

Causal Ambiguity, Cultural Integration, and Partner Attractiveness as Determinants of Knowledge Transfer: Evidence from Finnish Acquisitions

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Abstract:

This study aims to explain knowledge transfer in acquisitions by examining the impact of causal ambiguity of knowledge, partner attractiveness, and organizational cultural integration (convergence and crossvergence). We test our model on quantitative data from domestic and international acquisitions conducted by Finnish companies. The results provide evidence for a negative influence of causal ambiguity and for a positive impact of partner attractiveness and organizational cultural integration. The findings also show that causal ambiguity can moderate the effects of partner attractiveness and organizational cultural integration.

Keywords: Knowledge transfer | acquisition | merger | causal ambiguity | culture | international business | business management

Article:

Bibliographical notes:

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INTRODUCTION

Knowledge transfer is a central determinant of value creation in acquisitions (Haspeslagh and Jemison, 1991). Accordingly, several studies have identified factors that influence knowledge transfer in this context. These include characteristics of the knowledge that is to be transferred (e.g. Bresman, Birkinshaw, and Nobel, 1999; Tsang, 2008), characteristics of the relationship between the acquiring and the target firms (Empson, 2001; Westphal and Shaw, 2005), and managerial processes to integrate the firms (e.g. Castro and Neira, 2005; Ranft and Lord, 2002; Sarala and Vaara, 2010). However, few studies have incorporated these dimensions in order to explore their effects and interrelationships in large scale quantitative studies (for a notable exception see Bresman, Birkinshaw, and Nobel, 1999). Most studies that examine these dimensions simultaneously have relied on case studies with small samples (Castro and Neira, 2005; Ranft and Lord, 2002; Tsang, 2008; Westphal and Shaw, 2005).

Drawing on the resource-based view (Barney, 1991) and dynamic capabilities perspective (Teece, Pisano, and Shuen, 1997), we address this research gap by developing and testing an integrated model of knowledge transfer in acquisitions. We conceptualize knowledge transfer in acquisitions as a process that involves utilization of the sender's knowledge by the recipient (Minbaeva, Pedersen, Björkman, Fey and Park, 2003) and can consist of knowledge flows from the acquirer to the target and/or from the target to the acquirer (Bresman, Birkinshaw, and Nobel, 1999). First, based on the resource-based view, we consider the role of firm resources in acquisition value creation. We focus on the role of a specific resource (knowledge) characteristic that has not been previously examined in the acquisition context: causal ambiguity of knowledge, which refers to unclear links between knowledge inputs and outputs (Simonin 1999a, 1999b). We suggest that causal ambiguity of knowledge is a potential barrier to knowledge transfer. In addition, we suggest that the relationship between the acquisition partners constitutes a key organizational capital resource in acquisitions (Barney, 1991; Dyer and Singh, 1998). We focus on a key characteristic of this relationship, namely the level of partner attractiveness, which we define as the extent to which one firm admires and values the culture, managerial style, and performance of the other firm (Nahavandi and Malekzadeh, 1988). We propose that partner attractiveness can facilitate knowledge transfer in acquisitions (Empson, 2001; Westphal and Shaw, 2005). Second, related to the dynamic capabilities perspective, we focus on organizational cultural integration as an important managerial process, which facilitates knowledge transfer in

acquisitions. Cultural integration consists of the development of an organizational culture with compatible beliefs, values, and norms between the acquiring and the target firms (Schein, 1996; Shrivastava, 1986). This can take place through convergence (organizational cultures becoming increasingly similar along existing cultural dimensions) or through crossvergence (a combination of elements of both cultures or a creation of entirely new cultural dimensions) (Sarala and Vaara, 2010). Third, we combine both theoretical views by suggesting novel links between resource characteristics (causal ambiguity of knowledge and partner attractiveness), and managerial processes (cultural integration). More specifically, we suggest that certain knowledge characteristics (causal ambiguity) not only directly impede knowledge transfer, but also hinder value creation by reducing the positive effects of relationship characteristics (partner attractiveness) and managerial processes (cultural integration). We then proceed to test our model on data from domestic and foreign acquisitions conducted by Finnish firms and discuss our findings.

KNOWLEDGE TRANSFER IN ACQUISITIONS

A central proposition of the RBV is that the firm's physical, human, and organizational resources are a main source of competitive advantage (Barney, 1991). Among these resources, knowledge is viewed as particularly valuable (Grant, 1996). Drawing on the RBV, several acquisition studies have focused on knowledge as a firm's key resource and, consequently, on knowledge characteristics as determinants of knowledge transfer. While the tacitness of knowledge has received the most attention (Bresman, Birkinshaw, and Nobel 1999; Castro and Neira, 2005; Ranft and Lord, 2002; Westphal and Shaw, 2005), also social embeddedness (Ranft and Lord, 2002; Tsang, 2008), and context specificity of knowledge (Westphal and Shaw, 2005) have been put forward as barriers to knowledge transfer. On the other hand, complementarity of the knowledge stocks (Westphal and Shaw, 2005; Zou and Ghauri, 2008) has been shown to facilitate knowledge transfer. In addition, the relationship between the acquirer and the target can also be considered an important organizational resource (Barney, 1991), because it influences the firms' ability to collaborate efficiently and effectively (Dyer and Singh, 1998). A key relationship characteristic in acquisitions is how positively or negatively the partners perceive each other. Partner attractiveness facilitates knowledge transfer between the partners by reducing

tendencies for detrimental ingroup-outgroup categorizations between the acquisition partners (Empson, 2001; Westphal and Shaw, 2005).

The dynamic capabilities perspective builds on the RBV by suggesting that also the way a firm's resources are used – through specific managerial processes – represents a significant source of competitive advantage (Teece, Pisano, and Shuen, 1997). Accordingly, the dynamic capabilities perspective suggests that managerial processes influence the ability to successfully transfer knowledge between the acquirer and the target. These processes function both as coordination and knowledge-sharing mechanisms through which resources are reconfigured and transformed (Teece, Pisano, and Shuen, 1997). In previous acquisition studies, increased knowledge transfer has been linked to managerial processes that include both formal and social control mechanisms, such as decision-making autonomy (Castro and Neira, 2005; Ranft and Lord, 2002), incentives (Ranft and Lord, 2002; Westphal and Shaw, 2005), communication (Bresman, Birkinshaw, and Nobel 1999; Castro and Neira, 2005), and cultural integration (Sarala and Vaara, 2010). To explain knowledge transfer in acquisitions, we will now turn to the theoretical model of this paper.

HYPOTHESES

Causal ambiguity of knowledge as a determinant of knowledge transfer

Causal ambiguity can be defined as how easy it is to understand the links between the causes and effects of knowledge (Lippman and Rumelt, 1982; Simonin, 1999a; 1999b). Causal ambiguity stems from gaps between formal standards or norms and actual behaviour (Szulanski, Cappetta, and Jensen, 2004) resulting from a lack of clear 'espoused rules' that govern behaviour (Argyris and Schön, 1978; Szulanski, Cappetta, and Jensen, 2004). This is often a consequence of work routines that require highly tacit knowledge that is difficult to articulate (Kogut and Zander 1992; Szulanski, Cappetta, and Jensen, 2004). Accordingly, Simonin (1999a; 1999b) contends that causal ambiguity and tacitness are conceptually separate, but that tacitness can be seen as one antecedent of causal ambiguity.

Causally ambiguous resources are a source of competitive advantage, because they are more difficult for competitors to imitate (Barney, 1991; Reed and DeFillippi, 1990). However, inimitability of causally ambiguous knowledge also makes it difficult to transfer in multinational

corporations (MNCs) (Szulanski, 1996; Szulanski, Cappetta, and Jensen, 2004) and alliances (Simonin, 1999a, 1999b). We suggest that causal ambiguity of knowledge is an even more important barrier in M&As. In this context, the motivation to engage in knowledge transfer is likely to be lower than in MNCs or strategic alliances, because acquisitions are often characterized by change resistance and a tendency to resist cooperation (Empson, 2001; Vaara, 2003). First, the sender may not be motivated to depart from his/her valuable knowledge (Husted, Gammelgaard, and Michailova, 2005). This tendency is likely to further intensify in the case of causally ambiguous knowledge, because codifying such knowledge – so that it can be understood by the receiver – is a difficult and time consuming effort that the sender may not be willing to invest in. For example, Simonin (2004) found that partner protectiveness effectively hinders knowledge transfer. Second, in the context of causally ambiguous knowledge, absorptive capacity is decreased if the receiver is equally unwilling to spend time and effort on understanding, de-coding and re-applying the sender's knowledge to a different context (Husted, Gammelgaard, and Michailova, 2005), which is essential for transferring ambiguous knowledge. Accordingly, the results of Szulanski, Cappetta and Jensen (2004) show a negative correlation between causal ambiguity and the sender's motivation to disseminate knowledge and the recipient's ability and motivation to absorb it, although these constructs were only included as control variables. We thus propose the following:

Hypothesis 1a: Causal ambiguity of the acquirer's knowledge is negatively associated with knowledge transfer from the acquirer to the target.

Hypothesis 1b: Causal ambiguity of the target's knowledge is negatively associated with knowledge transfer from the target to the acquirer.

Partner attractiveness as a determinant of knowledge transfer

We focus on partner attractiveness as a key characteristic of the relationship between the acquirer and the target, and define it as the extent to which one firm values the culture, managerial style, and performance of the other firm (Nahavandi and Malekzadeh, 1988). Partner attractiveness alleviates organizational problems stemming from social identification processes – i.e. organizational members' psychological sense of belonging to a pre-acquisition social group (Hogg and Abrams, 1988; Tajfel, 1972). A large body of M&A research discusses problems stemming from such ingroup-outgroup categorizations. These include employee anxiety and

stress (Buono and Bowditch, 1989), organizational conflict and change resistance (Marks and Mirvis, 1985), and negative attitudes towards cooperation (Weber, Shenkar, and Raveh, 1996). Ingroup-outgroup categorizations that favour one's own in-group can reduce the recipient's motivation to absorb knowledge from what is perceived as an "unattractive" or "treacherous" source (Husted, Gammelgaard, and Michailova, 2005).

In contrast, organizational members are more motivated to receive knowledge from an "attractive" acquisition partner because they are less likely to view it as a treacherous "outgroup" (Westphal and Shaw, 2005). Consequently, knowledge stemming from an attractive partner is less likely to be considered as a threat that may contaminate the organization's identity and knowledge base. As a result, "fear of contamination" and the "not-invented-here syndrome" (Empson, 2001; Szulanski, 1996) are both decreased. Thus, we hypothesize:

Hypothesis 2a: The attractiveness of the acquirer is positively associated with knowledge transfer from the acquirer to the target.

Hypothesis 2b: The attractiveness of the target is positively associated with knowledge transfer from the target to the acquirer.

Organizational cultural integration as a determinant of knowledge transfer

Drawing on the dynamic capabilities perspective, post-acquisition integration efforts can be understood as managerial processes intended for controlling the activities of the acquiring and the target firms, and for reconfiguring and transforming their assets in order to create value through knowledge transfer (Haspeslagh and Jemison, 1991). Cultural integration – as an integral part of post-acquisition integration – can be conceptualized as a managerial process that develops an organizational culture with compatible beliefs, values, and norms between the acquirer and the target (Schein, 1996; Shrivastava, 1986). In their research, Sarala and Vaara (2010) further distinguish between two types of cultural integration: organizational cultural convergence and crossvergence.

In cultural convergence, organizational cultural differences are reduced by acquisition partners becoming increasingly similar along existing cultural dimensions (Sarala and Vaara, 2010). Cultural convergence is driven by the culturally dominant partner (Harding and Rouse, 2007), which is usually the acquiring firm (Haspeslagh and Jemison, 1991). Convergence is most likely to be related to the "absorption" integration mode, which aims at consolidating the

activities of both firms primarily by assimilating the target into the acquiring firm (Haspeslagh and Jemison, 1991). Cultural convergence creates an institutional platform for knowledge transfer (Schweiger and Goulet, 2005) and reduces differences between the partners' basic assumptions and beliefs (Napier, Simmons, and Stratton, 1989). This enables the acquirer to better articulate and teach its knowledge to the target, and makes it easier for the target to absorb this knowledge. Cultural convergence also contributes to more effective governance because a common culture functions as a form of social control (Teece, Pisano, and Shuen, 1997), which can facilitate knowledge transfer from the acquirer to the target.¹ Therefore, we propose that:

Hypothesis 3a: Organizational cultural convergence is positively associated with knowledge transfer from the acquiring firm to the target.

In contrast, organizational cultural crossvergence refers to the creation of a new culture that is distinct from the previous cultures of both the acquirer and the target. Sarala and Vaara (2010) suggest that crossvergence is either the result of combining characteristics of both cultures, or developing entirely new cultural dimensions in terms of creating new beliefs, values, and norms (Hogg and Terry, 2000). Cultural crossvergence is likely to be related to the “symbiosis” integration mode in Haspeslagh’s and Jemison’s (1991) framework, which aims at creating synergies by drawing on the strengths of both organizations. Similar to convergence, a reduction in organizational cultural differences through crossvergence results in the creation of an institutional platform that supports knowledge transfer (Schweiger and Goulet, 2005) and contributes to more effective governance (Teece, Pisano, and Shuen, 1997). Even more importantly, crossvergence supports the development of a cooperative and trusting atmosphere that encourages mutual participation (Van Knippenberg and Van Leeuwen, 2001) and potentially knowledge transfer in both directions (Bresman, Birkinshaw, and Nobel, 1999; Haspeslagh and Jemison, 1991). We thus suggest the following:

Hypothesis 3b: Organizational cultural crossvergence is positively associated with knowledge transfer from the acquiring firm to the target.

Hypothesis 3c: Organizational cultural crossvergence is positively associated with knowledge transfer from the target firm to the acquirer.

The indirect effects of causal ambiguity

We suggest that in addition to its direct relationship with knowledge transfer, causal ambiguity moderates the effects of partner attractiveness and cultural integration (convergence and crossvergence).

Whilst we proposed that partner attractiveness is likely to have a positive effect on knowledge transfer, we argue that its influence will be weaker when the sender's knowledge is causally ambiguous. When the recipient's ability to understand the sender's knowledge is weakened because of causal ambiguity (Simonin 1999a; 1999b), its motivation to try to de-code and re-apply it is also likely to be lower (Vroom, 1964). In such a situation – even if the sender as such is viewed as attractive – the recipient's attitude towards absorbing knowledge from the sender is still likely to be more negative, because of difficulties associated with understanding the partner's knowledge base (Empson, 2001; Lam, 1997). Frustration with the knowledge transfer process can exacerbate socio-cultural problems such as ingroup-outgroup categorizations (Marks and Mirvis, 1985), or the “not invented here syndrome” (Empson, 2001). Thus, we expect that the ambiguity of the sender's knowledge will weaken the positive association between sender's attractiveness and knowledge transfer.

Hypothesis 4a: The positive association between the acquirer's attractiveness and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.

Hypothesis 4b: The positive association between the target's attractiveness and knowledge transfer from the target to the acquirer will be lower in acquisitions where the causal ambiguity of the target's knowledge is greater.

We also argue that causal ambiguity moderates the positive relationships between cultural integration (convergence and crossvergence) on knowledge transfer by reducing these associations. The causal ambiguity of the sender's knowledge is typically a reflection of general differences between organizational norms and rules that are supposed to govern behaviour and organizational member's actual behaviour (Nelson and Winter, 1982; Szulanski, Cappetta, and Jensen, 2004). These differences may stem from a “vague” organizational culture that does not clearly express organizational norms and rules (Argyris and Schön, 1978; Szulanski, Cappetta, and Jensen, 2004). Alternatively, if the organizational members' work routines are highly tacit, it can be difficult to articulate precise rules and norms that should govern this behaviour (Kogut

and Zander 1992; Szulanski, Cappetta, and Jensen, 2004). This reduces the effectiveness of organizational culture as a factor that governs organizational members' behaviour and actions.

Consequently, in convergence, the acquirer imposing "vague" cultural values and norms on the target is less likely to result in such changes in the target's behaviour that would support knowledge transfer from the acquirer to the target. In crossvergence, causal ambiguity of knowledge can make it difficult to identify cultural strengths of both companies that can be used as a basis for a new shared culture (Hogg and Terry, 2000; Sarala and Vaara, 2010) or culturally embedded complementary knowledge that could be useful for the other party (Haspeslagh and Jemison, 1991).

Thus, we suggest that in the presence of causally ambiguous knowledge the influence of cultural integration (convergence and crossvergence) on knowledge transfer is likely to diminish. Therefore, we propose that²:

Hypothesis 5a: The positive association between organizational cultural convergence and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.

Hypothesis 5b: The positive association between crossvergence and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.

Hypothesis 5c: The positive association between crossvergence and knowledge transfer from the target to the acquirer will be lower in acquisitions where the causal ambiguity of the target's knowledge is greater.

The theoretical model is summarized in Figure 1.

---Insert Figure 1 about here---

METHOD

Data collection

We conducted two mail surveys of Finnish companies' acquisitions in Finland and abroad. The first survey was conducted in 2005 and covers acquisitions during the time period of 2001-2004. The second survey round was conducted in 2010 and covers the time period of 2006-2009. We

identified the acquisitions based on the database of Finnish “Talouselämä” business magazine that lists all acquisitions conducted by Finnish companies.

The CEOs of the acquiring companies were contacted and asked to identify potential respondents who had played a key role in the acquisition. Then, the survey was mailed to the identified respondents; via post in the first round and via email with links to an electronic survey in the second round. To reduce common method variance (CMV), we pre-tested the questionnaire with managers and scholars, and used previously validated measures as much as possible. In addition, we scattered the study questions in the questionnaire and added questions irrelevant to this study in between. Furthermore, we emphasized confidentiality in order to address social desirability bias. Finally, as reported in the results section, we used complicated specifications of regression models that included moderating effects and conducted statistical tests for CMV effects. (Chang, van Witteloostuijn, and Eden, 2010)

The data includes 195 responses from 171 acquisitions. The response rate was 20% in the 1st round and 17% in the 2nd round³. The responses consist of 152 single responses and 19 multiple responses. We tested for inter-rater reliability of multiple responses by calculating intraclass correlation coefficients. In the great majority of the cases, the answers showed a high level of inter-rater reliability. In three cases the coefficients were not significant and we removed these cases from the analysis in order to improve the reliability of the data (e.g. Calori, Lubatkin, and Very, 1994). 147 responses were from the acquiring firm, and 48 responses were from the target firm.

101 cases represent domestic acquisitions and 70 cases represent international acquisitions (see Table 1). A Finnish company was the acquirer in all cases, and 95% of the international acquisitions involved another European company as an acquisition target. The country distribution of the international acquisitions was as follows: Austria (1 acquisition), Belarus (1), Belgium (1), Canada (2), China (1), Czech Republic (2), Denmark (1), Estonia (5), France (3), Germany (7), Great Britain (2), Hong Kong (1), Italy (3), Latvia (3), Lithuania (6), the Netherlands (4), Norway (4), Poland (3), Russia (2), Spain (1), Sweden (12), Switzerland (1), and USA (4). More information about the data is provided in Table 1.

---Insert Table 1 about here---

Dependent variables

Knowledge transfer from the acquirer to the target

Following Capron (1999), the respondents were asked to which extent the acquirer's knowledge had been used in the target firm in the following six areas: general management expertise, product innovation capabilities, know-how in manufacturing processes, sales and marketing expertise, supplier relations, and distribution and logistics expertise (1=not at all to 7=very much; Cronbach's alpha=0.85).

Knowledge transfer from the target to the acquirer

Using the same approach as in the previous construct, we measured different types of knowledge transferred from the target to the acquirer by using an identical 7-point scale (Cronbach's alpha=0.86).

Independent variables

Causal ambiguity of acquirer's knowledge

Based on Simonin (1999a; 1999b), the respondents were asked to evaluate the extent to which i) the acquirer's knowledge is easily transferable to the target company and the extent to which ii) the association between causes and effects, inputs and outputs, and actions and outcomes related to the knowledge of the acquiring company is clear (1=do not agree to 7=completely agree. The questions were reverse-coded in order to build a construct for causal ambiguity of acquirer's knowledge (Cronbach's alpha=0.77).

Causal ambiguity of target's knowledge

We used the same questions with identical scales as in the previous construct, except that they referred to the target's knowledge (Cronbach's alpha=0.67).

Organizational cultural convergence

Building on Birkinshaw, Bresman and Håkanson (2000) and Sarala and Vaara (2010), we measured cultural convergence between the acquirer and target as the change in organizational cultural differences. In separate questions, the respondents assessed the extent of organizational cultural differences before the acquisition and at the time of the survey across seven organizational functions: management and control, sales and marketing, production, R&D,

finance, company values in general, and values of decision-makers. The change in cultural differences was determined by deducting cultural differences at the time of the survey from cultural differences prior to the acquisitions (Cronbach's alpha=0.86).

Organizational cultural crossvergence

Drawing on Sarala and Vaara (2010), we measured organizational cultural crossvergence with two questions regarding the extent to which i) a new culture and ii) a new identity shared by both companies had been created after the acquisition (1=not at all to 7=very much; Cronbach's alpha=0.82).

Attractiveness of the acquirer

This measure was based on previous theoretical and qualitative work on partner attractiveness (Buono and Bowditch, 1989; Nahavandi and Malekzadeh, 1988) and on the quantitative study of Birkinshaw, Bresman, and Håkanson (2000). The attractiveness of the acquirer was measured by two questions based on how the target perceived i) the practices and ii) the values of the acquiring firm (1=very negative to 7=very positive; Cronbach's alpha=0.74).

Attractiveness of the target

This measure was similar to the previous construct, except that it related to the acquirer's perception of the target's attractiveness (Cronbach's alpha=0.81).

Control variables

Size of the target

Larger companies tend to have more resources and may be able to transfer more knowledge (Gupta and Govindarajan, 2000). Thus, we included the target's size (net sales) at the time it was acquired.

Elapsed time

The amount of knowledge transferred may be influenced by the time that has elapsed after the acquisition (Bresman, Birkinshaw, and Nobel, 1999). We controlled for the number of years that had passed after the acquisition (1-4 years).

Industry

Individual knowledge possessed by professionals in service firms may be of higher personal value to these professionals – because it is associated with their image – than for employees in other industries (Empson, 2001). This may reduce service firm employees’ willingness to engage in knowledge transfer. Hence, we distinguished between: 1=service firms and 0=others.

National cultural differences

Cross-border acquisitions have been found to be more challenging than domestic (Schweiger and Goulet, 2005). We calculated the variance adjusted sum of national cultural differences between the two acquisition parties based on the nine dimensions of the GLOBE practices scores (House, Hanges, Javidan, Dorfman, and Gupta, 2004; Kogut and Singh, 1988).

RESULTS

To assess the extent of common method variance (CMV), we conducted Harman’s single factor test. The low level of variance explained by the first and second factors (28% and 17%) indicated that the sample data does not suffer from CMV (Podsakoff and Organ, 1986). We also tested for the effects of a single unmeasured latent factor (Podsakoff, MacKenzie, Jeong-Yeon, and Podsakoff; 2003). We first conducted a confirmatory factor analysis. All items correlated significantly ($p < 0.001$) with their respective constructs. After finding support for the constructs used in this study, we added an unmeasured latent method factor (‘CMV factor’) to the model and allowed all items also load on this factor (Podsakoff et al., 2003). No path coefficient between any of the items and the new ‘CMV factor’ was significant. In addition, the relationships in the model were not influenced by adding the ‘CMV factor’: the paths that were significant in the basic model also remained significant when common method variance was controlled for.

The descriptive statistics and correlations are presented in Table 2.

---Insert Table 2 about here---

Knowledge transfer from the acquirer to the target

We tested hypotheses relating to knowledge transfer from the acquirer to the target by conducting hierarchical linear regression analyses (see Table 3). Model 2, that included the independent variables, supported Hypothesis 1a that the causal ambiguity of the acquirer's knowledge would be negatively related with knowledge transfer from the acquirer to the target ($\beta=-0.221$, $p<0.001$). Hypothesis 2a – suggesting that the acquirer's attractiveness would be positively related to knowledge transfer – was rejected. Hypotheses 3a and 3b received support; higher levels of convergence and crossvergence were both positively associated with knowledge transfer from the acquirer ($\beta=0.298$, $p<0.001$, and $\beta=0.126$, $p<0.05$). Concerning the control variables, the size of the target was marginally significant ($\beta =-0.086$, $p<0.1$).

---Insert Table 3 about here---

The interaction hypotheses 4a, 5a and 5b were tested in models 3–5 (see Table 4). We found support for an interaction between 'acquirer attractiveness' and 'ambiguity of the acquirer's knowledge' (Model 3 in Table 4, $\beta=-0.109$, $p<0.05$). We interpreted the interaction term by first plotting the relationship between 'acquirer attractiveness' and the 'use of acquirer's knowledge' for two levels of 'ambiguity' ("low" and "high"). "Low" corresponded to one standard deviation below the mean and "high" to one standard deviation above the mean. Figure 2a shows that the positive relationship between 'acquirer attractiveness' and knowledge transfer from the acquirer to the target was lower when the acquirer's knowledge was highly ambiguous. Second, we used the simple slope coefficient test (Aiken and West, 1991) to examine the effect of 'acquirer attractiveness' at low and high levels of ambiguity. Acquirer attractiveness was significantly and positively related to knowledge transfer from the acquirer to the target at low levels of ambiguity (simple slope $\beta=0.177$, $p<0.05$), whereas it was insignificant at high levels of ambiguity. Taken together these tests indicated that ambiguity significantly weakened the positive effect of the sender's attractiveness in knowledge transfer from the acquirer to the target. However, because attractiveness did not have a significant direct effect on knowledge transfer from the acquirer to the target, hypothesis 4a was only weakly supported.

There was also a significant interaction effect between 'convergence' and 'ambiguity of the acquirer's knowledge' (Model 4 in Table 4, $\beta=0.177$, $p<0.01$). However, the effect was not negative as hypothesized. Figure 2b shows that at any values of convergence knowledge transfer from the acquirer to the target was highest when the acquirer's knowledge was not ambiguous.

However, the picture of the slopes also indicated that the effectiveness of convergence was greater in the presence of higher ambiguity. In addition, the results of the simple slope tests showed that convergence had a significantly stronger positive effect on knowledge transfer from the acquirer, when the acquirer's knowledge was highly ambiguous (simple slope $\beta=0.462$, $p<0.001$), and that this effect was only marginally significant at low levels of ambiguity (simple slope $\beta=0.159$, $p<0.1$). Thus, ambiguity enhanced – rather than weakened – the effect of convergence on knowledge transfer from the acquirer to the target. Hypothesis 5a was thus rejected.

Hypothesis 5b – proposing that the positive association between crossvergence and knowledge transfer from the acquirer to the target would be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater – was not supported (Model 5 in Table 4).

---Insert Table 4 and Figures 2a and 2b about here---

Knowledge transfer from the target to the acquirer

Hypothesis 1b – suggesting that the causal ambiguity of the target's knowledge would be negatively related with knowledge transfer from the target to the acquirer – was supported ($\beta=-0.188$, $p<0.01$; See Table 5, model 2). The relationship between the target's attractiveness and knowledge transfer from the target was only marginally significant ($\beta=0.109$, $p<0.1$), thus hypothesis 2b received only weak support. Hypothesis 3c – associating higher levels of crossvergence with higher levels of knowledge transfer from the target – was supported ($\beta=0.175$, $p<0.01$). Concerning control variables, the 'national cultural differences' variable was slightly significant ($\beta=-0.141$, $p<0.1$).

---Insert Table 5 about here---

In Table 6, we tested the interaction hypotheses 4b and 5b. We found a slightly significant negative interaction between 'target attractiveness' and 'ambiguity of the target's knowledge' (Model 3 in Table 6, $\beta=-0.110$, $p<0.1$). Figure 3a lends some support for hypothesis 4b: the positive relationship between the target's attractiveness and knowledge transfer from the target is lower when the target's knowledge is highly ambiguous. The simple slope test also provided support for hypothesis 4b: the effect of 'target attractiveness' was significantly and

positively related to the ‘use of target’s knowledge’ at low levels of ambiguity (simple slope $\beta=0.215, p<0.05$), and it was insignificant at high levels of ambiguity.

Concerning hypothesis 5b, we found support for a negative interaction between ‘crossvergence’ and ‘ambiguity of the target’s knowledge’ (Model 4 in Table 6, $\beta=-0.159, p<0.05$). Figure 3b shows that the positive relationship between crossvergence and knowledge transfer from the target is lower when the target’s knowledge is highly ambiguous, and that it is highest at high levels of crossvergence combined with low levels of causal ambiguity. The simple slope tests also indicated (Aiken and West, 1991) that crossvergence only had a positive effect of knowledge transfer from the target in the presence of low ambiguity (simple slope $\beta=0.290, p<0.01$), whereas it was insignificant at high ambiguity.

A summary of the findings is presented in Table 7.

---Insert Table 6 and Figures 3a and 3b about here---

---Insert Table 7 about here---

DISCUSSION

This study aimed to explain knowledge transfer in acquisitions from the resource-based view and the dynamic capabilities perspective. More specifically, we investigated the relationships between the firm’s resource characteristics (causal ambiguity as a knowledge characteristic and partner attractiveness as a relationship characteristic), managerial processes (cultural integration through convergence or crossvergence), and knowledge transfer.

We will first discuss our results concerning the firms’ resource characteristics as direct determinants of knowledge transfer. Regarding knowledge characteristics, we established that causal ambiguity of the sender’s knowledge is a significant barrier to knowledge transfer in acquisitions, irrespective of the direction of the transfer. Our results are in line with previous research on the negative effects of causal ambiguity on knowledge transfer in the contexts of alliances and MNCs (Simonin, 1999a, 1999b; Szulanski, 1996; Szulanski, Cappetta, and Jensen, 2004). The findings imply that, regardless of the potential of causal ambiguity for creating sustainable competitive advantage by protecting valuable knowledge from being imitated by competitors (Barney 1991), this potential cannot be easily leveraged across organizational boundaries in acquisitions.

Concerning partner attractiveness as a characteristic of the relationship between the acquirer and the target, we found that the attractiveness of the target increased knowledge transfer from the target to the acquirer, but only slightly. This could be due to reduced “fear of contamination” and “not-invented-here syndrome” (Empson, 2001; Szulanski, 1996). However, we did not find a relationship between the attractiveness of the acquirer and knowledge transfer from the acquirer to the target. This suggests that the acquirer’s perceptions of the target are more important for knowledge transfer.

Second, related to the dynamic capabilities perspective, we concentrated on examining cultural integration (convergence and crossvergence). We suggested and found evidence that convergence is particularly useful for knowledge transfer from the acquirer to the target. In contrast, we expected and showed that crossvergence is effective in increasing knowledge transfer both from the acquirer to the target and vice versa. These findings suggest that convergence is more suitable for leveraging the acquirer’s knowledge, and is indeed more effective for this purpose than crossvergence. However, crossvergence offers benefits in terms of functioning as a mechanism for transferring the knowledge of both firms. Linking our results to previous research, we associate convergence with the “absorption” integration mode in which the goal is to absorb the target firm into the acquiring firm. We connect crossvergence to the “symbiosis” integration mode which represents an amalgamation of the acquiring and target firms (Haspeslagh and Jemison, 1991). Consequently, we argue that both cultural integration modes serve important, but different purposes, in terms of knowledge transfer in particular and post-acquisition integration in general.

Finally, our results suggest novel links between resource characteristics and managerial processes. More specifically, we found that causal ambiguity of knowledge not only has a direct effect on knowledge transfer, but it is also an important moderating variable for partner attractiveness and cultural integration. Our results show that causal ambiguity weakened the positive effect of the target’s attractiveness on knowledge transfer from the target to the acquirer, thus moderating this effect. Although the acquirer’s attractiveness did not have a significant direct effect on knowledge transfer from the acquirer to the target, this effect was significant when the moderating effect of ambiguity was included in the model; attractiveness increased knowledge transfer at low levels of ambiguity. Thus, even if the sender is viewed as attractive, the recipient’s attitude towards absorbing knowledge from the sender is still likely to be more

negative in the presence of ambiguous knowledge, because of difficulties associated with an incomplete understanding of the partner's knowledge base and its value (Empson, 2001; Lam, 1997). This can intensify socio-cultural problems and the "not invented" here syndrome and thereby reduce the potentially positive influence of partner attractiveness.

We also found that causal ambiguity of knowledge significantly weakened the positive effect of crossvergence on knowledge transfer from the target to the acquirer. This provides evidence for causal ambiguity as a resource characteristic that can reduce the effectiveness of this specific type of managerial process. A possible explanation is that causal ambiguity of knowledge is related to difficulties with understanding the partner's knowledge (Szulanski, Cappetta, and Jensen, 2004) and culture in general (Schweiger and Goulet, 2005). Ambiguity is often a reflection of a dissonance between organizational norms and actual practices (Nelson and Winter, 1982; Szulanski, Cappetta, and Jensen, 2004). It can thus be difficult to identify important cultural elements that support knowledge transfer, without directly "seeing" or experiencing the partners' culture and practices. Because cultural crossvergence is likely to be related to "symbiosis" acquisitions (Haspeslagh and Jemison, 1991), where integration is done at a slower speed and more cautiously, acquisition partners may have fewer opportunities to directly perceive or experience each other's cultures and practices. Thus, when the partners' have causally ambiguous knowledge, it will be more difficult to build a new culture that has elements (values and norms) that support behaviour that is related to more efficient knowledge transfer.

Causal ambiguity of knowledge only weakened the effectiveness of crossvergence on knowledge transfer from the target to the acquirer, but not vice versa. One explanation could be that post-acquisition integration is ultimately a process lead by the acquirer, so that even in crossvergence the final decisions concerning which elements constitute the new, shared culture are mostly determined by the acquirer. The acquirer is less familiar with the target's knowledge base than with its own and causal ambiguity makes it even more difficult to understand the target's knowledge. Thus, as a part of creating a new, shared culture through crossvergence, the acquirer may proceed overly cautiously fearing that it may otherwise dismantle cultural elements that support the target's valuable knowledge base or introduce elements that destroy the target's valuable knowledge. This is less likely to happen on the acquiring firm's side because, even in the presence of causal ambiguity, the acquirer is more familiar with its own knowledge base.

Interestingly, and contrary to what we hypothesised, we found that convergence had a stronger positive effect on knowledge transfer from the acquirer to the target when the acquirer's knowledge was causally ambiguous. One explanation for this finding is that convergence – which is likely to be related to the “absorption” acquisition mode (Haspeslagh and Jemison, 1991) – involves more direct contact between the acquirer and the target, and a faster integration pace. This “hands on” integration style implies that, as the target adapts to the acquirer, its organizational members perceive and experience the acquirer's culture and practices more directly. The members of the target company are hence better able to make sense of the acquirer's knowledge, even if it is not clearly articulated in organizational norms and rules. In fact, convergence may be a prerequisite for transferring ambiguous knowledge to the target: The acquirer's causally ambiguous knowledge is usually embedded in its organizational culture and processes (Simonin, 1999a; 1999b), which makes it very difficult to “extract” from its context. Thus, when the acquirer's knowledge is highly ambiguous convergence may be the only way to efficiently transfer the acquirer's knowledge to the target, without detaching it from its original context. In contrast, when the acquirer's knowledge is unambiguous – and it is easy to understand and explain the causal links related to the knowledge – convergence is not likely to be a prerequisite, or as effective, for transferring knowledge from the acquirer to the target.

To conclude, our paper contributes to the literature on knowledge transfer in acquisitions by illustrating the complex mechanisms through which causal ambiguity of knowledge influences knowledge transfer. In addition to directly reducing knowledge transfer both from the acquirer to the target and vice versa, causal ambiguity can decrease the positive effects of partner attractiveness and crossvergence. However, some managerial processes, such as convergence, may be particularly effective in the context of causal ambiguity. Furthermore, a novelty of the paper is the conceptualization of knowledge transfer from the target to the acquirer and vice versa as two processes that are influenced by different cultural integration mechanisms: Convergence facilitates the transfer of acquirer's knowledge, while crossvergence can support knowledge transfer of both the acquirer's and target's knowledge. This expands our previous understanding of how convergence and crossvergence contribute to knowledge transfer in acquisitions (Sarala and Vaara, 2010). Finally, our study provides valuable information about the value creation processes in acquisitions in the less explored European context.

Regarding the limitations of the study, because we relied on subjective evaluations of managers mostly from the acquiring firms, we cannot entirely rule out common method variance. In addition, the empirical measures of cultural convergence and crossvergence may require further development to access the full complexity of these multifaceted concepts. Also, ideally, we would have collected evaluations of cultural differences separately before and after the acquisition.

In terms of future research, it would be interesting to further investigate the different mechanisms of cultural integration. Previous research suggests that building a common identity (Vaara, Tienari and Irrman, 2007) and cultural seminars (Schweiger and Goulet, 2005) could be useful for cultural integration, but more research is needed to establish how cultural interventions should differ depending on the cultural integration mode. In addition, it would be interesting to explore whether our results concerning the direct and indirect effects of causal ambiguity could be expanded to apply to other types of knowledge characteristics.

Our study has clear managerial implications. First, it is important to understand the complex effects of causal ambiguity of knowledge on implementing knowledge transfer in acquisitions. The key is to focus on how to make causally ambiguous knowledge more explicit without losing the value embedded in this type of knowledge. One way of achieving this may be to encourage collaborative cultural learning between the partner firms (Schweiger and Goulet, 2005). Second, our study sends a strong message regarding the importance of managerial processes in knowledge transfer. Depending on the desired level and direction of post-acquisition knowledge transfer, managers should carefully consider which cultural integration mechanism to aspire to, as it ultimately influences the success of knowledge transfer. Cultural convergence, as a part of broader absorption integration strategy, can be successful in transferring the acquirer's knowledge to the target, and it is especially beneficial when this knowledge is ambiguous. This may be a viable option when the efficiency of the target firm can be clearly improved by introducing the acquirer's practices (Haspeslagh and Jemison, 1991). Cultural crossvergence, in turn, can be a better alternative when the goal is to transfer knowledge from the target or to encourage two-directional knowledge flows. If this is desired, however, managers need to pay special attention to reducing the ambiguity of the target's knowledge, as ambiguity weakens the otherwise positive effect of crossvergence. Finally, while we did find some evidence for the positive effect of partner attractiveness, the effect was relatively minor. This is encouraging for

managers because it suggests that acquisitions in which initial partner attractiveness is lacking are not doomed to fail. In fact, carefully administered managerial processes, such as cultural integration, can be more influential in determining knowledge transfer outcomes.

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¹ Cultural convergence could potentially also increase knowledge transfer from the target to the acquirer in cases in which the target is "culturally dominant". We tested the possible link between convergence and knowledge transfer from the target to the acquirer. The insignificant result supported our theoretical reasoning of cultural convergence contributing specifically to knowledge transfer from the acquirer to the target.

² Regarding convergence, we focus only on knowledge transfer from the acquirer to the target because, as argued earlier in Hypothesis 3a, in cultural convergence the target is usually expected to assimilate to the acquirer's culture which is likely to result in knowledge flows predominantly from the acquirer to the target (Haspeslagh and Jemison, 1991). Concerning crossvergence, similar to Hypotheses 3b and 3c, we argue that it results in knowledge flows in two directions.

³ Data access in large-scale acquisition surveys is challenging because data about acquisitions can be sensitive and confidential. In a survey of cross-border acquisitions, Morosini et al. (1998) achieved a response rate of 25% while Datta (1991) reports a response rate (27%) in a survey on domestic acquisitions.

FIGURE 1

Theoretical model of knowledge transfer in M&As

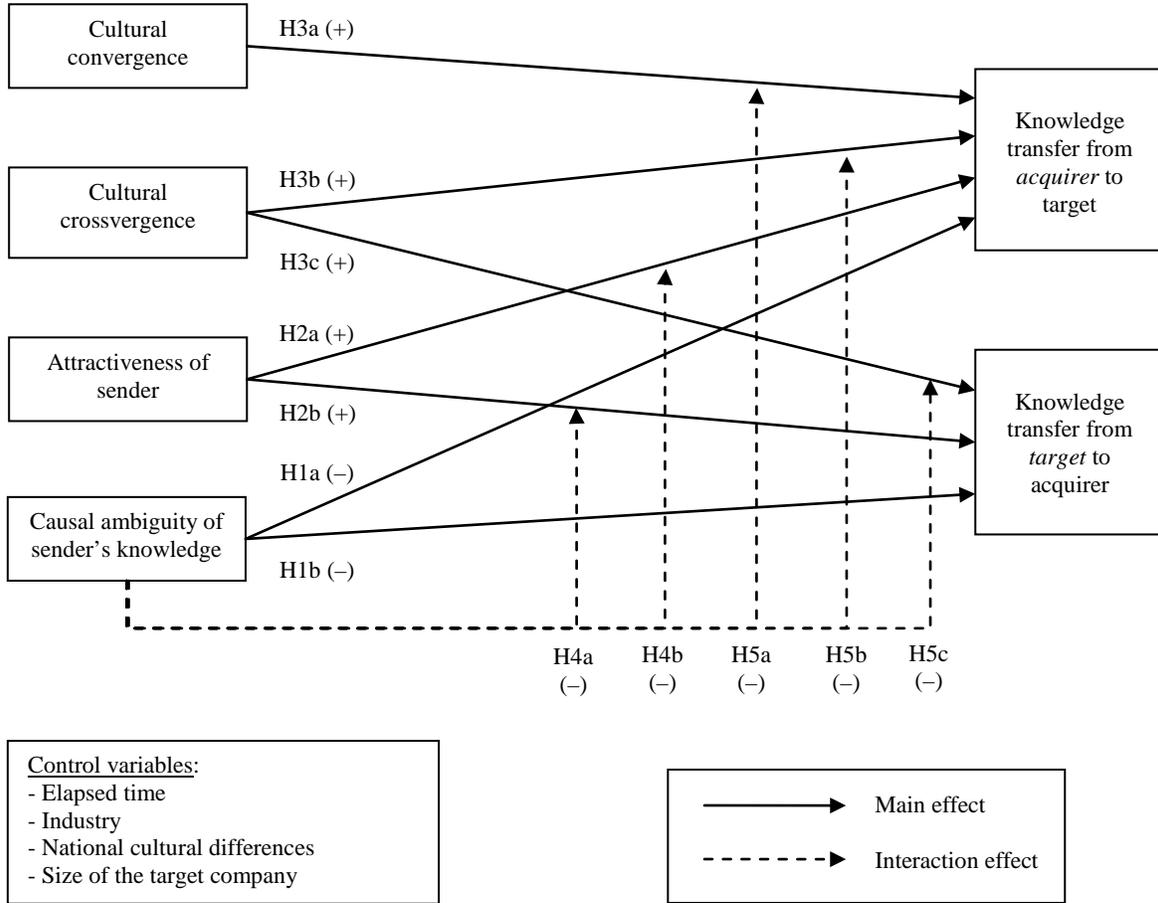


FIGURE 2a

Interaction effect on ‘use of acquirer’s knowledge’ for ‘acquirer attractiveness’ and ‘ambiguity of acquirer’s knowledge’

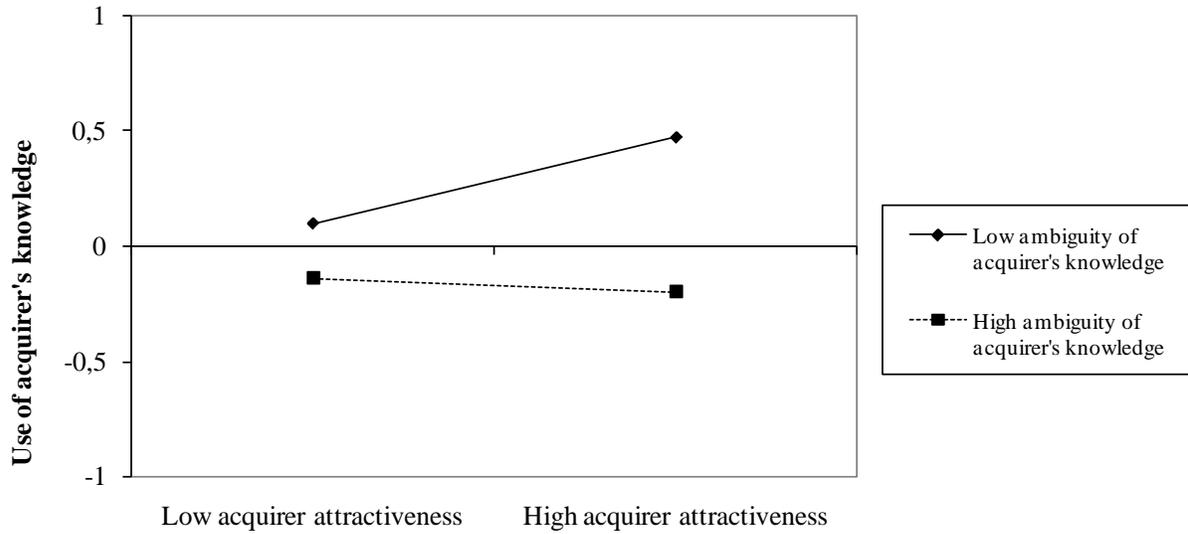


FIGURE 2b

Interaction effect on ‘use of acquirer’s knowledge’ for ‘convergence’ and ‘ambiguity of acquirer’s knowledge’

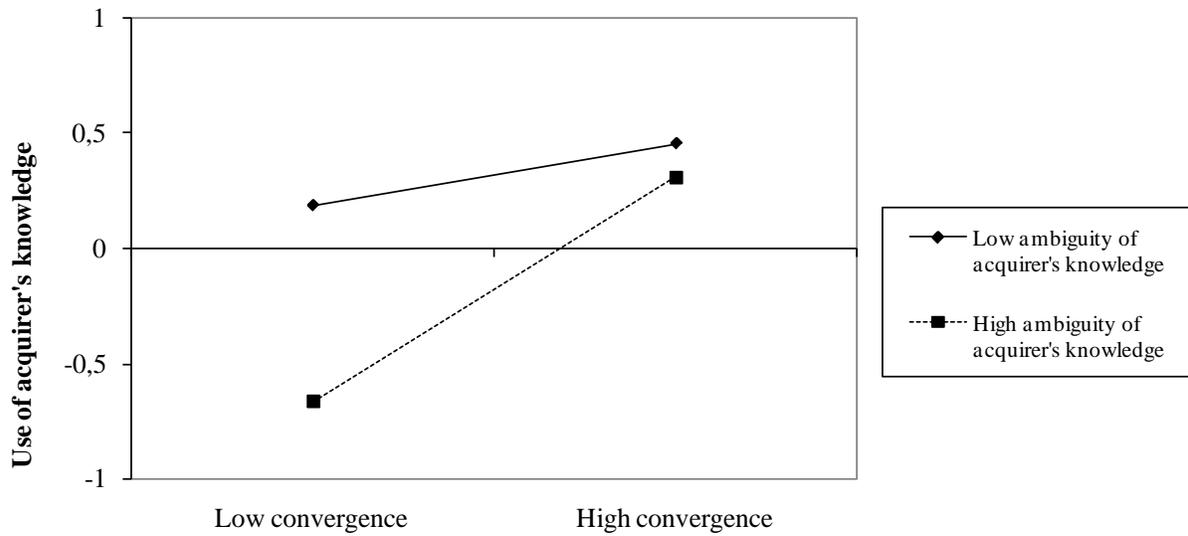


FIGURE 3a

Interaction effect on ‘use of target’s knowledge’ for ‘target attractiveness’ and ‘ambiguity of target’s knowledge’

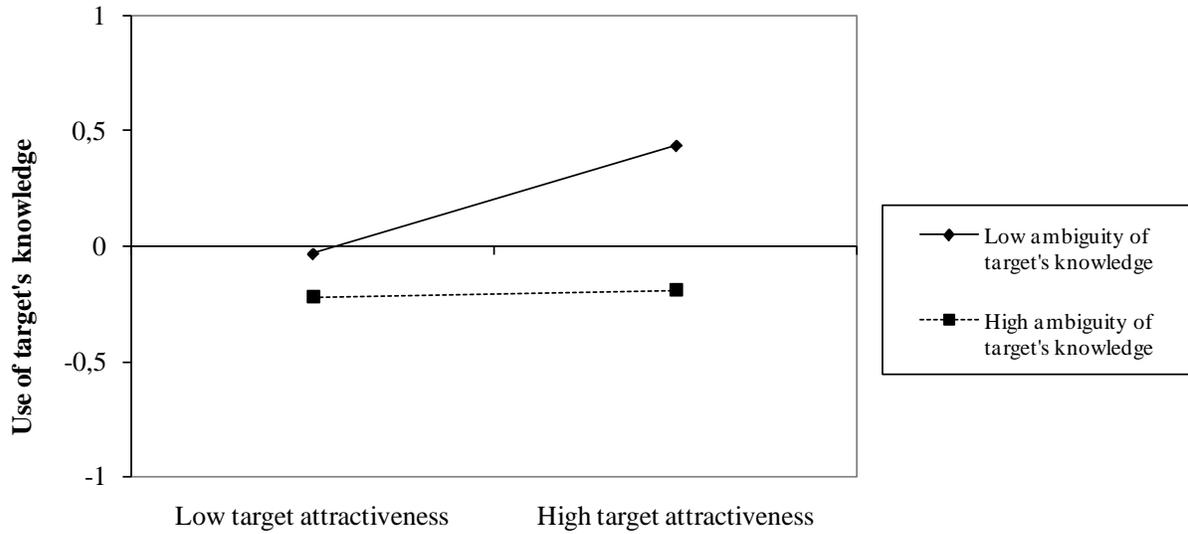


FIGURE 3b

Interaction effect on ‘use of target’s knowledge’ for ‘crossvergence’ and ‘ambiguity of target’s knowledge’

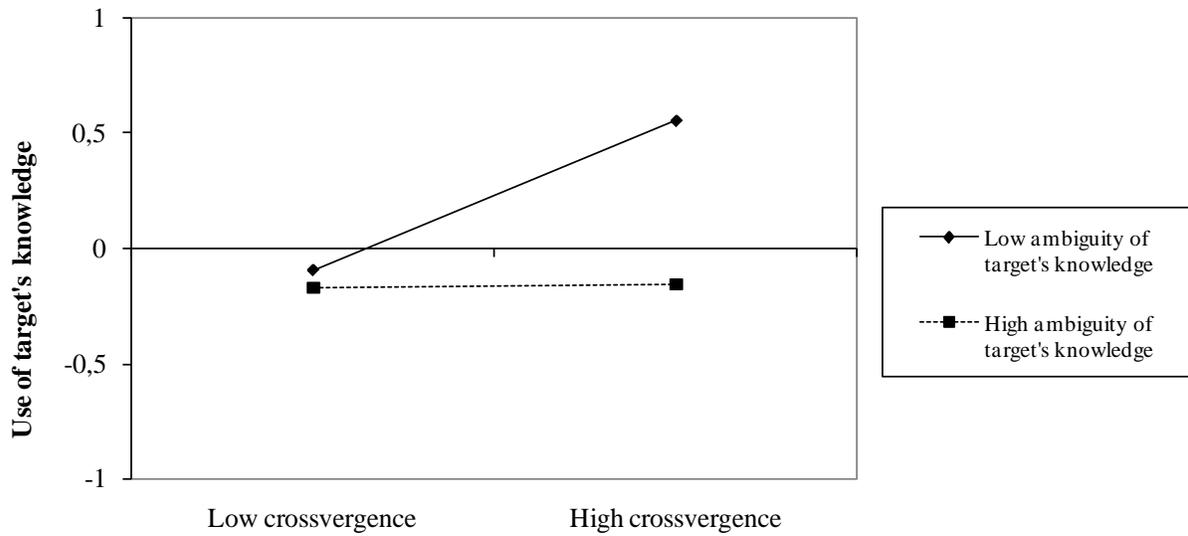


TABLE 1
Description of datasets 1 and 2

Table 1. Description of dataset 1 (2001-2004) and dataset 2 (2006-2009)

	Dataset 1	Dataset 2	Total
Response rate	20%	17%	-
Number of acquisitions	92	79	171
Number of responses	103	92	195
Number of single responses	82	70	152
Number of multiple responses	10	9	19
Number of responses from acquiring firm	84	63	147
Number of responses from target firm	19	29	48
Number of domestic acquisitions	51	50	101
Number of international acquisitions	41	29	70
Respondents: CEOs	44	39	83
Respondents: Top managers	44	49	93
Respondents: Other members of the management group and board members	15	4	19

TABLE 2
Descriptive statistics and correlations

Table 2. Descriptive statistics and correlations

Variable	N	Min	Max	Mean	S. e. mean	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. National cultural differences	155	-0.379	2.728	0.000	0.056	1																
2. Industry	168	0.000	1.000	0.482	0.039	-0.191*	1															
3. Elapsed time	166	-2.338	1.364	-0.008	0.078	0.096	0.004	1														
4. Size of the acquisition	164	-0.446	7.778	0.005	0.079	0.242**	-0.168*	0.019	1													
5. Ambiguity of acquirer's knowledge	157	-1.941	2.639	0.007	0.072	0.036	0.025	0.219**	-0.075	1												
6. Ambiguity of target's knowledge	156	-2.061	2.326	-0.014	0.070	0.032	-0.065	0.086	0.014	0.434***	1											
7. Convergence	161	-2.842	1.988	0.011	0.070	0.008	-0.112	-0.056	-0.180*	-0.259**	-0.145†	1										
8. Crossvergence	156	-2.577	2.174	-0.015	0.074	-0.075	0.009	-0.016	-0.036	-0.218**	-0.362***	0.309***	1									
9. Acquirer attractiveness	149	-2.014	1.927	0.008	0.061	-0.105	-0.054	0.023	-0.074	0.002	0.050	-0.025	-0.230**	1								
10. Target attractiveness	159	-2.352	2.033	0.012	0.073	-0.074	0.016	0.038	0.091	-0.106	-0.142†	0.198*	0.126	0.206*	1							
11. Use of acquirer's knowledge	153	-2.194	1.435	0.011	0.061	-0.109	-0.126	-0.082	-0.108	-0.318***	-0.052	0.217**	-0.107	0.360***	0.264**	1						
12. Use of target's knowledge	155	-1.511	1.929	0.024	0.061	-0.160†	0.005	0.010	0.054	-0.116	-0.295**	0.015	0.234**	0.073	0.297***	0.182*	1					
13. Convergence x ambiguity of acquirer's knowledge	155	-7.500	2.673	-0.209	0.085	0.236**	-0.010	0.084	0.210**	-0.063	-0.112	0.071	0.193*	-0.073	0.086	-0.158	-0.049	1				
14. Crossvergence x ambiguity of acquirer's knowledge	151	-5.992	1.649	-0.286	0.078	0.110	0.073	0.075	0.052	-0.198*	-0.166*	0.019	0.159†	-0.052	-0.026	-0.112	-0.089	0.544***	1			
15. Crossvergence x ambiguity of target's knowledge	146	-3.525	5.086	0.001	0.064	0.030	-0.097	0.040	-0.002	0.207*	0.146†	-0.081	-0.137	-0.068	-0.063	0.090	0.024	-0.309***	-0.485***	1		
16. Acquirer attractiveness x ambiguity of acquirer's knowledge	154	-3.947	2.129	-0.088	0.066	0.100	0.019	0.064	-0.148†	0.171*	-0.009	0.109	0.134	-0.075	-0.014	-0.144†	-0.008	0.368***	0.219**	0.288***	1	
17. Target attractiveness x ambiguity of target's knowledge	155	-2.684	2.156	-0.112	0.059	0.051	-0.087	0.121	-0.012	-0.008	0.002	0.132	-0.055	-0.087	-0.102	-0.181*	-0.187*	0.316***	0.294***	0.051	0.342***	1

Pearson's bivariate correlations, Spearman's rho for the Industry variable.

† p < .1

* p < .05

** p < .01

*** p < .001

TABLE 3

Regression analysis of ‘use of acquirer’s knowledge’ with models 1-2

Table 3. Regressions analysis with dependent variable 'use of acquirer's knowledge'

Variables	Model 1: Control Variables				Model 2: Control and Independent Variables			
	Beta	<i>t</i>	Sig.	VIF	Beta	<i>t</i>	Sig.	VIF
National cultural differences	-0.071	-0.843	0.400	1.075	-0.020	-0.271	0.787	1.095
Industry	-0.181	-1.650	0.101	1.041	-0.126	-1.289	0.199	1.070
Elapsed time	-0.034	-0.625	0.533	1.008	-0.001	-0.021	0.983	1.060
Size of the acquisition	-0.084	-1.494	0.137	1.077	-0.086†	-1.667	0.097	1.186
Ambiguity of acquirer's knowledge					-0.221***	-3.792	0.000	1.143
Acquirer attractiveness					0.068	1.147	0.253	1.205
Convergence					0.298***	4.239	0.000	1.073
Crossvergence					0.126*	2.251	0.026	1.133
R ²	0.035				0.272			
Adjusted R ²	0.011				0.235			
R ² change	0.035				0.237			
F	1.457				7.381***			

All two-tailed tests. N = 167, missing values replaced with mean

Data in the table represent standardised beta coefficients.

Dependent variable: Use of acquirer's knowledge.

† *p* < .1

* *p* < .05

** *p* < .01

*** *p* < .001

TABLE 4

Regression analysis of ‘use of acquirer’s knowledge’ with models 3–5

Table 4. Regressions analysis with dependent variable ‘use of acquirer’s knowledge’ and interaction variables

Variables	Model 3: Control, Independent and Moderating Variable 1				Model 4: Control, Independent and Moderating Variable 2				Model 5: Control, Independent and Moderating Variable 3			
	Beta	t	Sig.	VIF	Beta	t	Sig.	VIF	Beta	t	Sig.	VIF
National cultural differences	0.002	0.023	0.982	1.114	-0.020	-0.276	0.783	1.095	-0.009	-0.115	0.908	1.109
Industry	-0.121	-1.249	0.213	1.070	-0.102	-1.056	0.293	1.079	-0.117	-1.199	0.232	1.074
Elapsed time	0.008	0.160	0.873	1.067	0.000	-0.010	0.992	1.060	0.001	0.014	0.989	1.061
Size of the acquisition	-0.066	-1.271	0.206	1.222	-0.084†	-1.663	0.098	1.186	-0.095†	-1.831	0.069	1.205
Ambiguity of acquirer's knowledge	-0.226***	-3.932	0.000	1.145	-0.249***	-4.288	0.000	1.183	-0.206	-3.498	0.001	1.180
Acquirer attractiveness	0.079	1.339	0.182	1.212	0.074	1.270	0.206	1.206	0.079	1.319	0.189	1.225
Convergence	0.289***	4.153	0.000	1.076	0.311***	4.497	0.000	1.078	0.291***	4.144	0.000	1.078
Crossvergence	0.134*	2.420	0.017	1.138	0.129*	2.338	0.021	1.134	0.127*	2.271	0.025	1.134
Acquirer attractiveness x ambiguity of acquirer's knowledge	-0.109*	-2.271	0.024	1.093								
Convergence x ambiguity of acquirer's knowledge					0.177**	2.666	0.008	1.059				
Crossvergence x ambiguity of acquirer's knowledge									-0.087	-1.388	0.167	1.094
R ²	0.295				0.304				0.281			
Adjusted R ²	0.255				0.264				0.240			
R ² change	0.023				0.032				0.009			
F	7.306***				7.604***				6.813***			

All two-tailed tests. N = 167, missing values replaced with mean

Data in the table represent standardised beta coefficients.

Dependent variable: Use of acquirer's knowledge.

† p < .1

* p < .05

** p < .01

*** p < .001

TABLE 5

Regression analysis of ‘use of target’s knowledge’ with models 1-2

Table 5. Regressions analysis with dependent variable 'use of target's knowledge'

Variables	Model 1: Control Variables				Model 2: Control and Independent Variables			
	Beta	<i>t</i>	Sig.	VIF	Beta	<i>t</i>	Sig.	VIF
National cultural differences	-0.179*	-2.057	0.041	1.075	-0.141†	-1.725	0.086	1.094
Industry	-0.002	-0.018	0.986	1.040	-0.029	-0.276	0.783	1.054
Elapsed time	0.017	0.295	0.769	1.009	0.022	0.423	0.673	1.019
Size of the acquisition	0.065	1.123	0.263	1.077	0.052	0.943	0.347	1.102
Ambiguity of target's knowledge					-0.188**	-2.811	0.006	1.166
Target attractiveness					0.109†	1.689	0.093	1.220
Convergence					0.059	0.747	0.456	1.135
Crossvergence					0.175**	2.867	0.005	1.107
R ²	0.028				0.182			
Adjusted R ²	0.005				0.141			
R ² change	0.028				0.154			
F	1.189				4.437***			

All two-tailed tests. N = 168, missing values replaced with mean

Data in the table represent standardised beta coefficients.

Dependent variable: Use of target's knowledge.

† *p* < .1

* *p* < .05

** *p* < .01

*** *p* < .001

TABLE 6

Regression analysis of ‘use of target’s knowledge’ with models 3-4

Table 6. Regressions analysis with dependent variable 'use of target's knowledge' and interaction variables

Variables	Model 3: Control, Independent and Moderating Variable 1				Model 4: Control, Independent and Moderating Variable 2			
	Beta	<i>t</i>	Sig.	VIF	Beta	<i>t</i>	Sig.	VIF
National cultural differences	-0.129	-1.588	0.114	1.100	-0.140†	-1.729	0.086	1.094
Industry	-0.017	-0.157	0.876	1.058	-0.061	-0.573	0.567	1.075
Elapsed time	0.030	0.575	0.566	1.026	0.036	0.690	0.491	1.035
Size of the acquisition	0.057	1.052	0.294	1.105	0.047	0.865	0.388	1.104
Ambiguity of target's knowledge	-0.204**	-3.045	0.003	1.184	-0.195**	-2.946	0.004	1.169
Target attractiveness	0.124†	1.915	0.057	1.237	0.099	1.548	0.124	1.226
Convergence	0.061	0.772	0.441	1.135	0.044	0.556	0.579	1.145
Crossvergence	0.168**	2.768	0.006	1.112	0.165**	2.729	0.007	1.114
Target attractiveness x ambiguity of target's knowledge	-0.110†	-1.889	0.061	1.064				
Crossvergence x ambiguity of target's knowledge					-0.159*	-2.130	0.035	1.056
R ²	0.210				0.205			
Adjusted R ²	0.155				0.160			
R ² change	0.018				0.023			
F	4.404***				4.536***			

All two-tailed tests. N = 168, missing values replaced with mean

Data in the table represent standardised beta coefficients.

Dependent variable: Use of target's knowledge.

† p < .1

* p < .05

** p < .01

*** p < .001

TABLE 7
Summary of the results

Table 7. Summary of the results

Hypothesis	Result
H1a: Causal ambiguity of the acquirer's knowledge is negatively associated with knowledge transfer from the acquirer to the target.	Supported
H1b: Causal ambiguity of the target's knowledge is negatively associated with knowledge transfer from the target to the acquirer.	Supported
H2a: The attractiveness of the acquirer is positively associated with knowledge transfer from the acquirer to the target.	Rejected
H2b: The attractiveness of the target is positively associated with knowledge transfer from the target to the acquirer.	Weakly supported
H3a: Organizational cultural convergence is positively associated with knowledge transfer from the acquiring firm to the target.	Supported
H3b: Organizational cultural crossvergence is positively associated with knowledge transfer from the acquiring firm to the acquirer.	Supported
H3c: Organizational cultural crossvergence is positively associated with knowledge transfer from the target firm to the acquirer.	Supported
H4a: The positive association between the acquirer's attractiveness and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.	Weakly supported
H4b: The positive association between the target's attractiveness and knowledge transfer from the target to the acquirer will be lower in acquisitions where the causal ambiguity of the target's knowledge is greater.	Weakly supported
H5a: The positive association between convergence and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.	Rejected
H5b: The positive association between crossvergence and knowledge transfer from the acquirer to the target will be lower in acquisitions where the causal ambiguity of the acquirer's knowledge is greater.	Rejected
H5c: The positive association between crossvergence and knowledge transfer from the target to the acquirer will be lower in acquisitions where the causal ambiguity of the target's knowledge is greater.	Supported