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The impact of obfuscation on strategic alliance formation: If you can?t convince them, confuse them?

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Abstract

Strategic alliances have become a major instrument for companies to create competitive advantage. Hence, the choice of alliance partners becomes an important but little studied part of firm strategy. In this paper we highlight the role of obfuscation, i.e., the degree to which firms conceal information by presenting themselves in an overly complex manner, and link it to the signaling of trustworthiness in strategic alliance formation. We hypothesize that obfuscating firms are less likely to be included in a strategic alliance and contrast these predictions with stronger signals from previous alliances. Based on a sample of pharmaceutical and biotech firms, we create a dyad-level panel-dataset of all potential and realized linkages to study firm?s partner choices. We find that, on average, obfuscation decreases alliance formation probability for those firms that lack previous alliance experience as a primary signal. This effect is dyadic in

nature, i.e., particularly pronounced when experienced firms evaluate un-experienced partners. Our findings have important implications for impression management and perception engineering of firms which are new to industries or markets.

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THE IMPACT OF OBFUSCATION ON STRATEGIC ALLIANCE FORMATION: IF YOU CAN'T CONVINCE THEM, CONFUSE THEM?

Abstract

Strategic alliances have become a major instrument for companies to create competitive advantage. Hence, the choice of alliance partners becomes an important but little studied part of firm strategy. In this paper we highlight the role of obfuscation, i.e., the degree to which firms conceal information by presenting themselves in an overly complex manner, and link it to the signaling of trustworthiness in strategic alliance formation. We hypothesize that obfuscating firms are less likely to be included in a strategic alliance and contrast these predictions with stronger signals from previous alliances. Based on a sample of pharmaceutical and biotech firms, we create a dyad-level panel-dataset of all potential and realized linkages to study firm's partner choices. We find that, on average, obfuscation decreases alliance formation probability for those firms that lack previous alliance experience as a primary signal. This effect is dyadic in nature, i.e., particularly pronounced when experienced firms evaluate un-experienced partners. Our findings have important implications for impression management and perception engineering of firms which are new to industries or markets.

Keywords: Alliance formation; obfuscation; signaling theory; trustworthiness.

INTRODUCTION

The ability of firms to access and exploit external resources has been a primary theme of recent literature in strategic management (Dussauge, Garrette, & Mitchell, 2000; Oxley & Sampson, 2004; Lahiri & Narayanan, 2013). Strategic alliances focusing on innovative technologies and products have a particularly large potential for creating competitive advantages but have also been found to be fraught with conflict and disappointing results (Sampson, 2007). Having access to knowledge of other organizations allows firms to increase their performance by optimizing their own resource production (Fleming & Sorenson, 2004) or benefiting from novelty based on unique knowledge combinations (Rosenkopf & Nerkar, 2001). However, the mechanisms explaining why some firms are more likely to work together while others are not, are hardly understood. This is surprising because recent research shows that the performance effects of collaborations with external partners are highly partner-specific (Dyer & Hatch, 2006).

Our study is set in the crucial pre alliance formation stage (Wang & Rajagopalan, 2015). At this stage, management faces challenges when trying to assess potential partners based on limited and asymmetrically distributed information (Sarkar, Echambadi, & Harrison, 2001) while experiencing pressure from missing out on the optimal partner because others have moved faster (Sarkar, Cavusgil, & Aulakh, 1999). Under such conditions, the assessment of potential partners' trustworthiness signals becomes central for alliances to emerge (Schilke & Cook, 2015). We are – to the best of our knowledge – the first to consider the effects of obfuscation, i.e. the degree to which firms deliberately rely on misinformation or disinformation through complex language when they present themselves, on alliance formation. We predict that obfuscating firms will be less likely to end up in strategic alliances and explore conditions under which this negative effect is particularly pronounced.

Trustworthiness of the potential partner is an essential element in determining whether a firm wants to engage in an alliance (Das & Teng, 2001; Noteboom, 1996). Signaling trustworthiness is therefore an important management task. Probably one of the strongest signals to potential partners is a focal firm's previous behavior in inter-firm relationships. Not surprisingly, alliance experience has long been seen as an important factor for alliance formation (Gulati, 1995). This mechanism creates a path-dependent interrelatedness of previous alliances and future alliance formation (Gulati & Gargiulo, 1999; Walker, Kogut, & Shan, 1997). We can learn little from existing research about how young firms or firms entering a new market signal their trustworthiness to potential partners since they lack strong signals in the form of previous alliance experience. In this paper, we examine trustworthiness resulting from firms' general image in the market place (Das & Teng, 2002) predicting that firms which present themselves in a transparent and straight-forward way, i.e., do not obfuscate, will increase their chances to be chosen as alliance partners since they provide an alternative signal of trustworthiness.

We develop a novel dataset on alliance formation in the pharmaceutical and biotech sector in which we go beyond previous studies by analyzing all potential linkages among the firms in the sample while controlling for outside options. This allows us to study the impact of choice-characteristics, e.g. attributes of partners, and how they influence the propensity of two firms to ally. We find that obfuscation reduces the probability of alliance formation for those firms that lack strong, more direct signals in the form of previous alliance experience. An interesting exception is the special case of two firms with low levels of previous alliance experience evaluating each other. In this case obfuscation turns out to be unrelated to alliance formation likelihood, suggesting a more limited pool of potential partners to choose from. We document

that especially the experienced collaborators perceive alternative, secondary signals of trustworthiness of potential unexperienced partners to be important.

These findings have immediate relevance for both management research and practice. Our contributions to research are two-fold. First, we provide a theoretical link between the literature streams on impression management and strategic alliance formation. We demonstrate the usefulness of this integrated theoretical reasoning for how the nature of a firm's general presentation, i.e., its level of obfuscation influences its ability to form alliances with potentially valuable partners. Put differently, we show that there can be trade-offs when firms present themselves in opaque or misleading ways in order to protect their knowledge. Second, existing literature documents that alliance experience eases subsequent alliance formation (Wang & Rajagopalan, 2015 for a recent review). Large parts of this literature assume, at least implicitly, that firms without prior alliance experience are homogeneous in the way in which they present themselves to potential partners. Our findings show that this is not the case. Hence, studies which focus on the highly relevant group of young firms or new market entrants, i.e. lacking signals for potential partners from previous alliance experience, may suffer from biased findings.

Focusing on the relevance for management practice, we provide new insights into the benefits of firms presenting themselves in a transparent and straight-forward fashion, especially when they lack an alliance track record. This sets a counterpoint to existing studies which have emphasized the benefits of secretive firm behavior (e.g., Katila, Rosenberger, & Eisenhardt, 2008). Our finding has particular relevance given that our empirical setting is a high-tech sector in which knowledge flows and knowledge protection are of particular importance. Consequently, a comprehensive knowledge strategy has to balance the needs for obfuscation with the

opportunities that arise for collaboration with external partners. Besides, this balance can be adjusted once a firm has achieved a track record as a trustworthy alliance partner.

The remainder of the article is organized as follows. After this introduction we review relevant theory and develop hypotheses. The subsequent section outlines the empirical study for testing our hypotheses and presents the results. We conclude with the discussion of results, their implications as well as opportunities for future research.

THEORY

We begin our theoretical argumentation by defining central constructs and mechanisms. The goal of our study is to predict why certain firms have a higher likelihood of forming a strategic alliance with each other. Consequently, our theoretical reasoning occurs in the pre-alliance stage, in which firms assess a pool of potential alliance partners.

Strategic alliances can be formed for a variety of purposes. We will focus on strategic alliances related to innovation and knowledge production through R&D. These particular alliances have received special attention in recent strategy literature because of their potential to create competitive advantage for firms based on complementarities of knowledge and capabilities of alliance partners. The number of innovation alliances has increased in the last decades, however the performance of these alliances has frequently been lower than expected (Kogut, 1989; Sampson, 2007). This performance gap may be explained by the misfit between partners.

As firms frequently cannot rely solely on internal knowledge to develop new products and processes (Cassiman & Veugelers, 2006), they actively search for knowledge outside their boundaries. Firms participate in strategic alliances to leverage existing knowledge, gain access to

complementary capabilities and resources, and decrease the costs and extent of their internal R&D activities (Rosenkopf & Nerkar, 2001).

We theorize at the pre-formation stage of an alliance, i.e. before management reaches agreements and focuses on a particular dyad of partners (Wang & Rajagopalan, 2015). A primary management task during this stage is the identification of potential partners, their comparison and selection (Simonin, 1997). Organizational decision makers consider the fit with potential alliance partners on various levels such as at the strategic (Bierly & Gallagher, 2007) or task fit (Cummings & Holmberg, 2012). Firms have been found to search for knowledge that complements their knowledge base (Stuart & Podolny, 1996). They try to find partners with whom they share common knowledge that allows mutual understanding, but that also provide new knowledge, trying to balance closeness and diversity of knowledge (Ahuja & Katila, 2001; Keil, Maula, Schildt, & Zahra, 2008). There is evidence for misalignments among alliance partners related to excessive similarity and resulting lack of novelty (Vassolo, Anand, & Folta, 2004) as well as to excessive dissimilarity leading to a lack of absorptive capacity (Vasudeva & Anand, 2011). Other studies have emphasized relational features such as social capital and network position (Chung, Singh, & Lee, 2000; Gulati, 1999, Lavie & Rosenkopf, 2006).

It is important to note under which information conditions firms compare potential partners in the pre-alliance stage. Firms form expectations about how various potential partners will perform in a hypothetical alliance in the future. The information constituting these predictions is necessarily incomplete, e.g. on time horizons and objectives of potential partners, or asymmetrically distributed (Sarkar *et al.*, 2001). Especially potential partners with diverging time horizons and objectives have strong incentives to conceal those in the pre-alliance stage. Besides, firms are not only limited in the resources and attention that they can devote to collecting

information but they may also face time pressures arising from potentially missed opportunities given the limited set of potential partners (Sarkar *et al.*, 1999). What is more, the outcomes of R&D alliances are particularly difficult to predict. The outcomes of tests and experiments are by definition difficult to foresee and codify in a contractual agreement between partners. Hence, alliance contracts are necessarily incomplete for governing the interaction between the alliance partners (Bierly & Gallagher, 2007). All of these conditions make it likely that firms will assess the overall trustworthiness of potential partners based on a variety of signals.

Trust and trustworthiness in partner selection during alliance formation

Trustworthiness is essential to determine whether potential partners engage in an alliance (Schilke & Cook, 2015 for a recent review). We define trustworthiness as the attribute of an actor which is subjectively assessed by other actors based on their expectations of the level of trust the focal actor will bring to an interaction. Trust has been defined as "mutual confidence that no party to an exchange will exploit another's vulnerabilities, because opportunistic behaviour would violate values, principles and standards of behaviour that have been internalised by parties to an exchange" (Bierly & Gallagher, 2007: 138, adapted from Barney & Hansen, 1994). Das and Teng succinctly define trust as "a subjective state of positive expectations of the other in a risky situation" (Das & Teng, 2001: 255). These expectations can concern a partner's ability to perform according to agreements (competence trust) or his intentions to do so (goodwill trust) (Noteboom, 1996).

Trust is crucial for value creation in strategic alliances (e.g., Cullen, Johnson, & Sakano, 2000; Kale, Singh, & Perlmutter, 2000; Schilke & Cook, 2015) and has been directly related to alliance performance (e.g., Krishnan, Martin, & Noorderhaven, 2006). Krishnan et al. (2006) found that trust is pivotal under behavioral uncertainty resulting from the difficulty of anticipating and

understanding the actions of an alliance partner. Therefore, in the stage of partner selection and alliance formation – where behavioral uncertainty is highest – trust and trustworthiness are particularly important.

Generally, trust is built through repeated ties between partners (Gulati, 1995). The information that the network of a potential partner's previous alliances provides helps the focal firm to counterbalance the risk associated with entering an alliance with that firm. We build on this information perspective of how trust is communicated. The information about how trustful a potential partner plans to behave in a future strategic alliance is not readily observable. Especially partners who plan to behave opportunistically, i.e., not in a trustful manner, have strong incentives to hide this intention in the pre-alliance stage. Consequently, firms will need to interpret signals of potential alliance partners' trustworthiness. If these signals were limited to common or general alliance experience, the choice set of potential partners would be severely limited or non-existent for many firms. Hence, in the absence of alliance experience the assessment of potential partners is substituted by - more indirect, secondary - signals of trustworthiness.

Trust and obfuscation

In this paper, we focus on a signal that helps firms to anticipate behavior of potential partners and sort them according to their trustworthiness. The signal that we examine is obfuscation - the complexity of the language that a potential partner firm uses when it presents itself to a general audience. Obfuscation is related to impression management (Aerts, 1994) or perception engineering (Courtis, 2002) and/or a means for deliberate inclusion of misinformation, disinformation, or intentional information withholding. A low level of obfuscation shows that the firm is transparent in its communication. When organizations want to reduce clarity by

disclosing less about underlying firm factors and mechanisms, they obscure information through the use of overly complex language. Such a purposeful use of overly complex language has become known as the "obfuscation hypothesis" (Courtis, 1998).

All firms have to choose a level of clarity with which they want to present themselves to a general public. In principle, firms have incentives to keep crucial information on how they generate competitive advantages private from competitors. However, many important firm stakeholders such as investors or regulators reward or enforce clarity in how a firm describes itself since they want to evaluate the firm (Litov, Moreton, & Zenger, 2012). Since the information given to clarity-demanding stakeholders is typically also available to competitors, the risk of imitation when information is easily and comprehensively understandable is higher (Barney, 1991). The focal firm has strong incentives to make this imitation process as long and as risky for imitators as possible (Mansfield, Schwartz, & Wagner, 1981). Firms have been found to go to great length to obscure the nature of their competitive advantages such as choosing remote locations for research activities (Alcacer & Chung, 2007) or restricting access and interaction with key employees (Liebeskind, 1996). Particularly the research stream on causal ambiguity has received much attention in strategy literature for preventing imitation of strategic assets (King & Zeithaml, 2001 provide a review). The competitive value of an asset increases the more tacit, embedded and complex it is because these factors slow down imitation (Reed & DeFillippi, 1990). Consequently, every firm chooses a level of obfuscation in its overall presentation which balances the demands from various stakeholder groups for clarity and simplicity with the risks from imitation through competitors.

Empirical literature demonstrates a variety of degrees of obfuscation among firms. Smith and Taffler (1992) found in a matched sample that firms with high performance (most notably

liquidity) tend to signal good news, while low performing firms obscure their performance. By contrast, Cen and Cai (2014)'s results show that firms with extremely low or high profitability use more obfuscation. Li (2008), found that low performing firms opportunistically obscured their annual reports using high complexity language to hide adverse information from investors. Moffitt and Burns (2009) further showed that obfuscation is associated with fraudulent 10k reports.

We conclude that firms are likely to incorporate the general presentation of a firm into their decision making process on potential alliances in the pre-alliance formation stage given the shortages of reliable information. Given that the general presentation of potential partner firms is readily available (e.g., on websites or in communication with shareholders and financial markets), decision makers of the focal firm are likely to detect excessive degrees of obfuscation or at least identify the most transparent and most straight forward (i.e. low obfuscating) firms.

Under these assumptions, firms are likely to interpret obfuscation as a negative signal of a potential partner's trustworthiness since it makes it more difficult to evaluate the potential partner's capabilities and intentions. We hypothesize:

Hypothesis 1: *The likelihood of forming a strategic alliance decreases with the level of obfuscation.*

Obfuscation occurs in an information environment in which firms send a multitude of signals which could be related to their trustworthiness. Obfuscation in the way a firm presents itself to a general audience signals a general attribute of a firm. Other signals may be more closely related to the formation of a strategic alliance. This level of relatedness has been found to be a strong predictor for the effectiveness of signals (Connelly, Certo, Ireland, & Reutzel, 2011). More

effective signals are expected to be of primary importance, while less effective signals may substitute when such primary signals are not present.

Among the signals most widely discussed in existing literature on strategic alliances is alliance experience (Gulati, 1995). Previous studies find that firms with more alliance experience have higher rates of alliance success in terms of financial outcomes (Kale, Dyer, & Singh, 2002) and innovation performance (Sampson, 2005). Alliance experience of a firm is used as signal of its attractiveness as a partner (Hitt, Dacin, Levitas, Arregle & Borza, 2000), and, consequently, it is expected to be an especially effective signal.

The signal function has two dimensions. First, alliance experience produces tangible outcomes which can be positive (e.g., patents) or negative in nature (e.g., lawsuits). Firms can develop a track record on how they behave when engaging with external partners. Hence, they demonstrate the trustworthiness of their behavior in the actual alliance setting. Second, firms with repeated strategic alliances are more likely to have management systems and procedures in place which determine their alliance behavior (Kale & Singh, 2009). Rothaermel and Deeds (2006) identify an alliance capability originating from alliance experience. With increasing experience, firms develop coordination, communication, and conflict management procedures that make the behavior of alliance partners more predictable (Wang & Rajagopalan, 2015).

We conclude that alliance experience is a more effective signal of a firm's trustworthiness as a potential alliance partner than obfuscation because it is immediately related to the alliance setting. Accordingly, we suspect that signals from obfuscation are mostly secondary in nature for partners which have already gained alliance experience. Conversely, we expect particularly strong effects of obfuscation signals for firms without sufficient prior alliance experience. We predict:

Hypothesis 2: *The likelihood of forming a strategic alliance decreases with the level of obfuscation and this negative effect is stronger for firms with little alliance experience.*

Given that alliance experience is path dependent, a particularly relevant group of firms for theorizing are firms which have not gained any experience yet. They are structurally disadvantaged in finding alliance partners but have a lot to gain from establishing a stock of alliance experience. In this context, it should be noted that the absence of experience is not necessarily a negative signal because it can originate from being a young firm (Schulz, 2001) or new to a geographical market (Zaheer & Mosakowski, 1997). We predict that firms are heterogeneous in the degree to which they treat obfuscation as a negative signal about the trustworthiness of a potential partner without alliance experience. Arguments can be developed based on signaling theory or a capability-based view. We explore both routes of argumentation.

From a signaling perspective, especially firms with strong signals for their own trustworthiness can expect to find partners with equally strong signals. Existing research supports the notion that particular firms have a higher level of agency in their partner choices than the average firm. The level of alliance experience influences the pool of potential firms from which a firm can choose from (Ahuja, Polidoro, & Mitchell, 2009). Firms with a lot of alliance experience can draw potential partners from a larger pool of firms since they have a more central position in the network structure (Podolny, 1994). Following the same logic, firms with little alliance experience can only draw partners from a limited pool of potential partners.

We believe that this effect of previous alliance experience on the size of the pool of potential partners influences the impact of obfuscation on the likelihood of forming an alliance, since firms evaluate the trustworthiness of their potential partners relatively to other potential partners. We claim that for firms with high levels of alliance experience, obfuscation of potential partners

has a higher importance as a trustworthiness signal since these firms have a larger pool of potential partners to choose from. In the same line, firms with lower levels of alliance experience have a limited pool of potential partners to choose from and, consequently, we argue that for these firms obfuscation of potential partners is less relevant as a partner selection signal.

A capability-based perspective suggests that previous alliance experience enables firms to establish an alliance capability. Firms have learned to establish and manage alliances. Since this learning process is path dependent it can establish a capability in the sense that it is difficult for competitors to imitate or substitute (Wang & Rajagopalan, 2015). In a pre-alliance formation stage firms with superior alliance capabilities can be assumed to be more effective and efficient to analyze potential partners. Hence, these companies are particularly well positioned to evaluate partners lacking strong signals such as previous own alliance experience. They can assess information from potential partners comparatively more effectively and efficiently even in the absence of strong signals. However, firms with strong alliance capabilities are equally likely to detect obfuscation from potential partners early and divert their attention to more transparent partners. In sum, we hypothesize based on both signaling and capability-based arguments:

Hypothesis 3: *The likelihood of forming a strategic alliance decreases with the level of obfuscation and this negative effect is stronger for a potential alliance between a firm with little alliance experience and a firm with a lot of alliance experience.*

DATA AND EMPIRICAL APPROACH

The empirical context of this study is the pharmaceutical industry. This single industry focus allows us to identify different collaboration patterns and strategies of firms that operate in the same industry context. The pharmaceutical industry has received considerable attention in the alliance literature due to its high level of inter-firm collaborations (Hagedoorn, 2002), which

makes it an appropriate context for our study. We choose to examine large, R&D intensive pharmaceutical and biotech firms because these firms are more likely to have larger variations in their strategic focus and heterogeneous orientations in terms of temporality as compared to low-R&D performing firms. We initially identified a set of 100 firms as the top R&D spending pharmaceuticals and biotech firms. The time period we consider in our study covers the years 2002 to 2012. Given limited data availability, we were able to find all required information for 79 firms. Because the data coverage over time is not the same for all companies, we created an unbalanced panel covering the 2002 to 2012 period. All firms in the final sample are heavily engaged in the processes of research, development and marketing of drugs in a global context.

Alliance formation

Firm-level data on collaborative activities is derived from Thomson SDC Platinum database and complemented by additional search on the Lexis Nexis database. Since the level of analysis is all hypothetical dyadic relationships between the firms in the sample, our dependent variable has a value of zero in case no alliance has been formed between the two firms of the dyad and one in case there is an alliance. As reliable data on the termination of an alliance are not available, a five-year window was chosen, as suggested by prior research (Lin, Yang and Arya, 2009, Kogut, 1988).

Obfuscation measure: Coleman Liau index

We focus on the level of obfuscation in a firm's Letter to Shareholders (LTSs) as (a) the shareholders are arguably the most important external audience of any public firm and, (b) the

letters are publicly available and can be interpreted as well as compared by any outside party. LTSs[1] are signed by the CEO.

Obfuscation can be measured through different readability indices. Almost 70 versions of readability formulas have been developed (Courtis, 2004). Among the different readability indices we chose the Coleman-Liau index (Coleman & Liau, 1975). Like other readability indices (e.g., Flesch-Kincaid Grade Level, SMOG index, Gunning-Fog score, automated reliability index) the Coleman-Liau index indicates the level of complexity of a text. Coleman-Liau index is a function of the average number of letters per 100 words and the average number of sentences per 100 words. For instance, a score of '14' would be equivalent to a college sophomore reading level (Coleman & Liau, 1975). The Coleman-Liau index has the advantage of counting the characters rather than the syllables per word (such as the SMOG index, the automated reliability index, the Fog index), allowing for a more accurate count than other indices. At the same time, the Coleman-Liau index is not overly complex since it uses only a few simple factors that are designed to be easy to calculate and are rough approximations to the linguistic factors that determine readability (Pitler & Nenkova, 2008). The Coleman-Liau index is widely accepted, has been extensively tested, is reasonably comparable to other readability scores (e.g., Chandar, Webber, & Carterette, 2013) and is more precise than other indices due to the character-based count.

Control variables

We use COMPUSTAT and Thompson Innovation to collect additional firm-level data to reflect observable heterogeneity in firm characteristics. We include control variables that are commonly

1 An alternative text source would have been the 10 k but the SEC issued a "plain English" guideline for the 10-k in 1998, which could bias our results.

used in R&D alliance research: firm size, alliance experience, outside alliances, technological breadth, and technological proximity. Firm size is approximated with the number of employees. Alliance experience is defined as the number of previous alliances during the last five years. Since it is hardly possible to include all potential partnering firms in the sample, it is necessary to control for the alliances outside the sample. We do so by including a variable that counts the number of technology alliances that a firm has with all firms but those present in the sample.

The pharmaceutical industry has one of the highest patent propensities of all industries (Arundel & Kabla, 1998). Hence, we can use firms' patenting behavior to track their technological portfolios. The US patent system (USPTO) provides a useful classification for patented technologies by grouping patents with similar technologies in patent classes. We calculate two variables based on USPTO statistics. First, we follow Ahuja and Katila (2001) and calculate the breadth of the technological portfolio of a focal firm by summing up all technology classes in which the firm holds patents in a given year. The availability of different technologies may influence partner choices and controlling for patent breadth is therefore a useful control variable. Second, we calculate the technological proximity between all firms of our sample in each year of the observation period. In line with Jaffe (1986), we use patents as well as patent classes to assess the technological proximity between all pairs of firms. More precisely, technological proximity between two firms is the uncentered correlation between the number of patents within all patent classes in which two firms are active (see Van de Vrande, 2013 for a recent application and details). The measure of technological proximity ranges from 0 (patenting of two firms is completely uncorrelated across technology classes) to 1 (patenting of two firms is perfectly correlated across technology classes). In line with previous studies we use the 5-year time period preceding the observation year for the calculations.

Since our sample is composed of pharmaceutical and biotech companies, we also include a dummy variable indicating whether both firms are mainly active in the same industry or not. We also identified the city and country of all partner firms and retrieved information on where these firms were/are headquartered. Based on latitude and longitude of the dyad-level headquarter information of both firms we calculated geodesic distances for all hypothetical pairs. Additionally, we include a dummy variable indicating whether the alliance is a cross-border alliance or not.

Given the importance of the CEO for the strategic decision of interest (alliance formation) and the potential bias introduced through different CEOs who might influence the writing style of the LTSs we control for CEO change. We further control for whether the CEO is internal or external to the company (CEO internal) and for whether the CEOs of two potential alliance partners received their education in the same higher education institution. Finally, we include the text size (in kb) of the LTSs since extreme length might be related to the level of obfuscation.

Estimation approach

Our estimation approach utilizes data that considers all possible relationships that a focal firm can have with all other firms in the sample. The focal firm observes a number of characteristics of their potential partners. We assume that these potential partner characteristics, as well as the "distance" of these characteristics relative to the focal firm, influence the likelihood of starting an alliance. In addition, dyad-specific characteristics may influence the likelihood of starting an alliance. Such dyad-characteristics include, for example, the geographic or technological distance between two partners. Suppose that firm i faces the problem of choosing an alliance partner among J alternatives and that U_{ij} represents the value of the j-th choice to the i-th firm. In presence of a systematic component h_{ij} and a random component e_{ij} we can write

$$U_{ij} = h_{ij} + e_{ij} \qquad (1)$$

and assume that firms which aim to maximize value from alliance partner choice will prefer alternative j if U_{ij} is largest, hence the probability that firm i is willing to ally with partner j is

$$p_{ij} = Pr\{Y_i = j\} = Pr\{\max(U_{i1}, \dots, U_{iJ}) = U_{ij}\} \qquad (2),$$

which allows to derive the equation for a multinomial logit model. Notwithstanding, for a match to occur, the potential partner will need to form similar partnering preferences. Since the usual multinomial logit expresses expected utilities of alternative firm choices based on characteristics of firm i, e.g. $h_{ij} = x_i\beta_j$, the same attributes of firm i are used to model the potential partner choices. As we are interested in how the potential partners' obfuscation influences alliance formation, we do not want h_{ij} to be only dependent on covariates of firm i but also model the expected utilities in terms of characteristics of the partner j. In addition dyad-level characteristics that are jointly rooted in characteristics of firm i and j should be allowed for as well to reflect proper modeling of partner choices among a set of alternatives. The conditional logit (McFadden, 1973) allows studying the influence of the characteristics of the alternatives, $h_{ij} = z_j g$, with z_j representing characteristics of potential partner firms. Combining elements from the multinomial logit and the conditional logit model, our general model contains both, attributes of the potential partners and characteristics of the focal firm,

$$h_{ij} = x_i\beta_j + z_{ij}g \qquad (3)$$

with x_i expressing fixed firm characteristics of the focal firm i that are constant across choices, and z_{ij} representing characteristics that differ across choices – some varying over each focal firm and some not.

RESULTS

Descriptive statistics and a correlation table of the sample used in our analysis are reported in Table A1 and A2 in the Appendix. Relative to the number of hypothetical dyadic relationships the alliance event is far less common and we observe only in less than 3 percent of all dyad-year observations a realized alliance. Rare events can cause logistic regression models to underestimate probability (King & Zeng, 2001), however this is only problematic when the event is rare in absolute and not relative terms. In other words, small sample bias in maximum-likelihood estimations depends on the total count of the rare event and not the percentage of the event. With the number of events present in our sample, a logistic regression does not suffer from small-sample bias. Table A3 in the Appendix reports the number of dyad-year observations along the lines of low/high alliance experience and low/high obfuscation using a 2x2 matrix. We observe that the two main variables for the interaction effects are not mutually exclusive and consequently a valid choice alternative.

Maybe more interesting is our measure of obfuscation. Figure 1 displays Kernel density estimates for the group of firms that allies at any point with another firm in the sample and those firms that do not. The Kernel density plots indicate that those firms, which have not participated in an alliance with any of the other firm in the sample during the period of observation, tend to have slightly higher obfuscation values. For the full sample we observe values ranging from 10 to 17.4 with a mean of approximately 14 and a standard deviation of around 1.4. Thus the average readability corresponds to that of a second year undergraduate. In comparison, the abstract of this manuscript has a corresponding grade level of 16 which is appropriate for graduate college students. In fact, we find that almost ten percent of all LTSs that we analyzed are as readable (or more difficult to read) as our abstract.

<<Figure 1 about here>>

Table 1 presents the results of a conditional logit with firm fixed effects for the focal firm *i*. The independent variables correspond to attributes of firm *j* (e.g., obfuscation, firm size, technological breadth, alliance experience, outside alliances), the absolute deviation of firm j's attributes from attributes of focal firm *i* (i.e. |Δ| obfuscation, etc.), and dyad characteristics (i.e. technological proximity, geographic distance, and dummy variables indicating same industry and cross-border dyads).

<<Table 1 about here>>

In the first hypothesis we claim that the likelihood of forming a strategic alliance decreases with the level of obfuscation. We do not find support for this hypothesis since the main effect of the obfuscation variable is non-significant.

Hypotheses 2 and 3 provide boundary conditions for Hypothesis 1 and allow a more refined approach to the effect of obfuscation on the likelihood of the formation of dyadic strategic alliances. Hypothesis 2 states that the effect of the level of obfuscation on the likelihood of forming a strategic alliance is dependent on the potential partner's alliance experience. We claim that, especially in the absence of a stronger primary signal like alliance experience, will potential partners consider obfuscation level as a trustworthiness signal. The results from Model 1 give support to this hypothesis: the interaction between the obfuscation variable and the below-average industry alliance experience is negative and significant while the interaction between the obfuscation variable and the above-average industry alliance experience is non-significant. Hypothesis 3 claims that obfuscation should be analyzed taking into consideration the dyadic nature of alliances. To test it, we split the sample according to the level of alliance experience of the focal firm. Model 2 shows the results of the sub-sample of firms with a lot of alliance

experience while Model 3 reports the results of the sub-sample of firms with little alliance experience. The results show that obfuscation of potential partners decreases the likelihood of little experienced firms being selected as alliance partners, but that it is only significant when the focal firm has a lot of alliance experience. These results give support to Hypothesis 3. To sum up, our results show that the level of obfuscation helps explaining the likelihood of being selected as an alliance partner but only when other signals (like alliance experience) are missing and when the potential partner has a lot of alliance experience and is able to select from a considerable pool of potential partners.

Regarding the control variables we observe that especially firm size differences, alliance experience, and technological proximity increase the probability of an alliance. Dyad differences in outside alliances decrease the likelihood of an alliance. Several other control variables are significant in the full sample but not when splitting the sample. For example, potential partner's firm size is positively and the number of outside alliances is negatively related to alliance probability in the full sample but not the sub-samples. For the other variables we do not observe stable patterns. In some cases – and similar to our theorizing about obfuscation – this is related to the perspective we take, i.e., which firm is the focal firm. For example, our results indicate that experienced firms tend to have a higher likelihood to form an alliance when the partner is located in a different country, while low-experience firms are more likely to form alliances with domestic partners. These results are in line with the idea that experienced firms have a larger choice set.

In order to test the robustness of our findings, we collected additional data on the CEOs. Table A4 in the Appendix report results that include additional covariates indicating change of the CEO in any of the partnering firms, a binary variable indicating if CEOs experienced education

in the same institution, and variables specifying if CEOs are internal or external to the company. Since information on CEOs was not available for all firms the sample for these robustness checks is smaller. Overall, the results reported in table A4 support our previous findings. We also used a different definition for the threshold of alliance experience (sample median) and re-estimated all models using the sample of realized linkages plus a random sample of potential linkages of equal size in order to have similar event/non-event likelihood. These exercises support our reported findings and are available upon request.

DISCUSSION AND CONCLUSIONS

In this paper, we examine the role of obfuscation as a signal for a lack of trustworthiness for partner selection in alliance formation. Our findings show that obfuscation serves as a negative signal in situations where there is limited alliance experience available. More specifically, we find that this is the case if the focal firm has a high level of alliance experience and, consequently, chooses partners from a larger pool. This finding suggests that missing or incomplete signaling via alliance experience can be substituted by the way firms communicate with their environment.

With obfuscation, we propose a signal of trustworthiness as decision criterion for alliance formation, complementing other criteria such as technology and capability. Obfuscation in the way a firm presents itself to a general audience is a signal that is available to any firm; anyone can easily observe it or systematically examine it. It gives a signal of trustworthiness and is particularly important in the absence of other signals such as alliance experience.

We contribute to the literature on partner selection in the alliance formation process in two ways. First, by providing evidence that the level of obfuscation influences a firm's ability to form an alliance with potentially valuable partners, we show that there can be negative consequences

when firms present themselves in opaque and misleading ways. In the context of alliances, firms that use obfuscation are less likely to be chosen as alliance partners when lacking other signals. What is more, strategy literature is rich with settings in which firms enter new product (liability of newness) or geographical markets (liability of foreignness) in which they lack credible signals based on past behavior. Our findings suggest that under these conditions the clarity and straightforwardness of the company presentation is an asset when building relationships with important partners.

Second, we show that at the pre-alliance stage firms assess the level of information availability and managerial trustworthiness rather than merely technological and capability capacities. Alliance experience has been discussed widely as an indicator for trustworthiness. In our paper we show how alliance experience interacts with obfuscation. Obfuscation being the more subtle signal, it does not influence the alliance formation directly if alliance experience, a more immediate signal of trustworthiness, is available. By studying this dynamic between different signals of trustworthiness, we contribute more generally to a better understanding of the behavioral facts of prospective alliance partners (Doz & Hamel, 1998).

Implication for strategic management practice

Focusing on the relevance for management practice, we provide new perspective into the impact of how a firm presents itself to external partners on the probability of forming alliances. We also show that (the absence of) obfuscation can serve as a signal of trustworthiness that complements previous alliance experience. This sets a counterpoint to existing studies which have stressed the benefits of secretive firm behavior (e.g., Katila *et al.*, 2008). Our finding has particular relevance given that our empirical setting is a high-tech sector in which knowledge flows and knowledge protection are of particular importance. Consequently, a comprehensive knowledge strategy has

to balance the needs for obfuscation with the opportunities for collaboration with external partners. Besides, this balance can be adjusted once a firm has achieved a track-record as a trustworthy alliance partner.

Limitations and Future Research

For partner selection in alliance formation, obfuscation functions as a signal that firms consider under certain conditions. However, in future research it would be interesting to examine to what extent obfuscation is related to trusting behavior during different stages of the alliance process, and, consequently, determine the relationship between obfuscation and alliance success.

Beyond the immediate context of strategic alliances, obfuscation likely also has negative effects in other contexts that involve the resource allocation to risky projects and to other organizational entities, or any type of investment in any firm or project. We encourage future research to expand the use of obfuscation to other contexts. Obfuscation indices are unobtrusive and hence researchers can use them for any data set for which relevant documents such as the LTSs are publically available.

Given that the context of our study were the pharmaceutical and biotech industries, we cannot generalize beyond this particular industry/this kind of industry context (knowledge-intensive, high uncertainty). It will be interesting to test whether the findings hold for other types of industries.

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Table 1: Regression results

	All firms	All firms	From perspective of high exp. firms	From perspective of low exp. firms
	1	2	3	4
Obfuscation	-0.0503	–	–	–
	(0.0319)			
Obfuscation * below avg. industry alliance exp.	–	-0.0738**	-0.0911**	0.00769
		(0.0322)	(0.0375)	(0.0649)
Obfuscation * above avg. industry alliance exp.	–	-0.0132	-0.0332	0.0418
		(0.0323)	(0.0379)	(0.0639)
|Δ| obfuscation	-0.0444	-0.0407	-0.0225	-0.0631
	(0.0344)	(0.0342)	(0.0437)	(0.0574)
Same industry (1=Yes)	-0.0115	-0.0251	0.119	-0.512**
	(0.116)	(0.115)	(0.132)	(0.225)
Firm size (ln)	0.168***	0.0870**	0.0751	0.107
	(0.0354)	(0.0383)	(0.0581)	(0.0709)
|Δ| Firm size (ln)	0.218***	0.198***	0.186***	0.187***
	(0.0362)	(0.0367)	(0.0589)	(0.0628)
Technological breadth	0.000923	0.000252	0.000509	-0.00815
	(0.00223)	(0.00223)	(0.00248)	(0.00849)
|Δ| technological breadth	-0.00286	-0.00273	-0.00602**	0.00870
	(0.00227)	(0.00228)	(0.00261)	(0.00852)
Alliance experience	0.152***	0.0945***	0.0742***	1.001***
	(0.0219)	(0.0239)	(0.0284)	(0.201)
|Δ| alliance experience	-0.0399**	-0.00627	-0.0241	-0.877***
	(0.0192)	(0.0203)	(0.0233)	(0.199)
Outside alliances	-0.0670***	-0.0496**	-0.0431	-0.146
	(0.0220)	(0.0221)	(0.0269)	(0.0924)
|Δ| outside alliances	0.0811***	0.0739***	0.0678***	0.160*
	(0.0184)	(0.0184)	(0.0202)	(0.0932)

Table 1: continued

Technological proximity	0.853***	0.788***	0.416*	1.415***
	(0.197)	(0.201)	(0.240)	(0.375)
Cross-border (1=Yes)	0.104	0.0879	0.427**	-0.541**
	(0.138)	(0.136)	(0.175)	(0.226)
Distance in km (ln)	-0.0491	-0.0508*	-0.0669*	0.00774
	(0.0304)	(0.0303)	(0.0365)	(0.0566)
Text size (kb)	0.0147**	0.0128**	0.0192***	-0.00746
	(0.00590)	(0.00596)	(0.00682)	(0.0121)
|Δ| text size (kb)	-0.0101	-0.00931	-0.00955	-0.0105
	(0.00620)	(0.00623)	(0.00732)	(0.0121)
Observations	25,734	25,734	11,501	13,875
Pseudo-R-squared	0.0771	0.0846	0.0557	0.170
Log-pseudo-likelihood	-2656	-2635	-1718	-857.2
Wald chi2	443.7	487.0	202.6	350.4

Note: Fixed effects logistic regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1. Independent variables refer to characteristics of firm *j*, |Δ| indicate the absolute difference of firm *i* and *j*, and "same industry", "technological proximity", "distance" and "cross-border" refer to dyad-characteristics. All regressions include year fixed effects which are not reported for brevity. Model 3 utilizes all dyads for which the focal firm has above average alliance experience, while model 4 analyzes the sample from the perspective of firm with below average alliance experience.

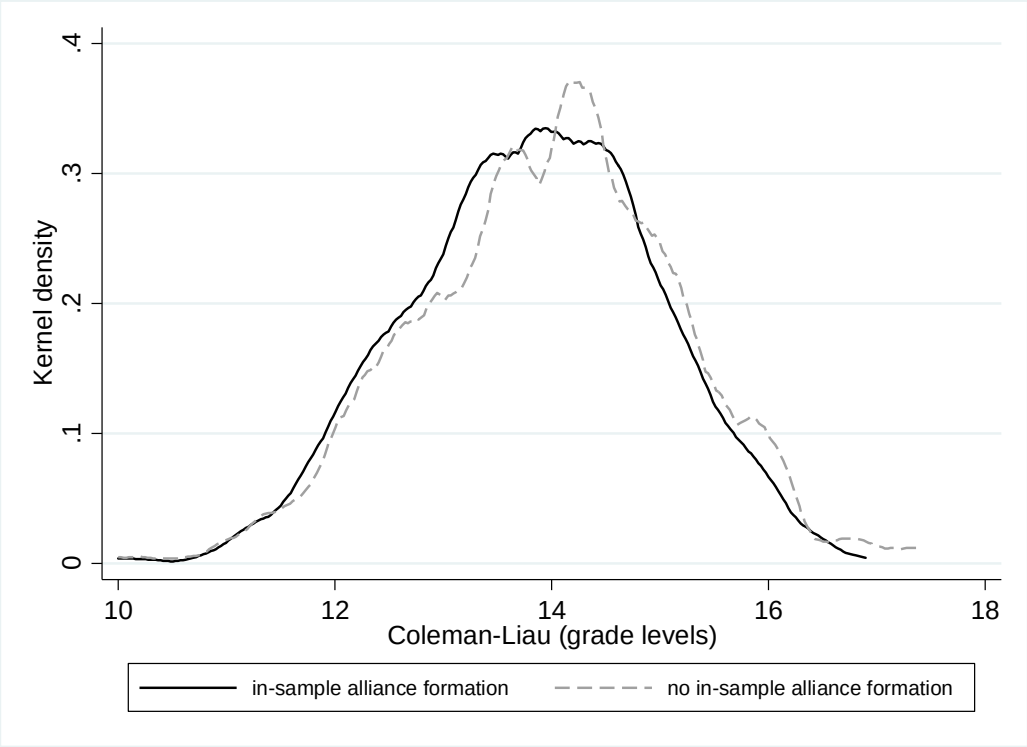

Figure 1: Kernel density plot of Coleman-Liau (grade levels) for firms that ally with other firms in the sample and firms that do not

Appendix:

Table A1: Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Alliance formation (1= Yes)	25734	0.0267351	0.1613112	0	1
Obfuscation	25734	13.92269	1.425137	10	17.4
|Δ| obfuscation	25734	1.417094	1.378675	0	17.1
Same industry (1=Yes)	25734	0.371221	0.4831408	0	1
Firm size (ln)	25734	8.374713	2.229927	1.791759	12.03957
|Δ| Firm size (ln)	25734	2.543598	1.845943	0	9.892595
Technological breadth	25734	25.50556	29.32241	1	144
|Δ| technological breadth	25734	29.71843	30.9491	0	143
Alliance experience	25734	2.217759	2.941873	0	19.8
|Δ| alliance experience	25734	2.81758	3.207844	0	19.8
Outside alliances	25734	1.374058	2.537492	0	22
|Δ| outside alliances	25734	2.073133	2.898471	0	22
Technological proximity	25734	0.5979696	0.2931831	0	1
Cross-border (1=Yes)	25734	0.7988653	0.4008563	0	1
Distance in km (ln)	25734	8.103986	1.495905	-1.383638	9.759093
Text size (kb)	25734	11.04699	8.220082	1.09	119.55
|Δ| text size (kb)	25734	7.772087	9.205649	0	116.86
CEOs education in same institution (1=Yes)	19931	0.0071246	0.0841081	0	1
CEO change *i* (1=Yes)	19931	0.1076715	0.3099728	0	1
CEO change j (1=Yes)	19931	0.1053635	0.3070289	0	1
CEO internal i (1=Yes)	19931	0.7496362	0.4332334	0	1
CEO internal j (1=Yes)	19931	0.7005168	0.4580432	0	1

Table A2: Correlation table

	1	2	3	4	5	6	7	8	9	10
1 Alliance formation (1= Yes)	1									
2 Obfuscation	-0.02*	1								
3 |Δ| obfuscation	-0.01*	-0.29*	1							
4 Same industry (1=Yes)	-0.03*	0.03*	-0.04*	1						
5 Firm size (ln)	0.08*	-0.05*	-0.04*	-0.20*	1					
6 |Δ| Firm size (ln)	0.02*	-0.02*	-0.01	0.21*	-0.25*	1				
7 Technological breadth	0.08*	-0.07*	-0.03*	-0.14*	0.70*	-0.04*	1			
8 |Δ| technological breadth	0.06*	-0.07*	0.01	-0.09*	0.24*	0.38*	0.49*	1		
9 Alliance experience	0.12*	-0.09*	-0.03*	-0.12*	0.61*	-0.01	0.71*	0.31*	1	
10 |Δ| alliance experience	0.10*	-0.04*	-0.01	-0.12*	0.24*	0.29*	0.31*	0.53*	0.52*	1
11 Outside alliances	0.08*	-0.09*	-0.01	-0.10*	0.49*	-0.01	0.56*	0.26*	0.75*	0.40*
12 |Δ| outside alliances	0.10*	-0.06*	0.01	-0.11*	0.22*	0.19*	0.27*	0.40*	0.41*	0.66*
13 Technological proximity	0.05*	0.01	-0.04*	-0.09*	0.11*	-0.15*	0.09*	-0.02*	0.12*	0.11*
14 Cross-border (1=Yes)	0.01	-0.03*	0.04*	-0.05*	0.10*	-0.05*	0.04*	-0.01	0.07*	0.04*
15 Distance in km (ln)	-0.03*	0.04*	0.03*	0.04*	-0.04*	-0.02*	-0.07*	-0.10*	-0.06*	-0.07*
16 Text size (kb)	0.02*	0.15*	0.00	-0.03*	0.20*	-0.09*	0.15*	0.05*	0.12*	0.02*
17 |Δ| text size (kb)	-0.002	0.04*	0.03*	0.00	0.02*	0.02*	0.02*	0.03*	-0.00	-0.01
18 CEOs education in same institution (1=Yes)	0.01	0.01	-0.00	-0.02*	0.01	-0.01	0.01	0.00	0.02*	0.04*
19 CEO change *i* (1=Yes)	0.01*	0.01	0.06*	-0.04*	-0.00	0.02*	0.01	0.04*	0.01	0.05*
20 CEO change j (1=Yes)	0.01*	-0.04*	0.03*	-0.03*	0.07*	-0.01	0.07*	0.03*	0.08*	0.04*
21 CEO internal i (1=Yes)	0.03*	-0.00	-0.05*	-0.07*	-0.01	-0.03*	0.01	0.11*	0.01	0.15*
22 CEO internal j (1=Yes)	0.04*	-0.00	-0.06*	-0.05*	0.32*	-0.09*	0.22*	0.09*	0.24*	0.11*

Table A2: continued

	11	12	13	14	15	16	17	18	19	20	21
11 Outside alliances	1										
12 |Δ| outside alliances	0.58*	1									
13 Technological proximity	0.09*	0.09*	1								
14 Cross-border (1=Yes)	0.05*	0.04*	0.09*	1							
15 Distance in km (ln)	-0.05*	-0.06*	0.05*	0.46*	1						
16 Text size (kb)	0.08*	0.03*	0.07*	-0.023*	0.03*	1					
17 |Δ| text size (kb)	0.00	-0.01	0.03*	-0.03*	0.05*	0.46*	1				
18 CEOs education in same institution (1=Yes)	0.02*	0.04*	-0.03*	-0.03*	-0.04*	0.00	-0.01*	1			
19 CEO change *i* (1=Yes)	0.01	0.01	0.04*	0.00	0.01	-0.01	-0.01	0.02*	1		
20 CEO change j (1=Yes)	0.02*	0.01	0.03*	0.00	0.01	-0.01	-0.02*	0.03*	0.02*	1	
21 CEO internal i (1=Yes)	0.02*	0.13*	0.06*	0.02*	-0.07*	-0.01	-0.03*	0.01	-0.05*	0.00	1
22 CEO internal j (1=Yes)	0.23*	0.10*	0.03*	0.06*	-0.08*	0.06*	-0.01	0.00	0.01	-0.02*	-0.01

Note: * Significant at the 5% level.

Table A3: Number of dyad-year observations for low/high alliance experience and low/high obfuscation

	Below industry alliance experience	Above industry alliance experience	Total
Low obfuscation	7,085	5,219	12,304
High obfuscation	9,023	4,407	13,430
Total	16,108	9,626	25,734

Table A4: Robustness checks

	All firms	All firms	From perspective of high exp. firms	From perspective of low exp. firms
	1	2	3	4
Obfuscation	-0.0480	–	–	–
	(0.0350)			
Obfuscation * below avg. industry alliance exp.	–	-0.0778**	-0.0939**	-0.000554
		(0.0354)	(0.0415)	(0.0764)
Obfuscation * above avg. industry alliance exp.	–	-0.0158	-0.0466	0.0703
		(0.0353)	(0.0420)	(0.0724)
|Δ| obfuscation	-0.0158	-0.00964	-0.00195	-0.0183
	(0.0369)	(0.0366)	(0.0484)	(0.0583)
Same industry (1=Yes)	-0.153	-0.159	-0.00748	-0.754***
	(0.132)	(0.131)	(0.147)	(0.282)
Firm size (ln)	0.140***	0.0321	0.0417	0.0412
	(0.0450)	(0.0483)	(0.0707)	(0.102)
|Δ| Firm size (ln)	0.237***	0.200***	0.190***	0.0974
	(0.0441)	(0.0439)	(0.0668)	(0.0898)
Technological breadth	0.00410*	0.00385*	0.00363	-0.00592
	(0.00234)	(0.00234)	(0.00261)	(0.0104)
|Δ| technological breadth	-0.00478**	-0.00421*	-0.00718***	0.00942
	(0.00237)	(0.00238)	(0.00269)	(0.0105)
Alliance experience	0.130***	0.0810***	0.0742**	0.941***
	(0.0248)	(0.0266)	(0.0314)	(0.248)
|Δ| alliance experience	-0.00142	0.0340	0.00336	-0.795***
	(0.0228)	(0.0240)	(0.0275)	(0.245)
Outside alliances	-0.0511*	-0.0414	-0.0364	-0.122
	(0.0262)	(0.0262)	(0.0318)	(0.119)
|Δ| outside alliances	0.0629***	0.0615***	0.0572**	0.137
	(0.0224)	(0.0223)	(0.0247)	(0.119)

Table A3: continued

Technological proximity	0.704***	0.729***	0.238	1.756***
	(0.228)	(0.231)	(0.268)	(0.472)
Cross-border (1=Yes)	0.730***	0.677***	1.021***	-0.0111
	(0.170)	(0.167)	(0.216)	(0.276)
Distance in km (ln)	-0.113***	-0.106***	-0.131***	-0.0385
	(0.0349)	(0.0351)	(0.0417)	(0.0658)
Text size (kb)	0.00754	0.00776	0.0111	-0.00612
	(0.00649)	(0.00653)	(0.00762)	(0.0133)
|Δ| text size (kb)	0.000145	3.66e-05	0.00182	-0.00399
	(0.00656)	(0.00659)	(0.00801)	(0.0128)
CEOs education in same institution (1=Yes)	0.395	0.356	0.652	-0.935
	(0.406)	(0.405)	(0.434)	(1.148)
CEO change *i* (1=Yes)	0.317**	0.309**	0.358**	0.253
	(0.146)	(0.146)	(0.171)	(0.337)
CEO change *j* (1=Yes)	0.248*	0.220	0.204	0.229
	(0.137)	(0.137)	(0.171)	(0.236)
CEO internal *i* (1=Yes)	0.464	0.466	0.664**	0.412
	(0.284)	(0.284)	(0.322)	(0.956)
CEO internal j (1=Yes)	0.394***	0.427***	0.419***	0.454
	(0.129)	(0.130)	(0.147)	(0.284)
Observations	19,931	19,931	9,198	10,333
Pseudo-R-squared	0.0967	0.103	0.0692	0.211
Log-pseudo-likelihood	-2048	-2033	-1364	-617.7
Wald chi2	438.4	468.0	202.7	330.6

Note: Fixed effects logistic regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1. Independent variables refer to characteristics of firm j, |Δ| indicate the absolute difference of firm *i* and *j*, and "same industry", "technological proximity", "distance", "cross-border", and "CEOs education in same institution" refer to dyad-characteristics. All regressions include year fixed effects which are not reported for brevity. Model 3 utilizes all dyads for which the focal firm has above average alliance experience, while model 4 analyzes the sample from the perspective of firm with below average alliance experience.