr.'s (1979) recommendations to design and pretest the survey. Two interviews were conducted early to check the relevance of our topic and develop some preliminary ideas about the research questions and the variables to include in the study. We used established multi-item scales to measure all independent and dependent variables.

Regulatory focus: Recent literature conceptualizes regulatory focus and its components as a set of behavioral strategies to achieve pleasure and avoid pain (Higgins, 1997). Neubert, Kacmar, Carlson, Chonko, and Roberts (2008) developed an 18-item scale with two sub-dimensions: promotion focus and prevention focus. Nine items pertain to prevention focus, and nine items pertain to promotion focus. Promotion focus measures hopes and achievements as the main mechanisms regulating behavior (Förster, Grant, Idson, & Higgins, 2001). We used the nine-item scale with three sub-dimensions (achievement, ideals, and gains) developed by Neubert et al. (2008). The respondents were asked to indicate the degree to which they focused on gains and aspirations in their work. Prevention focus measures behavior that is intended to fulfill duties or responsibilities and avoid mistakes (Higgins, 1997). We adopted the nine-item scale with three sub-dimensions (security, oughts, and losses) developed by Neubert et al. (2008). The respondents were asked to identify the extent to which they fulfill obligations and avoid failures at work.

Table 1
Descriptive statistics of the respondent firms.

Types of industry	Pharmaceutical and biotechnology	14
	Oil/gas and marine technology	64
	Aquaculture	5
	Machinery and construction	37
	Others	22
Firm size (SIZE)	Mean	202
	Median	45.5
Alliance age (AGE)	Mean	7.76
	Median	5
Types of alliance (MT)	Research and development (MT)	22
	Development of new products and/or technology (MT 2)	55
	Concept development (MT3)	10
	Organizational development (MT4)	1
	Development of new markets (MT5)	11
	Fabrication and/or building (MT6)	11
	Production and delivery of finished products (MT0)	32
Types of contract (CT)	Written contract only describing the intentions with the cooperation (CT1)	77
	Detailed written contract describing each firm's rights and responsibilities (CT2)	61
	Detailed written contract describing each firm's rights and responsibilities and in addition both firms have ownership possessions in the other firm (CT0)	4

Trustworthiness: The three dimensions of trustworthiness with 12 items developed by Mayer et al. (1995) were used to measure perceived partner trustworthiness. The three dimensions were integrity, benevolence, and ability. These items have been adapted to an alliance context by Becerra et al. (2008), and we used their version. By using this measurement scale, we investigate boundary spanners' level of perceived trustworthiness of their partner firms. The items cover sub-dimensions such as the partner's integrity (i.e., the overall moral character and ethical behavior of the partner), benevolence (i.e., the positive vs. egocentric orientation of the partner in dealing specifically with his or her firm), and ability (i.e., the general competence and expertise of the partner).

Tacit knowledge transfer: Because tacit knowledge is hard to articulate, verbalize, and codify, it is generally difficult to communicate, transfer, and share between alliance partners. We measured tacit knowledge transfer in terms of learning through sharing activities, observation, and direct contact. We used three items from Becerra et al. (2008).

Knowledge leakage: We applied the eight-item scale by Jiang et al. (2013) with three sub-dimensions covering knowledge leakage risk, intentional knowledge leakage, and unintentional knowledge leakage. In order to extend the scope of a potential knowledge leakage risk, we added one item ("emphasis on an open relationship with our partner represents a threat that private knowledge and core technologies can be easily transferred to our partner") developed from Frishammar, Ericsson, and Patel (2015). One of the items from the Jiang et al. (2013) scale had a very low factor loading, and this item was deleted ("our private knowledge is likely to leak out because we do not pay much attention to protecting it in the cooperation").

This variable can be a candidate for censoring (left) because (1) knowledge leakage may happen only rarely during inter-firm collaboration, and (2) knowledge leakage may be unobservable or hidden for a period before it is discovered. We find in our data that knowledge leakage has a mean of 2.195, with a large amount of data distributed with lower scores. This is an indication that left censoring should be applied. The censoring problem can be solved mathematically by adopting a Tobit latent variable model (Muthén, 1989). The Tobit model assumes that the dependent variable has a number of values clustered at a limiting value, and it uses all observations, both at and above the limits, to estimate a regression line (McDonald & Moffitt, 1980; Tobin, 1958).

Control variables: We included four control variables: firm size, alliance age, alliance type, and alliance contract. The research on knowledge transfer in alliances suggests that firm size may be an indicator of an organization's ability to access resources (Becerra et al., 2008). We measured firm size (SIZE) based on the number of employees. Alliance age may affect knowledge acquisition, as trust grows during long-term relationships, causing firms to be more willing to share knowledge over time (Becerra et al., 2008). Alliance age (AGE) was measured as the number of years the alliance had existed. Alliance type reflects the underlying motives of alliance formation. We asked the respondent to identify the primary task of the alliance, and the respondents could choose between seven different tasks: (1) research and development (MT1), (2) development of new products and/or technology (MT2), (3) concept development (MT3), (4) organizational development (MT4), (5) development of new markets (MT5), (6) fabrication and/or building (MT6), and (7) production and delivery of

finished products (MT0). We use six dummy variables to control for the differences in the motivation of joining an alliance, and we use the last one, MT0, as the baseline. Contract type is one of the fundamental mechanisms governing inter-firm relationships (Poppo & Zenger, 2002) and avoid knowledge leakage (Jiang et al., 2013). We asked the respondents to identify contract type, and they could choose between the following three types: (1) written contract only describing the intentions with the cooperation (CT1), (2) detailed written contract describing each firm's rights and responsibilities (CT2), and (3) detailed written contract describing each firm's rights and responsibilities and in addition both firms have ownership possessions in the other firm (CT0). Similarly, we control for the differences in the types of contracts with two dummy variables, CT1 and CT2, with CT0 as the basesline contract type. Table 1 gives a description of the control variables. We used standardized values for firm size and alliance age in the analyses to reduce the threat of multicollinearity.

4. Results

4.1. Measurement model

Common method bias can be a problem in self-reported surveys. The Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) shows a very poor fit (chi-squared = 541 ($p < 0.001$); CFI = 0.60), which means that several constructs clearly emerge from the data, and the common method variance problem is insignificant.

Since we have a small sample size, the independent and dependent variables are measured by multi-item scales, and the variables except tacit knowledge have multiple dimensions, it is difficult to include all variables in one confirmatory factor analysis. We therefore first conduct separate confirmatory factor analyses for all original measurement scales (except the control variables) to test the unidimensionality and adequacy of the measures. The results are presented in Appendix A. The results indicate that tacit knowledge transfer can be regarded as one-dimensional, while regulatory focus, trustworthiness, and knowledge leakage consist of three dimensions. All the measurement scales have a sufficient degree of reliability, as reflected by composite reliability (CR) values above 0.70 (see Appendix A) (Fornell & Larcker, 1981).

Second, we apply partial disaggregation models for the variable with one dimension – tacit knowledge transfer (Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994). We construct the latent variable by using only two indicators, and we average all the original items to form two indicators in the following way. The two odd-numbered items of tacit knowledge transfer are averaged to form the first indicator, and the remaining even-numbered item forms the second indicator. The partial disaggregation model reduces the number of parameters, decreases measurement error, requires smaller sample sizes, and yields a better model fit (Bagozzi & Edwards, 1998). This model can only be applied if all items load on one single factor.

For the variables with more than one dimension, we apply the partial aggregation model (Bagozzi & Edwards, 1998). We aggregate each sub-dimension of a latent variable as one indicator and the indicators form the latent construct. By applying the partial aggregation model, we give up "specificity and distinctiveness among the components within a facet to capitalize on increased reliability" and "explore the properties of integrated facets of scale" (Bagozzi & Edwards, 1998, pp. 56–57). After partial aggregation, trustworthiness, knowledge leakage, promotion focus, and prevention focus have three indicators, and each indicator is an aggregation of one sub-dimension (e.g., for trustworthiness, there is one indicators for integrity, one for benevolence, and one for competence).

Finally, we conduct a confirmatory factor analysis for all scales after applying partial disaggregation and partial aggregation. The results are presented in Table 2. All factor loadings are high and significant. Discriminant validity describes the extent to which the items of a given construct differ from the items of other constructs; in other words, constructs should not be highly correlated with each other (Brown, 2006). To ensure discriminant validity, we checked that the square root of the average variance extracted (AVE) for each construct is higher than the construct's correlations with any other construct (Fornell & Larcker, 1981). Each construct's $\sqrt{AVE}$ is reported in Table 2, and we find that the values are higher than any inter-factor correlations (maximum shared variance [MSV] between constructs, constituting evidence of discriminant validity). Furthermore, because Fornell and Larcker's criterion is satisfied, an inference error due to multicollinearity is unlikely (Grewal, Cote, & Baumgartner, 2004). In sum, the measurement model receives acceptable fit measures: chi-square (df = 89) = 137.77 ($p = 0.001$), RMSEA = 0.062, SRMR = 0.065, CFI = 0,93, NNFI = 0.84 (e.g., Hair, Anderson, Tatham, & Black, 1995).

Table 2
Composite reliability (CR), average variance extracted (AVE), maximum shared variance (MSV), and Cronbach's alpha (α).

Partial disaggregated and partial aggregated model

	Factor loadings	CR	α	$\sqrt{AVE}$	MSV
1. Prevention focus		0.84	0.84	0.79	0.01
Security	0.78				
Oughts	0.77				
Losses	0.83				
2. Promotion focus		0.70	0.70	0.66	0.06
Gains	0.61				
Achievement	0.61				
Ideals	0.77				
3. Trustworthiness		0.77	0.75	0.73	0.15
Integrity	0.87				
Benevolence	0.66				
Competence	0.64				
4. Tacit knowledge transfer		0.75	0.73	0.78	0.27
Item1	0.91				
Item2	0.63				
5. Knowledge leakage		0.75	0.74	0.71	0.05
Knowledge leakage risk	0.61				
Intentional knowledge leakage	0.74				
Unintentional knowledge leakage	0.76				

4.2. Hypotheses testing

Descriptive statistics for all variables and correlations are shown in Table 3. We find some significant correlations among the variables. As expected, trustworthiness correlates with tacit knowledge transfer and knowledge leakage. The correlation between promotion focus and prevention focus is not significant. This means that a person can be motivated by promotion outcomes and simultaneously have strong prevention needs, and vice versa. This is consistent with previous findings that promotion and prevention are two different goal-striving strategies that go via different motivational channels. A person can have both, just one, or neither of them (Lanaj et al., 2012). Furthermore, there is no indication of correlations between regulatory focus and trustworthiness; therefore, the boundary spanner's perception and evaluation of a partner's trustworthiness does not seem to be influenced by his or her regulatory focus or vice versa.

The hypotheses are tested by structural equation modeling by using Mplus and the results are shown in Table 4. Model 1 investigates the direct effects of regulatory focus on tacit knowledge transfer and knowledge leakage. Regarding hypothesis 1a, we find that promotion focus is positively and significantly associated with tacit knowledge transfer ($b = 0.387$, $p < 0.05$) in support of the hypothesis. This indicates that boundary spanners with a high promotion focus are more willing to transfer tacit knowledge. Hypothesis 1b suggests that prevention focus will be negatively associated with knowledge leakage. Table 4 shows that the relationship between prevention focus and

Table 3
Means, standard deviations, and correlations.

	Mean	S.D.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Prevention focus	5.27	0.78	1.00														
2. Promotion focus	3.84	0.61	−0.10	1.00													
3. Trustworthiness	5.59	0.87	0.09	0.10	1.00												
4. Tacit knowledge transfer	4.87	0.91	0.13	0.29*	0.39	1.00											
5. Knowledge leakage	2.20	0.61	0.01	0.14	−0.23*	0.19	1.00										
6. SIZE	202	481	−0.10	0.00	0.07	−0.07	−0.05	1.00									
7. AGE	7.76	7.71	0.20†	−0.03	0.02	0.30**	0.15	−0.10	1.00								
8. MT1	0.15	0.36	−0.01	0.03	0.03	0.01	0.00	−0.08	0.01	1.00							
9. MT2	0.39	0.49	0.04	0.02	−0.05	−0.05	0.02	0.23**	−0.16†	−0.34*	1.00						
10. MT3	0.07	0.26	−0.02	0.13	0.01	−0.03	0.06	−0.04	−0.02	−0.12	−0.22**	1.00					
11. MT4	0.01	0.08	−0.01	−0.01	0.09	0.09	−0.03	−0.02	0.08	−0.04	−0.07	−0.02	1.00				
12. MT5	0.08	0.27	0.14	0.05	0.06	0.07	−0.05	−0.10	0.06	−0.12	−0.23**	−0.08	−0.02	1.00			
13. MT6	0.08	0.27	0.01	−0.11	0.03	−0.02	0.00	−0.07	0.19	−0.12	−0.23**	−0.08	−0.02	−0.08	1.00		
14. CT1	0.54	0.50	0.06	−0.09	0.08	0.10	−0.07	−0.22**	0.25**	−0.47**	−0.52**	0.25**	0.08	0.27**	0.27**	1.00	
15. CT2	0.42	0.50	−0.10	0.02	−0.11	−0.07	0.09	0.23**	−0.23**	0.34**	0.57**	−0.24**	−0.07	−0.25**	−0.25**	−0.95**	1.00

N = 142
** P < 0.01 (two-tailed).
* p < 0.05 (two-tailed).

Table 4
Results of hypotheses testing.

Variables	Model 1		Model 2	
	Tacit knowledge transfer	Knowledge leakage	Tacit knowledge transfer	Knowledge leakage
Main effects				
Prevention focus	0.068	0.060	0.060	0.083
	(0.104)	(0.111)	(0.104)	(0.114)
Promotion focus	0.387**	0.169	0.398*	0.190
	(0.150)	(0.144)	(0.152)	(0.148)
Trustworthiness	0.299**	-0.183*	0.257	-0.181*
	(0.089)	(0.089)	(0.085)	(0.083)
Interaction effects				
Trustworthiness × Prevention focus			0.299**	-0.192
			(0.112)	(p = 0.096)
				(0.117)
Trustworthiness × Promotion focus			0.093	-0.109
			(0.157)	(0.208)
SIZE	-0.032	-0.082	-0.016	-0.086
	(0.078)	(0.082)	(0.074)	(0.081)
AGE	0.207**	0.105	0.217	0.089
	(0.076)	(0.079)	(0.073)	(0.080)
MT1	0.243	-0.427	0.152	-0.329
	(0.431)	(0.398)	(0.396)	(0.397)
MT2	0.103	-0.356	0.049	-0.314
	(0.345)	(0.309)	(0.310)	(0.307)
MT3	-0.182	0.202	-0.190	0.213
	(0.342)	(0.316)	(0.313)	(0.315)
MT4	0.352	0.044	0.382	0.053
	(0.829)	(0.866)	(0.800)	(0.860)
MT5	0.019	-0.27	-0.085	-0.213
	(0.335)	(0.312)	(0.305)	(0.312)
MT6	-0.168	0.005	-0.182	0.022
	(0.324)	(0.309)	(0.298)	(0.308)
CT1	0.802	-0.178	0.962	-0.024
	(0.57)	(0.58)	(0.542)	(0.568)
CT2	0.854	0.411	0.856	0.532
	(0.464)	(0.508)	(0.446)	(0.501)
RMSEA[a]	0.059			
CFI[a]	0.904			

N = 142, standard errors show in parentheses.
** p < 0.01 (two-tailed).
* p < 0.05 (two-tailed).
[a] RMSEA&CFI is computed without Tobit regression.

knowledge leakage is not statistically significant, and hypothesis 1b is thus not supported. This result is contrary to the argument that boundary spanners and their personal orientations work as informal safeguards. Furthermore, we note that trustworthiness is positively linked to tacit knowledge transfer (b = 0.299, $p < 0.01$), which is consistent with the findings of previous studies (Becerra et al., 2008). In addition, trustworthiness is negatively related to knowledge leakage (b = -0.183, p = 0.04) indicating that trustworthiness can serve as a safeguarding mechanism.

The interaction effects are included in Model 2, we note that the interaction of promotion and trustworthiness on tacit knowledge transfer is not significant, and hypothesis 2a is not supported. The interaction of prevention focus and trustworthiness on knowledge leakage is marginally, positively significant at the 10% level (b = -0.192, $p = 0.096$), rendering partial support for hypothesis 2b. Prevention-focused boundary spanners in combination with trustworthiness seem to reduce knowledge leakage.

Surprisingly, we find that the interaction between prevention focus and trustworthiness has a positive effect on tacit knowledge transfer (b = 0.299, $p < 0.01$). Increases in trustworthiness seem to positively moderate the relationship between prevention and tacit knowledge transfer. We further test the role of prevention focus on tacit knowledge transfer for different levels of trustworthiness, and we find that the

Table 5
Conditional indirect effects of prevention focus on tacit knowledge transfer at different levels of trustworthiness.

	Trustworthiness	Total effect	S.E.	Z	P > |Z|
Tacit knowledge transfer	S.D. (-1 S.D.)	-0.226	0.152	-1.485	0.138
	0.00 (Mean)	0.069	0.095	0.722	0.470
	S.D. (+1 S.D.)	0.364	0.151	2.404	0.016

effect size increases with higher levels of trustworthiness (b = -0.226, 0.069, and 0.364 when trustworthiness was low, medium, and high, see Table 5). This indicates that when trustworthiness is low, boundary spanners' prevention focus is unrelated to tacit knowledge transfer. Boundary spanners with a prevention focus seem to be unwilling to transfer tacit knowledge if they do not consider their partner to be trustworthy. On the other hand, when trustworthiness is high, prevention focus is positively associated with the transfer of tacit knowledge (b = 0.364, $p < 0.05$). Boundary spanners with a high prevention focus can thus facilitate tacit knowledge transfer if they perceive their partner as highly trustworthy.

Concerning the control variables, we find that alliance age is positively and significantly related to tacit knowledge transfer, which is reasonable because tacit knowledge transfer requires the partners to have cooperated for some time. Firm size does not have any effects on either tacit knowledge transfer or knowledge leakage. Contract types 1 (written contract only describing the intentions with the cooperation) and 2 (detailed written contract describing each firm's rights and responsibilities) are weakly, positively related to tacit knowledge transfer, but only at the 0.10 significance level. Finally, none of the different alliance types has any effect on tacit knowledge transfer or knowledge leakage. Thus, we do not find any indication that the underlying motives for alliance formation seem to affect tacit knowledge transfer or knowledge leakage.

4.3. Additional analyses of combinations of promotion and prevention

The hypotheses test the effects of promotion and prevention, but they do not consider different combinations of promotion and prevention. In order to explore possible differences between combinations of promotion and prevention, we group the respondents into four groups based on their average scores on promotion and prevention. Group 1 (77 observations) scores high on both promotion and prevention, group 2 (16 observations) scores high on promotion and low on prevention, group 3 (47 observations) scores low on promotion and high on prevention, and group 4 (2 observations) scores low on both promotion and prevention. We test for differences between groups 1, 2, and 3 on trustworthiness, tacit knowledge transfer, and knowledge leakage by running Oneway Anova (group 4 was excluded since it has only 2 observations). We do not find any significant differences between the groups, except that group 1 and group 3 score different on knowledge leakage at the 0.061 significance level.

We also compare group 1 to the three other groups, and we find differences on all three variables at the 0.05 significance level. This means that group 1 has as higher average score on trustworthiness, tacit knowledge transfer, and knowledge leakage than the average score of the three other groups. These findings may indicate that boundary spanners scoring high on both promotion and prevention are in a better position to transfer tacit knowledge, but they also seem to increase knowledge leakage. Furthermore, the group 1 alliances have a higher level of trustworthiness than the alliances in the three other groups. This may indicate that alliances scoring high on promotion, prevention, and trustworthiness are different from the other alliances. They seem to be able to realize a high level of tacit knowledge transfer, but they are also exposed to a high level of knowledge leakage. The high level of trustworthiness may be the mechanism that serve to balance the tradeoff between the needs for both knowledge transfer and knowledge safeguarding.

5. Discussion and implications

5.1. Discussion of the results

Inter-firm knowledge transfer has been the subject of much attention in alliance studies. Most of these studies focus on how specific antecedents, such as partner characteristics, knowledge characteristics, partner interactions, and knowledge management, may affect inter-firm knowledge transfer (Meier, 2011). The analyses are usually conducted at the firm level, which implicitly attributes homogeneity to the individual level by assuming that people behave similarly both within and across firms (Felin & Hesterly, 2007). Thus, few studies examine the roles of individuals and their characteristics on inter-firm knowledge transfer (Ebers & Maurer, 2014; Park & Harris, 2014; Tippmann, Scott, & Mangematin, 2014). By studying boundary spanners' regulatory focus, we question the implicit assumption that individuals are homogeneous and instead pay attention to the heterogeneity of individuals. Our contribution has been to suggest an alternative explanation for variations in successful knowledge transfer by introducing differences in boundary spanners' regulatory focus as an important explanatory variable.

First, our results confirm previous studies finding that trustworthiness has a large impact on successful knowledge transfer between alliance partners (Becerra et al., 2008; Inkpen & Tsang, 2005; Levin & Cross, 2004). Second, boundary spanners with a high promotion focus increase the transfer of tacit knowledge. This indicates that boundary spanners who are highly promotion-focused increase the potential for tacit knowledge transfer. Third, in situations with a high level of trustworthiness, boundary spanners with a high prevention focus also increase tacit knowledge transfer. Thus, boundary spanners who has high prevention focus are only able to transfer tacit knowledge if they consider the partner firm to be highly trustworthy. Fourth, a prevention focus in combination with trustworthiness may reduce knowledge leakage. Boundary spanners with a focus on avoiding negative outcomes can seemingly reduce knowledge leakage when the perceived trustworthiness of the partner is high.

However, we did not find that prevention focus has a direct, negative effect on knowledge leakage. One reason may be that boundary spanners' different regulatory focus influence their daily work and decisions, which are intertwined with firms' strategic decision-making. Boundary spanners with different regulatory orientations exhibit certain patterns of daily routines, which can moderate, but not directly affect, firms' decisions. If the firm has defined tacit knowledge transfer as an alliance objective, a boundary spanner's prevention focus may perhaps make it more difficult to realize this outcome, but cannot change it. Another reason may be that prevention-focused boundary spanners tend to avoid potential risks. If they are involved in the formation stage of an alliance, they are likely to avoid choosing a partner with a high potential for opportunistic behavior in order to minimize potential knowledge leakage. Therefore, the risk of knowledge leakage can be avoided, or at least reduced, before the firms start to cooperate, while tacit knowledge transfer can only be realized through the cooperation process.

5.2. Theoretical implications

The study contributes to the literature on interfirm knowledge transfer (Dhanaraj et al., 2000; Khanna et al., 1998; Kogut & Zander, 1992), boundary spanning (Albers et al., 2016; Schotter et al., 2017; Tushman & Scanlan, 1981), and regulatory focus theory (Higgins, 1997, 1998) by empirically demonstrating a relationship between boundary spanner's regulatory focus and interfirm knowledge transfer. The study

connects individual-level goal orientations and organizational-level constructs by proposing that individual differences in terms of self-regulation may affect interfirm knowledge transfer.

The results show that boundary spanners' focus on realizing desired positive outcomes has a significant bearing on firms' ability to acquire tacit knowledge from their partner firm. Furthermore, in situations with a high level of trustworthiness between the partner firms, boundary spanners with a focus on avoiding undesired negative outcomes can both increase tacit knowledge transfer and reduce knowledge leakage. These results confirm the importance of individual-level factors for transferring knowledge between firms and avoiding knowledge leakage (e.g., Gupta et al., 2007; Simon, 1991). This study is one of the first to identify specific individual characteristics that can be linked to knowledge transfer at the inter-firm level. In this way, the study extends our theoretical understanding of factors contributing to knowledge transfer and reducing the risk of knowledge leakage.

The findings showing that the interaction of trustworthiness and prevention focus can both increase tacit knowledge transfer and reduce knowledge leakage, indicate a bridging role of trustworthiness between individual characteristics and firm-level outcomes. Within a highly trustworthy atmosphere, prevention-focused boundary spanners can be in a position to balance the need for protecting knowledge not intended for sharing with the partner, and simultaneously increase transfer of tacit knowledge intended for sharing. A number of studies confirm the important role of trustworthiness for knowledge transfer and learning, but this study directs attention to another role of trustworthiness; a linking mechanism between the individual and the firm levels.

5.3. Managerial implications

The results suggest that firms can benefit from considering their boundary spanners' goal orientations when entering into alliances involving extensive sharing and transfer of information and knowledge. Although highly promotion-focused boundary spanners increase the transfer of tacit knowledge, highly prevention-focused boundary spanners are more effective in reducing unintended knowledge leakage. If a firm cooperates with a highly trustworthy partner, prevention-focused boundary spanners can increase the transfer of tacit knowledge and simultaneously reduce the risk of knowledge leakage.

Identifying the most appropriate boundary spanners for working within alliances is both a critical and difficult managerial task. It may not necessarily be straightforward to identify employees as either promotion-focused or prevention-focused. This requires that managers have deep knowledge of their employees. Training managers to identify boundary spanners with appropriate individual characteristics and qualifications can thus be an important alliance capability. Moreover, our results may indicate that boundary spanners who are able to combine high promotion with high prevention may be good for balancing the needs for respectively knowledge transfer and avoiding knowledge leakage.

5.4. Limitations and directions for future research

This study has some limitations that may serve as starting points for future research. First, we simplified our assumptions and considered the regulatory focus of only one key boundary spanner from each respondent firm. Although we targeted boundary spanners who were responsible for managing the alliances and involved in the most important decisions, middle managers or other employees are extensively involved in alliances. Future research should include middle managers or other employees' regulatory focus and investigate how individuals with different regulatory focuses work together and jointly influence the effectiveness of alliances. Strategic fit, a well-known term in the alliance literature, describes how partner firms in an alliance are strategically linked. Similarly, we suggest that the regulatory fit between boundary spanners working together across firm boundaries should also be considered.

Second, our findings uncovered an interaction mechanism between partner trustworthiness and boundary spanners' regulatory focus on tacit knowledge transfer and knowledge leakage. There are likely to be other factors affecting inter-firm knowledge sharing, such as for example, risk of opportunism (Meier, 2011). Future studies should seek to explore other variables that can explain additional variations in inter-firm knowledge transfer and knowledge leakage, for example, the interaction between a partner's perceived opportunism and boundary spanner's regulatory focus.

Third, mediating mechanisms, such as boundary spanners' influence in decision-making processes and their level of embeddedness within the firm and in relation to the partner, are likely to have effects. Ebers and Maurer (2014) suggest that a firm's absorptive capacity emerges from boundary spanners' external and internal relational embeddedness and relational empowerment. In our study, we did not consider boundary spanners' level of empowerment nor their influence on the firms' decision-making processes. Therefore, future studies should include relevant mediators to expand our knowledge of the roles of boundary spanners in alliances.

Finally, due to this study's cross-sectional design, we should be cautious in drawing causal inferences about the observed relationships. Firms' knowledge acquisition and leakage can vary substantially throughout the collaboration process. In order to strengthen these arguments, both the independent and outcome variables should be measured multiple times. This will also enable researchers to examine boundary spanners' regulatory focus during different stages of the collaboration process, which may identify whether boundary spanners' regulatory focus is stable throughout the collaboration process, or if it is dynamic and adapts based on experiences at different stages of the collaboration process.

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Appendix A. Measurement scales, factor loadings, and composite reliability (CR)

	Factor loadings	CR
Prevention focus		0.98
Security		
I concentrate on completing my work tasks correctly to increase my job security.	0.84	
At work, I am often focused on accomplishing tasks that will support my need for security.	0.82	
Job security is an important factor for me in any job search.	0.60	
Oughts		
At work, I focus my attention on completing my assigned responsibilities.	0.49	

Fulfilling my work duties is very important to me.	0.48	
At work, I strive to live up to the responsibilities and duties given to me by others.	0.60	
Losses		
I do everything I can to avoid loss at work.	0.56	
I focus my attention on avoiding failure at work.	0.48	
I am very careful to avoid exposing myself to potential losses at work.	0.70	
Promotion focus		0.80
Gains		
I take chances at work to maximize my goals for advancement.	0.70	
I tend to take risks at work in order to achieve success.	0.72	
If I had an opportunity to participate in a high-risk, high-reward project, I would definitely take it.	0.59	
Achievement		
If my job did not allow for advancement, I would likely find a new one.	0.69	
A chance to grow is an important factor for me when looking for a job.	0.51	
I focus on accomplishing job tasks that will further my advancement.	0.68	
Ideals		
I spend a great deal of time envisioning how to fulfill my aspirations.	0.61	
My work priorities are impacted by a clear picture of what I aspire to be.	0.80	
At work, I am motivated by my hopes and aspirations.	0.79	
Trustworthiness		0.76
Integrity		
The partner firm has a strong sense of justice.	0.81	
The partner firm is fair in business dealings with us.	0.90	
This alliance partner stands by its words.	0.90	
Sound principles seem to guide the partner firm's actions.	0.91	
Benevolence		
When making important decisions, the partner firm is concerned about our company's welfare.	0.77	
The partner would not knowingly do anything to hurt our company.	0.49	
Our firm's needs are important to the partner firm.	0.91	
The partner firm looks out for what is important to our firm in the alliance.	0.95	
This partner firm will go out of its way to help our firm.	0.67	
Competence		
The partner firm is very capable of performing its role in the alliance.	0.92	
The partner firm is well qualified for the alliance.	0.93	
The partner firm has much knowledge about the work that needs to be done in the alliance.	0.72	
We are very confident about the partner firm's skills.	0.79	
The partner firm has specialized capabilities that add value to the alliance.	0.68	
Tacit knowledge transfer		0.77
We share activities that provide learning with this company.	0.51	
We regularly visit each other's facilities and observe on site how operations are conducted.	0.84	
This company and ours have learned much from the direct contact between our two organizations.	0.80	
Knowledge leakage		0.77
Knowledge leakage risk		
Our proprietary knowledge and core technologies have risks of being appropriated by the partner.	0.67	
Emphasis on an open relationship with our partner represents a threat that private knowledge and core technologies can easily be transferred to our partner.	0.82	
Intentional knowledge leakage		
Our private knowledge is imitated by the partner behind our back.	0.78	
The partner usually encroaches on our technological assets deliberately.	0.54	
The partner has illegally internalized our private knowledge and technologies.	0.75	
Unintentional knowledge leakage		
Our core knowledge has sometimes been unconsciously transferred to the partner through daily communication and interaction.	0.79	
Our core knowledge has sometimes been accidentally transferred to the partner due to unwanted facilities in the alliance (such as unrestrained collaborative environments created or easy access).	0.97	
Our core knowledge has sometimes been involuntarily transferred to the partner by offering detailed information to the partner.	0.87	

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