Balancing the trade-off between learning prospects and spillover risks: MNC subsidiaries' vertical linkage patterns in developed countries

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Abstract

This paper investigates local vertical linkages of foreign subsidiaries and the dual role of such linkages as conduits for learning as well as potential channels for spillovers to competitors. On the basis of data from 97 subsidiaries, we analyze the quality of such linkages under varying levels of competition and subsidiary capabilities. Our theoretical development and the results from the analysis document a far more complex and dynamic relationship between levels of competition and MNCs' local participation in knowledge intensive activities, i.e. learning and spillovers, than previous studies do. We find a curvilinear relationship between the extent of competitive pressure and the quality of local linkages confirming our argument of a trade-off between learning prospects and spillover risks. Furthermore, the level of subsidiary capabilities moderates this relationship.

Keywords: Quality of local vertical linkages, competitive pressure, subsidiary capabilities, learning, spillovers.

1. Introduction

An important consequence of foreign direct investment (FDI) lies in the phenomenon of local linkages, i.e. non-equity relationships that multinational corporation (MNC) subsidiaries develop with local firms in their host countries (Chen, Chen & Ku, 2004). There is a substantial strand of literature that has characterized linkages' attributes (Giroud & Scott-Kennel, 2009; Santangelo, 2009; Scott-Kennel, 2007; Scott-Kennel & Enderwick, 2004), investigated their antecedents (Belderbos, Capannelli, & Fukao, 2001; Giroud & Mirza, 2006; Jindra, Giroud, & Scott-Kennel, 2009; Santangelo, 2011), and analyzed their consequences (Andersson, Forsgren, & Holm, 2002; Holm, Holmstrom & Sharma, 2005; Hansen, Pedersen, & Petersen, 2009). This literature has recently suggested that local linkages have a dual effect (Giroud & Scott-Kennel, 2009). On the one hand, local linkages act as channels through which MNC knowledge spills over to local firms (Driffield, Munday, & Roberts, 2002; Ghauri & Buckley, 2006). On the other hand, they also act as conduits for subsidiary learning from the domestic environment (Andersson et al., 2002; Mu, Gnyawali, & Hatfield, 2007; Giroud & Scott-Kennel, 2009).

Not all local relationships have the same potential for subsidiary learning and spillovers. Building on network research (Granovetter, 1985; Uzzi, 1996), both sub-streams of literature on learning and spillovers have suggested that these effects depend on the quality of the linkages (Andersson et al., 2002; Giroud & Scott-Kennel, 2009; Saliola & Zanfei, 2009; Santangelo, 2009) – to some extent also referred to as linkage intensity (Scott-Kennel & Enderwick, 2005; Giroud & Scott-Kennel, 2009) or embeddedness (Andersson et al., 2002). Linkages of high quality can be characterized by partners' interdependence, mutual adaptation, and breadth of interaction in terms of possibilities to exchange fine-grained knowledge and information (Uzzi, 1996, 1997;

Gulati, 1998; Andersson et al., 2002; Giroud, 2003). As a consequence, they are more effective than arm's-length relations for information and knowledge flows in both directions. While high quality linkages offer important learning opportunities, they simultaneously expose the subsidiary's knowledge to the risk of spillover to the host-economy (Blomström & Kokko, 1998; Mudambi & Navarra; 2004, Sanna-Randaccio & Veugelers, 2007).

Despite their importance, research on the antecedents of local linkage quality is still scarce (Jindra et al., 2009; Santangelo 2009) for three reasons. First, while previous literature has analyzed the influence of subsidiary- and sector-specific variables (Chen et al., 2004; Holm et al., 2005; Jindra et al., 2009; Scott-Kennel & Enderwick, 2005; Scott-Kennel, 2007), the role of the local environment and, more specifically, the role of local competitive pressure remains under-investigated despite substantial evidence suggesting that local competition is a major element influencing MNC strategy (Alcacer & Chung, 2007; Kogut & Chang, 1991; McCann & Mudambi, 2005).

Second, previous research has failed to investigate how such competition might interact with the subsidiaries' level of capabilities. This is despite evidence in the network literature showing that the choice of building and developing linkages depends on both firm internal and external factors (Andersson, Björkman, & Forsgren, 2005; Frost, Birkinshaw, & Ensign, 2002; Gulati & Gargiulo, 1999; Luo, 2003) and that these factors might interact when explaining competitive action (Blanc & Sierra, 1999).

Finally, most literature on local linkages has focused on less advanced and developing economies (e.g. Hansen et al., 2009; Jindra et al., 2009; Santangelo, 2009). While this approach increases our understanding of how such countries can benefit from foreign MNC activity (Hoekman & Javorcik, 2006; Kugler, 2006), it neglects the linkage patterns in developed contexts, where domestic actors are likely to be highly

competent, equipped with absorptive capacity, and located in competitive industries. These conditions make local firms desirable vertical partners for subsidiaries' learning but, simultaneously, increase the risk of an erosion of competitive advantage due to spillovers.

In this study we address these limitations and investigate the quality of vertical local linkages, i.e. of supply chain relationships that foreign subsidiaries build with local suppliers and customers (Giroud & Scott-Kennel, 2009). We posit that the extent to which the subsidiary perceives the local environment as highly competitive as well as the level of the subsidiary's own capabilities affect the trade-off between learning opportunities and potential spillovers. In turn, this influences the subsidiaries' investment into their local relationships, i.e. subsidiaries adapt the quality of their linkages to these characteristics. Our results confirm our argument. We find a curvi-linear relationship between perceived local competitive pressure and the quality of linkages. In addition, the level of the subsidiary's capabilities negatively moderates this curvi-linear relationship.

Our study has several contributions. First, we contribute to the recent stream of research on local linkages of MNC subsidiaries (Chen et al., 2004; Jindra et al., 2009; Santangelo, 2009; Saliola & Zanfei, 2009). We confirm literature that has argued that local competitive pressure is an important influencing factor on MNC strategy (e.g. Holm et al., 2005). Furthermore, we show that in developed countries, increasing local competitive pressure can be positively or negatively related to the quality of local linkages because of spillover risks and learning opportunities: it depends on the initial level of competition in the host country. This study extends previous literature that suggested a more simple effect of local competitive conditions on MNC strategic behavior (e.g. Alcacer, 2006; Alcacer & Chung, 2007). It also adds to our understanding

of the circumstances under which host countries might profit most from the presence of foreign firms (Marin & Bell, 2006). Second, our findings support literature that has argued that both firm internal and external factors need to be integrated in studies on linkages (e.g. Giroud & Scott-Kennel, 2009), since they might interact with each other (Alcacer & Chung, 2007). In our study, subsidiary capabilities have an important role as they moderate the effect of increasing competition. The building, development and adaptation of MNC host country linkages is apparently a highly complex process. Third, based on our findings, we suggest that studying linkages in developed countries is important as learning opportunities and spillover risks increase in such environments, thus leading to strong reactions by subsidiaries. This provides a complement to studies on emerging/developing countries (e.g. Jindra et al., 2009). Finally, we argue that FDI phenomena, such as local linkages, can be better explained by complementing traditional economic reasoning with findings from network theory. To this end, we confirm that studying the quality of linkages is important (Scott-Kennel, 2007; Giroud & Scott-Kennel, 2009). We also add that perceptions of environmental conditions are strong drivers of subsidiary behavior. This is an important dimension to study because the network-based literature states that the context of business relationships is socially constructed (e.g. Anderson, Håkansson, & Johanson, 1994). Firms react to their perceived environment, rather than simply adapting to constraints exerted by an "*intractable externality*" (Astley & Fombrum, 1983; p. 576).

The remainder of the paper is organized as follows. In the next section, we review the existing research on local linkages, spillovers and subsidiary learning, and recall the relevance of quality linkages. We then elaborate on the "trade-off" between local learning and spillover associated with quality linkages. Subsequently, we develop

and test our model. We conclude with a discussion of our empirical results, the study's limitations, and practical implications.

2. Literature Review

2.1 Linkages, Spillovers and Subsidiary Learning

Literature on local linkages has recognized that they encompass two main effects. On the one hand, they represent one of the most effective channels for spillovers from FDI (Rodriguez-Clare, 1996). On the other hand, they provide the subsidiary with relevant learning opportunities from the local environment (Giroud & Scott-Kennel, 2009). Although these effects have long been investigated separately, integrating both mechanisms allows for a better understanding of the local linkages phenomenon. In fact, given the interactive nature of linkages, knowledge flows in one way (from the subsidiary to the host-country) can be assumed to result in knowledge flows in the other way (from the host-country to the subsidiary). Most importantly, spillovers to and learning from the host-economy may influence the subsidiary's performance along two opposite directions. While spillovers may endanger the subsidiary's competitive advantage if captured by domestic rivals, learning from local partners is likely to improve the subsidiary's business activities. In order to combine these effects in our theoretical framework, it is important to review fundamental literature on FDI spillovers and subsidiary's learning through vertical linkages.

Traditional FDI literature suggests that the establishment of MNCs' subsidiaries abroad may generate spillovers, i.e. allowing domestic firms to gain access to the MNCs' knowledge (Caves, 1974; Aitken & Harrison, 1999). Over the years, a huge array of studies, both theoretical and empirical, has investigated FDI spillovers (Blomström, 1986; Globerman, 1979; Görg & Greenaway, 2003; Görg & Strobl, 2001;

Kokko, 1996; Konings, 2001; Haskel, Pereira, & Slaughter, 2007). These studies have built on the debate on the role of the technological distance between the MNC's home and host economy. In particular, the technological gap hypothesis suggests that a great technological distance between home and host country would yield potential gains for domestic firms arising from the acquisition of advanced foreign knowledge (Findlay, 1978). Conversely, the technological accumulation hypothesis relates a great technological distance to a lack of absorptive capacity that prevents local firms from internalizing and making use of MNCs' technology (Glass & Saggi, 1998).

Literature has conceptualized FDI spillovers according to the recipients (horizontal vs. vertical) and to the mechanisms through which they take place (indirect vs. direct). Horizontal spillovers refer to externalities that benefit the subsidiary's local rivals thus impairing the subsidiary's competitive advantage. These spillovers are unintentional. Conversely, vertical spillovers refer to capabilities and technologies diffused either intentionally or unintentionally to the MNC's local value chain partners (Javorcik, 2004). FDI spillovers may arise through both indirect and direct channels (Giroud & Scott-Kennel, 2009). Indirect spillovers occur through such mechanisms as labor mobility or demonstration effects (Görg & Greenaway, 2003). On the contrary, direct spillovers require the establishment of transactional and collaborative relationships between domestic and foreign firms and enhance the productivity of local firms, such as local suppliers, by increasing the demand of their goods (Saliola & Zanfei, 2009) and by allowing them access to advanced knowledge (Spencer, 2008). Direct spillovers therefore occur through local linkages, i.e. relationships that involve directly the foreign subsidiary with other firms in the host country (Giroud & Scott-Kennel, 2009). Local linkages may include a multiplicity of inter-firm relationships (supplier, customer and subcontracting linkages, strategic alliances, technology

development contracts, etc) (Chen et al., 2004). Among them, especially vertical local linkages have attracted scholars' attention, due to their great developmental potential for the host economy (Rodriguez-Clare, 1996; Javorcik, 2004). Vertical local linkages refer to direct business relationships that foreign subsidiaries build up both with domestic suppliers (i.e., backward linkages) and with local customers (i.e., forward linkages) (Giroud & Scott-Kennel, 2009).

Spillovers are not only considered as a threat to MNCs' competitive advantage. On the one hand, it is obvious that firms want to prevent knowledge from spilling over to competitors (horizontal spillovers). This has been emphasized in the early FDI literature: MNCs seek to internalize transactions to protect their proprietary advantages (Dunning, 1979; Rugman, 1980). On the other hand, another perspective highlights the positive role of resources that are shared with vertical business partners (for example, see the work on networks as strategic resources (Gulati et al., 2000) and on alliance capitalism (e.g. Dunning, 1995)). These streams point out the benefits that firms can achieve when they transfer their superior knowledge to their own value chain counterparts, for example because of the increased performance of intermediate input suppliers (Javorcik, 2004). Accordingly, IB scholars suggest that linkages are often characterized by an intention to develop local partners' capabilities (Giroud & Scott-Kennel, 2009). Horizontal and vertical spillovers are not independent dimensions of linkages. Vertical linkages channel MNC knowledge primarily towards the subsidiaries' direct business partners. Yet, this knowledge can diffuse further and lead to indirect, unintended horizontal spillovers. In fact, through their networks of interaction, the subsidiaries' local partners can activate a process of diffusion of the MNCs' knowledge to local rivals (Spencer, 2008). Leakage of knowledge may occur through mediated contacts between the subsidiary and its local competitors. That is, information and

resources shared within a vertical relationship might be channeled also to other agents within the local context (Mesquitas, Anand, & Bruch, 2008; Spencer, 2008). For example, a local supplier of the subsidiary could also be a supplier to a subsidiary's competitor. Therefore, when a vertical linkage is embedded in an inter-firm business network, the subsidiary's local partners may act as bridges between the subsidiary's competitive resources and other local firms (including competitors) (Ghauri, Hadjikhani, & Johanson, 2005; Gulati, 2007). In sum, while subsidiaries have an incentive to promote vertical spillovers through linkages, they need to counteract horizontal spillovers that would improve the performance of their local rivals.

Beyond the fact that local firms might profit from MNC knowledge, extensive literature has shown that also subsidiaries may strongly benefit from interaction with local partners in host economies. Starting from the "*learning-oriented FDI*" approach (Dunning, 1994), several studies have highlighted the importance of learning opportunities offered by host locations. Almeida and Phene (2004) report that knowledge linkages with firms in host-countries increase subsidiary innovativeness. Embeddedness literature has shown that a subsidiary's local network is an asset in itself, since it allows the foreign unit to access to distinctive resources that reside outside the boundaries of the firm (Andersson et al., 2002). This network represents an important source of competitive advantage (Dyer & Singh, 1998). Collaboration with the local business context positively affects subsidiaries' competence development by providing them with novel opportunities for combining complementary assets (Holm & Pedersen, 2000; Moore, 2001; Holm et al. 2005). In a similar vein, the stream of literature on "reverse spillovers" points to the existence of technological externalities that foreign subsidiaries can reap when operating in the host-country (Castellani, 2002; Driffield & Love, 2003). In general, by interacting with local suppliers and distributors, subsidiaries

gain a privileged exposure to location-specific pockets of expertise and develop a better understanding of the local markets (Chen & Chen, 1998).

In sum, vertical local linkages have the potential to act as channels for both spillovers of the MNCs' knowledge and foreign subsidiaries' learning (Giroud & Scott-Kennell, 2009). However, if this bi-directional knowledge flow is to be fully understood, special attention must be paid to the attributes of linkages that allow for effective resource sharing and technology transfer (Giroud, 2007; Scott-Kennel & Enderwick, 2004; Spencer, 2008; Giroud & Scott-Kennel, 2009; Santangelo, 2009). Most of previous research on local linkages has focused on the quantitative dimension of the phenomenon. These studies have mainly measured local linkages as the value of goods and services that subsidiaries buy or sell in the host country (Belderbos et al., 2001; Driffield & Noor, 1999; Gorg & Ruane, 1997; Iguchi, 2008; Turok, 1993), or through input/output analyses (Girma, Gorg, & Pisu, 2004). The quantity of vertical linkages provides information on the benefits from the increased demand or supply of products and services FDI creates within host countries (Giroud & Scott-Kennel, 2009). Researchers have also pointed to the limited significance of this attribute when it comes to evaluating the impact of linkages on local firms' development and subsidiary learning (Giroud & Scott-Kennel, 2009; Santangelo, 2009; Scott-Kennel, 2007; Spencer, 2008). Network research has produced ample evidence that especially linkages of high quality act as a mechanism for knowledge sharing (Uzzi, 1996; Gulati, 1995; Mowery, Oxley & Silverman, 1996; Lane & Lubatkin, 1998). Such linkages are characterized by the development of shared vision and co-evolution (Duanmu & Fai, 2007; Li, 2005). They encompass broad and intense interaction (both at a relational and at a personal level) that allows relationship partners to develop trust, and to foster mutual problem solving and the exchange of fine-grained information (Uzzi, 1997;

Gulati, 1998). Literature on FDI local linkages has recently argued for the importance to adopt a network perspective that integrates such dimensions of resource sharing, trust and relational interaction, as they allow to better capture linkages potential for learning and spillovers (Giroud & Scott-Kennel, 2009; Ghauri et al., 2005). These studies have highlighted the need to focus on quality local linkages, suggesting they are complex and multi-dimensional phenomena (Giroud & Scott-Kennel, 2009).

2.2 The trade-off of high quality linkages

High quality local linkages activate processes of bi-directional learning. These allow for the transfer of a variety of resources (information, technology, managerial and marketing skills, technical and organizational capabilities) that foster product innovation, as well as economies of scale and specialization (Duanmu & Fai, 2007; Giroud, 2007). However, they may also channel the subsidiary's knowledge to local competitors, thus endangering its competitive advantage. In sum, vertical linkages of high quality are critical for both subsidiary learning and spillovers. Hence, they generate a trade-off that the MNC has to manage. We suggest that managing this trade-off is crucial for MNCs operating in developed countries. Developed country firms engage in substantial "learning effort" especially through heavy investments in their human resources' skills (Liu, Siler, & Wang, 2000). They show a high concentration of development and initial commercialization of relevant innovation (Bell & Pavitt, 1997). Normally a significant proportion of their R&D is imitative (De Melto, McMullen, & Wills, 1980; Deiaco, 1992). Developed countries are usually characterized by strong and sophisticated demand, as well as by a wide presence of domestic suppliers (Porter, 1990). Firms operating in advanced countries have increasingly developed high degrees of differentiation and specialization (Bell & Pavitt, 1997) and they are able to provide high-value components, machinery, and services. In these contexts, cooperative activities along related

and supporting sectors are fundamental (Girma, Greenaway, & Wakelin, 2001; Girma, Gorg, & Pisu, 2004; Liu et al., 2000), but local industries also tend to be highly competitive due to their advanced institutional environments (Porter, 2000). Thus, local partners' greater competitiveness is not only an opportunity, but also a threat for foreign subsidiaries. On the one hand, domestic customers and suppliers possess high-value business and technical resources, which make them attractive partners. On the other hand, their greater absorptive capacity enables them to internalize subsidiary knowledge and, eventually, to further channel it to the subsidiary's local competitors. This reasoning is consistent with the findings of literature on networks that emphasizes the existence of a "*tension between the hope to acquiring new capabilities and the fear of losing control over one's resources*" (Brass, Galaskiewicz, Grebe, & Wenpin, 2004; p.808). Accordingly, also the literature on subsidiary-specific advantages (Rugman & Verbeke, 2001; Moore, 2001) suggests that subsidiaries aim to access location-specific accumulated resources while being committed to prevent the dissipation of the strategic assets they bring with them when entering the host economy.

3. Hypothesis development

3.1 The external environment of vertical linkages: the role of local competitive pressure

Local competitive pressure is considered to be a fundamental element of host country contexts influencing MNC behavior (Alcacer & Chung, 2007; Kogut & Chang, 1991; Holm et al., 2005; McCann & Mudambi, 2005). It can be defined as a situation where firms are strongly exposed to each other's actions and where forces to upgrade technology, products, and production processes intensify in the market (Boone, 2000). It increases the uncertainty of firms' relative positions as their advantages and distinctive resources are less stable and more difficult to preserve (Cool & Dierickx, 1993).

Competition exposes firms to a pressure to innovate (Grant, 1991; Porter, 1990). In fact, they are pushed towards upgrading and innovating in an attempt to sustain their competitive advantage and gain future market power (Cassiman & Veugelers, 1999; Schumpeter, 1942).

Due to its strong impact on a firm's competitive position, it is relevant to investigate the role local competition plays for subsidiaries' linkage decisions. Especially in developed countries, where high-quality linkages simultaneously encompass increased potential value and risk, it is reasonable to assume that MNC subsidiaries are alert to the consequences of linkages and that they perceive both learning opportunities as well as the risk of spillovers. We assume that subsidiaries located in developed countries are "advanced" agents that screen the competitive dynamics and recognize existing opportunities and threats. This is consistent with extant research that has documented subsidiaries' abilities to act on arising opportunities and constraints in the host market (Birkinshaw & Hood, 1998). Network theory has supported the idea that the environment in which firms operate is socially constructed (Astley, 1984). Firms' interaction with their business network is influenced by their perception of the environment itself (Pfeffer & Salancik, 1978; Pfeffer, 1987; Anderson et al., 1994). Hence, in order to understand the drivers of a subsidiary's strategic behavior regarding its vertical linkages in the host-country, it is very important to account for the subsidiary's perception of local competition.

3.1.1 Local competitive pressure and the quality of vertical linkages

Competition exposes firms to forces that challenge their position in the industry. In such situations, increasing the quality of local linkages is a valid response to the environmental threat. As outlined above, a subsidiary's network of local relationships is the source of distinctive knowledge and valuable learning opportunities. High quality

linkages also allow subsidiaries to gain access to resources that have competitive value (Gulati et al., 2000). Increasing the quality of local linkages fosters the relational capital and reciprocity between the partners and it increases the likelihood of joint problem solving and improved information exchange (Uzzi, 1997). In addition, a more intense involvement into already established relationships stabilizes the subsidiary's input-output mechanisms (Dacin, Ventresca, & Beal, 1999). Hence, under increasing levels of local competition, fostering the quality of linkages with local business partners helps the subsidiary to better handle the environmental threats and to innovate.

We argue that when competitive pressure becomes too high, subsidiaries may perceive a further increase of the quality of local linkages as too risky. Firms operating in highly competitive environments are particularly plagued by the risk of knowledge spillovers to rivals. In these settings, competitors aggressively seek to imitate the sources of a firm's superior performance (Barney, 1986) in an attempt to destroy its competitive advantage. Furthermore, in this context of increased market uncertainty, firms' competitive action, reaction and interaction is highly dynamic and difficult to predict (Reed and DeFillippi, 1990). As a consequence, even more skilled firms may find it difficult to maintain control over their assets, as this would require committing a large amount of resources to monitoring activities and implementing thorough protection strategies. Therefore, spillovers are more likely to happen.

In addition, under very high levels of competition, close and interconnected relationships with suppliers, distributors, service providers and companies operating in related industries are more likely to mediate the process of horizontal knowledge diffusion (McEvily & Zaheer, 1999). In fact, the turbulence stemming from increased competition may harm the general trust and social capital on which the focal relationships between the firm and its partners build (Cooke, 2001). This increases the

risk of being exposed to opportunistic behaviors. In fact, research also suggests that, when knowledge is shared within a non-trust based environment, it is more likely to be transferred to third parties who are outside the control of the knowledge source (McCann & Mudambi, 2005). Therefore, under very high levels of competition, high quality linkages to local partners are riskier since they may act as conduits for horizontal spillovers.

Integrating these arguments, we expect that in presence of very high levels of local competitive pressure, the risk of spillover is also very high. In turn, subsidiaries are more likely to regard their linkages as increasingly dangerous channels for horizontal spillovers. Hence, faced with rising competitive pressures, subsidiaries in developed countries will increase the quality of their linkages at a decreasing marginal rate and finally even reduce the investments in their vertical linkages to ultimately limit the risk of spillovers. Accordingly, Scherer (1965) found that moderate levels of competition seem most conducive to innovation, since scarce appropriation opportunities in highly competitive environments lower firms' incentives to innovate. Analogously, we expect the highest quality of linkages at moderate levels of competition:

Hypothesis 1: **There is an inverted U-shaped relationship between local competitive pressure and the quality of vertical local linkages.**

3.2 The role of subsidiary capabilities

In addition to firm-external conditions, firm-internal characteristics have also been highlighted as important factors influencing MNC choice to build relationships (Gulati & Gargiulo, 1999; Luo, 2003; Nell, Ambos, & Schlegelmilch, 2011; Santangelo, 2009). More specifically, previous research has suggested that subsidiary capabilities play a

role in determining the extent to which subsidiaries develop linkages with their local partners (Marin & Bell, 2006; Jindra et al., 2009). We are not interested in such a direct effect that a subsidiary's level of capabilities might have on the quality of its linkages. However, we draw on research suggesting that environmental factors and firm-internal traits interact when explaining firm competitive action (Blanc & Sierra, 1999). As a consequence, we argue that the effect of the perceived level of competitive pressure on the quality of local linkages is moderated by how much the subsidiary can potentially lose through spillovers or gain in terms of additional learning. This is in line with previous literature suggesting that firm capabilities influence firm's competitive strategies under varying levels of host-country competition (Shaver & Flyer, 2000; Alcacer, 2006; Alcacer & Chung, 2007). More capable firms avoid establishing themselves in regions with high levels of industrial activity because their potential loss in terms of spillovers to local competitors would be too high as compared to potential knowledge advantages (Alcacer & Chung, 2007). Firms that are already equipped with strong capabilities do not ascribe great value to further learning opportunities but they strongly fear potential spillovers to the external environment (Arikan, 2009). We suggest that this reasoning also applies to subsidiaries' behavior regarding the quality of their local linkages.

Following Birkinshaw and Hood (1998, p. 24), subsidiary capabilities may be defined as "*the capacity to deploy resources, usually in combination, using organizational processes to effect a desired end*". Subsidiaries with high levels of capabilities are attractive to their counterparts (Håkansson & Nobel, 2001). Local partners of highly capable subsidiaries have strong incentives to learn from them, and might seek to build quality linkages to gain access to their extensive set of competences. If capabilities diffuse to competitors and become replicable, they lose their strategic

value. As a consequence, "*firms have every reason to prevent others from accessing a valuable body of knowledge they possess so that the knowledge remains rare and a source of competitive advantage*" (Arikan, 2009; p. 666). In presence of a high spillover risk, more capable subsidiaries have much more to lose from relationships with local partners than to gain through learning effects because their marginal improvement of capabilities tends to be relatively small. We expect that such subsidiaries react to high levels of competition even stronger, i.e., the combined effect of high potential loss and high competitive pressure makes subsidiaries reduce their investments into quality linkages faster and further than if the subsidiary has less to lose because of a limited capability base. By the same token, a limited capability base makes further learning, and thus vertical linkages of high quality, more appealing for such subsidiaries while the potential damage caused by high spillover risks is smaller. Therefore:

Hypothesis 2: **Subsidiary capabilities negatively moderate the inverted U-shaped relationship between the local competitive pressure and the quality of vertical local linkages.**

4. Methods

For this study, 13 MNCs were chosen from the Swedish OMX 'Large Cap' list, excluding firms in the financial, insurance, and banking sectors. Our sample includes a variety of industries, such as pulp and paper, telecommunications, petrochemicals, hard materials, power systems, and equipment manufacturing.[1]

Initially, we approached the managing directors of 20 business divisions within these 13 MNCs since all subsidiaries clearly belonged to one of the divisions. All divisions studied were highly international, 75% of them having more than half of their

[1] For a full description of the data, see Forsgren et al., (2005).

employees outside the home country. In these international divisions, we gathered data from 97 subsidiaries located in European countries and in North America[2]. This resulted in a wide range of different locations. Approximately 20% of the subsidiaries were located in the home country Sweden often at different sites than the divisional headquarters. Five percent were located in the Americas, 38% in large European countries (Germany, France, Italy, and UK), and the rest in smaller Western European countries including 20% of subsidiaries in Sweden's neighbouring countries Denmark, Finland, and Norway.

On average, about five subsidiaries were studied in each division, although the variance is between two and nine. The divisions' headquarters assisted in the selection of subsidiaries that were representative for the division's business activities with the intention of increasing the possibility of drawing general conclusions. On average, the subsidiaries in the sample accounted for over 50% of the divisions' combined operations measured in terms of the number of employees. In 25% of the divisions, the subsidiaries investigated accounted for more than 80% of the division's total operations, whilst they accounted for between 10% and 60% in the remaining divisions. The number of employees in the subsidiaries varied from 50 to over 5,000. The subsidiaries all performed their own production and sales. Product development and production process development were important activities in all subsidiaries studied.

The data used to test the model were gathered through face-to-face interviews using a standardized questionnaire. Three different managers at each subsidiary, the CEO of the subsidiary, the sales-, and the purchasing manager, were interviewed resulting in a total number of 291 interviews. The questionnaire instrument was carefully developed incorporating feedback from several academics that identified

[2] Note that regression analysis is mainly done with 96 subsidiaries due to missing values.

questions being vague, ambiguous or the source of possible bias. The questionnaire was also pilot tested on an experienced manager in an MNC not approached in the actual study. Subsequently, we modified our instrument in accordance with the feedback from the scholars and the manager.

4.1. Measures

Dependent variable: the quality of vertical linkages

Following the approach by Andersson et al. (2002), we measure the quality of linkages based on four items that capture the degree of interdependence between the two partners and the breadth of direct interaction. This allows for the integration of multiple dimensions of linkages in order to assess their quality. Interdependence is based on three items that ask subsidiary managers to assess the degree of mutual adaptation in terms of (1) product technology, (2) production technology, and in terms of (3) overall business conduct. Furthermore, (4) the number of functional areas involved in the relationship with the business counterpart is asked to reflect the breadth of the relationship and thereby the relationship's possibilities for exchange of knowledge[3].

To derive our measures, we first asked the subsidiary sales and purchasing managers to identify the six most important relationships, three with external customers and three for external suppliers, that the subsidiary maintains. Second, the respondents provided information about the extent of adaptation within each relationship based on a Likert-type scale ranging from 1 (not at all) to 5 (very much). Finally, the sales and purchasing managers were asked to state the number of different functional areas from

[33] Note that in contrast to Andersson et al., (2002), we aggregate the four indicators to one single factor. This is because our exploratory principal component factor analysis show that all indicactors load on one factor. It is also justified as our quality of linkages construct is broadly conceived capturing elements of technical adaptation, business conduct, and breadth of interaction.

which individuals are involved in direct contacts with the specific customer or supplier, respectively. These functional areas are the chief executives, the administration, the purchasing department, the sales department, the production department (technical staff), and the R&D department. For each of the four items, we summed the scores of the subsidiaries' external relationships and divided the obtained value by the total number of external relationships. The four resulting subsidiary-level indicators load on one single factor (Construct Reliability CR = .85)[4]. They were used to create the subsidiary's average quality of vertical local linkages. The measure does not include the counterpart's view on the mutual adaptation and interdependence. However, this problem should not be overstated since it has been shown that indications regarding mutual adaptation from one side of a relationship match the assessment from the other side (Hallén, Johanson, & Sayed-Mohammed, 1991, p. 34).

The advantage of our measure is that it allows for a proper assessment of the linkages' quality. First, the identification of the relationships as well as the assessment of the relationships' attributes is made by the subsidiaries' managers responsible for sales and purchasing. Through this technique, rather than considering the whole set of heterogeneous local relationships of the subsidiary, we concentrated on those relationships that have been screened by an internal agent who is arguably in the best position to assess the relationships' quality. Second, our four items capture the mechanisms that are important to our understanding of learning and spillovers because they capture the extent to which a vertical relationship goes beyond arm's-length character. Strong mutual adaption and interaction in many functional areas indicate that the subsidiary focuses on and has an opportunity to learn from their counterparts as well

[4] Construct Reliability (CR) was calculated as an alternative to Cronbach's alpha due to the dependency of alpha on the number of items. We used the approach according to Hair et al. (2006) taking into account the square of the summed loadings and the sum of the error variance terms for the construct.

as the counterparts' possibilities to absorb and learn from the relationship with the subsidiary. Mutual adaptation in many important areas, such as product technology and manufacturing processes, allows us to depict the extent to which subsidiaries commit to and invest in local linkages, upgrading them from simple arm's-length relations to high-interdependency ties. The emphasis on the different functional areas involved points to the breadth of interaction and thereby the relationship's potential to function as conduits of knowledge flow. Moreover, embracing the idea that the highest-level capabilities of the firm are "cross-functional capabilities" that derive from the combination of more specialized, functional capabilities (Grant, 2008), it becomes clear that – through the interaction with different subsidiaries' functional areas (captured by our quality linkages measure) – vertical partners may have access to the most important competitive assets of the subsidiaries.

Local competitive pressure

To proxy the local competitive pressure, we asked the subsidiary purchasing and sales managers to evaluate the extent to which they experience that competitors influence the most important customer or supplier relationships identified for the dependent variable. We use a five-point Likert scale from 1 (not at all) to 5 (very much). Purchasing managers were instructed to rate only the influence on the supplier relationships, and sales managers the influence on the customer relationships. Analogous to the dependent variable, we aggregate the influence scores at the subsidiary-level, i.e. the scores for each of the subsidiary's relationships are summed and then divided by the number of relationships. This results in a perceptual measure of the average influence exerted by competitors in the subsidiary's local environment on the most important vertical

relationships that the subsidiary maintains[5]. This is consistent with our aim to capture perceptions of environmental conditions as the true drivers of firm behavior (Boyd, Dess, & Rasheed, 1993; Weick & Roberts 1993). Such perceptions would be hardly captured through the use of secondary data (Santangelo & Meyer, 2011).

Subsidiary capabilities

It is difficult to objectively measure capabilities. To overcome this limitation, we focused on the results of such capabilities (cf. Phene & Almeida, 2008 for similar approaches). Subsidiaries that are very capable in one area are often given a specific mandate, i.e. the subsidiaries are taking over activities for other units within the MNC (Birkinshaw & Hood, 1998). Thus, as a proxy for the capabilities of our subsidiaries, we asked the subsidiary top management to assess the extent to which the subsidiary is responsible for other MNC units' purchasing and sales activities on a 5 point Likert-type scale. We assume that the higher the level of responsibility for other MNC units' business activities the higher the subsidiary's capability base (cf. Frost et al., 2002 for a similar point regarding centers of excellence). The two indicators load on the same factor and we summed the scores to create the proxy for the extent to which the subsidiary possesses important capabilities (CR = .72).

Controls

We controlled for several industry-specific and firm-specific factors. Following previous literature on local linkages (Jindra et al., 2009), we included a measure that accounts for the type of entry mode and created a dummy indicating whether the foreign

[5] Note that the influence items do not capture what kind of influence the subsidiary experiences, e.g. influence on price or product development. However, the extent to which the buying and selling activities of subsidiaries are influenced by competitors defines – on average – how independent the subsidiary is on direct competitors' actions or if it is dominating the industry. This is what we refer to in our hypothesis development section.

investment was made through acquisition. We also controlled for subsidiary size (Scott-Kennel, 2007) as captured by the number of subsidiary employees, as well as for subsidiary age[6], measured by the number of years the subsidiary has been located in the given location (Scott-Kennel, 2007). Industry-effects have been accounted for through the introduction of two industry-dummies. Following Chen et al. (2004, p. 329), we split subsidiaries into three groups: high-tech industries, which cover electrical and electronics, machinery and precision instrument sectors; producer-driven industries, which cover chemicals, basic metals, metal products, non-metal mineral sectors; and buyer-driven industries, which cover textiles, food, paper, wood products and leather. We also controlled for the geographical distance between the subsidiary and the headquarters using the logged distance in kilometers. Following previous literature (Jindra et al., 2009), we also accounted for subsidiary autonomy by asking the subsidiary CEO to evaluate the extent to which the subsidiary can decide about organizational structure, investments, investments in R&D, and acquisitions. We averaged the values of the items of this 5-point scale to derive an average measure of subsidiary autonomy (CR = .80)[7]. Table 1 presents the correlations and descriptive statistics of our constructs.

----- Table 1 about here ------

We took precaution to limit potential common method variance. First, as described previously, our variables are informed by three different managers, thus reducing the risk of one single source of variance. The subsidiary CEO answered

[6] Information on subsidiary entry mode, size and age was provided by the CEO of the subsidiary.
[7] We did not chose a list-wise deletion approach in case of missing values for single dimensions but proceeded with the simple average.

questions regarding the subsidiary's level of capabilities as well as autonomy. The sales and purchasing managers answered questions specifically regarding the relationships to the subsidiaries' most important business partners for a specific product or product group, i.e. the mutual adaptation and breadth of interaction, and regarding the competitive pressure. Second, our study uses complex constructs based on a number of items and our models include quadratic effects and interaction effects. This strongly limits the possibility of common method variance (CMV) (Siemsen, Roth, & Oliveira, 2009). Thus, we are confident that common method bias is not of serious concern in our data.

4.3. Analysis and Results

To test our hypotheses, OLS regressions were used. To account for the fact that several subsidiaries belong to the same division and that their linkage patterns might be correlated, we applied the robust cluster procedure[8]. We checked for the normality of the residuals, the absence of multicollinearity, and undue influential cases. We obtained an average variance inflation factor (VIF) of 1.42 ranging from 1.09 to 2.33. Together with the bi-variate correlations all with $r < .50$ this suggests no apparent risk of multicollinearity. We standardized the variable of local competitive pressure before squaring it. We used the mean centering technique for subsidiary capabilities to calculate the interaction effect with competitive pressure in order to avoid multicollinearity. Table 2 shows the results of our main regressions[9].

--------- Table 2 about here -------

[8] This was not necessary for several subsidiaries belonging to the same country as intra-class correlations are very low and insignificant.
[9] Robustness tests using logged variables and without robust clusters lead to qualitatively similar results.

The baseline model (Model 1) explains about 6% of the variance. It shows that sub-units in producer-driven industries operate with significantly lower quality in their local linkages than subsidiaries operating in high-tech industries. None of the other regressors are significant. Model 2 tests the curvilinear relationship between local competitive pressure and the quality of vertical linkages. The explained variance increases to 32%. Both competitive pressure coefficients are significant ($p<.01$) with the linear effect being positive and the quadratic effect being negative. This supports our Hypothesis 1. The effects remain stable across the remaining specifications. In Model 3, we add the variable "subsidiary capabilities". The single effect of subsidiary capabilities is insignificant. In Model 4, we add the interactions between subsidiary capabilities and both local competitive pressure terms to test Hypothesis 2. The model explains approximately 37% of the variance ($p<.01$). The estimation shows that the interaction of subsidiary capabilities with the linear term of competitive pressure is significant ($p<.05$). The interaction with the quadratic term, however, is not significant. This result lends support to our Hypothesis 3.

We have plotted the result for the interaction in Figure 1[10]. Figure 1 shows that the overall shape of the curve does not change with the level of subsidiary capabilities since the interaction term with the quadratic effect is not significant. However, for any level of competitive pressure, the slope of the curve of the subsidiary with higher capabilities is smaller than the slope of the curve of the subsidiary with lower capabilities. This shows that, at low levels of competitive pressure, highly capable subsidiaries increase the quality of their linkages slower than low-capability

[10] Note that high and low were defined as approximately ½ a standard deviation above and below the mean value of subsidiary capabilities (capability values of +1 and -1). The competitive pressure variable is standardized so that these values represent standard deviations.

subsidiaries. Furthermore, at higher levels of competitive pressure, highly capable subsidiaries decrease the quality of linkages more strongly than low-capability subsidiaries.

-------- Figure 1 about here ---------

The effect of competitive pressure on the quality of vertical linkages depends on the level of capabilities that the subsidiary possesses. Furthermore, our follow-up analysis reveals that not all curves in our Figure 1 have a "tipping point" where the quality of the linkages decreases after a certain threshold level of competitive pressure. The tipping point is at competitive pressure levels of 1.8 for low-capability subsidiaries, at 1.3 for average subsidiaries, at 0.8 for highly capable subsidiaries. Hence, the tipping point of the curve moves to the left (i.e. to lower levels of competitive pressure) with an increase of the level of capabilities that the subsidiaries possess. The higher the subsidiary's capabilities, the less competitive pressure is required to make the curve tip. For subsidiaries with very low capabilities (0.8 standard deviations below the mean, capability value of -1.4), there is a decreasing marginal effect but even under the highest levels of competition they will still increase the quality in their linkages as they have little to lose, but still a lot to learn.

5. Discussion and Conclusions

We analyze the relationship between environmental conditions and the strategic behavior of MNCs by focusing on the impact of perceived local competitive pressure on the foreign subsidiary behavior regarding adjustments in the quality of linkages to vertical local partners. We show that subsidiaries in developed countries adapt the

quality of their most important local relationships to the perceived level of competition in the host environment and to their level of capabilities. Our findings reveal a curvilinear relationship between local competitive pressure and the quality of subsidiaries' vertical linkages and a negative moderating effect of the subsidiary capability level on this relationship.

This paper offers three major contributions. First, we contribute to the recent stream of literature on subsidiary local linkages (Chen et al., 2004; Jindra et al., 2009; Saliola & Zanfei, 2009; Santangelo, 2009). Previous research has paid scant attention to the environmental antecedents of the quality of linkages and, in particular, to the role of local competitive conditions. We suggest that subsidiaries adapt their local vertical linkages to the changing competitive conditions in the host-country in an attempt to manage the trade-off between learning opportunities and spillover threats. Our results are consistent with previous work arguing that local competition is one of the most critical factors of the host-country influencing the strategic behavior of foreign firms (Kogut & Chang, 1991; Blomström, Kokko, & Zejan, 1992; McCann & Mudambi, 2005; Holm et al., 2005). Our finding of a curvilinear relationship between local competition and the quality of vertical linkages also contributes to the stream of literature suggesting a rather simple relationship between host country competition and firm strategic behavior. Previous studies (Alcacer, 2006; Baum & Haveman, 1997; Cantwell & Santangelo, 2002; Sanna-Randaccio & Veugelers, 2007) have shown that firms tend to avoid co-locating or starting knowledge-intensive activities in regions characterized by high competition (Alcacer & Chung, 2007; Sanna-Randaccio & Veugelers, 2007), i.e. competition inhibits MNCs' local participation. In contrast, we show that local competitive pressure does not always deter subsidiaries' interaction with local agents. Instead it has a double role as the marginal effect of a one-unit increase in competitive pressure does depend on the initial level of competition. Whereas very high competitive

pressure discourages subsidiaries from increasing the quality of their local relationships because of spillover risks, lower levels of competitive pressure make spillover risks less critical. As a consequence, additional learning opportunities weigh stronger and encourage the subsidiary to increase the quality of local linkages. Firms' strategic reaction to local competition is not univocal as suggested by previous research (Baum & Haveman, 1997), but rather varies depending on the perceived level of competitive pressure. Furthermore, we highlight that the reaction to varying levels of competition also depends on the extent of subsidiaries' capabilities. In fact, when subsidiaries have very low levels of capabilities they will not reduce the quality of their linkages even in presence of very high competition: they have nothing to lose, but still a lot to learn. By showing that the complex relationship between competition and quality linkages is further moderated by subsidiary capabilities, our study is also in line with recent literature arguing that firms' endowment of resources and capabilities has to be integrated in analyses on spillovers and learning (Alcacer & Chung, 2007; Santangelo, 2011). Previous research has shown that host-competition and firm capabilities interact in determining MNCs' location choices (Alcacer & Chung, 2007). We add to this literature by showing that not only the relationship between competition and location choice is moderated by firm capabilities, but also the relationship between competition and inter-organizational strategy. We also extend previous literature by using a developed country context. We find that especially in developed countries the interaction of local competition and subsidiary capabilities has a strong impact on subsidiary's networking behavior as subsidiaries attempt to manage the bi-directional flow of knowledge. This substantially extends the work on MNC host-country linkages that, to-date, has primary focused on vertical linkages in less developed or developing host countries (Hansen et al., 2009; Jindra et al., 2009; Santangelo, 2009).

Second, our study provides support to recent work attempting to enrich the traditional literature on FDI (Hymer, 1976; Buckley & Casson, 1976; Dunning, 1980) with findings from network research (Andersson et al., 2002; Ghauri et al., 2005). The former has compiled substantial evidence on the phenomenon of MNC host country linkages, the reasons for firms to invest into such relationships, and their potential consequences. We complement traditional FDI literature by studying the *quality* dimension of local linkages and emphasizing the role of perceptions subsidiary managers have of environmental threats and opportunities. To this end, we support previous literature that has argued for including the quality dimension of local linkages as a much better proxy for bi-directional knowledge flows that are so critical for the net effect of FDI (Giroud & Scott-Kennel, 2009). Furthermore, we adopt from network theory a much more socially enriched understanding of economic exchange. In particular, network research has established the idea that *perceptions* of environmental conditions drive the behavior of firms (Anderson et al., 1994). In our model, the subsidiaries' perceptions of local competitive pressure and their own level of capabilities help explain their inter-organizational strategy. Thus, we argue that network theory offers perspectives that may complement traditional FDI theory, and help gaining a more realistic understanding of how foreign firms manage the trade-off between potential learning and spillovers.

Third, our findings have a bearing on the literature on FDI spillovers to host-markets (Castellani & Zanfei 2006, Santangelo, 2009). This literature has so far reported that more capable foreign subsidiaries typically establish high quality linkages and, as a result, are sources of potential spillovers to the host markets (Marin & Bell, 2006; Santangelo, 2009; Jindra et al., 2009). Shifting the context of analysis to more developed countries, our study shows that the potential spillovers associated to more

capable subsidiaries critically depend on local market competitive conditions to the extent that spillovers to the host market may fail to materialize under strong local competition. Highly capable subsidiaries decrease the quality of linkages in presence of strong local competition to protect their valuable assets, thus reducing the potential for spillover. We show that medium levels of competition might provide an optimum level for host countries to profit from the presence of foreign MNCs. This result is consistent with previous research suggesting that an industry's innovative output is maximized in presence of moderate levels of competition (Scherer, 1965). The mirror consequence of this reasoning provides a major insight to the literature on subsidiary learning (Almeida, 1996; Almeida & Phene, 2004). This literature has regarded the host market primarily as a source of learning for the foreign subsidiary (Cantwell, 1989; Mudambi & Navarra, 2004; Phene & Almeida, 2008). Our analysis confirms this argument only under the conditions of low perceived competitive pressure. We find that some subsidiaries might consciously forgo the opportunity to learn from high-quality relationships with local partners in developed countries. This is because the relative detrimental effects of spillovers outweigh the learning benefits.

5.1 Limitations

Our study suffers from some limitations. First, we do not cover the effects of other types of "spillover-controlling" mechanisms, such as formal protection strategies (De Faria & Sofka, 2010), beyond the adjustment of local linkages quality. Future research could investigate other mechanisms that foreign subsidiaries adopt to defend their knowledge, and how these are used to manage the environmental threats. Second, only linkages to customers and suppliers are included in our analysis. Yet, despite a certain level of underestimation of spillovers and learning from the local context this approach might

cause, both effects are arguably affected in the same way thus not skewing our analysis. Third, while our focus on the six most important relationships of subsidiaries assures that the relationships do bear some level of importance and are thus managed with care, we have limited knowledge on the rationale underlying the assessment of this importance. However, this problem is not uncommon in other disciplines. For instance, ego-centered network studies often ground their empirical analysis on the identification (made by the informants) of a number of personal acquaintances or colleagues in order to collect information on network density and centrality. The criteria through which these acquaintances are selected are rather general and do not seem to be an issue (Ibarra, 1993; Morrison, 2002). Finally, our measure of subsidiary capabilities is based on subsidiaries' skills in terms of purchasing and sales activities. Although this is consistent with our focus on vertical linkages, it does not include technological skills. This is not a strong concern as both purchasing as well as marketing/sales capabilities can be important sources of competitive advantage (e.g. Heide, 1994). There is also evidence suggesting that technical and marketing capabilities are correlated, as the effective management of upstream and downstream markets represents a strong input for firms' technical development processes (Calantone & Di Benedetto, 1988; Moorman & Slotegraaf, 1999). Nevertheless, future research could validate our findings in the specific context of technological capabilities.

5.2 Practical Implications

This study bears interesting practical implications. For subsidiary managers, our results imply that adaption processes regarding inter-organizational strategies of subsidiaries are immensely complex undertakings. Subsidiary managers need to embrace such complexity and be aware that inter-organizational strategies encompass both gains and

costs, which are driven by a multitude of factors. Inter-organizational relationships need to be managed with care, especially in developed market contexts. This requires subsidiary managers to be able to scrutinize carefully local conditions and relate that to firm-internal capabilities. For headquarters managers, our findings suggest that subsidiaries may be able to balance learning opportunities with spillover risks. Thus, avoiding FDI in a risky location altogether might be too strong of a reaction. For policy makers, it is important to notice adverse selection logics in subsidiaries' linkage behavior. More skilled subsidiaries will shy away from high quality local linkages in presence of strong competition and only the less capable subsidiaries will be eager to develop close and interdependent linkages with local firms. In this case, the net outcome of subsidiaries' linkages for domestic firms might be lower than expected as the domestic firms might face situations in which they share more valuable knowledge with foreign subsidiaries than they receive back from them.

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Table 1: Descriptive statistics and correlation matrix.

Variable		1	2	3	4	5	6	7	8	9	10	11
1	Quality of Vertical Linkages	1.000										
2	Entry Mode (1 = Acquisition)	0.068	1.000									
3	Sub. Size	0.124	0.056	1.000								
4	Sub. Age	-0.022	-0.169	0.055	1.000							
5	Producer-Driven Industry Dummy	-0.120	0.114	-0.080	0.051	1.000						
6	Buyer-Driven Industry Dummy	-0.089	-0.244	-0.125	0.184	-0.228	1.000					
7	Geographic Distance from HQ	-0.051	-0.011	-0.094	-0.142	-0.317	-0.032	1.000				
8	Sub. Autonomy	0.081	-0.028	-0.080	0.033	0.247	-0.364	-0.060	1.000			
9	Local Competitive Pressure	0.466	0.118	0.098	0.054	-0.025	-0.038	0.026	0.071	1.000		
10	Local Competitive Pressure Squared	-0.190	0.168	-0.026	-0.160	-0.199	0.060	0.053	-0.129	0.056	1.000	
11	Sub. Capabilities	0.176	0.046	0.082	-0.008	-0.131	-0.149	-0.017	-0.121	0.058	-0.101	1.000
	Means	2.796	0.216	684.3	29.9	0.082	0.361	5.605	3.586	0.000	0.990	0.000
	Std. Dev.	0.686	0.414	1612.3	27.8	0.277	0.483	2.942	0.990	1.000	1.197	1.913

Table 2: OLS regression results for dependent variable quality of vertical linkages.[1)]

Specifications		(1)	(2)	(3)	(4)
Hypothesized relationships	H1: Local Competitive Pressure		0.320***	0.316***	0.274***
			(0.058)	(0.055)	(0.068)
	H1: Local Competitive Pressure Squared		-0.151***	-0.143***	-0.103**
			(0.041)	(0.043)	(0.045)
	Sub. Capabilities			0.032	0.018
				(0.035)	(0.040)
	H2: Local Competitive Pressure x Sub. Capabilities				-0.101**
					(0.043)
	H2: Local Competitive Pressure Squared x Sub. Capabilities				0.044
					(0.026)
Controls	Entry Mode (1 = Acquisition)	0.102	0.086	0.082	0.049
		(0.168)	(0.167)	(0.167)	(0.195)
	Sub. Size	0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)
	Sub. Age	-0.000	-0.002	-0.002	-0.002
		(0.002)	(0.002)	(0.002)	(0.002)
	Producer-Driven Industry Dummy	-0.488**	-0.552***	-0.507***	-0.536***
	(baseline: high-tech industry)	(0.201)	(0.145)	(0.159)	(0.164)
	Buyer-Driven Industry Dummy	-0.097	-0.087	-0.054	-0.108
	(baseline: high-tech industry)	(0.208)	(0.154)	(0.139)	(0.122)
	Geographic Distance from HQ	-0.022	-0.029	-0.027	-0.036
		(0.024)	(0.027)	(0.028)	(0.026)
	Sub. Autonomy	0.086	0.032	0.045	0.021
		(0.104)	(0.067)	(0.068)	(0.071)
	Constant	2.650***	3.091***	3.015***	3.159***
		(0.503)	(0.350)	(0.357)	(0.366)
	Firm-Controls[2)]	Yes	Yes	Yes	Yes
	F	4.72***	33.89***	34.34***	22.26***
	R-squared	0.06	0.32	0.33	0.37
	Mean VIF				1.42

1) Unstandardized regression coefficients. Robust standard errors in parentheses. *** p<0.01, ** p<0.05. Number of observations n=96 except for specification 1 where 97 observations are used for the estimation.

2) Controls for potential inter-correlations between subsidiaries belonging to the same firm included in the model (Robust clusters procedures as in STATA 10)

Figure 1: The relationship between Local Competitive Pressure and Quality of Vertical Linkages for different levels of Subsidiary Capabilities.