KNOWLEDGE FLOWS WITHIN MULTINATIONAL CORPORATIONS: WHY ARE SOME SUBSIDIARIES ISOLATED?

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ABSTRACT

Applying a new theoretical and empirical approach to intra-firm knowledge transfers, this paper provides some initial insight to the little-researched phenomenon of why some subsidiaries are isolated from knowledge transfer activities within the MNC. Knowledge transfer is framed as a problemistic search process initiated by the recipient unit. We show that knowledge flows from units that are perceived to be highly capable to units that perceive themselves to be highly capable. Knowledge flows are also associated with existing levels of communication, geographical proximity and reciprocity. Taken together, these findings suggest that knowledge transfers in MNCs typically occur between highly capable members of an in-crowd, while the isolated minority rarely, if ever, engage in knowledge sharing activities. Finally, we show that the isolated minority underperforms other subsidiaries, suggesting the possibility of a “liability of internal isolation”.
Over the last several years there has been widespread interest among scholars in the importance of knowledge management in firms and, particularly, in multinational corporations (e.g. Eisenhardt & Santos, 2002; Ghoshal & Bartlett, 1988; Gupta & Govindarajan, 2000; Schulz, 2001, 2003; Szulanksi, 1996; Zander & Kogut, 1995). Within a multinational corporation (MNC), subsidiaries can learn from each other, and benefit from new knowledge developed by other units around the world. Knowledge sharing among units provides opportunities for mutual learning and interunit cooperation (Bartlett & Ghoshal, 1989; Tsai & Ghoshal, 1998). Prior research has examined the difficulties of transferring tacit and complex knowledge within the organization (e.g. Szulanksi, 1996; Zander & Kogut, 1995), the importance of motivation and absorptive capacity for transferring knowledge (e.g. Gupta & Govindarajan, 2000) and the relevance of central network positions in intraorganizational knowledge transfers (e.g. Tsai, 2001).

Much less attention has been focused on investigating why some subsidiaries seem to be alienated from the knowledge transfer activities within the MNC. Previous research (e.g. Gupta & Govindarajan, 2000; Hansen & Lovas, 2004) has indicated the existence of subsidiaries that are isolated from the inflows and outflows of knowledge that are the focus of most of the literature. And our data, as described later, reveals the magnitude of this phenomenon: out of our sample of 171 subsidiary units, 22% experienced inflows of new products or practices less than once per year, 53% participated in outflows of new products or practices less than once per year, and 13% experienced neither inflows nor outflows more than once per year. However, there is practically no attempt to explain the reasons why some subsidiaries are isolated from the knowledge transfer activities within the MNC (an exception is Gupta & Govindarajan, 1991), or what the performance consequences are for “isolated” subsidiaries (i.e. those that experience few if any intrafirm knowledge outflows or inflows).
In other words, we believe there is an incomplete understanding of knowledge transfers within MNCs because most of the existing literature focuses on identifying the barriers and facilitators of knowledge transfers from the perspective of those subsidiaries that are already involved in knowledge transfer activities – and disregards the group of subsidiaries that is simply isolated from any knowledge transfer activity within the MNC. We believe that it is important to advance the literature on intrafirm knowledge transfers by investigating the isolated subsidiary phenomenon.

Two questions guide our research. First, what explains the pattern of knowledge flows that give rise to subsidiary isolation? Second, what is the impact of subsidiary isolation on subsidiary performance? We address these questions by developing a demand-driven model of knowledge flow that builds on the behavioural theory of the firm (Cyert and March, 1963). In this model, we focus on the recipients of knowledge flows within the MNC as they engage in a process of problemistic search. We argue that it is the recipients’ motivation and absorptive capacity (rather than the attributes of the source unit) that drives the process of knowledge transfer. And we argue that, rather than engage in a careful evaluation of all potential sources of valuable knowledge within the MNC, subsidiary units will focus their search on units with which they have existing relationships and which are geographically close to them. Taken together, these arguments suggest that knowledge flows will become concentrated among the more-capable subsidiaries, leaving the less-capable subsidiaries isolated. Finally, and as a logical consequence of the above, we argue subsidiaries that are alienated from the knowledge transfer activities within the firm not only do not benefit from the specific knowledge of other units within the MNC (e.g. new products developed by another subsidiary) but also they end up not participating in an information network that is a vehicle for the rapid communication of news about opportunities and obstacles. We conjecture that similar to the idea of liability of (external) unconnectedness (Powell, Koput
and Smith-Doerr, 1996) there is a liability of internal isolation and we hypothesize that, all other things equal, the isolated subsidiaries have a lower performance than those subsidiaries that regularly receive and send knowledge within the MNC.

In the body of the paper, we conduct an empirical test of these arguments using nodal data that focuses on the perceived capabilities, knowledge flows, and performance of subsidiary units. Our data set consists of questionnaire responses from the managers of 171 subsidiaries belonging to six large Swedish multinationals (Sandvik Steel, Coromant, Ericsson, Volvo, Pharmacia and Alfa Laval Agri), plus evaluations of those same subsidiaries by their corporate HQ and their peers. We receive broad support for the arguments. In the final section of the paper, we discuss the implications of our findings for both theory and practice.

**BACKGROUND**

**The MNC as a Differentiated Knowledge Network**

We define knowledge as the “accumulated practical skill or expertise that allows one to do something smoothly and efficiently” (Kogut and Zander, 1992: 386). The idea that MNCs create value from the internalization of their accumulated knowledge and from their knowledge “assets” (e.g. patents, trade secrets, and organizational routines) can be traced back to the pioneering work of Hymer (1960), Caves (1971) and Buckley & Casson (1976), among others. Today there is a broad consensus that a MNC is “an international network that creates, accesses, integrates and applies knowledge in multiple locations” (Almeida, Song & Grant, 2002:148). Consistent with this “Differentiated Network” model of the MNC (Nohria & Ghoshal, 1997), we believe that the MNC’s distinctive feature is that it operates in multiple countries, each of which is characterized by a distinct task environment or organizational field (Ghoshal & Nohria, 1989; Westney, 1993). In order to respond effectively to its environmental heterogeneity, the MNC must differentiate the activities of its subsidiaries but
it must also integrate them (Ghoshal & Nohria, 1989). As Schulz (2003) puts it, the integration of the knowledge of the MNC on a worldwide basis, although difficult, is what enables MNCs to reap the “incremental value of being multinational” (Kogut, 1989: 383).

Attributes of knowledge in MNCs

The reality, however, is that knowledge integration within the MNC is far from perfect. There is evidence in the literature (e.g. Chew, Bresnahan and Clark, 1990; Leibenstein, 1966; Szulanski, 1995) that leading-edge management practices do not flow rapidly and seamlessly from country to country. For instance, Teece (1981) estimated that transfer cost for the intra-MNC technology transfer ranged from 2.24% to 59% of total project costs with a mean of 19.16%. The reason for the lack of effective knowledge integration in MNCs is typically attributed to its stickiness. Knowledge does not flow uneventfully (Szulanski, 1996) from country to country. Instead, it frequently gets “stuck” in one location.

There is a related attribute of firm knowledge that is less well understood, but no less important in terms of its adverse affect on knowledge integration, namely the very limited awareness in the MNC of where its useful knowledge resides. Knowledge assets, by their nature, are hard to evaluate, and rarely given explicit attention (Galunic & Rodan, 1998; Szulanski, 1996). When combined with the sticky and dispersed nature of knowledge in the MNC, the result is often considerable disagreement between subsidiary units, and between the subsidiary and the corporate HQ, as to where valuable capabilities reside. For example, in the most comprehensive study of this subject to date, Denrell, Arvidsson and Zander (2004) found that the median correlation between the subsidiary’s self-evaluation of its capabilities, and the corresponding evaluation by HQ, was just 0.28. Similarly weak levels of agreement have been found in other MNC studies (Birkinshaw, Holm, Thilenius and Arvidsson, 2001) as well as in the analogous literature on supervisor/subordinate performance evaluations.
(Bommer et al, 1995; Harris & Schaubroek, 1988). In the current study we build explicitly on these two attributes of firm knowledge to examine the phenomenon of subsidiary isolation. Most prior research, in contrast, has focused on those subsidiaries already engaged at some level with knowledge sharing – colloquially known as the “in-crowd”. For instance, the very way Szulanski (1996) designed his research ensured that it took into account only those units that were already involved with a best-practice transfer. Similarly, Hansen & Lovas (2004) studied knowledge transfers between new product teams and subsidiaries and reported that out of the 40 subsidiaries investigated five did not receive any transfers and were excluded from their analysis. Also, out of 121 project teams observed, only 54 experienced a transfer event and only those were analysed. In other words, most of the existing literature on knowledge transfers focuses on the problems faced by those subsidiaries that are somehow already engaged in sharing knowledge with their peer subsidiaries or with the MNC’s headquarters.

The research is conducted using a nodal unit of analysis, that is a focus on the subsidiary unit itself, and the flows of knowledge into and out of it. This is the same approach as adopted by Gupta and Govindarajan (2000) and Schulz (2001, 2003). It is appropriate here because we are interested ultimately in what makes the subsidiary successful, so we need to examine a full range of subsidiaries from those with no knowledge inflows/outflows to those with high levels of knowledge inflows/outflows. However, this nodal approach also limits us in an important sense, in that we cannot get detailed insight into individual cases of knowledge flows to or from the subsidiary. This limitation needs to be

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1 The imperfect evaluation of subsidiary capabilities creates a conceptual challenge in the current research. The anticipated differences in ratings between subsidiary and HQ cannot simply be regarded as measurement error, because there are rarely (if ever) meaningful objective indicators of a subsidiary’s capabilities. Instead, it seems appropriate to argue that perceptions are reality from the point of view of the unit that is doing the evaluating. This is consistent with the behavioural framing of the research, and it allows us to make use of our multiple ratings of subsidiary capabilities (rather than assume them away as measurement error).
borne in mind as we develop our research hypotheses. We should also note at this stage that we focus on one specific type of knowledge: marketing knowledge—know-how about new products, new services and marketing best practices. Knowledge inflows are therefore the aggregate volume of marketing knowledge received either from other subsidiaries (horizontal inflows) or from the MNC headquarters (vertical inflows) by the focal subsidiary; and knowledge outflows are the aggregate volume of marketing knowledge transmitted from the focal subsidiary to other subsidiaries (horizontal outflows) or to the HQ (vertical outflows).

THEORETICAL DEVELOPMENT AND HYPOTHESES

What is the nature of knowledge flows in a MNC where knowledge is dispersed, sticky, and imperfectly evaluated? In this section we develop a set of theoretical arguments based on the behavioural theory of the firm (Cyert and March, 1963), which leads to the development of specific hypotheses regarding the conditions under which we would expect to see knowledge flows into and out of the focal subsidiary.

Problemistic Search

The behavioural theory of the firm is rooted in the pioneering work of Herbert Simon and James March (March and Simon, 1958; Simon, 1947) and was formally introduced in Cyert and March’s (1963) book of the same name. The principles of this theory are now applied broadly in the organisational literature, in such sub-fields as transaction cost economics, organizational learning, and decision theory. In this paper we build on assumptions that managers are boundedly rational (i.e. they have significant cognitive limitations) and that they satisfice (i.e. they seek out an acceptable solution to a problem, rather than an optimal one). We then focus on the process of problemistic search, that is “search that is stimulated by a problem and is directed toward finding a solution to that problem” (Cyert and March, 1963: 121). Problemistic search is assumed to be (1) motivated by a particular problem such as a failure to satisfy one of its goals, it is (2) simple-minded,
meaning that it proceeds on the basis of a simple model of causality unless driven to a more complex one, and it is (3) biased, meaning that the search process is steered by the prior experiences and goals of the managers driving it (Cyert and March, 1963: 121).

Consider these arguments now in the context of the MNC. We suggest that *knowledge transfer between units can be framed as a process of problemistic search on the part of the recipient*. Knowledge transfers, by definition, involve both a source and a recipient, but by framing the discussion in this way we are suggesting that a primary driver of the process is the motivation and perceptions of the recipient. Several academic studies, for example, have shown that attributes of the recipient are significantly associated with the level of knowledge flows (Gupta and Govindarajan, 2000; Szulanski, 1995), and others have explicitly focused on the recipients’ search process (Hansen and Haas, 2001). The broader literature on knowledge management has emphasized the value of a demand-driven approach to knowledge transfer (Stewart, 1998; Davenport and Prusak, 1998), and problem-driven search is also emphasized in the innovation literature (Adner and Levinthal, 2001; Schmookler, 1965). By framing our research in this way, we are not in any way denying the importance of a motivated knowledge source or a well-managed process for achieving effective knowledge transfer (Szulanski, 1995). Rather, we are simply suggesting that by better understanding the process of search that the recipient pursues, we can generate useful insights into the patterns of knowledge flow we observe in reality.

A knowledge flow in the MNC is therefore viewed as being motivated in large part by a specific problem facing a specific unit, such as a failure to meet profitability or productivity goals.² When faced with such a problem, the managers of the unit begin to search for a

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² To be clear, this logic does not apply to those cases of HQ-mandated initiatives where the subsidiary has no option whether it conforms or not. However, our sense from the research interviews we conducted for this study is that the sales and marketing subsidiaries in this study received relatively few HQ-mandated directives, and had considerable degrees of freedom in the extent to which they engaged in corporate knowledge sharing activities.
solution, and as predicted by the Behavioural Theory of the Firm, their search proceeds in a “simple minded” and “biased” way (Cyert and March, 1963: 121). That is, they search through existing contacts and through easily-available solutions, rather than through an exhaustive evaluation of all possible solutions. Once an acceptable solution has been found, perhaps through a knowledge transfer with another unit of the MNC, or perhaps through an external relationship, the search process stops. There is also likely to be a dynamic element to this process. Every unit in the MNC has an array of relationships with other units, some much deeper and more useful than others. It is more likely to search for a solution to its perceived problem in those units it has a stronger relationship with (Hansen and Lovas, 2004). In engaging in knowledge transfer with one of these other units, both parties are likely to gain a better insight into each other’s capabilities, thereby creating greater awareness of the potential for further knowledge flows in the future. There is also likely to be an affect-based component to this relationship, thereby creating an expectation of reciprocity on the two parties. The net result, in other words, is a self-reinforcing process whereby those units in the MNC that initially engage in knowledge flows (as either source or recipient) are more likely to be involved in subsequent knowledge flows than those who were not initially involved. This broad argument can now be turned into a set of specific hypotheses that apply to the nodal subsidiary. Essentially, we are focusing on the various elements of the problemistic search process (geographical proximity, existing levels of communication, reciprocity, and the recipient’s evaluation of the nodal subsidiary) as predictors of knowledge flows; and then we hypothesise a link between the overall levels of knowledge inflow and outflow and subsidiary performance.

**Predictors of Knowledge Inflows and Outflows**

Hypotheses one and two are concerned with the local search process that will be followed by the unit that is seeking knowledge. First, the frequency of communication
between two units makes managers in both units more aware of opportunities for leveraging competencies (e.g. Hansen, Nohria and Tierney, 1999; Hansen, 1999; Hansen and Lovas, 2004; Katz and Tushman, 1979). Individuals may also find it easier to contact people who work in other units to the extent that they know them or at least know their colleagues. When units seeking knowledge understand the operations of potential knowledge providers, they are more likely to identify and retrieve relevant knowledge from them (Schulz, 2003:447). This general argument about the relationship between communication and knowledge flows can be broken down into four specific hypotheses. It potentially applies to both inflows of knowledge to the nodal subsidiary, and outflows from that subsidiary; it also applies to both vertical relationships (i.e. with the corporate HQ) and to horizontal relationships (i.e. with peer subsidiaries). Thus:

Hypothesis 1. The frequency of communication with HQ is associated with the level of vertical inflows (1a) and outflows (1b) of knowledge; and the frequency of communication with other subsidiaries is associated with the level of horizontal inflows (1c) and outflows (1d) of knowledge.

Second, there is a large body of literature (e.g. Allen, 1977, DeCarolis & Deeds, 1999; Hansen and Lovas, 2004; Sorenson and Stuart, 2001) showing how geographic proximity influences the frequency of interactions between two distant parties. Sorenson and Stuart (2001), for instance, have shown that teams spend much more time searching and identifying useful knowledge if the geographic distance between the two units is large. Similarly, two units within the same firm are less likely to interact if the spatial distance between them is large (Hansen and Lovas, 2004). The idea that knowledge transfers would be focused on geographically-proximate units is also entirely consistent with the “simple minded” search process in the Behavioural Theory of the Firm (Cyert and March, 1963). For this research, our
focus on the nodal subsidiary means we only consider the potential geographic distance effect in the relationship between the subsidiary and HQ. Thus:

**Hypothesis 2.** The geographic proximity of the subsidiary to the corporate HQ is associated with higher vertical knowledge outflows (2a) and inflows (2b).

Hypothesis three is concerned with the relationship between knowledge inflows and knowledge outflows in the nodal subsidiary. The argument here is based on *reciprocity*, that is, the idea that those subsidiaries who are highly involved in sharing their knowledge with others will also be active recipients of knowledge (Axelrod, 1984; Kim and Mauborgne, 1991; Kogut, 1989). This is a well-established argument in the knowledge management literature (see Schulz, 2003 in particular). It builds directly on the previous argument, that knowledge flows follow existing channels of communication. However, reciprocity suggests something more – an expectation on the part of the source unit that the favour it is providing to the recipient unit will one day be returned, and a moral obligation on the recipient unit to uphold this implicit deal. Reciprocity is also made easier by the nature of the previous interaction between the two parties. For example, a subsidiary that frequently shares knowledge with its peers is more likely to know which units have knowledge they are looking for than a subsidiary that seldom exchanges any knowledge. Taken together, these arguments suggest the following hypothesis.

**Hypothesis 3a.** Higher frequency of horizontal knowledge outflows from the subsidiary is associated with higher frequency of horizontal knowledge inflows to the subsidiary.

**Hypothesis 3b.** Higher frequency of vertical knowledge outflows to HQ is associated with higher frequency of vertical knowledge inflows from HQ.

The above three hypotheses are all consistent with prior studies. The next two, in contrast, represent a novel addition to the literature in that they build on the link between the
perceived capabilities and motivation of the nodal subsidiary and its knowledge inflows and outflows. As noted earlier, it is inappropriate to rely on the implicit assumption in many studies about knowledge flows within MNCs that the value of the subsidiary’s capabilities is known by or agreed between different organisational units (Denrell et al., 2004). Instead, we expect that what influences knowledge flows is the *perceptions* of the subsidiary’s capabilities, rather than their absolute levels. On the basis that the focal subsidiary’s self-rating of its own capabilities does not exactly coincide with the assessment of the unit it is sharing knowledge with, knowledge flows can be influenced by two different perceptions: (1) the self-rating given by the focal subsidiary, and (2) how its peers (in the case of horizontal flows) or the HQ (in the case of vertical flows) perceive the capabilities of the focal unit.

Consider first the case where the focal subsidiary is the source of knowledge that is being transferred either to its peers or to HQs. Gupta and Govindarajan (2000) posited that we should expect higher knowledge outflows from units with more valuable knowledge. To a certain extent we subscribe to this proposition, but the behavioural logic employed throughout this paper offers a slightly more nuanced perspective on the hypothesized relationship. Specifically, we would argue that the recipient of the subsidiary’s knowledge (the corporate HQ or a peer subsidiary) *perceives* the focal subsidiary to have high capabilities, and therefore it sees that subsidiary as potentially being able to address the problem it faces. The difference between this argument and Gupta and Govindarajan’s (2000) logic is not just semantic, because in our case knowledge flows are triggered by the perceptions of the potential recipients of the subsidiary’s knowledge, whereas in Gupta and Govindarajan’s (2000) case knowledge flows are driven by absolute levels of subsidiary capability (and are measured as such). Our proposition is also consistent with Borgatti & Cross’s (2003:434) finding, at the individual level, that a knowledge seeker should positively evaluate the knowledge and skills
of the person sought after in relation to the problem the seeker is attempting to solve. Thus, we propose formally that:

**Hypothesis 4a.** Higher rating of the focal subsidiary’s capabilities by HQ is associated with a high frequency of vertical knowledge outflows.

**Hypothesis 4b.** Higher rating of the focal subsidiary’s capabilities by its peers units is associated with a high frequency of horizontal knowledge outflows.

Consider now the case where the focal subsidiary is the recipient of knowledge inflows. Here, it is less clear how the perceptions of the focal unit’s capabilities will influence vertical and horizontal knowledge inflows. One line of thought would be to predict that low self-ratings would be associated with higher knowledge inflows, i.e., that units which assess their own capabilities as high would decide that they do not need more knowledge and so would engage in less knowledge inflows. This would be consistent with findings in social psychology (e.g. Weiss and Knight, 1980) where individuals with high self-esteem were reliant more on themselves than on their job environments for guidance in task-related behaviours. In such a case, the logic of the receiving unit being perceived as having weak capabilities is consistent with the traditional logic where best practices flow from the most capable units to the less capable ones (e.g. Chew, Bresnahan and Clark, 1990; Leibenstein, 1966; Szulanski, 1995).

The behavioural perspective developed in this paper leads us to make exactly the opposite prediction. That is, we expect that high self-ratings of capability will be associated with high knowledge inflows. Two sets of arguments support this proposition. First, the process of interacting with other units (through established communication channels as described above) increases the focal unit’s absorptive capacity – that is, its ability to recognize the value of other units’ knowledge, and its capacity to assimilate that knowledge. Absorptive capacity is a measure of the overall stock of knowledge in a unit, and it has been
shown in many contexts that absorptive capacity increases the firm’s ability to access and make use of external knowledge (Cohen and Levinthal, 1990; Zahra and George, 2002). Lane and Lubatkin (1998) have further argued that absorptive capacity has a relational component, so that the ability to assimilate external knowledge is in part a function of the level of fit between the interacting parties.

The second argument is that the subsidiary which rates its own capabilities highly is likely to be more motivated to engage in knowledge inflows. We build here on the concept of group-efficacy—defined as a group's belief in its capability to perform a task objective (Bandura, 1997; Gibson, 1999, 2003; Lindsley, Brass and Thomas, 1995)—which can be a high motivator in a team. Consistent with recent multilevel theorizing, we argue that group efficacy has origins at the individual level—and at the concept of self-efficacy (Bandura, 1986)—but emergent properties at the group level (Kozlowski & Klein, 2000) and we suggest that it could equally apply to the level of the subsidiary management team. Durham, Locke, Poon & McLeod (2000) showed that group efficacy positively affects information seeking. We suggest that subsidiaries with low group-efficacy tend to be distracted by ruminations about perceived inadequacies and failures, which consumes limited cognitive resources that are needed to process task demands and seek, attend to, integrate and interpret information effectively. Conversely, those subsidiaries with high group-efficacy tend to be more focused on task requirements and less distracted by performance anxiety and off-task cognitions (Bandura, 1991, 1997) and therefore they may be better able and motivated to seek, integrate, and interpret information (Brown et al., 2001:5).

The concept of group-efficacy helps to explain why the subsidiary that rates its own capabilities highly would also be engaging in problemistic search. Essentially, greater self-belief creates a motivation for the subsidiary to improve (and therefore fulfill that self-belief), which leads to a more explicit and self-critical assessment of the subsidiary’s own strengths.
and weaknesses. This process is likely to expose aspects of the subsidiary’s activities that are not as strong as managers would like, with the result that they engage in a process of search to identify other units that can help them to improve further. Stated more formally:

**Hypothesis 5a.** Higher self-rating of its capabilities by the focal unit is associated with a high frequency of vertical knowledge inflows.

**Hypothesis 5b.** Higher self-rating of its capabilities by the focal unit is associated with a high frequency of horizontal knowledge inflows.

The net effect of hypotheses four and five is that a subsidiary unit is likely to be isolated from internal knowledge flows if it is perceived by others and by itself as having low capabilities. This happens because other units do not perceive the value of focal unit’s capabilities and therefore they do not look for its knowledge. On top of that, the focal unit that perceives itself as having low capabilities is likely to lack both the initiative and the ability to look for and absorb outside knowledge.

**Knowledge flows and subsidiary performance**

Our model suggests an overall pattern of knowledge flows that reinforces existing relationships and potentially leaves some subsidiaries isolated from the main flow of interactions in the MNC. We now examine the likely impact that this pattern will have on subsidiary performance. This is important because while most of the extant literature implicitly links knowledge transfer and performance, only a few studies (e.g. Brown & Eisenhardt, 1997; Lord & Ranft; 1998, Tsai, 2001) actually measure performance.

We expect that the isolated subsidiaries are in fact in a disadvantageous position within the MNC. They are not able to take advantage of the knowledge developed by other units within the MNC (e.g. new products or services). In addition, we conjecture that the advantages of internal knowledge transfers derive not only from the knowledge inflow itself but also from the knowledge transfer process, i.e., from the participation in an internal
knowledge network. Powell et al. (1996: 142) found that biotech firms that do not engage in interorganizational collaboration agreements have a liability of unconnectedness and tend to have lower performance than those firms that have larger, more diverse alliance networks. They argue that the development of absorptive capacity, the skill at managing collaborations, the increased awareness of new projects and reputation as a valuable partner, are all serendipitous benefits of collaboration. We believe that similar mechanisms operate in knowledge transfers among units belonging to the same MNC. Therefore, we speculate that units participating in knowledge transfer activities (both sending and receiving knowledge) within the MNC enjoy the serendipitous benefits described by Powell et al. (1996). Conversely, isolated subsidiaries also have a liability analogous to the idea of “liability of unconnectedness” (Powell et al., 1996) that we call “liability of internal isolation. More precisely, to be an isolated subsidiary the focal unit should be isolated both in terms of outflows and inflows both horizontally and vertically. Thus:

_Hypothesis 6. Higher frequency of knowledge inflows and outflows is associated with higher performance; in other words, isolated subsidiaries will underperform subsidiaries that are not isolated._

**RESEARCH METHODOLOGY**

**Empirical setting**

The study focused on the market-facing subsidiaries—units responsible for marketing and sales activities within a particular country—of large MNCs, and in particular on their _marketing capabilities_ – their skills in understanding and satisfying customers (Day, 1994). We argue that market-facing units lend themselves well to the study of knowledge transfer within MNCs because they serve as corporate links between customers and the major value-adding activities of the MNC, and in order to facilitate worldwide value creation they are highly dependent on knowledge transfer within the organization (Schlegelmilch & Chini,
Moreover, market-facing units are sufficiently plentiful, and diverse in age, origin, and geographic location, that they are likely to provide an appropriate context to examine the phenomenon of isolated subsidiaries.

**Sample**

Data collection for this study consisted of three phases. Firstly, a qualitative pilot study of transfers of best practices in the European operations of a U.S. based MNC was conducted. The qualitative pilot study included interviews with a total of seven marketing managers from four different countries. After this qualitative pilot study, we put together a draft questionnaire that was presented, discussed, and tested at one Swedish MNC. The questionnaire, which was based on a mixture of established scales from the literature and our own measures of constructs relevant for our study, was completed by 17 managers in five countries, as well as three HQ managers. The third phase of the research was the main data-gathering exercise. We approached six large MNCs to take part in the research. Once their support had been gained, we were given a lead contact—the corporate marketing manager or the equivalent—who provided us with a list of all marketing subsidiaries around the world. The main survey consisted of two parts. The first was sent to the managers of 204 marketing subsidiaries in the six participating MNCs (Sandvik Coromant, Sandvik Steel, Ericsson, Volvo, Pharmacia and Alfa Laval Agri). The overall average subsidiary response rate was 84% (171 responses). See Table 1. No particular geographic region was over- or under-represented in the response by the subsidiary managers. The second part of the survey was filled in by executives from corporate HQ. Our lead contact in each of the firms either filled in the survey himself/herself, or provided names of corporate managers with global or regional responsibility for marketing activities in the MNC. The average corporate response rate was 88%, i.e. 22 out of 25 corporate/division managers. The two parts of the questionnaire yielded the quantitative data upon which the hypotheses in this study are tested.
Measures

The bulk of the questions were attitudinal, in that they asked respondents to assess the extent to which they agreed with the question on a 1-7 Likert scale. In addition, we also asked a number of factual questions, such as the subsidiary’s year of foundation or its number of employees. Finally, we also collected some data from secondary sources, such as the geographic distance from headquarters and the income per capita in each host country.

Knowledge flows—We operationalized this construct by asking subsidiary managers about the frequency of (1) transfers of products and services and (2) transfers of marketing practices, on a 1-5 Likert scale (1-never; 2-less than once a year; 3-once or twice a year; 4-around 3-6 times a year; 5-more than 6 times/year). These questions were asked for four different sets of conditions: (1) inflows from peer subsidiaries (horizontal knowledge inflows); (2) inflows from the MNC headquarters (vertical knowledge inflows); (3) outflows to peer subsidiaries (horizontal knowledge outflows) and (4) outflows to the headquarters (vertical knowledge outflows). For each of these knowledge flow directions, responses across the two items were averaged to yield composite measures. The means, medians, standard deviations and Cronbach alpha values are shown in Table 2.

Subsidiary performance—To avoid common method bias, we asked the corporate respondents (i.e. the subsidiary manager’s boss) to rate the subsidiary’s relative financial performance on three dimensions: overall sales revenue, overall market share and operating profit (where 1=much below average, 4=average and 7=much above average). Responses on

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3 Concerned about the possibility of common method bias, we conducted factor analysis including all the attitudinal variables that were measured by subsidiary managers. The first factor accounted for only 44% of the variance and four factors were necessary to explain 86% of the variance. If common method bias were a serious problem in our data, one factor accounting for most of the covariance in the independent and dependent variables should have emerged (Podsakoff and Organ, 1986).
the three items were averaged to yield a composite measure of subsidiary performance. Reliability was moderate (0.69).4

*Ratings of focal subsidiary capabilities* — We operationalised subsidiary capabilities as their market orientation, defined as the continuous collection of information about customers’ needs and competitors’ capabilities and the use of this information to create superior customer value (Jaworski and Kohli, 1993; Slater & Narver, 1995). We believe that the use of market orientation is particularly appropriate in this study because of our focus on the transfer of marketing knowledge (it certainly would have not been the best indicator of the subsidiary’s capabilities if we were analysing knowledge flows between R&D units, for instance). As we discussed above, we used three perceptual measures of market orientation: (1) the focal subsidiary’s self rating of its market orientation; (2) the corporate manager’s rating of the focal subsidiary’s market orientation, and (3) the peers’ rating about the market orientation of the focal subsidiary. The focal subsidiary’s *self-rating* was measured using Jaworski & Kohli’s (1993) established index. Because of space constraints, we ended up shortening their instrument (by deleting those items that had the weakest loading in the pilot questionnaire) leaving 21 items. The scale had high reliability (Alpha=0.81). The *corporate manager’s rating* of the focal subsidiary’s market orientation was measured through a 3-item scale which asked corporate respondents to rate, using a 1-7 Likert scale (1=much below average, 4-average and 7=much above average), each subsidiary’s expertise in (1) collecting market information; (2) distributing market information and (3) analysing and acting on market information. (Alpha=0.92). The corporate respondents did not answer the questions on all 21 items because they were typically answering for ten or more different units, but we carefully explained these items to them before they assessed the subsidiary’s market orientation.

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4 We are aware that this reliability is slightly below the 0.70 minimum acceptable level. It should be taken into consideration, however, that Cronbach alpha values are quite sensitive to short-scales (i.e. it tends to be lower in scales with less than ten items) and in this case we have only a three-item scale (Hair et al., 1998:118).
Finally, we measured the **peers’ rating** of a focal subsidiary market orientation by asking each respondent unit to vote for the most capable subsidiary in (1) collecting market information; (2) distributing market information and (3) analysing and acting on market information. The peers’ rating variable is the sum of all votes in the three items above received by a focal subsidiary⁵.

*Geographic distance*—We computed the geographic distance in kilometres between the hosting city of the focal subsidiary and the city in Sweden where the MNC’s headquarters were located. In order to dampen the high variability in distance and achieve a more normal distribution, the natural logarithm of the geographic distance was used in our analyses.

*Isolated subsidiaries*—This is a dummy variable that took the value of one only when the focal subsidiary met *all* the following criteria: it experienced (1) vertical knowledge outflows less than once a year; (2) vertical knowledge inflows less than once a year; (3) horizontal knowledge outflows less than once a year; and (4) horizontal knowledge inflows less than once a year. Note that “less than once a year” is a score of 2 on the 5-point knowledge flow scale (see above), which seemed to be a reasonable level at which to define the concept of isolation. See Tables 2 and 3. However, as described below we also tested hypothesis 6 with alternative cut-off points as a way of assessing the robustness of our results.

*Communication frequency*—Based on a simple frequency scale where 1 = daily and 7 = yearly or less (see Ghoshal, 1986; Nobel & Birkinshaw, 1998), this scale asked respondents to indicate often how they communicated with (a) HQ managers, face-to-face, to discuss operations, (b) HQ managers, through other means, to discuss operations. The responses to

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⁵ For example, in Ericsson we asked 25 subsidiaries to rate which of their peers was best on each of the three dimensions of marketing orientation, resulting in a number of votes between zero and 12 for each country subsidiary. The number of “votes” was then assigned to the subsidiary in question as the aggregate peer rating of their capability. While a more precise approach to operationalizing this construct would be possible in a dyadic research design (i.e. studying individual flows), we believe this is as precise as one could achieve with a nodal design.
these two items were averaged to yield a composite measure of communication with headquarters (Alpha 0.75). The same questions were posed in relation to the communication with peer subsidiaries. Again, responses were averaged and a composite measure of communication with peer subsidiaries was created (Alpha 0.74). We reverse-coded the communication items so that a higher number is associated with more frequent communication rather than vice versa.

**Control variables.** Tacitness of knowledge—we used Zander and Kogut’s (1995) scale. Respondents answered the following questions about their knowledge based on a 1-7 Likert scale, where 1=strongly disagree and 7=strongly agree: (a) a manual describing how our activities are executed could be written, (b) new staff can easily learn how to perform the services that our local company offers by talking to skilled employees, (c) training new personnel is typically a quick and easy job for us, (d) new personnel with a university education can perform the services that our local company offers. Reliability for these items was moderate (Alpha = 0.67). Tacitness items were reverse coded so that a higher number is associated with more tacit knowledge.

**Host country economic level**—Different levels of economic development of the country where the focal subsidiary is hosted may affect knowledge flows from and to that subsidiary (Gupta & Govindarajan, 2000). To control for these effects, for each host country, data on per capita income (gross national product per capita Atlas method) in 1998 (year the data for this study were collected) were obtained from the World Development Report (World Bank, 2003).

**Subsidiary age**—Older subsidiaries may have had more time to develop the mechanisms and relationships to share knowledge within the MNC (Birkinshaw, Nobel & Ridderstrale, 2002). To control for this effect, we included a variable called “Subsidiary age” which is the year when data for this study were collected (1998) minus the year of the subsidiary’s foundation.
Subsidiary size—Unit size may affect the frequency of intra-firm knowledge transfer (Birkinshaw et al., 2002; Hansen & Lovas, 2004). We control for this effect by asking respondents to indicate the number of employees in the subsidiary, which we convert to a natural logarithm in order to dampen the high variability in size and achieve a more normal distribution.

Use of external expertise—In order to control for the impact of external sources of knowledge (e.g. customers, suppliers, competitors), respondents answered the following question about their use of external expertise on a 1-7 Likert scale, where 1=strongly disagree and 7=strongly agree: “We frequently draw on external expertise when we perform our activities.”

Validity checks—We used SAS V8 to perform confirmatory factor analyses (CFA) to check the discriminant validity (Bollen, 1989, Long, 1983, Judge, 1993) of some of our multi-item constructs (e.g. the four types of knowledge flows and the two types of communication). The results show that horizontal and vertical communications are two different constructs (the correlation between them is significantly less than 1.0) and that our two-factor model has a better fit than an alternative one-factor model. Akaike’s information criterion (AIC; Boomsma, 2000; Hu&Bentler, 1999) was better (that is, smaller) for our two-factor model than for one-factor model (AIC 2-factors=12.53; AIC 1-factor=69.96). Similarly, our four constructs used to describe knowledge flows (vertical knowledge outflows, horizontal knowledge outflows, vertical knowledge inflows and horizontal knowledge inflows) also have discriminant validity (the correlation among the four latent constructs were all significantly less than 1.0, ranging from 0.30 to 0.67 with a mean of 0.48). In addition, a four-factor solution has a better fit than plausible rival models. Akaike’s information criterion (AIC; Boomsma, 2000; Hu&Bentler, 1999) was better for our four-factor model than for the one- or two-factor models (AIC 4-factors=26.20; AIC 2-factors=108.74; AIC 1-factor=185.48). Although this
four-factor model of intra-firm knowledge flows has been used before in the literature (e.g. Gupta&Govindarajan, 2000; Schulz, 2001), to the best of our knowledge, this is the first time that CFA is used to ascertain the discriminant validity of these measures. We have also checked the convergent validity (i.e. the degree to which specific items jointly load on their hypothesized constructs; Judge, 1993) of all our multi-item constructs. Factor loadings varied considerably (from 0.41 to 0.98) but were all highly significant (p<.01) and corresponded to the hypothesized latent constructs.

RESULTS

Before moving on to a discussion of the hypotheses, it is useful to discuss a few descriptive statistics associated with the questionnaire data. Tables 2 and 3 contain the descriptive and frequency statistics of the four knowledge flow variables (vertical outflows and inflows and horizontal outflows and inflows). We confirmed that a significant number of subsidiaries (12.5%) never or less than once a year was involved in any of the four types of knowledge flows (see last column in Table 3): these are the isolated subsidiaries as defined above. The correlation matrix in Table 4 also shows, as predicted, the low correlations between the three perceptions (self, corporate and peers) of a focal subsidiary’s capabilities. The correlation between self-perception and corporate perception is 0.14 and between the former and peer perception is only 0.04. Peer perception and corporate perception about a focal subsidiary’s capabilities show a stronger correlation (0.30) but still very far from 1.0.

Statistical Methods

We used ordinary least squares (OLS) to test our hypotheses. We used Stata 8.0’s regression with robust standard errors to counter the effects of heterocedasticity and because multiple observations from the same host country may not be independent, we also used robust clustering procedure as implemented in Stata 8.0 for all our models (Williams, 2000;
To eliminate any spurious effects due to unobserved differences among firms, we included fixed firm effects by entering *dummy variables* for the six companies in the study. In order to check for the effects of multicollinearity, we calculated the variance inflation factors (VIF) and none of our variables was close to the common cut-off threshold of tolerance that corresponds to a VIF above 10 (Wooldridge, 2002).

**Tests of Hypotheses**

Hypothesis one posited that communication with HQs and with peers was positively correlated with knowledge outflows and inflows. Model 2 in Table 5 shows that hypothesis 1a is not supported. Communication with HQ has the predicted sign, i.e., it is positively associated with vertical knowledge outflows, but it is not significant. Model 4, on the other hand, strongly supports the prediction that communication with other subsidiaries is associated with horizontal knowledge outflows. As Models 6 and 8 show, neither hypothesis 1c and nor 1d which predicted the association of frequency of communication with knowledge inflows was supported.

Hypotheses 2a and 2b predicted that the closer a focal subsidiary is to the MNC’s headquarters, the higher the vertical knowledge outflows from and inflows to that subsidiary. Models 2 and 6 offer support to hypotheses 2a and 2b, respectively. Hypotheses 3a and 3b predicted that the higher the knowledge outflows from a focal subsidiary the higher the knowledge inflows to that subsidiary, both at the vertical and horizontal levels. Models 6 and 8 in Table 6 provide strong support to our hypotheses, suggesting that vertical and horizontal knowledge outflows are positively and significantly correlated to vertical and horizontal knowledge inflows, respectively. Hypotheses 4 and 5 refer to the association between perceptions of a focal unit’s capabilities and knowledge outflows from and inflows to that

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6 We have also run the models including one dummy variable for each of the host countries in the sample. This reduced drastically the degrees of freedom of the models but the results were qualitatively the same as those presented in the next session.
unit. In order to test those hypotheses we included in our models both the source’ and the recipient’s perceptions. More precisely, we posited in hypothesis 4a that a higher frequency of vertical knowledge outflows would be associated with a high rating of the focal subsidiary’s capabilities by HQ, and in 4b that a higher frequency of horizontal knowledge outflows would be associated with a high rating of the focal subsidiary’s capabilities by its peers units. In Model 2, we see that HQ’s rating of the focal subsidiary’s capabilities is positively and significantly (p<0.01) associated with vertical knowledge outflows, supporting H4a. Model 4 also shows support for H4b. Turning to hypothesis 5, we predicted that a high self-rating of its capabilities by the focal unit is associated with high knowledge inflows both from the HQs (5a) and from its peer units (5b). Models 6 and 8 provide strong support for both hypotheses.

Insert Tables 5 and 6 about here

Finally, hypothesis 6 proposed that isolated subsidiaries have lower performance than subsidiaries that are not isolated. We tested this hypothesis by introducing a dummy variable (isolated subsidiaries) that took the value of one when the subsidiary has vertical and horizontal knowledge inflows and outflows less than once a year and the value of zero otherwise, while controlling for all other variables in our model. We expected a negative and significant coefficient for that dummy variable. As Model 10 indicates, we found strong support for hypothesis 6 (p<0.01).7

Insert Table 7 about here

Robustness checks

7 In order to avoid common method bias (given our performance measure was provided by corporate managers) we have not included in our performance models (Models 9 and 10) the corporate managers’ rating of the focal subsidiary’s capabilities. If included in the model, this variable is highly significant (p<0.001) and our isolated variable remains significant, although less so (p<0.05)
We also performed a number of robustness checks on our results. We tested hypothesis 6 using a continuous variable (total knowledge flows=sum of the four types of knowledge flows) instead of the dichotomous variable. This variable is positively associated with subsidiary performance although at a lower level of significance. We also tested hypothesis 6 using different cut-off points to define the isolated subsidiaries dummy variable. For instance, we aggregated vertical knowledge inflows and horizontal knowledge inflows in one single variable (total inflows, Alpha 0.75) and vertical knowledge outflows and horizontal knowledge outflows in another variable (total outflows, Alpha 0.83) and used the cut-off of two (never or less than once a year) to define which subsidiaries were considered isolated. We found a significant negative effect (p<0.01) of the isolated subsidiaries dummy. We also tried to use the medians in each type of knowledge flows as the cut-off point. As Table 2 indicates, the median in three types of knowledge flows was 2.0 (the same cut-off point previously used) but it was 3.0 in the case of vertical knowledge inflows. Once more, the isolated subsidiaries dummy had a negative association with subsidiary but this time it is less significant (p<0.05)

**DISCUSSION**

Overall, the findings of this study support the idea that knowledge transfers between units within a MNC tend to be influenced by a demand driven process, initiated by problemistic search on the part of the recipient unit. Three broad sets of insights emerge from the research. First, this study provides empirical support for the importance of physical proximity and reciprocity to explain knowledge flows. Being geographically close to the HQ facilitates both vertical knowledge inflows to as well as vertical knowledge outflows from a focal subsidiary, which seems to indicate that even with access to modern technological resources (the firms in our sample are reasonably large MNCs), physical distance still matters when it comes to searching for and transferring knowledge. Reciprocity seems to be an
important predictor of knowledge inflows, as knowledge tends to flow to those units that frequently share their knowledge with the rest of the organisation. This is likely to end up creating a sub-group of units within the MNC that are frequently exchanging knowledge among themselves while those subsidiaries that rarely act as sources of knowledge transfers are also unlikely to receive knowledge from other units. We found, however, only partial support for our hypotheses about the importance of communication to knowledge outflows and inflows. Communication with HQ does not seem to have a significant impact either on vertical knowledge outflows or on vertical knowledge inflows. On the other hand, communication with peers has a significant association with horizontal knowledge outflows and with horizontal knowledge inflows, when we do not control for horizontal knowledge outflows. Taken in conjunction with the reciprocity findings, these results seem to provide two interesting insights. A focal subsidiary that communicates frequently with HQ does not necessarily engage in more vertical knowledge flows. When it comes to relationship with its peers, however, communication seems to be a good predictor of horizontal knowledge outflows. If we refer back to our demand driven model, this may indicate that when a focal subsidiary communicates frequently with its peers it is somehow generating some demand for its knowledge. Communication *per se*, however, does not seem to guarantee that a focal subsidiary will receive horizontal knowledge flows: here again being a knowledge sharer with its peers is what seems to significantly affect the levels of horizontal knowledge inflows to a focal unit.

Second, we showed that not only do the three ratings (self, corporate and peer) of a focal subsidiary’s capabilities vary significantly (the pairwise correlations among them are quite low, ranging from 0.04 to 0.30) but also that they have different impact on knowledge outflows and inflows. We suggested that knowledge transfer between units within a MNC is a process of problemistic search on the part of the recipient unit and departing from the
assumption that source and recipient agree about how valuable a focal subsidiary’s knowledge is (cf. Gupta and Govindarajan, 2000), we included in our model both the self-rating and the recipient’s evaluation of the source’s capabilities. In the knowledge outflows models, our results supported our argument that what predicts knowledge outflows from a focal unit is not how good it believes itself to be, but rather how the recipient rates the knowledge source. In relation to knowledge inflows, both from HQs and from peer subsidiaries, it is the recipient unit’s perception again that matters. Those units that perceive themselves as highly capable seem to have both the ability and the motivation to look out more frequently for external knowledge than those units with lower self-ratings of their own capabilities.

Those results in conjunction suggest the possibility of a certain path dependence in knowledge transfers within MNCs: as units communicate more frequently and exchange knowledge between each other, they recalibrate their understanding of their capabilities and knowledge. As they update their understanding of themselves as well as of the units they are interacting with, this positively affects their probability of interacting again in the future, creating a dynamic self-reinforcing system, and with time units may be locked in to a limited set of units with which they interact (Borgatti & Cross, 2003:442). It is worth noting that this argument is potentially at odds with Kogut and Zander’s (1996) social identity argument, i.e. that one of the advantages of the firm in relation to markets is that the former provides the normative territory to which members identify. Our argument, instead, is in line with a more nuanced view of social identity (Tajfel, 1982; Tajfel & Turner, 1986), namely optimal distinctiveness theory (Brewer, 1993). According to this theory, the classification of self (in our case a MNC unit) as a member of a highly inclusive superordinate category (e.g. belonging to Ericsson) is unlikely to satisfy most units’ needs for differentiation. Hence, classification at that level may motivate attention to distinctions between themselves and other category members and an active search for subgroup differentiation (Brewer, 1993),
resulting in some sort of in-group / out-group dynamic emerging (Tajfel, 1982; Tajfel & Turner, 1986). To the extent that this occurs, knowledge is more likely to be exchanged between those units that perceive themselves to belong to the same sub-group within the organisation, leading to frequent knowledge exchanges among units belonging to one group of subsidiaries (the in-crowd) while another group (that we labelled isolated) remains alienated from these knowledge sharing activities. Clearly these arguments cannot be verified or falsified with the focus of the current research, because we have no insights into the way that individual subsidiary units identify with other units within the MNC. However, it is interesting to speculate that many of the same patterns of interaction that would be predicted by social identity theory can actually be generated through the problemistic search process. Additional research will be needed to shed light on the extent to which social identity and optimal distinctiveness have any real bearing on the patterns of knowledge flow observed here.

Third, another major goal of this study was to investigate the impact of internal isolation on the isolated subsidiary’s performance. Evidence supported that, all other things being equal, isolated subsidiaries seem to have lower performance than those subsidiaries that are not isolated. We believe that those subsidiaries that are alienated from the knowledge transfer activities within the firm not only do not have access to the knowledge of other units within the MNC (e.g. best practices developed by another subsidiary) but also they are alienated from an information network that is a vehicle for the rapid communication of news about opportunities and obstacles. We speculate that analogous to the idea of liability of (external) unconnectedness (Powell et al., 1996) there may be a liability of internal isolation. The causal relationship between isolation and performance is not clear though. In fact, we believe that knowledge flows and performance may be self-reinforcing mechanisms, i.e., high performing subsidiaries may have the slack resources making them able to share their
knowledge, while low performing subsidiaries are fighting fires and have to concentrate on their own daily activities not sharing any knowledge. Therefore, knowledge sharing provides opportunities for improved performance and improved performance providing slack resources for knowledge sharing.

Limitations and Future Research

This study represents an effort to explore a new theoretical and empirical perspective on knowledge transfers within MNCs. Notwithstanding the robustness of our results across models and the lack of obvious symptoms of biases, we can identify some limitations of this study that should be borne in mind for future research. First, we conducted our examination at the nodal level of analysis (i.e. the subsidiary). This was useful as a means of identifying isolated subsidiaries, but it also created a problem because knowledge transfers are best observed at the level of the dyad or system (Gupta & Govindarajan, 2000). Future research could build on this study to develop more elaborate hypotheses that could be tested at the dyadic level of analysis. Second, despite the fact that we collected some data from secondary sources (e.g. geographic distance from headquarters and the income per capita in each host country), we used perceptual instruments to measure most of our variables, notably, the extent of knowledge outflows and inflows and subsidiary performance. Finally, the test of hypotheses in a cross-sectional research design indicates association, not causality. This raises the problem of simultaneity and we suggest the results of this study be interpreted with the necessary caution, avoiding strong causal inferences from them. It would be desirable if future research could investigate why some subsidiaries are isolated from the knowledge transfers activities within the MNC using longitudinal data. A promising avenue for future research is to use longitudinal data to test if differences between “in-crowd” and “out-crowd” units tend to increase, stabilise or diminish over time. According to the principle of learning substitution (Levinthal & March, 1993:99), for instance, and assuming that a MNC is a nested
learning system, where learning occurs at several different but interrelated units at the same time, one could expect that learning in one subsidiary would potentially be a substitute for learning at another (Levinthal & March, 1993). If this is true, with time the highly capable units would be increasingly involved in knowledge outflows and inflows and would substitute for learning in low capable subsidiaries, generating increasing disparities between the former and the latter. Hence, these in-crowd subsidiaries would increasingly develop their capabilities, releasing the pressure for the isolated units to adapt.

**Conclusion**

To conclude, this study provided a fresh look at the issue of knowledge sharing in MNCs by focusing on the situation facing subsidiary units that are not involved in knowledge sharing to any meaningful degree. We proposed that the recipients of knowledge flows within the MNC engage in a process of problemistic search that privileges those units that are geographically close, with which they have some communication and from which they can expect some reciprocity in terms of knowledge flows. We argue that it is the recipients’ motivation and absorptive capacity (rather than the attributes of the source unit) and their perceptions about the capabilities of those units they are sourcing knowledge from that drive the process of knowledge transfers within MNCs. For MNCs concerned about how they might better manage their internal knowledge flows, such subsidiaries are a real priority, and should therefore be the focus of far more attention than they have received to date.
### TABLE 1 Subsidiary Response Rates—Overall and by Firm

<table>
<thead>
<tr>
<th></th>
<th>Number of units</th>
<th>Number of units per firm</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial mailing</td>
<td>204*</td>
<td>Coromant 31, Steel 39, Ericsson 46, Volvo 29, Pharmacia 26, Alfa Laval Agri 33</td>
<td>100%</td>
</tr>
<tr>
<td>Non-responses</td>
<td>33</td>
<td>Coromant 0, Steel 7, Ericsson 14, Volvo 4, Pharmacia 7, Alfa Laval Agri 1</td>
<td>16.2%</td>
</tr>
<tr>
<td>Responses</td>
<td>171</td>
<td>Coromant 31, Steel 32, Ericsson 32, Volvo 25, Pharmacia 19, Alfa Laval Agri 32</td>
<td>83.8%</td>
</tr>
<tr>
<td>Corporate responses</td>
<td>154**</td>
<td>Coromant 27, Steel 32, Ericsson 21, Volvo 25, Pharmacia 17, Alfa Laval Agri 32</td>
<td>75.5%</td>
</tr>
</tbody>
</table>

*Two units were excluded from an initial sample since one of the MNCs was closing down its operations in these countries. There were few employees left, and their motivation to participate in the study was very low. ** 19 corporate managers assessed those 154 subsidiaries.

### TABLE 2 – Descriptive Statistics - Knowledge Flows

<table>
<thead>
<tr>
<th></th>
<th>Vertical knowledge outflows</th>
<th>Horizontal knowledge outflows</th>
<th>Vertical knowledge inflows</th>
<th>Horizontal knowledge inflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>N valid</td>
<td>167</td>
<td>165</td>
<td>164</td>
<td>165</td>
</tr>
<tr>
<td>Mean</td>
<td>2.18</td>
<td>2.18</td>
<td>3.01</td>
<td>2.30</td>
</tr>
<tr>
<td>Median</td>
<td>2.00</td>
<td>2.00</td>
<td>3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.01</td>
<td>.90</td>
<td>.932</td>
<td>.956</td>
</tr>
<tr>
<td>Cronbach Alpha</td>
<td>0.82</td>
<td>0.79</td>
<td>0.73</td>
<td>0.77</td>
</tr>
</tbody>
</table>

### TABLE 3 – Frequency Statistics - Knowledge Flows

<table>
<thead>
<tr>
<th>Frequency of knowledge flows</th>
<th>Vertical knowledge inflows</th>
<th>Horizontal knowledge inflows</th>
<th>Vertical knowledge outflows</th>
<th>Horizontal knowledge outflows</th>
<th>All four types of knowledge flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never or less than once a year</td>
<td>21.3%</td>
<td>53.9%</td>
<td>53.3%</td>
<td>58.2%</td>
<td>12.5%</td>
</tr>
<tr>
<td>More than once a year</td>
<td>78.7%</td>
<td>46.1%</td>
<td>46.7%</td>
<td>41.8%</td>
<td>87.5%</td>
</tr>
</tbody>
</table>
### TABLE 4  Descriptive Statistics and Correlation matrix

| N  | Mean  | S.D.  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  |
|----|-------|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1  | Vertical outflow | 167 | 2.18 | 2.03 | 1.00 |
| 2  | Vertical inflow  | 164 | 3.01 | 1.86 | 0.39 | 1.00 |
| 3  | Horizontal outflow | 165 | 2.18 | 1.80 | 0.63 | 0.26 | 1.00 |
| 4  | Horizontal inflow | 165 | 2.30 | 1.91 | 0.30 | 0.45 | 0.44 | 1.00 |
| 5  | Isolated subsidiaries | 168 | 0.13 | 0.33 | -0.38 | -0.55 | -0.38 | -0.34 | 1.00 |
| 6  | Performance | 154 | 4.10 | 1.33 | 0.33 | 0.03 | 0.36 | 0.00 | 0.14 | 1.00 |
| 7  | Market orientation (corporate rating) | 154 | 4.42 | 1.26 | 0.28 | -0.07 | 0.29 | -0.12 | 0.07 | 0.65 | 1.00 |
| 8  | Market orientation (subsidiary rating) | 171 | 4.41 | 0.73 | 0.15 | 0.21 | 0.28 | 0.32 | 0.11 | 0.17 | 0.34 | 1.00 |
| 9  | Market orientation (peer rating) | 171 | 0.90 | 2.52 | 0.20 | 0.10 | 0.20 | -0.01 | -0.60 | 0.33 | 0.30 | 0.04 | 1.00 |
| 10 | Communication with sub | 169 | 2.95 | 1.19 | 0.09 | 0.10 | 0.24 | 0.20 | -0.10 | 0.20 | 0.14 | 0.26 | 0.09 | 1.00 |
| 11 | Communication with HQ | 169 | 3.41 | 1.34 | 0.14 | 0.13 | 0.09 | 0.07 | -0.10 | 0.09 | 0.03 | 0.13 | 0.10 | 0.37 | 1.00 |
| 12 | Geographical distance (ln) | 161 | 7.53 | 1.14 | 0.29 | 0.07 | 0.29 | -0.09 | 0.03 | -0.35 | -0.22 | -0.09 | 0.12 | -0.25 | -0.07 | 1.00 |
| 13 | Age | 154 | 27.63 | 23.06 | 0.27 | 0.15 | 0.26 | 0.07 | -0.12 | 0.29 | 0.29 | 0.14 | 0.06 | 0.05 | 0.02 | -0.18 | 1.00 |
| 14 | Tacitness | 171 | 4.36 | 0.82 | 0.12 | -0.08 | 0.13 | -0.08 | 0.16 | 0.08 | 0.24 | 0.27 | -0.05 | 0.04 | -0.07 | -0.20 | 0.04 | 1.00 |
| 15 | Use of external expertise | 170 | 3.48 | 1.70 | -0.07 | -0.05 | -0.10 | 0.01 | 0.02 | 0.04 | 0.10 | 0.03 | 0.01 | -0.03 | 0.15 | -0.02 | -0.09 | -0.05 | 1.00 |
| 16 | Size (ln employee) | 166 | 3.96 | 1.50 | 0.27 | -0.06 | 0.27 | -0.05 | -0.03 | 0.45 | 0.36 | 0.01 | 0.19 | 0.01 | -0.04 | -0.12 | 0.31 | 0.00 | 0.02 | 1.00 |
| 17 | Gni per capita host country | 157 | 19129.87 | 11724.50 | 0.25 | -0.03 | 0.19 | -0.06 | -0.08 | 0.47 | 0.45 | -0.01 | 0.19 | 0.17 | 0.09 | -0.37 | 0.26 | 0.06 | 0.01 | 0.23 | 1.00 |
| 18 | dumsteel | 171 | 0.19 | 0.39 | 0.02 | 0.05 | -0.03 | 0.03 | -0.14 | -0.19 | -0.06 | 0.04 | -0.09 | -0.20 | 0.16 | 0.08 | 0.10 | 0.02 | 0.11 | -0.33 | 0.06 | 1.00 |
| 19 | dummcorom | 171 | 0.18 | 0.39 | -0.05 | 0.25 | -0.03 | -0.10 | -0.13 | 0.00 | 0.03 | 0.02 | -0.02 | -0.06 | 0.04 | 0.05 | 0.15 | 0.05 | 0.12 | 0.06 | -0.01 | -0.23 | 1.00 |
| 20 | dumeric | 171 | 0.19 | 0.39 | 0.01 | -0.05 | -0.14 | -0.17 | 0.05 | 0.13 | 0.04 | -0.17 | -0.11 | 0.05 | 0.10 | 0.04 | -0.23 | -0.03 | -0.08 | 0.13 | -0.04 | -0.23 | 1.00 |
| 21 | dumvolvo | 171 | 0.15 | 0.35 | -0.09 | -0.18 | -0.02 | 0.10 | 0.15 | -0.05 | 0.24 | 0.09 | 0.00 | 0.22 | 0.17 | -0.13 | -0.06 | 0.12 | 0.18 | 0.06 | 0.09 | -0.20 | -0.19 | 0.20 | 1.00 |
| 22 | dumpharm | 171 | 0.11 | 0.32 | -0.12 | -0.30 | 0.06 | -0.02 | 0.26 | 0.07 | -0.04 | -0.10 | -0.03 | 0.24 | -0.05 | -0.11 | 0.00 | 0.08 | 0.30 | 0.03 | -0.17 | -0.17 | -0.15 | 1.00 |
| 23 | dumagri | 171 | 0.19 | 0.39 | 0.20 | 0.15 | 0.18 | 0.17 | -0.13 | 0.07 | -0.14 | 0.06 | 0.30 | 0.04 | 0.14 | -0.01 | 0.11 | -0.10 | 0.16 | -0.05 | 0.00 | -0.23 | -0.23 | -0.20 | -0.17 | 1.00 |
**TABLE 5 Results of Regression Analysis of Vertical and Horizontal Knowledge Outflows**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Vertical Outflows</th>
<th>Model 2 Vertical Outflows</th>
<th>Model 3 Horizontal Outflows</th>
<th>Model 4 Horizontal Outflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market orientation capabilities (corporate rating)</td>
<td>-</td>
<td>0.32**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Market orientation capabilities (self rating)</td>
<td>-</td>
<td>0.16</td>
<td>-</td>
<td>0.18</td>
</tr>
<tr>
<td>Market orientation capabilities (peer rating)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.09**</td>
</tr>
<tr>
<td>Ln geographic distance (from HQ)</td>
<td>-</td>
<td>-0.31**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Communication with HQ</td>
<td>-</td>
<td>0.20</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Communication with subsidiaries</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.50***</td>
</tr>
<tr>
<td>Age</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Tacitness</td>
<td>0.26</td>
<td>0.36</td>
<td>0.22</td>
<td>0.22</td>
</tr>
<tr>
<td>Size (lnemployee)</td>
<td>0.45***</td>
<td>0.38**</td>
<td>0.30**</td>
<td>0.31***</td>
</tr>
<tr>
<td>Gni per capita (host country)</td>
<td>0.00</td>
<td>-0.00</td>
<td>0.00</td>
<td>-0.00</td>
</tr>
<tr>
<td>Use external expertise</td>
<td>-0.07</td>
<td>-0.08</td>
<td>-0.09</td>
<td>-0.16**</td>
</tr>
<tr>
<td>_cons</td>
<td>-0.16</td>
<td>2.05</td>
<td>2.35</td>
<td>0.63</td>
</tr>
<tr>
<td>Firm effects (joint test)</td>
<td>**</td>
<td>*</td>
<td>Not Sig.</td>
<td>Not Sig.</td>
</tr>
<tr>
<td>F</td>
<td>3.29**</td>
<td>7.08***</td>
<td>6.13***</td>
<td>10.10***</td>
</tr>
<tr>
<td>ΔF</td>
<td></td>
<td></td>
<td>6.83***</td>
<td>10.55***</td>
</tr>
<tr>
<td>R2</td>
<td>0.21</td>
<td>0.33</td>
<td>0.21</td>
<td>0.35</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.15</td>
<td>0.24</td>
<td>0.15</td>
<td>0.28</td>
</tr>
<tr>
<td>Δ in Adjusted R2</td>
<td>-</td>
<td>0.09</td>
<td>-</td>
<td>0.13</td>
</tr>
<tr>
<td>N</td>
<td>138</td>
<td>119</td>
<td>136</td>
<td>136</td>
</tr>
</tbody>
</table>

† p < 0.10, * p < 0.05; **p < 0.01, ***p < 0.001. Two-tailed tests. Robust standard errors between parentheses. Firm dummies included in all models but not shown.

---

**TABLE 6**
Results of Regression Analysis of Vertical and Horizontal Knowledge Inflows

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 5 Vertical inflows</th>
<th>Model 6 Vertical inflows</th>
<th>Model 7 Horizontal inflows</th>
<th>Model 8 Horizontal inflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical outflow</td>
<td>-</td>
<td>0.28**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal outflow</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.42***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.11)</td>
</tr>
<tr>
<td>Market orientation (corporate assessment)</td>
<td>-</td>
<td>-0.13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market orientation (self assessment)</td>
<td>-</td>
<td>0.55**</td>
<td>-</td>
<td>0.61**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.26)</td>
<td></td>
<td>(0.18)</td>
</tr>
<tr>
<td>Market orientation (peer assessment)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.06)</td>
</tr>
<tr>
<td>Ln geographic distance (from HQ)</td>
<td>-</td>
<td>-0.19†</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with HQ</td>
<td>-</td>
<td>-0.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with peer subsidiaries</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.13)</td>
</tr>
<tr>
<td>Age</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.00</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Tacitness</td>
<td>-0.27</td>
<td>-0.36</td>
<td>-0.24</td>
<td>-0.52**</td>
</tr>
<tr>
<td></td>
<td>(0.19)</td>
<td>(0.21)</td>
<td>(0.15)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>Size (lnemployee)</td>
<td>-0.01</td>
<td>-0.25**</td>
<td>-0.10</td>
<td>-0.22*</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Use of external expertise</td>
<td>-0.04</td>
<td>0.00</td>
<td>-0.10</td>
<td>-0.07</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.09)</td>
<td>(0.10)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Gni per capita (host country)</td>
<td>-0.00</td>
<td>-0.00</td>
<td>-0.00†</td>
<td>-0.00*</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>_cons</td>
<td>7.28***</td>
<td>6.44***</td>
<td>6.64***</td>
<td>3.79**</td>
</tr>
<tr>
<td></td>
<td>(1.05)</td>
<td>(1.49)</td>
<td>(1.08)</td>
<td>(1.00)</td>
</tr>
<tr>
<td>Firm effects (joint test)</td>
<td>***</td>
<td>***</td>
<td>*</td>
<td>Not Sig.</td>
</tr>
<tr>
<td>F</td>
<td>4.08***</td>
<td>6.27***</td>
<td>2.88**</td>
<td>5.75***</td>
</tr>
<tr>
<td>ΔF</td>
<td>-</td>
<td>3.18*</td>
<td>-</td>
<td>12.66***</td>
</tr>
<tr>
<td>R2</td>
<td>0.18</td>
<td>0.35</td>
<td>0.13</td>
<td>0.37</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.12</td>
<td>0.25</td>
<td>0.06</td>
<td>0.29</td>
</tr>
<tr>
<td>Δ in Adjusted R2</td>
<td>-</td>
<td>0.13</td>
<td>-</td>
<td>0.23</td>
</tr>
<tr>
<td>N</td>
<td>135</td>
<td>116</td>
<td>136</td>
<td>133</td>
</tr>
</tbody>
</table>

† p < 0.10, * p < 0.05; **p < 0.01, ***p<0.001. Two-tailed tests. Robust standard errors between parentheses. Firm dummies included in all models but not shown.
### TABLE 7

Results from Regression Analysis of Subsidiary Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 9</th>
<th>Model 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated subsidiaries dummy</td>
<td>-</td>
<td>-0.89**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.33)</td>
</tr>
<tr>
<td>Market orientation</td>
<td>0.17**</td>
<td>0.17**</td>
</tr>
<tr>
<td>(peer assessment)</td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Market orientation</td>
<td>0.17</td>
<td>0.13</td>
</tr>
<tr>
<td>(subsidiary assessment)</td>
<td>(0.12)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Communication with HQ</td>
<td>-0.00</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Communication with peer subsidiaries</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Age</td>
<td>0.00</td>
<td>0.01†</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Ln geographic distance</td>
<td>-0.16†</td>
<td>-0.16†</td>
</tr>
<tr>
<td>(from HQ)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Tacitness</td>
<td>0.12</td>
<td>0.19†</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Size (lnemployee)</td>
<td>0.20*</td>
<td>0.18†</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Use of external expertise</td>
<td>0.07</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>Gni per capita (host country)</td>
<td>0.00***</td>
<td>0.00**</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>_cons</td>
<td>1.75†</td>
<td>1.78†</td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
<td>(0.93)</td>
</tr>
<tr>
<td>Firm effects (joint test)</td>
<td>*</td>
<td>Not Sig.</td>
</tr>
<tr>
<td>F</td>
<td>30.06***</td>
<td>29.60***</td>
</tr>
<tr>
<td>ΔF</td>
<td>-</td>
<td>8.68**</td>
</tr>
<tr>
<td>R2</td>
<td>0.49</td>
<td>0.52</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.42</td>
<td>0.44</td>
</tr>
<tr>
<td>Δ in Adjusted R2</td>
<td>-</td>
<td>0.02</td>
</tr>
<tr>
<td>N</td>
<td>120</td>
<td>119</td>
</tr>
</tbody>
</table>

† p < 0.10, * p < 0.05; **p < 0.01, ***p<0.001. Two-tailed tests. Robust standard errors between parentheses. Firm dummies included in all models but not shown.
References


Teece, D. J. 1981. The market for know-how and the efficient international transfer of technology, Annals, AAPSS, 458, 81-96.


Executive Summary of the revisions of “Knowledge Flows within Multinational Corporations: Why are some subsidiaries isolated” (AMJ #04-0329).

We would like to offer our sincere appreciation for the comments and suggestions provided by the editor and reviewers, as well as your patience as we reframed, re-conceptualised and conducted many new analyses. In all instances, the feedback you provided was constructive and extremely helpful. It is worth noting that the new version is dramatically different to the old one in many respects, and approximately two-thirds of the text is now new. By implementing your ideas, we believe our manuscript has vastly improved. We hope you agree! We provide an overview here of the major changes in this piece, followed by specific responses to each of your comments.

1. Theoretical model— After much consideration, re-examination of the literature, and further exploration of our data, we agreed with the editor and reviewers 1 and 2 that we had a problem in our level of analysis to the extent that the applicability of micro level theories to the subsidiary level was not immediately evident. We also agreed with reviewer 2 that without having longitudinal data, the predictions we were making using the learning substitution effect (Levinthal & March, 1993) were open to alternative explanations that we could not rule out completely. Therefore, although we continue to believe that both learning substitution and in-group-out-groups dynamics play an important role in intra-firm knowledge flows, given the nodal and cross-sectional nature of our data, we could not directly test some of our old hypotheses. We have now transformed both arguments into conjectural points and included them in the discussion section.

Our new theoretical model is still based on traditional theories about the MNC and knowledge flows within it (Ghoshal and Nohria, 1989; Gupta and Govindarajan, 2000; Nohria and Ghoshal, 1997; Schulz, 2003; Szulanski, 1996) but we now develop two new building blocks: first, we went back to Cyert and March’s (1963) Behavioural Theory of the Firm to argue that knowledge transfer between units can be framed as a process of problemistic search on the part of the recipient. Second, we suggest that there is very limited awareness in the MNC of where its useful knowledge resides and knowledge flows is driven not by an absolute notion of value but by perceptions of value. We should acknowledge that this second argument was strongly influenced by a specific comment made by all three reviewers. In their comments, the three reviewers raised the issue about why we were using two different measures of market orientation (corporate’s and subsidiary’s ratings). Reviewers 1 and 3 were particularly surprised by the low correlation (0.14) between the two measures and reviewer 1, for example, suggested that we included the two measures in our models. This is exactly what we did (We have included two ratings in all our models. In vertical flows we included the HQs rating and the self-rating. In horizontal flows, we included again the self-rating but then replaced HQs rating with peers’ rating). As we discuss in the body of the paper, this imperfect evaluation of subsidiary capabilities created a conceptual challenge in our research. These differences in ratings between subsidiary and HQ (and also between peers’ and subsidiary and between peers’ and HQs) cannot simply be regarded as measurement error, because there are rarely (if ever) meaningful objective indicators of a subsidiary’s capabilities, so we cannot say with any conviction whether one rating is more valid than the other. Instead, it seems appropriate to argue that perceptions are reality from the point of view of the unit that is doing the evaluating. This is consistent with the behavioural framing of the research, and it allowed us to make use of our multiple ratings of subsidiary capabilities (rather than assume them away as measurement error).

The figure below summarizes our new theoretical framework and hypotheses:
2. **Scale construction, additional control variables and analytical techniques**—We go beyond reporting only the reliability of our multi-item scales and have now included a validity checks sub-section where we report their validity using confirmatory factor analyses. We have also followed the suggestion made by Reviewer 1 and included a variable to control for the use of external knowledge. We also collected some additional data as suggested by Reviewer 3 to control if the isolation in 1998 (year we collected our data) was a previous stage to a subsidiary closure. Five years later (end of 2003), out of the 21 isolated in our sample, only two had been closed, indicating that there is no evidence that isolation is a prior step to closure. As correctly spotted by Reviewer 2, we now clarify which analytical techniques we used (OLS with robust standard errors instead of robust regression) and also provide additional measures in our result tables as recommended by Reviewer 1 (e.g. adjusted R2, ?F and ? Adjusted R2 measures).

While these are big changes, many concepts have been retained, and the paper’s objectives and scope of inquiry are basically the same as before (though with some careful fine-turning to address specific points you raised).

We hope you like this new version, and we look forward to receiving your comments again.
Responses to the editor

By focusing on the existence and implications of isolated units in MNCs, you have identified an interesting and little considered issue, and the reviewers think your manuscript has promise. The reviewers also complement you on the literature review and are intrigued by your data set. All in all, they believe that your manuscript has numerous strengths… I am also impressed by your manuscript’s literature review and by the sample. You have selected an unusual and compelling set of firms.

Thank you for your encouragement. We hope you will agree that the new manuscript is much improved and makes the kind of contribution AMJ readers expect.

1. Theoretical model: All three reviewers raise concerns about the theoretical model. Their comments indicate that the model needs to be strengthened, clarified and more fully developed… In your revision, it will be critical that you improve your manuscript’s theoretical model so that it provides a solid basis for making new and interesting hypotheses… Specifically, I suggest that you provide an introduction into the basic premises underlying the theoretical model. It is important that this introduction present concepts and relationships that are conventional and complete… So, as you go forward, I recommend that you think in a three-step model: Introduce the base theory in a way that we can understand and accept, explain how you extend or revise it, and then link the hypotheses closely and clearly with the new logic.

These were very helpful comments that made us rethink completely our old theoretical model. We have already detailed in the executive summary how we changed our theoretical model. In terms of structuring our argument, we have now tried to follow the three-step model you suggested as follows:

1. We start by presenting base theories about knowledge within MNCs that are conventional and complete (e.g. the MNC as a differentiated knowledge network—Ghoshal and Nohria, 1989; Nohria and Ghoshal, 1997—and the sticky character of knowledge—Szulanski, 1996);
2. We then introduce a new theoretical argument, i.e., that the very limited awareness within the firm of where its valuable knowledge resides may have an important impact on the way knowledge flows within MNCs. In other words, we extended the existing logic by adding a third attribute of knowledge within MNCs (i.e. in addition to its stickiness and dispersion in the network of MNC units) and we use another conventional theory—Cyert &March’s Behavioural Theory of the Firm (1963)—to frame knowledge transfers within MNCs as a process of problemistic search on the part of the recipient unit.
3. We develop our hypotheses directly from the theoretical arguments (and underlying assumptions) previously made.

2. Research method: Reviewers 1 and 2 argue that the method may not be integrated sufficiently with the theoretical model. All three reviewers criticize the structure of the research design, and believe that it needs to contain additional control variables so to account for alternative explanations… Reviewers 1 and 3 worry about construct validity and call for objective evidence that goes beyond establishing reliability.

We now go beyond reporting only the reliability of our multi-item scales and have included a validity checks sub-section where we report their validity using confirmatory factor analyses. We have also followed the suggestion made by Reviewer 1 and included a variable to control for the use of external knowledge. We also collected some additional data as suggested by Reviewer 3 to control if the isolation in 1998 (year we collected our data) was a previous stage to a subsidiary closure. Five years later (end of 2003), out of the 21 isolated in our sample, only two had been closed, indicating that there is no evidence that isolation is a previous step to closure. As correctly spotted by Reviewer 2, we now clarify which analytical techniques we used (OLS with robust standard errors instead of robust regression) and also provide additional measures in our results tables as recommended by Reviewer 1 (e.g. adjusted R2, ?F and ? Adjusted R2 measures).
3. Theoretical contribution: I am concerned about the proposed contribution for theory. I wonder whether what you are doing, theoretically, is significant and novel above and beyond current understanding of learning and knowledge. Are you providing a confirmation of tenets already known? I suggest that you provide a clearer discussion of how your study extends or revises prior understanding and that you explain why the proposed advance is theoretically interesting and important… Related to point #3, one reviewer believes that the scope and scale of the contribution fits with our research note format. At this point in time, I do not wish to constrain unnecessarily your ability to respond to the requests for expanded theoretical development. Thus, I wish to leave the issue of a full article versus a research note to you.

We believe that this new version of the paper makes a much stronger theoretical contribution. We combined basically three streams of literature to provide new theoretical explanations for knowledge flows within MNCs. We started with the traditional studies on MNC and knowledge flows within it (e.g. Ghoshal and Nohria, 1989; Gupta and Govindarajan, 2000; Nohria and Ghoshal, 1997; Schulz, 2003, Szulanski, 1996). But then we used Cyert & March’s (1963) arguments to suggest that knowledge transfer between units can be framed as a process of problemistic search on the part of the recipient. By revisiting some of conventional theoretical arguments in the intra-firm knowledge transfers literature and, at the same time, introducing the problemistic search approach coupled with perception gaps in capabilities assessment (Denrell, Arvidsson and Zander, 2004), we came up with a quite novel explanation for knowledge flows within MNCs and for the scarcely studied phenomenon of subsidiary isolation.

Thank you for your suggestion of transforming the paper into a research note. After all the changes we made (and after struggling to comply with the 40-page limit), we believe it makes the strong theoretical contribution expected from a full article. Please let us know, however, you feel that a research note format would be more appropriate.
Responses to Reviewer 1

“Knowledge flows within multinational corporations: Why are some subsidiaries isolated?” explores factors associated with knowledge inflows and outflows to and from MNC subsidiaries. You also introduce the concept “liability of internal isolation”. The paper is extremely well written (much appreciated) and explores an important issue, within firm knowledge transfer. Following are a number of theoretical and empirical issues for your consideration.

Thank you for your encouraging words, and for your many constructive comments. Below we will respond point-by-point to the issues you raised in your review.

Theoretical Issues

1. Social identity and self-categorization theories as well as optimal distinctiveness theory tend to be applied at the micro (individual) level. In this paper they are applied at the subsidiary level. (…) It is not immediately clear how this can be applied at a subsidiary level.

This is a fair point. After much consideration, re-examination of the literature, and further exploration of our data, we decided to drop the hypotheses based on social identity, self-categorisation and optimal distinctiveness theories. We continue to believe that in-group-out-groups dynamics play an important role in intra-firm knowledge flows but given that our data was collected at the subsidiary level, we could not directly test whether the social identification phenomenon was actually transpiring. We have now left this argument to the discussion section.

2. Related to point number one, researchers now recognize the need to examine knowledge transfer at a micro, rather than macro level (…). While knowledge undoubtedly flows between subsidiaries, it does so through individuals. Please comment on how your data captures this micro-level knowledge transfer (if you feel it does).

You raised the important issue that the mobility of people is one of the ways that knowledge flows from one unit to another. In fact, the literature you mentioned (e.g. Gittleman & Kogut, 2003; Almeida & Kogut, 1999) and some other studies (e.g. Rosenkopf&Almeida, 2003; Song, Almeida & Wu, 2001) describe many cases of inter-firm knowledge flows associated with the mobility of engineers. Unfortunately, our data does not capture knowledge flows in the form of transfers of managers from/to HQ and/or subsidiaries to/from a focal unit. Although it is a limitation of our study—and we now acknowledge it in the paper—we think it is less of a problem given the specific setting of our study: marketing subsidiaries. Differently from R&D units (which are the focus of most studies investigating knowledge transfers through mobility of people) where when star scientists and/or discoverers move from unit (or firm) to another, it really represents a knowledge flow (e.g. Almeida&Kogut, 1999, show that after a firm hired a new engineer, there was a significantly greater tendency for the hiring firm to cite the prior patents of the newly employed engineer than would be expected given its technology profile), in the case of marketing subsidiaries it is less clear that the mobility of managers from one unit to another leads to knowledge flows, defined as “transfer of new products, new services or marketing best practices”.

3. While knowledge from intra-firm sources is certainly important, other sources of knowledge exist (i.e., suppliers, customers, competitors, etc.). (…) It seems important to discuss and control for other sources of knowledge given your central premise that internally isolated subsidiaries do not perform as well as other subsidiaries.

You are correct: although external sources of knowledge are not the focus of our study, we should definitely control for the alternative explanation that the lower performance of isolated subsidiaries is a result of their external isolation. In our sensitivity analysis, we have now included a control variable for external expertise (frequency of use of external expertise). This variable did not reach statistical significance and our results remained qualitatively the same.

Apologies for the lack of clarity of the term “market-facing subsidiaries”. We have now clarified that these are units responsible for marketing and sales (as opposed to R&D or manufacturing) activities within a determined geographic region.

5. On page 17 you identify the term “liability of internal isolation” and note that it is analogous to the liability of unconnectedness. Why not just use Powell et al.’s term?

It is true that we might just use Powell et al.’s “liability of unconnectedness” term. However, many readers of the Academy of Management Journal may automatically relate this to Powell et al.’s original idea of lack of inter-organisational links, which is not the focus of our study. Therefore, by using the term “liability of internal isolation” we opted to highlight the internal (i.e. intra-firm) side of unconnectedness. Please let us know, however, if you strongly feel that we should simply use Powell et al.’s term.

6. The theoretical development for hypotheses 4a and 4b is insufficient. There is a very large literature describing the effects of geographic proximity that could be used to build up these hypotheses (…)

This is a fair criticism. We followed your suggestion and re-wrote the theoretical development of our hypotheses about the association between knowledge flows and geographic distance, citing some of the references you suggested. Thank you.

Methodology

7. Given that subsidiary performance and knowledge tacitness reached only moderate reliability, I suggest you perform a confirmatory factor analysis to more clearly ascertain the discriminate validity of these measures. Judge’s (1993) work may be useful here.

Again you are right. We should have used confirmatory factor analysis to investigate the degree to which purportedly different constructs are capable of being distinguished from one another (i.e. whether they have discriminant validity; Bollen, 1989, Long, 1983, Judge, 1993). Following your suggestion (also made by the other reviewers), we used SAS V8 to perform confirmatory factor analyses (CFA) and have now included in the paper a “Validity checks” section where we report that our multi-item constructs not only have discriminant validity but also convergent validity (i.e. the degree to which specific items jointly load on their hypothesized constructs; Judge, 1993). In relation to your specific question (the discriminant validity of the subsidiary performance and knowledge tacitness constructs), the correlation between these two latent constructs was significantly less than 1.0 (0.13). Our most important result probably was to show that a our four constructs used to describe knowledge flows (vertical knowledge outflows, horizontal knowledge outflows, vertical knowledge inflows and horizontal knowledge inflows) have discriminant validity (the correlation among the four latent constructs were all significantly less than 1.0, ranging from 0.30 to 0.67 with a mean of 0.48) and convergent validity (the factor loadings were all highly significant (p<.01) and corresponded to the hypothesized latent constructs). In addition, we also report that a four-factor solution has a better fit than plausible alternative models. Akaike’s information criterion (AIC; Boomsma, 2000; Hu&Bentler, 1999) was better (that is, smaller) for our four-factor model than for the one- or two-factor models. Although this four-factor model of intra-firm knowledge flows has been used before in the literature (e.g. Gupta&Govindarajan, 2000; Schulz, 2001), to the best of our knowledge, this is the first time that CFA is used to ascertain the discriminant validity and convergent validity of these measures.

8. Why do you feel market orientation as measured by the subsidiary and by HQ differ significantly in their effects on your dependent variables even though you are convinced that the respondents share an almost identical view of market orientation? Why is there such a low correlation (0.14) between these measures? Clearly HQ and the subsidiary manager view the subsidiary’s market orientation differently. Did you test your hypotheses with both measures of market orientation in each analysis? This might be helpful to clarify the relationships.

The question about the low correlation between market orientation measured by the subsidiary and by HQ is really an intriguing one which made us rethink (and substantially rewrite) our previous theoretical model. The low correlation could mean three things: (1) the concept of market orientation is not measured adequately, (2) there are two different concepts with the same name in the paper or
that corporate and subsidiary managers simply have different perceptions about the focal subsidiary’s market orientation. We believe the latter is the reason for this mismatch between the two measures of market orientation. Recently, Denrell, Arvidsson and Zander (2004) argued that the evaluation of marketing capabilities is a very complex task and found a very low inter-rater correlation (0.28) between corporate and subsidiary managers in large multinational companies. These differences in ratings between subsidiary and HQ (and also between peers’ and subsidiary and between peers’ and HQs) cannot simply be regarded as measurement error, because there are rarely (if ever) meaningful objective indicators of a subsidiary’s capabilities, so we cannot say with any conviction whether one rating is more valid than the other. Instead, it seems appropriate to argue that perceptions are reality from the point of view of the unit that is doing the evaluating. We thus argue that knowledge flows in MNCs are actually triggered by perceptions of the potential recipients of the subsidiary’s knowledge, instead of being driven by absolute levels of subsidiary capability (cf Gupta and Govindarajan, 2000). This is consistent with the behavioural framing of the research, and it allowed us to make use of our multiple ratings of subsidiary capabilities (rather than assume them away as measurement error). As you insightfully suggested, we included in all our models two measures of market orientation: the perceptions of the sender and of the recipient units.

9. As you rightly noted, a major limitation in this paper is the cross-sectional nature of the data. In particular I am concerned about potential reverse causality between market orientation and performance. Better performing subsidiaries may have more financial resources with which to continuously collect information about customers’ needs and competitors’ capabilities and use this information to create superior customer value (market orientation). If this is so, these firms would then be expected to have more opportunities to transfer knowledge, to avoid isolation, and thus perform better. Further, would knowledge transferred this year impact performance this year (year t) or would it more likely influence performance in year t+1?

Thank you for this very insightful comment. You inspired us to rethink the relationship between knowledge inflows, outflows and performance and we have now added a paragraph in our discussion section about this. We agree that it is not clear what is the causal relationship here, and that a plausible relationship is that high performing subsidiaries may have the slack resources making them able to share their knowledge, while low performing subsidiaries are fighting fires and have to concentrate on their own daily activities not sharing any knowledge. Thus, knowledge flows and performance may be self-reinforcing, with knowledge sharing providing opportunities for improved performance and improved performance providing slack resources for knowledge sharing. Unfortunately, the cross-sectional nature of our data precludes us to make any estimate about the time lag effects of knowledge flows on performance.

10. You note two mediation effects in the “tests of hypotheses” section. Why not develop formal hypotheses? (…).

You are right: in our enthusiasm we started describing additional results (regarding these mediation effects) which although interesting are not directly related to the core of our paper. We were tempted to develop formal hypotheses but given that we were already exceeding the maximum of 40 pages, we decided to leave these mediation effects for a future paper, omitting them in the revised version of the paper.

11. It seems to me the continuous variable for isolated subsidiaries is more interesting than the dichotomous variable. By using the continuous variable you avoid testing the performance implications of being an outlier and you increase the variable’s variance. By using the dichotomous variable you are essentially saying that 87.5% of the subsidiaries in your sample are equivalent (from Table 3) when in fact the range of inflows and outflows is fairly large especially when compared to the isolated firms. I realize the strength of the relationship is not as strong when using the continuous variable but, as I noted, it is the more interesting alternative.

You raise the interesting issue that using the continuous variable of knowledge flows to test our hypothesis is the more interesting alternative. As you also rightly noted, using a continuous measure does not imply that our hypothesis will be no longer supported, as our results are still statistically significant when we use the continuous measure. However, the conceptual point we are trying to make is that we have two groups of
subsidiaries in a MNC: the out-crowd (or the isolated subsidiaries) and the in-crowd, and that there are significant performance differences between the two groups. In other words, we are not arguing that a focal subsidiary that exchanges knowledge more than 6 times/year performs better than another one that exchanges knowledge 5 times a year. Our hypothesis is that a focal subsidiary that never or very rarely exchanges knowledge has a worse performance than another subsidiary that shares knowledge frequently (i.e. at least once or twice a year). To that extent, we are indeed saying that 87.5% of our subsidiaries (i.e. the non-isolated subsidiaries) are equivalent. Notwithstanding, we acknowledge that it is important to mention to AMJ readers that we performed a sensitivity analysis to show the robustness of our results if we use a continuous measure.

12. **In the discussion section (p. 29) you note that over time one group of subsidiaries increasingly sends their knowledge to the rest of the MNC while another group of subsidiaries does not and thus becomes isolated. Are you speculating that this happens? It does not seem that you can conclude this from cross-sectional data.**

We agree that we cannot make this inference from a cross-sectional data and therefore we deleted that sentence from the paper.

13. **At the bottom of page 30 you note that ‘strong learning capabilities leads to a more frequent level of communication with peer subsidiaries and consequently to higher levels of horizontal knowledge outflows’. This statement seems to imply causality which you rightly note in your limitations section you cannot determine due to the cross sectional nature of your data. Perhaps you could reword this sentence.**

Yes, good point. But this sentence has been dropped in the revision process as we are no longer reporting the mediation effects (also see answer to comment 10).

14. **Again in the discussion section, you may want to tone down your conclusion that isolated subsidiaries have lower performance than do subsidiaries that are not isolated for two reasons. First, your performance measure is statistically relatively weak and second I feel you should use the continuous measure for isolation which is marginally significant.**

Thanks for this useful advice. We did as you suggested and toned down our conclusion in relation to the causal relationship between internal isolation and performance along the lines of our answer to your comment 9 (see also our answer to your comment 11).

15. **In your results tables please include the adjusted R² measure in each of the analyses. Also, for each dependent variable, please provide a base analysis with only the control variables then include in the subsequent analyses ?F and ? R² measures.**

Following your suggestion, our models 1, 3, 5, 7, and 9 now provide this base analysis with only control variables and we have also included Adjusted R², ?F and ? Adjusted R² measures.

**Miscellaneous**

16. **The reference for Frost, Birkinshaw, and Prescott (2002) on page 30 is not listed in the reference section.**

We included Frost, Birkinshaw, and Prescott (2002) in the reference section.

**Best of luck as you develop your paper!**

Thank you. Your constructive comments were very helpful. We hope that we have been able to ease your concerns and that you will like the revised version of the paper.
Responses to Reviewer 2

The question of what explains observed differences in the flows of knowledge among and between units of multinational corporations is of significant concern to the fields of international business and knowledge management. Furthermore, as the authors point out, the relationship between participation is such knowledge flows and unit performance is largely unexamined. I believe the paper has significant promise, but I have significant concerns regarding the development of specific hypotheses, the validity of most measures, certain aspects of the statistical analysis and the interpretation of the results. I elaborate on these and other concerns below and make suggestions on how I think they could be alleviated where appropriate.

Thank you for your encouragement and very helpful and constructive comments. Below, we will respond to each of the issues you raised.

1) On the top of page 7, you refer to findings from a study by Teece (1981). Please explain what the percentages mean (e.g., 2.24% of what?).

Apologies for the lack of clarity in this sentence. The percentages are of the total project costs (i.e. how much transfer costs represent of the total project costs).

2) Both subsections on page 8 seem out of place. The material in the “Conceptual development” section could be integrated with the beginning of the theory development section (since you are providing an overview of your core theoretical arguments). The material in the “Empirical context” section could be moved to the methods section since you are discussing sampling issues.

You are right: the subsections “Conceptual development” and “Empirical context” were actually out of place. We followed your suggestion and included the material of the former at the beginning of our theory development section. Part content of the “Empirical context” subsection (e.g. sample description) was included, as you suggested, in our methods section. The other part, which had to do with the definition of knowledge and knowledge flows, was re-written and included before we state our first hypothesis (see also our answer to your comment 3). Thanks for this suggestion.

3) Prior to the statement of your first hypotheses, it would be helpful to provide a definition of the key concepts of knowledge, knowledge inflows and outflows (see, e.g., Schulz, 2003).

Again, you are correct. These are key concepts in our study and should be defined before we state our hypotheses. As Schulz (2003:443) put it, “a number of different definitions of knowledge have been proposed, and a generally accepted definition has yet to emerge” (Schulz, 2003:443). Kogut and Zander (1992) define knowledge as encompassing both information—i.e. knowledge that can be transmitted without loss of integrity once the syntactical rules required for deciphering it are known—and know-how—i.e. a description of knowing how to do something. We focus on the latter aspect of knowledge. More importantly, in this study we restrict our investigation to one specific type of knowledge: marketing knowledge—know-how about new products, new services and marketing best practices. Knowledge inflows are the aggregate volume of marketing knowledge received either from other subsidiaries (horizontal inflows) or from the MNC headquarters (vertical inflows) by the focal subsidiary. Similarly, knowledge outflows are defined as the aggregate volume of marketing knowledge transmitted from the focal subsidiary to other subsidiaries (horizontal outflows) or to the HQ (vertical outflows).

4) On page 10, you provide the logic for hypotheses 1a and 1b. I have numerous concerns about this line of argument. (…) Please provide an explanation for H1a. Finally, findings related to H1a and H1b are open to alternative explanations (…).
These are very important (and fair) criticisms. After giving a great deal of thought to the theoretical arguments we used to explain knowledge outflows, we decided to substantially rewrite that section. Although we still believe that there are learning substitution processes occurring in MNCs (the case of subsidiaries that are increasingly developing their learning capabilities and end up becoming “centres of excellence”—e.g. Frost, Birkinshaw & Prescott, 2002; Hedlund, 1986; Holm and Pedersen, 2002—is a good example of the “hypertrophy” caused by learning substitution), the power (and beauty) of this theory lies on its dynamic aspect, which unfortunately we are unable to test given the cross-sectional nature of our data. Although our original theoretical argument was that with time, we would see a group of subsidiaries becoming increasingly good at learning (the “in-crowd” or the “hypertrophied”) and simultaneously another group of subsidiaries that would be left behind (the “out-crowd” or “atrophied”), our hypotheses 1a and 1b did not include any time effect and therefore were open to alternative explanations (e.g. based on resource dependence theory, as you rightly pointed out). In the revised version of the paper, we have left the learning substitution argument as a promising lens to a future longitudinal study of intra-firm knowledge flows.

5) On page 12, you argue, “…there is also a search for in-group differentiation within the MNC.” You make a similar argument on the top of page 13. Given that this is an important premise of your arguments for H2 and H3, is there any empirical evidence to support this assertion?

Yes, good point but the old hypotheses H2 and H3 have been dropped in the revision process.

6) At the end of the first paragraph on page 13 you provide a statement of the proposition relating in-group identity to knowledge sharing. (…). Thus, the logic underlying H2a and H2b does not seem to lead to H2a and H2b.

You are right. As we acknowledged in the executive summary above, the nodal structure of our data did not allow us to test some of our old hypotheses and we have dropped them in the revised paper.

7) On the bottom of page 13, you argue that three sets of subsidiary-related identity characteristics (…) Is there empirical evidence that suggests these three characteristics are indeed salient?

A good point, but as with the previous point, we have dropped social identification argument and the resulting hypotheses from our theory and hypotheses section.

8) On page 14, you argue that the logic underlying H2a and H2b differs from that of the norm of reciprocity. I have two concerns here. First, you provide little explanation of how the two logics (identify vs. reciprocity) differ. Second, while the logics may differ, your statement of the hypotheses and your research design do not allow for discrimination between these alternative explanations. Thus, findings that support H2a and H2b would also be consistent with reciprocity arguments.

Yes, this was a very helpful comment. We now use the conventional reciprocity argument as the main theoretical explanation for the association between knowledge inflows and outflows. We still believe that the idea of social identity complements the reciprocity argument. Schulz (2003:448), for example, explains that “when a subunit provides helpful knowledge to other subunits, it probably expects reciprocation in kind from the recipient units”. It is likely that individuals perceive in-group members as more trustworthy, honest and cooperative and therefore identification may precede the expectation of reciprocation. In other words, in-group members may think that expecting reciprocation from out-group members is a not a plausible expectation because out-group members are not trustworthy. As you correctly argued, however, our research design does not us to test directly the identification argument, so we decided to drop it.

9) On the bottom of page 17, you state that, “…to be an isolated subsidiary the focal unit should be isolated both in terms of outflows and inflows both horizontally and
This statement seems to be inconsistent with your arguments regarding the liability of isolation. Your arguments seem to focus exclusively on the detriment to subsidiaries from not obtaining or being able to effectively utilize inflows of knowledge and do not address knowledge outflows. Based upon your arguments, it seems that the appropriate operationalization of isolation would be to limit it to assessing knowledge inflows. You raise a fair point here, but after careful consideration we think it is appropriate to operationalize isolation in terms of both inflows and outflows. The reason for this is simply that inflows and outflows are two sides of the same coin: that is, the process of interaction we predict and find evidence for suggests that subsidiaries either get into an in-crowd where they are sharing frequently with their peers, or they get into an isolated position where they experience neither inflows or outflows. In the previous version of the paper we clearly failed to get this point across. We now elaborate the point made by Powell et al. (1996:142) that the development of absorptive capacity (Cohen & Levinthal, 1990), the skill at managing collaborations, the increased awareness of new projects and reputation as a valuable partner, are all serendipitous benefits of collaboration, from the perspective of both knowledge senders and receivers. Therefore, our argument is that units participate in the internal network of knowledge sharers, and it is the lack of participation, either as a sender or a receiver (and as we have shown usually senders are also receivers) that is associated with low performance. Therefore, although we agree with you that our argument in the previous version of the paper focused mainly on the benefits of knowledge inflows, we opted to better develop our theoretical model rather than change the operationalisation of isolation.

10) In your discussion of the sample and sources of data (pgs. 18-19) please explain what data (measures) were obtained from the two different types of sources and why you chose these two different types of sources. Also, please explain why only 25 “corporate managers with global or regional responsibility” were surveyed. Do these individuals have varying spans of control over the 204 marketing subs? Did each manager assess a unique marketing subsidiary or did multiple managers rate the same sub? Finally, please explain how the sample of 22 managers maps to the sample 171. What was the total effective, usable sample size considering responses from both sources?

We apologize for the confusion we raised through the inadequate description of this part of our research methodology. First, let us clarify that we collected only two measures from corporate managers: subsidiary performance and market orientation. Most MNCs do not publicly disclose their subsidiaries’ performance and in the absence of public information, we thought the closer to an objective measure we could get would be to report the corporate managers’ assessment of each subsidiary under their supervision. Conversely, we wanted to collect the corporate managers’ measure of market orientation not because it was more objective than the one reported by the subsidiary. Rather it was because the recipient’s demand driven process described in our theoretical model is determined by managers’ perceptions. Therefore, we wanted to test the hypotheses related to vertical knowledge flows using the market orientation as perceived by corporate managers. We sent our questionnaires to 22 corporate managers; we did not get responses from three of them (two from Ericsson and one from Volvo), ending up with responses from 19 corporate respondents. The way these 19 managers map to the 171 subsidiaries is the following: we had 4 corporate managers at Coromant assessing 27 subsidiaries (4 missing values); 3 at Steel assessing 32 subsidiaries (0 missing value); 3 at Ericsson assessing 21 subsidiaries (11 missing); 2 at Volvo assessing 25 subsidiaries (no missing value); 2 at Pharmacia assessing 17 subsidiaries (2 missing values) and 5 at Alfa Laval Agri assessing 32 subsidiaries (0 missing values). In total, we had 154 usable responses from corporate respondents. Table 1 in the paper now describes response rates both from subsidiary and corporate managers.
11) On the bottom of page 20 you state, “The corporate respondents did not answer the questions on all 21 items…” How many items did they answer for each subsidiary? How was this subset of items established? What was the alpha for this measure?

They answered three items for each subsidiary, namely: expertise in (1) collecting market information; (2) distributing market information and (3) analysing and acting on market information). These are the three key components of the market orientation construct as defined by Kohli & Jaworski (1990) and Jaworski & Kohli (1993) and widely used in the marketing literature. They had a very high Alpha (0.92). It is important to clarify that the corporate respondents did not answer the questions on all 21 items because each corporate respondent was assessing several different units (see our answer to your comment 10), but we carefully explained these items to them before they assessed the subsidiary’s market orientation.

12) Please explain how you calculated geographic distance? Minor point: you can use “geographic” instead of “geographical.”

We calculated geographic (as you suggested) distance as the distance in kilometres between the city in Sweden where the MNC’s HQs are located and the city where the focal subsidiary was located.

13) As I mentioned in point 9 above, your measure of isolated subsidiaries seems to depart from the underlying theory linking it to subsidiary performance. I suggest recoding it using only knowledge inflows and conducting your sensitivity analysis using alternative constructions of this variable.

As we have explained above, although we agree that in the old version of the paper the underlying logic linking isolation to subsidiary performance highlighted the knowledge inflows aspects, we believe the way to address this issue is to make our theoretical arguments clearer rather than recoding isolation using only knowledge inflows.

14) I am confused by the two items used to measure communication frequency (bottom of page 21): you provide an object (HQ managers) of the preposition with in (a) as well as the phrase “through other means.” However, in (b) you provide no object but duplicate the phrase “through other means.” Please clarify how these two items are different.

You are absolutely right: this was not clear at all. The words “through other means” should be deleted from item (a). We have now re-written these two sentences and they read as follows: “… how often they communicated with (a) HQ managers, face-to-face, to discuss operations and (b) HQ managers, through other means, to discuss operations”.

15) I would like to see evidence of the convergent and discriminant validity of the multi-item scales using confirmatory factor analysis. See Morrison & Phelps (1999) for an example.

Yes, a good point (and one which all the other reviewers picked up on as well). Following your suggestion, we used SAS V8 to perform confirmatory factor analyses (CFA) and have now included in the paper a “Validity checks” section where we report that overall our multi-item constructs have both discriminant and convergent validity. Our most important result probably was to show that our four constructs used to describe knowledge flows (vertical knowledge outflows, horizontal knowledge outflows, vertical knowledge inflows and horizontal knowledge inflows) have discriminant validity (the correlation among the four latent constructs were all significantly less than 1.0, ranging from 0.30 to 0.67 with a mean of 0.48) and convergent validity (the factor loadings were all highly significant (p<.01) and corresponded to the hypothesized latent constructs). In addition, we also report that a four-factor solution has a better fit than plausible alternative models. Akaike’s information criterion (AIC; Boomsma, 2000; Hu&Bentler, 1999) was better (that is, smaller) for our four-factor model than for the one- or two-factor models. Although this four-factor model of intra-firm knowledge flows has been used before in the literature (e.g. Gupta&Govindarajan, 2000; Schulz, 2001), to the best of our
knowledge, this is the first time that CFA is used to ascertain the discriminant validity and convergent validity of these measures.

16) I am unclear as to why you chose to use robust regression instead of OLS with robust standard errors. Your stated concern is with heteroscedasticity (which robust standard errors address) rather than with leverage values, influence points and outliers (which robust regression addresses). Please provide a more thorough explanation of why you implemented robust regression and which specific implementation of robust regression you employed (e.g., Huber weights/iterations).

Apologies again for the confusion we made here. We did mean to say “regression with robust standard errors” and this was actually the statistical procedure we performed. In fact, there is a note at the bottom of each of our tables indicating that we were reporting robust standard errors between parentheses, but the text on page 25 was really unclear. We have now rewritten this section making it very clear that we used OLS with robust standard errors and not robust regression. Thanks for spotting this inconsistency in the previous version of the paper.

17) In your “Tests of Hypotheses” section, please explain why the sample sizes differ across models.

Good point: we have now included an endnote explaining that we had some missing values in most of the variables and that the sample size of each model is a result of the usable observations we had when considered all the variables in that specific model.

18) In your test of H5 you regress subsidiary performance on your isolated variable and controls. This implicitly assumes that isolatedness is randomly assigned across subsidiaries. However, your theory indicates that there may be systematic reasons for subsidiary isolation. (…). That is, you may have an endogeneity bias in your results since isolation is a choice variable. Considering that you have constructed your isolation variable as dichotomous, you should implement a 2-stage Heckman correction (…). See Shaver (1998) for an excellent discussion of this issue and the references therein.

This is a very interesting point. We do not believe, however, that subsidiary isolation is a firm choice but rather that it is the result of behavioural processes that affect the patterns of knowledge flows from and into a focal subsidiary. One conjectured made by Reviewer 3, for example, was that corporate managers may choose to isolate subsidiaries before they close it. In fact, we collected, some additional data to control if the isolation in 1998 (year we collected our data) was a previous stage to a subsidiary closure. Five years later (end of 2003), out of the 21 isolated in our sample, only two had been closed, indicating that there is no evidence that isolation is a prior step to closure. But even if we were agnostic (which we are not) about whether isolation is a choice or not, the implementation of a 2-stage endogeneity correction (Heckman, 1974, 1979; Lee, 1978) may not be a good statistical remedy in this case. The major issue would be the specification of the reduced form isolation choice in the first stage (probit). We would need to find one or more instrumental variables Z that affect isolation choice but do not directly affect performance. Unfortunately, we do not believe we have such variables in our dataset. As Hamilton & Nickerson (2003:67) explain in the absence of such instrumental variables, the inverse Mills ratio terms are simply non-linear functions of X\textsubscript{i} so that the parameters \( d \) d\textsubscript{1} and \( d \) d\textsubscript{0} are only identified by the normality functional form assumption and it is well known that identification by functional form alone in this model often leads to very unstable and unreliable estimates of the parameters (Little, 1985). In any case, we believe endogeneity may be less of a problem in this paper for two reasons: first, from our review of the literature and interviews with managers, there is no evident unobservable variable that would be correlated both with isolation choice and subsidiary performance. Second, and more importantly, we have rewritten our discussion and we now acknowledge that the causal relationship between isolation and performance is not
clear. We speculate that a plausible relationship is that high performing subsidiaries may have the slack resources making them able to share their knowledge, while low performing subsidiaries are fighting fires and have to concentrate on their own daily activities not sharing any knowledge and consequently not receiving any either. Thus, knowledge flows and performance may be self-reinforcing, with knowledge sharing providing opportunities for improved performance and improved performance providing slack resources for knowledge sharing. If this is actually the case, the concerns with endogeneity are no longer present as we would not be arguing a causal relationship between isolation (and isolation choice) and performance.

19) On page 28 you conclude, “Overall, the findings of this study support the idea that both the principle of learning substitution and in-group-out-group dynamics (…) I have pointed out above (points 4 and 8) your findings related to H1 – H2 are also consistent with alternative explanations that you currently do not and cannot rule out. You need to address these concerns before you can make this type of conclusion.

Yes, this is a fair point. As we have explained in our previous answers, we have re-written both our hypotheses 1 and 2, so this point is now moot.

20) On page 29 you state, “…according to the principle of learning substitution (…) You do not observe the same subsidiaries over time and therefore do not observe to what extent they become more or less isolated and why.

You are right. But this point is also moot, as we have dropped the learning substitution effect explanation for knowledge outflows.

21) On page 30 you state, “Second, our results revealed that subsidiaries do not share their knowledge indiscriminately within the MNC. Instead, they identify themselves with other units that have similar characteristics.” You did not measure the extent to which specific dyadic combinations of subsidiaries had similar or different characteristics. Consequently, you need to rephrase this conclusion.

This point echoes your concern described in your comment 6. We have dropped the social identification hypotheses in the revised paper.

22) On page 31, it would be useful to provide some explanation (albeit speculative) as to why you found a mediated relationship among horizontal knowledge flows, market orientation and communication. Furthermore, an explanation as to why you did not find such a mediated relationship for vertical knowledge flows would also be helpful.

Good point. In our enthusiasm we started describing additional results (regarding these mediation effects) without providing much explanation for them. We were tempted to provide the explanations you suggested (and even develop formal hypotheses) but given that we were already exceeding the maximum of 40 pages, we decided to leave these mediation effects, that although interesting are not directly related to the core of our paper, for a future paper. We now omit them in the revised version of the paper.

I hope you find that these comments and suggestions prove useful in helping you improve your manuscript. Best of luck.

Thank you again for your encouraging words, for your very competent criticism, and for your many valuable suggestions. We believe that you helped us to improve the paper considerably and hope that you will like its revised version.
Responses to Reviewer 3

The paper addresses the question of why are some subsidiaries isolated within MNCs. I believe it is a very interesting research question and I agree there is a gap that needs to be filled in. I want to state that I was intrigued by this research and enjoyed reading the paper.

Thank you very much for your constructive and helpful comments. We will respond to your comments and concerns below.

Theory and hypotheses

Regarding the way you focus your paper I have one criticism to do: it seems that subsidiary isolation occurs as an accident that is independent of management decisions. I would be reluctant to believe that MNC managers do not know what subsidiaries are isolated and what others are not. Also, could management decide to isolate some subsidiaries? Then arises one more issue: is isolation the cause of worst performance or is it the consequence? This has important implications for hypothesis 5. Could isolation be the previous stage to the closing down of a subsidiary? I would appreciate you control this possibility. As data were gathered in 1998, the evolution of sales since this date or simply a control on the existence of the analyzed subsidiaries would definitely help.

Let us address your second comment first. We followed your suggestion (endorsed by the other reviewers) and rewrote our conclusion about the relationship between isolation from knowledge sharing activities and subsidiary performance. We agree that it is not clear what is the causal relationship, and that a plausible relationship is that high performing subsidiaries may have the slack resources making them able to share their knowledge, while low performing subsidiaries are fighting fires and have to concentrate on their own daily activities not sharing any knowledge. Thus, knowledge flows and performance may be self-reinforcing, with knowledge sharing providing opportunities for improved performance and improved performance providing slack resources for knowledge sharing. Thank you very much for your very insightful suggestion regarding the collection of additional data about the closure of subsidiaries in our sample after 1998. We followed it and collected some additional data from the six companies’ websites and annual reports. We checked if the 21 subsidiaries which were “isolated” in 1998 still existed at the end of 2003 (date of the most recent annual reports we could access), i.e., five years later. In fact, 19 of them were still operating and only two of them were closed. This provided us with more confidence that isolation is not a previous step to closure. In relation to your first point, although we agree with you that subsidiary isolation does not occur as an accident (in fact we propose some social and behavioural reasons for it), we do not believe that isolation, as we define it, i.e., isolation from knowledge flows both from HQs and peer subsidiaries, is determined by corporate management.

Hypothesis 3.

This hypothesis seems to me tautological. Market orientation is defined in p. 10 as “the continuous collection of information about customers’ needs and competitors’ capabilities and the use of this information to create superior customer value”. The definition of market orientation itself implies that the higher level of market orientation, the higher knowledge/information inflows.

This is a fair criticism and it is probably due to our lack of clarity in defining knowledge and knowledge inflows. We have now included a couple of paragraphs before we state our first hypothesis clarifying that in this study we focus on the more procedural or tacit type of knowledge (know-how) instead of mere information (Kogut and Zander, 1992) and more importantly we restrict our investigation to marketing knowledge—know-how about new products, new services and marketing best practices. Knowledge inflows are the aggregate
volume of marketing knowledge received either from other subsidiaries (horizontal inflows) or from the MNC headquarters (vertical inflows) by the focal subsidiary. We believe that with these definitions it becomes clearer the differences between inflows of marketing knowledge and market orientation, resolving (or at least attenuating significantly) your concerns with tautology in our hypothesis 3.

**The sample**

*There is very little information about the structure of the six analyzed MNCs. I presume that the subsidiaries are to some extent homogeneous inside each MNC. (...) but I think market orientation would not be sufficient for R&D organizations or universities (here, technology should also be taken into account).*

This is a very good point. We now make it clear that our sample only has marketing subsidiaries—i.e. units responsible for marketing and sales activities within a determined geographic region, which do involve direct contact with customers. You are right that market orientation would not be a good proxy of a subsidiary’s capabilities if we our sample were formed by R&D units. We had timidly made a similar point in our endnote iii on page 43 but given the importance of this clarification we are now emphasizing this point in the body of the paper. Thanks for this suggestion.

**Control variables**

*Absorptive capacity and learning capability are very close concepts. I would suggest not controlling for absorptive capacity: this control is not justified in the text and it can be confusing.*

This is a very good comment. We do agree with you that absorptive capacity and market orientation are close concepts and in our new set of hypotheses we use the subsidiary’s self-rating of their market orientation as an indicator of their absorptive capacity. We did follow your suggestion and deleted our previous absorptive capacity measure.

*Some hypotheses and some methods are based on Gupta and Govindarajan (2000)’s SMJ paper. Gupta and Govindarajan justify the inclusion of the industry resource characteristics and the nature of subsidiaries’s operations as control variables. I think you should include them as well.*

You are right: these are important control variables. In our study, given that each company in our sample belonged to a different industry, including firm dummy variables, as we did, automatically controls for industry effects. Also, given that the nature of the operations of all units in our sample is the same—i.e. they are all marketing subsidiaries—we do not need to include any other control variable.

**Measurements**

*You use a wide set of measurement scales. Items and scales are based on the literature. This is a good start. However, the only use of Cronbach’s alpha coefficient seems a poor test for the scale overall goodness (Devellis, 1991). Even at the very best, alpha coefficient only checks the scale reliability. I would suggest you also test the scale validity applying the analyses carried out by Jaworski & Kohli (1993) or Schulz (2001). One more sophisticated option would be to check out the validity and reliability of the scales carrying out Confirmatory Factor Analysis. Here you have several recent examples of measurement scales’ reliability and validity checks: Tippins and Sohi (2003), Gibson and Birkinshaw (2004), or Hult, Ketchen and Slater (2004).*

Again, you are correct. Following your suggestion (which the other reviewers also made), we used SAS V8 to perform confirmatory factor analyses (CFA) and have now included in the paper a “Validity checks” section where we report that overall our multi-item constructs have both
discriminant and convergent validity. Our most important result probably was to show that our four constructs used to describe knowledge flows (vertical knowledge outflows, horizontal knowledge outflows, vertical knowledge inflows and horizontal knowledge inflows) have discriminant validity (the correlation among the four latent constructs were all significantly less than 1.0, ranging from 0.30 to 0.67 with a mean of 0.48) and convergent validity (the factor loadings were all highly significant (p<.01) and corresponded to the hypothesized latent constructs). In addition, we also report that a four-factor solution has a better fit than plausible alternative models. Similar to the procedures adopted by Gibson and Birkinshaw (2004), we report that in our case the Akaike’s information criterion (AIC; Boomsma, 2000; Hu&Bentler, 1999) was better (that is, smaller) for our four-factor model than for the one- or two-factor models. Although this four-factor model of intra-firm knowledge flows has been used before in the literature (e.g. Gupta&Govindarajan, 2000), to the best of our knowledge, this is the first time that CFA is used to ascertain the discriminant validity and convergent validity of these measures.

**Market orientation.**

This concept is measured with two measurement scales: one answered by the subsidiary manager and another one answered by a corporate manager at the headquarters. I do not understand why some hypotheses are tested with the subsidiary perception and some others with the HQ perception. The first measurement scale is based on a scale created by Jaworski and Kohli (1993). (…). Moreover, I would recommend exhibiting the items that make up the reduced scale; the reader would feel more comfortable. Further, are the two measurements of market orientation (subsidiary and HQ) consistent with each other? In fact, they have a very low correlation in Table 4. This could mean two things: (1) the concept of market orientation is not measured adequately, or (2) there are two different concepts with the same name in the paper. Both possibilities are problematic.

This was an extremely important point. The question about the low correlation between market orientation measured by the subsidiary and by HQ really intrigued us and made us rethink (and substantially rewrite) our previous theoretical model. As you said the low correlation could mean two things: (1) the concept of market orientation is not measured adequately, (2) there are two different concepts with the same name in the paper. We believe there is still a third and more likely reason in this context: that corporate and subsidiary managers simply have different perceptions about the focal subsidiary’s market orientation. We believe the latter is the reason for this mismatch between the two measures of market orientation. Recently, Denrell, Arvidsson and Zander (2004) argued that the evaluation of marketing capabilities is a very complex task and found a very low inter-rater correlation (0.28) between corporate and subsidiary managers in large multinational companies. These differences in ratings between subsidiary and HQ (and also between peers’ and subsidiary and between peers’ and HQs) cannot simply be regarded as measurement error, because there are rarely (if ever) meaningful objective indicators of a subsidiary’s capabilities, so we cannot say with any conviction whether one rating is more valid than the other. Instead, it seems appropriate to argue that perceptions are reality from the point of view of the unit that is doing the evaluating. We thus argue that knowledge flows in MNCs are actually triggered by perceptions of the potential recipients of the subsidiary’s knowledge, instead of being driven by absolute levels of subsidiary capability (cf Gupta and Govindarajan, 2000). This is consistent with the behavioural framing of the research, and it allowed us to make use of our multiple ratings of subsidiary capabilities (rather than assume them away as measurement error). Finally, you question the way we reduced the original 32-item scale to 21 items and suggest that we exhibit the items that make up the reduced scale so our readers would feel more comfortable. In the table below, you can inspect the 21 items in our reduced scale but, due to space limitations, we are afraid we are not able to include this table in the revised version of the paper. As you rightly noted in one of your final comments, we were exceeding the 40-page maximum limit. But please let us know if you have strong reasons to believe we should include it.
1. People from other local companies regularly interact with our customers
2. We do a lot of in-house market research
3. We are slow to detect changes in customers’ product preferences
4. We often communicate with those who can influence end users’ purchases
5. Our local company regularly collects intelligence on competitors
6. We are slow to detect changes in our industry structure
7. We periodically review the likely effects on customers of changes in our business environment
8. We have meetings with local companies at least once a quarter to discuss market trends and developments
9. We often discuss customers’ future needs with other local companies
10. Data on customer satisfaction is regularly disseminated to all in our company
11. There is minimal communication between our local and other local companies on market developments
12. When other local companies discover something important about competitors, they are normally slow to alert our local company
13. It takes us forever to decide how to respond to competitors’ price changes
14. Market segmentation principles drive product development in our firm
15. We tend to ignore changes in customers’ product or service needs
16. Our business plans are driven more by products than by market needs
17. The choice of products that we sell depend more on internal politics than real market needs
18. The activities of different functions in our firm are well coordinated
19. We are quick to respond to changes in competitors’ pricing structures
20. When we find that customers are unhappy with the quality of our products, we take corrective action immediately
21. When we find that customers would like us to modify a product or service, the departments involved make concerted efforts to do so

**Tacitness of knowledge.**

The scale you use seems very interesting to me. However, I have not been able to find in the literature the scale you use. You say that you took Zander’s (1991) scale which was also used in Nobel & Birkinshaw (1998). (…)

Apologies, the reference to Nobel and Birkinshaw (1998) was incorrect. We now refer the reader to Zander and Kogut 1995 (Org. Science) which definitely includes Zanders’ measures of tacitness, as well as other dimensions of knowledge.

**Finally, I recommend putting the questionnaire as an appendix. The reader would have a more detailed and clear vision on the empirical work.**

We understand your concerns and agree that including the questionnaire as an appendix is always desirable as this provides readers with a more detailed notion of the empirical work that was performed. As we have already mentioned above, however, we were already exceeding the 40-page maximum limit and including our questionnaire would add at least more 3 pages to the paper. Please let us know, however, if you think it would be really essential to include the questionnaire as an Appendix.

**Results**

I am not sure that the proposition in p. 13 is fully verified. The reason for high sending units to be also high receiving units could be their higher learning capability instead of their belonging to a certain “social class” within the MNC. Results reveal that the phenomenon (high sending units are also high receiving units) occurs but results do not explain why this happens. I am not convinced that the paper explains why are some subsidiaries isolated. If this issue was not further clarified I would recommend to change the title.
We have substantially rewritten our hypotheses development and we hope that the reciprocity argument (cf. Schulz, 2003) that we use to explain why knowledge outflows and inflows are associated sound more convincing to you.

The paper seems to me to reinforce Gupta and Govindarajan (2000)’s work. If the phenomenon of subsidiary isolation is not further explained I would also recommend emphasizing the distinctive aspects of this paper in comparison to Gupta and Govindarajan (2000)’s.

You are right that our paper is strongly influenced by Gupta’s and Govindarajan’s (2000). We can see, however, many differences between the two studies. First, we use quite a novel theoretical explanation for knowledge flows and we shed light on a specific case—subsidiaries that never or very rarely receive or send any knowledge—that is not at all addressed in Gupta and Govindarajan (2000). In addition, we propose an association between knowledge flows and subsidiary performance, which also is not present in Gupta and Govindarajan (2000). More importantly, we question an implicit assumption in Gupta and Govindarajan (2000) that a subsidiary’s knowledge has an absolute value known and agreed by other units. Rather, we argue that what drives knowledge flows are the recipient’s perceptions. Finally, controls for firm fixed effects, regressions with robust standard errors and discriminant and convergent validity of constructs, notably of the four types of knowledge flows, are three examples that our empirical results were subject to more stringent robustness checks than Gupta’s and Govindarajan’s (2000). In a nutshell, although we acknowledge the valuable contribution of Gupta and Govindarajan (2000), we believe this study is quite distinct from the former.

Discussion

p.28. 1\textsuperscript{st} paragraph of the discussion section. I am not convinced about this. I believe that the reasons you propose to explain why some subsidiaries are isolated are not proved.

We made some substantial changes in discussion section of the paper and rewritten its first paragraph. We hope our new theoretical explanations taken together are now able to provide you with a convincing explanation for subsidiary isolation.

Minor points

The paper is a bit long. There is a maximum of 40 pages and the paper has 43.

You are right. The revised version of the paper now complies with the 40-page limit.

p. 13. 2\textsuperscript{nd} paragraph. 1\textsuperscript{st} sentence. I do not understand this sentence.

Apologies for the lack of clarity here. We have deleted that sentence in the revised paper.

p. 14. End of 3\textsuperscript{rd} paragraph. Could you give a reference on this traditional logic?

A good seminal reference is Leibenstein, (1966) but this logic is also implicit in Szulanski (1995) and Chew, Bresnahan and Clark (1990)

p. 27, 1\textsuperscript{st} paragraph. Isn’t it model 6 instead of model 3? Please check.

You are definitely right. Thank you.

p. 16: e.g. Brown & Eisenhardt, 1998. In the references section the year of publication is 1997.

We amended the cite on p.16 to read Brown & Eisenhardt, 1997. Thanks.

We hope that our responses take care of your concerns. You raised a number of interesting, and very insightful, viewpoints. We think that responding to, and incorporating, these viewpoints have enriched significantly the paper. Thank you for your contribution. We hope that you will like the new version of our manuscript.