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Engaging Customer Co-creation in New Product Development through Foreign Subsidiaries: Influences of MNCs' Global Integration and Local Adaptation Mechanisms

Efforts to engage customers in co-creating new products have garnered much research attention from studies documenting their positive impact on firm innovation and performance. Less research, however, has counterbalanced the bright with the potential dark side of customer co-creation, especially as a strategy for multinational corporations (MNCs) operating in foreign markets. This study examines how MNC subsidiaries' customer co-creation (CC) affects new product innovativeness and knowledge leakage to competitors. Adopting a broader agency perspective to recognize that subsidiaries often do not perform up to headquarters' expectations due to both self-serving opportunism and honest incompetence, this study explores how CC effects are contingent upon MNCs' global management mechanisms. Using a dyadic managerial survey of 238 MNC subsidiaries, the authors find that MNCs can control knowledge leakage by implementing proper global integration and local adaptation mechanisms. However, CC may not necessarily improve new product innovativeness, except when the subsidiary has low local R&D staff influence. This study contributes to the CC literature by showing its benefits, challenges, and boundary conditions as a growing MNC innovation strategy.

Keywords: customer co-creation, new product development, knowledge leakage, multinational corporations, headquarters-subsidiary relationship

As an innovation strategy, customer co-creation (CC), which refers to the extent to which customers participate as co-developers in the firm's new product development (NPD) process (Fang 2008; Griffith and Lee 2016), is gaining credence in academic research and real-world practice for its ability to enhance NPD success (Chang and Taylor 2016; Coviello and Joseph 2012; Hoyer et al. 2010).¹ For example, Trek uses its Custom Project One program to invite customers to “create their own bike from a wide selection of customizable options, allowing them to be intimately involved with the development and design of the end product,” while DuPont “collaborates closely with multiple industrial buyers to optimize applications development, material technology, and innovation” (Griffith and Lee 2016, p. 3). In particular, multinational corporations (MNCs) increasingly leverage this strategy in foreign markets to access local knowledge resources and expand innovation possibilities. For example, when General Electric (GE) built its first overseas innovation center in Chengdu, China in 2012, Mr. Jeff Immelt, GE's chairman and CEO at the time, announced that “open innovation practices, especially the customer co-creation approach embodied at the Chengdu center, is essential for multinational technology companies, such as GE” (BioSpectrum 2012). Recently, IKEA also launched a workspace in their Shanghai store, inviting customers to co-create with the development team on new concepts and prototypes aimed at creating localized new product solutions for cooking, eating and cleaning (Ejdemo 2019).

Despite the growing trend of MNCs' increasing collaboration with their local customers in NPD (Merlo, Eisingerich, and Auh 2014), there is a significant gap in the literature regarding how MNCs leverage CC across global operations to create new product advantage (Griffith and Lee 2016). Compared with domestic firms, MNCs need to respond to a broader set of market characteristics and customer needs, making local CC strategies even more important (Griffith

and Lee 2016). MNCs also encounter specific challenges in engaging CC in NPD in foreign markets (Lee and Griffith 2019). First, subsidiaries have differential innovative competence depending on the contexts in which they are embedded (Almeida and Phene 2004). Thus, subsidiaries may vary in their ability to improve product innovativeness through CC.

Second, effective oversight of and control in MNCs' international operations are challenging due to their geographically dispersed subsidiary network (Kumar, Sunder, and Ramaseshan 2011). Thus, by leveraging CC in foreign markets, MNCs may expose themselves to more downside effects, such as knowledge leakage to competitors, which could have detrimental consequences to their competitive advantage (Sisodiya, Johnson, and Grégoire 2013). For example, SIG allCap, a Swiss plastic products manufacturer, learned a hard lesson when a customer with whom the firm had collaborated on an innovation project brought the firm's knowhow and joint ideas to a competitor for final product development (Enkel, Kausch, and Gassmann 2005). This risk is especially notable in host countries where intellectual property infringements are common (Zhao 2006). However, the likely influence of CC on knowledge leakage has not been substantiated empirically in the context of MNC subsidiaries.

Third, local co-creation efforts can be supported or undermined by MNCs' global management mechanisms, because foreign subsidiaries are locally embedded in their host country and globally linked with their MNC network (Grewal et al. 2013). Recently, Griffith and Lee (2016) find that cross-country collaboration of marketing personnel has mixed moderating effects on CC in local markets. Thus, in the effective management of CC in foreign subsidiaries, the spillover effects of MNCs' broader organizational context need to be examined; to date, well-structured theoretical explorations remain scarce in the international marketing literature.

This research aims to address two overarching research questions. Is CC a double-edged

sword that fosters both positive and negative innovation-related outcomes? If so, can MNCs' management mechanisms enhance or dampen these outcomes? Engaging local CC may allow foreign subsidiaries with the relevant capabilities to improve *new product innovativeness* (Coviello and Joseph 2012), or the extent to which the new product differs from competing alternatives in a unique and meaningful way to customers (Fang 2008). Opening up the NPD process for CC may also heighten the risk of *knowledge leakage* (West and Bogers 2014), or the extent to which unique and proprietary knowledge is imitated or appropriated by competitors in the host country (Jiang et al. 2013). In considering the potential double-edged effects of CC, the current research draws on the broader agency perspective (Hendry 2002; Hoenen and Kostova 2015) and MNC literature (e.g., Phene and Almeida 2008; Prahalad and Doz 1987) to posit that the effects of CC are contingent upon the MNC's global integration and local adaptation mechanisms. Specifically, we consider two global integration mechanisms—*subsidiary decision involvement* (headquarters-subsidiary communication) and *task coordination* (integration of functional operations across MNC subsidiaries)—as well as two local adaptation mechanisms—*subsidiary local embeddedness* (adaptation of local business activities with external business partners) and *local research and development (R&D) staff influence* (importance of host country nationals relative to expatriates in the local R&D team). We conducted a multi-informant survey on 238 MNC subsidiaries in a foreign market to verify our postulates.

Our research contributes to the co-creation and MNC literature in a few ways. First, while prior studies have predominately focused on the positive effects of CC on NPD successes, such as operational (e.g., innovativeness, speed to market), financial (e.g., sales and profits of new products), and marketing (e.g., customer satisfaction, loyalty) performance (Chang and Taylor 2016), we examine both its bright and dark sides simultaneously. Second, we propose that MNCs

face unique challenges when delegating their subsidiaries to engage local CC, because their ability to benefit from this strategy relies on their global integration and local adaptation mechanisms (Lee and Griffith 2019). Some MNC organizational attributes, such as local R&D staff influence, are generally expected to facilitate subsidiary performance (Law et al. 2009). However, we ascertain that they might bestow no such benefits when used in conjunction with CC. Third, we answer recent calls to generate insights from a broader agency perspective (Hoenen and Kostova 2015) by suggesting that a subsidiary may not perform up to headquarters' (HQ's) expectations in engaging CC in NPD for reasons of both incompetence and opportunism. Such agency hazards might be resolved by specific MNCs' global and local management mechanisms. Fourth, we also extend the MNC literature on subsidiary dual embeddedness (e.g., Meyer, Mudambi, and Narula 2011) that stresses the importance of simultaneously managing the subsidiary's external linkages within the local context and its internal linkages within the MNC network. Our research offers guidelines for effective CC management and holds practical implications for MNCs that increasingly rely on local customer involvement to drive innovation in foreign markets. Yet, as shown in this study, involving customers in the NPD process does not always lead to desirable innovation outcomes.

THEORETICAL FRAMEWORK

Effects of Customer Co-creation on New Product Innovativeness and Knowledge Leakage

A critical advantage of engaging CC in the NPD process is that it allows the firm to gain access to innovative product ideas and unmet market needs (Hoyer et al. 2010). However, its overall impact on new product innovativeness remains unclear (Chang and Taylor 2016), suggesting the need to consider the role of boundary conditions. How well a subsidiary leverages customer inputs to enhance product innovativeness is driven by its innovative competence, such

as sourcing and combining knowledge (Frost, Birkinshaw, and Ensign 2002; Phene and Almeida 2008). Because a foreign subsidiary is internally embedded within the MNC network and organizationally bound to follow HQ mandates (Grewal et al. 2013), its innovative competence and capabilities will be affected by how the MNC manages its global operations.

Engaging CC in the NPD process also increases the risk of knowledge misappropriation. Customers and employees involved in the collaborative innovation process may leak sensitive information into the public domain unintentionally due to unawareness of its confidentiality, overenthusiasm in problem-solving, and/or mistakes (e.g., leaving documents unattended) (Matusik and Hill 1998; Olander and Hurmelinna-Laukkanen 2015). Knowledge leakage can also occur when customers who disregard confidentiality clauses leak secrets to other firms intentionally for personal gain. Some R&D employees may even exhibit a “not-invented-here syndrome,” a well-documented negative attitude or bias towards knowledge coming from outside the organization (Enkel, Kausch, and Gassmann 2005; Lichtenthaler and Ernst 2006). Such employees may leak knowledge intentionally to sabotage the firm’s CC effort in order to safeguard and preserve their own worth within the firm (Crino 1994).

Whether or not knowledge leakage occurs hinges on (1) the subsidiary’s governance capability to protect knowledge, such as secrecy and non-disclosure contracts (de Faria and Sofka 2010; Jiang et al. 2013), and (2) the level of self-interest-seeking or opportunistic behaviors of subsidiary employees (Boyd and Spekman 2008). MNCs’ management mechanisms may influence a subsidiary’s innovative competence and capability, and may also have implications for the subsidiary’s governance capability and employee opportunism, thus affecting the subsidiary’s ability to safeguard against knowledge leakage.

Agency Theory and the Broader Agency Perspective

Both agency theory (Eisenhardt 1989) and the broader agency perspective (Hendry 2002) are theoretically appropriate for the study of HQ-subsidary relationships due to their resemblance of principal-agent relationships (O'Donnell 2000). To innovate in local markets, HQ (the principal) delegates NPD responsibilities and decision-making authority to the subsidiary (the agent) (Ghoshal and Bartlett 1990). A “principal’s problem” occurs when the subsidiary fails to perform as prescribed and expected by HQ (Yu, Subramaniam, and Cannella 2009), such as when its CC efforts fail to generate product innovativeness and/or lead to knowledge leakage. However, the two agency theories differ in terms of the causes they attribute to the problem and the corresponding remedies (Hendry 2002; Hoenen and Kostova 2015).

In the traditional agency theory, a “principal’s problem” is attributed to self-interest seeking or opportunistic behaviors of agents. For example, a subsidiary may withhold its full support to the HQ’s local CC initiative because it does not agree with HQ about the salient consumer needs (Griffith and Lee 2016). To resolve them, monitoring mechanisms or incentive structures could be used to align interests and preferences between principals and agents (Eisenhardt 1989). Implicit in this view is the assumption that self-interested agents are economically rational and fully competent to carry out principals’ objectives. The broader agency perspective, however, considers the presumptions of self-interest and perfect rationality to be inappropriate (Ghoshal and Moran 1996). It purports that the problem may be rooted in the subsidiary’s “honest incompetence” (Hendry 2002; Hoenen and Kostova 2015). An agent’s incompetence can stem from bounded rationality, in that it suffers “from limited human knowledge and foresight and from the limitations of rational understanding and communication arising from language, culture, and cognition” (Hendry 2002, p. 101). Such incompetence can also arise from judgmental

infallibility, or “human fallibility in making judgments and interpretations” (Hendry 2002, p. 101). For instance, principals may be unable to specify objectives in an accurate way (Nelson and Winter 1982) while agents may lack the competence to understand these objectives, judge situations, and act appropriately (Hendry 2002). Accordingly, principals may mitigate the problem by providing accurate specifications of objectives and more resources for training and guidance (Hendry 2002).

The broader agency perspective further proposes that the institutional environment in which agents are embedded, affects their levels of opportunism and honest incompetence (Wiseman, Cuevas-Rodriguez, and Gomez-Mejia 2012). For example, host market environments are more likely to exacerbate these causes when they have less developed formal institutions (Kostova, Nell, and Hoenen 2018). We adopt the broader agency perspective as the overarching theory of our study because it underscores the importance of MNCs’ management mechanisms in offering an organizational environment that enables subsidiaries to simultaneously overcome their incompetence and reduce opportunism when they engage local CC to generate innovative products while mitigating knowledge leakage (Hoenen and Kostova 2015).

Moderating Effects of MNC’s Global Integration and Local Adaptation Mechanisms

We posit that MNCs’ global and local management strategies can foster or hinder the effects of subsidiaries’ CC on new product innovativeness and knowledge leakage. According to Prahalad and Doz’s (1987) integration-responsiveness framework, MNCs use global integration mechanisms to coordinate strategic decisions and activities across countries to maximize the collective organization and build efficient operations networks (Roth and Morrison 1990). They also use local adaptation mechanisms that allow subsidiaries to respond to local needs and maximize their initiatives to pursue new opportunities proactively (Johnson 1995). Given the

increasing globalization of the competitive environment, maintaining a system of global integration while allowing foreign subsidiaries the necessary flexibility to adapt to their local conditions, enables MNCs to simultaneously meet local demands and capitalize on worldwide competitive advantages (Luo 2001; Roth and Morrison 1990).

Specifically, MNCs employ *vertical* integration mechanisms to establish linkages between foreign subsidiaries and HQ, and they employ *lateral* integration mechanisms to facilitate coordination across different foreign subsidiaries (O'Donnell 2000). We choose subsidiary decision involvement and task coordination, respectively, as proxies for these aspects of global integration. MNCs' local adaptation mechanisms can take two forms: *functional* adaptation, which involves adjustments of business activities to local contexts (Andersson, Forsgren, and Holm 2002), and *personnel* adaptation, which relates to the localization of firm employees (Lam and Yeung 2010; Law et al. 2009). We adopt subsidiary local embeddedness (Anderson, Björkman, and Forsgren 2005) and local R&D staff influence (Li, Wang, and Liu 2013) to represent these aspects of local adaptation, respectively. Together, these global and local management strategies (see Appendix A for a summary) can act as mechanisms that jointly mitigate the honest incompetence and opportunism of subsidiaries as postulated by the broader agency perspective (Hendry 2002). Figure 1 presents the overall conceptual model.

[Insert Figure 1 about here]

Subsidiary Decision Involvement. Subsidiary decision involvement captures the extent of communication between HQ and the subsidiary, such as mutual information flows and consensus building for decision-making (Grewal et al. 2013). Such involvement is high when HQ emphasizes two-way communications with the subsidiary, such that considerations about the unique parameters of the local environment are integrated into HQ's decisions and policies

pertaining to the subsidiary, whereas it is low when a unilateral approach is adopted that allows for minimal inputs to and from the subsidiary (Luo 2003).

Subsidiary decision involvement enhances mutual understanding in HQ–subsidiary communications. It allows HQ to communicate to its subsidiary about how to engage CC more clearly and precisely, which can help to reduce the subsidiary’s honest incompetence in engaging CC due to misinterpretation and misjudgment (Hendry 2002). High subsidiary decision involvement also allows HQ to interpret the subsidiary’s local challenges more accurately and acquaint itself with the local needs (O’Donnell 2000). This increases the chances that HQ will promptly provide training and guidance to the subsidiary when needed (Luo 2003), further alleviating the agent’s incompetency problems (Hendry 2002). Thus, the provision of clear objectives, resources, and guidance can boost the subsidiary’s competency to engage CC (Bartlett and Ghoshal 1989) to enhance product innovativeness.

Rich HQ–subsidiary communication also stimulates the exchange of information and knowledge between HQ and the subsidiary (Gupta and Govindarajan 2000). Frequent information sharing allows the subsidiary to source global knowledge and acquire innovative competency from HQ’s global network and experience (Ambos, Ambos, and Schlegelmilch 2006; Luo 2003). The availability of heterogeneous market perspectives and insights in turn improves new product innovativeness when introduced into the CC process (Fang 2008; Ko and Liu 2019; Phene and Almeida 2008). As Prabhu, Chandy, and Ellis (2005, p. 116) indicate, “[t]he broader a firm’s existing knowledge, the greater is its ability to combine knowledge in related fields in a more complex and creative manner...[and] the greater is its ability to create innovations.” Therefore, we posit:

H_{1a}: Subsidiary decision involvement positively moderates the effect of customer co-creation on new product innovativeness.

Because high subsidiary decision involvement facilitates the exchange of complementary knowledge between HQ and the subsidiary in the CC process (Björkman, Barner-Rasmussen, and Li 2004), new proprietary knowledge generated in cooperation with customers encompasses more complementarity with the subsidiary's intrafirm network. As Zhao (2006, p. 1186) indicates, "[competitors'] motivation to imitate is low when the value of a technology is highly dependent on the proprietary firm's internal resources ... Intellectual properties are less vulnerable to imitation in the presence of strong complementarities." Complementary knowledge helps reduce the motivations for knowledge leakage through customers and employees as it is more difficult for competitors to comprehend and imitate, since fully exploiting that knowledge requires combining it with additional expertise (de Faria and Sofka 2010).

Creating and maintaining a set of knowledge protection mechanisms that is broad and strong enough to curb knowledge leakage, requires substantial resources from the subsidiary (Hurmelinna-Laukkanen and Olander 2014). High subsidiary decision involvement allows HQ and the subsidiary to establish a shared set of values, objectives, and beliefs (Grewal et al. 2013; Schleimer and Pedersen 2014). This unitary alignment can motivate the subsidiary to strengthen its competence in protecting knowledge, such as by monitoring non-disclosure contracts with customers and employees or implementing employee awareness training (Hurmelinna-Laukkanen and Olander 2014) to minimize knowledge spillovers to competitors.

In addition, the ideological agreement and goal compatibility between HQ and the subsidiary resulting from high subsidiary decision involvement can increase subsidiary employees' identification with the global organization (O'Donnell 2000). In turn, subsidiary employees will more likely pursue the interests of the MNC as a whole rather than just their own self-interests, even in the absence of formal oversight by HQ (Nohria and Ghoshal 1994). This lessens the

opportunistic tendency of subsidiary employees to intentionally disclose proprietary knowledge to competitors even when CC is engaged in the NPD process. Thus, we posit:

H_{1b}: Subsidiary decision involvement negatively moderates the effect of customer co-creation on knowledge leakage.

Task Coordination. Task coordination refers to the extent to which operations are coordinated in an integrated fashion across the global network of MNC subsidiaries (Grewel et al. 2013). Coordination of operations is an important lateral integration mechanism (Kim, Park, and Prescott 2003) that facilitates the movement of generalized resources (e.g., knowledge and learning) across subsidiaries (O'Donnell 2000), aligns subsidiary operations for optimal MNC outcomes (Andersson, Forsgren, and Holm 2007), and immunizes the MNC against institutional hazards (Feinberg and Gupta 2009). Thus, more task coordination can alleviate the subsidiary's incompetence problem and positively moderate the effect of CC on new product innovativeness by facilitating the provision of training and guidance among subsidiaries through mutual learning across the network (Thongpapanl, De Clercq, and Dimov 2012).

More task coordination also means more exchange of operational information and support across subsidiaries (Grewal et al. 2013). As Berry (2014, p. 874) suggests, “[w]hen firm engineers, employees, and inventors from different country locations come together to generate new knowledge, they are likely to draw on this diversity and bring together different perspectives and ideas from their local country environment.” The intensified cross-subsidiary communication improves the subsidiary's competence in sourcing dissimilar foreign perspectives, synthesizing broader knowledge profiles, and integrating them with local knowledge gained from CC to enhance product innovativeness.

However, task coordination may also impede the effect of CC on new product innovativeness for two reasons. First, task coordination across subsidiaries requires the establishment of

common policies, guidelines and centralized decision making which pertain to product-related operations (Kim, Park, and Prescott 2003). Second, it leads to international interdependence, such that a subsidiary needs to rely on other subsidiaries' activities or inputs to perform its product-related operations effectively (Ambos and Schlegelmilch 2007; O'Donnell 2000). Procedural formality and international interdependence associated with a tightly coordinated network constrain the subsidiary's discretion with regard to its local operations and innovation initiatives. Since "organizational autonomy is often considered positive for product innovation because the innovating unit is free of 'red tape,' bureaucracy, and other responsibilities that disrupt the product innovation task" (Hansen 1999, p. 86), low operational freedom resulting from task coordination hinders the subsidiary's ability to combine insights from CC flexibly and creatively, which could decrease product innovativeness. Based on these opposing arguments, we propose the following competing hypothesis:

H_{2a}: Task coordination positively/negatively moderates the effect of customer co-creation on new product innovativeness.

As task coordination and interdependence across subsidiaries increase, the complementarity in knowledge and resources among them also increases, and this discourages the formation of highly localized capabilities (Alcácer and Zhao 2012). Thus, the subsidiary's customer co-created outputs must be integrated with complementary knowhow from other subsidiaries to create the end product (Feinberg and Gupta 2009). This makes the co-created new product knowledge less attractive to competitors, because they do not have access to the same critical complementary knowledge (Zhao 2006). Therefore, task coordination serves as a knowledge protection mechanism, minimizing spillovers of co-created knowledge to competitors.

Furthermore, global coordination of subsidiaries' operations allows HQ to closely monitor and control the activities at each location to ensure that those activities align with MNC priorities

(Alcácer and Zhao 2012; Ambos and Schlegelmilch 2007). This heightened level of HQ oversight decreases opportunistic behaviors of subsidiary employees and lowers the leakage of knowledge acquired through CC by employees and customers. Thus, we expect that:

H_{2b}: Task coordination negatively moderates the effect of customer co-creation on knowledge leakage.

Subsidiary Local Embeddedness. Subsidiary local embeddedness refers to the extent to which a subsidiary has adapted its activities (e.g., business routines, product and production development) to conform to similar processes in its business partners' (e.g., suppliers, distributors, etc.) organizations (Andersson and Forsgren 1996).² Because local embeddedness “mirror[s] a subsidiary’s capacity to understand changing business conditions and its ability to adapt to these conditions through its business relationships” (Andersson, Forsgren, and Holm 2002, p. 987), it serves as a useful organizational mechanism to achieve local responsiveness to support CC (Luo 2001). With high local embeddedness, joint trust and commitment allow the subsidiary to easily access, identify, and assimilate proprietary and “fine-grained” knowledge from the business network (Andersson, Forsgren, and Holm 2002; Uzzi 1996) and to readily transfer tacit knowledge across organizational boundaries (Rowley, Behrens, and Krackhardt 2000). By doing so, the subsidiary can improve its competence in sourcing diverse market and technological information to complement and support the development of novel products through the co-creation process (Ko and Liu 2019).

The process of engaging CC in NPD involves various organizational activities ranging from development and testing to planning and production. These business activities must be flexible enough to allow for incremental sense making and “mindful trial and error” in CC (Coviello and Joseph 2012). When business activities are mutually adapted, the subsidiary and its business partners can “coordinate functions and work out problems ‘on the fly’” (Uzzi 1996, p. 679), so

that the subsidiary can flexibly adjust its business activities to integrate creative inputs throughout the co-creation process. In addition, embedded relationships imply a better understanding of the counterpart's needs and abilities (Andersson, Forsgren, and Holm 2002). Through embedded relationships, the subsidiary and its business partners are more likely to exchange constructive feedback and solve problems collaboratively, thus reducing product development uncertainty and increasing new product success from CC (Uzzi 1996). We posit:

H_{3a}: Subsidiary local embeddedness positively moderates the effect of customer co-creation on new product innovativeness.

High embeddedness takes time and effort to develop. Knowledge about the counterpart's capabilities must be acquired and business activities must be mutually adapted. Mutual trust also needs to be developed through deepening personal ties and mutual investments (Andersson, Björkman, and Forsgren 2005). As Dyer and Singh (1998, p. 667) note, "alliance partners [bring] distinctive resources to the alliance, which, when combined with the resources of the partner, result in a synergistic effect whereby the combined resource endowments [are] more valuable, rare, and difficult to imitate." Thus, it is difficult for outsiders to access, understand, and imitate the distinctive set of resources and processes when they are applied to support CC at the subsidiary. Therefore, high subsidiary local embeddedness serves as a protection mechanism against leakage of co-created knowledge through both customers and employees.

High local embeddedness fosters organizational trust, mutual gain, and reciprocity between the subsidiary and its business partners (Andersson, Forsgren, and Holm 2002). Thus, firms in an embedded network are more likely to forego individual short-term interests and develop shared behavioral expectations that govern and constrain actions in the group (Rowley, Behrens, and Krackhardt 2000). Because the subsidiary's customer-co-created innovation can have spillover benefits to business partners (e.g., economic returns to suppliers and distributors; Roper, Vahter

and Love 2013), firms in the embedded network have joint interests in protecting knowledge against leakage. Thus, information on any deviant behavior can be readily disseminated, and the behavior can then be sanctioned (Walker, Kogut, and Shan 1997). Therefore, we expect:

H_{3b}: Subsidiary local embeddedness negatively moderates the effect of customer co-creation on knowledge leakage.

Local R&D Staff Influence. Staff localization is a common MNC local adaptation strategy (Zhao, Park, and Zhou 2014). Local R&D staff influence reflects the extent to which a subsidiary's local staffs, relative to expatriates, have substantial influence over decisions and performance pertaining to its R&D activities. Compared to expatriates, local staffs have more comprehensive knowledge of the local market environment (Gupta and Govindarajan 1991). Thus, they can easily understand, assimilate, and use customer inputs in the NPD process (Lane and Lubatkin 1998). When subsidiary staffs and customers possess overlapping and compatible knowledge, "they can communicate effectively, draw on the partner's expertise and experience, and use similar approaches to solve problems and address the learning environment...result[ing] in greater comprehension of partner knowledge and appreciation of its value. Overlapping knowledge bases also imply greater cross-understanding...[which can] enhance the emergence and elaboration of task-relevant information, resulting in greater learning and superior collaborative outputs" (Ho and Ganesan 2013, p. 94). Furthermore, local staffs have greater local legitimacy (Gong 2003) and more knowledge about how to deal with local stakeholders (Zhao, Park, and Zhou 2014), which allow them to interact efficiently with customers to generate ideas for innovative products. Therefore, having more local R&D staff influence enhances the subsidiary's competence in engaging CC to develop innovative products.

However, local staffs' insights are more likely to overlap with the knowledge that local customers can offer, thus limiting the contribution of CC in adding fresh perspectives to the NPD

process. They also are less likely than expatriates to be actively involved in intrafirm knowledge transfer due to their weaker ties with managers at HQ and in other MNC units (Gupta and Govindarajan 2000; Plourde, Parker, and Schaan 2014). Therefore, a subsidiary with high local R&D staff influence is more likely to develop the honest incompetence problem and less likely to have diverse foreign knowledge to complement CC in enhancing new product innovativeness. Based on these opposing arguments, we suggest the following competing hypothesis:

H_{4a}: Local R&D staff influence positively/negatively moderates the effect of customer co-creation on new product innovativeness.

Local staffs are less likely than expatriates to be socialized into the parent company (Björkman, Barner-Rasmussen, and Li 2004), and their career progression into the parent's hierarchy tends to be rare (Gupta and Govindarajan 1991). Thus, they may be less likely than expatriates to identify with HQ's global strategic goals (Zhao, Park, and Zhou 2014), to act in accordance with its strategic intent and best interests (Björkman, Barner-Rasmussen, and Li 2004; Gong 2003), or to be incentivized to implement HQ-devised knowledge protection policies at the subsidiary level which safeguard against knowledge leakage.

Local staffs' deep embeddedness in the local business culture also makes them more likely than expatriates to follow questionable local practices for self-gain at the expense of global ethical standards (Zhao, Park, and Zhou 2014). When local R&D staffs are more influential, HQ has less monitoring and supervision power over the subsidiary's development activities (Brock et al. 2008), increasing the chance that self-interested local staffs will act opportunistically and leak customer co-created product knowledge to competitors. Thus, we posit:

H_{4b}: Local R&D staff influence positively moderates the effect of customer co-creation on knowledge leakage.

METHOD

Research Context

We test the hypotheses with data collected from a multi-informant survey of foreign subsidiaries across multiple business-to-consumer (B2C) manufacturing industries in China. We use China as our context for a number of reasons. First, the country's fast-growing economy has opened up huge market opportunities for MNCs. However, this situation has also given rise to heavy local and foreign competition, requiring MNCs to find new ways to innovate (Zhou, Yim, and Tse 2005). Therefore, engaging local customers to participate in NPD has become a notable emerging strategy among MNCs (Chang and Taylor 2016). Second, knowledge leakage is especially problematic in China. Local competitors often neglect intellectual property rights and exploit knowledge leakages to imitate products or strategies of successful MNCs (Luo, Sun, and Wang 2011). Thus, for MNCs, the prevalence of this hazard places utmost importance on safeguarding customer co-created knowledge. Finally, China is an institutionally unique market environment in which many MNC subsidiaries, even with sufficient resources, may lack certain competences for sustained innovation or performance (Yu, Subramaniam, and Cannella 2009), and need to rely on organizational support from HQ. For all of these reasons, China presents an appropriate context for our examination of the broader agency proposition.

Data Collection

We developed the survey in English based on an extensive literature review, and translated it into Chinese. Next, it was back translated into English by research assistants and finally the authors checked the translations to ensure conceptual equivalence. We conducted a pretest and collected comments from 10 executives to finalize the survey instrument. To minimize common method variance, our survey adopted a multi-informant design consisting of two parts to be

completed by two informants (a director and a manager) of the same firm. The director survey included the dependent variables (new product innovativeness and knowledge leakage), subsidiary firm-related moderating variables (subsidiary decision involvement, task coordination, and subsidiary local embeddedness), and HQ-subsidiary dynamics and industry-related control variables (HQ control, relational disharmony, industry competitiveness, and environmental turbulence). The manager survey included the independent variable (customer co-creation), subsidiary employee-related moderating variable (local R&D staff influence), and other control variables (absorptive capacity and organizational support).

Our sampling frame included two firm directories. The first of these is the list of foreign firms in all 588 manufacturing industries in China, with data collected by the National Bureau of Statistics of China and managed by All China Market Research (ACMR).³ The second is the membership lists of major chambers of commerce in China (e.g., American Chamber of Commerce in China, European Union Chamber of Commerce in China, Japanese Chamber of Commerce and Industry in China) operating as non-profit organizations with open membership to firms from different countries.

Since many foreign firms require their senior executives to sign confidentiality agreements, it is generally unadvisable to send survey questionnaires to them directly. Thus, we instead collaborated with a prestigious university in China (with more than 2,000 senior executives enrolled in its MBA, EMBA, and other executive training programs annually) and obtained an alumni list of senior executives who had attended the university's EMBA or senior executive training programs in the past three years. We recruited and instructed research assistants to cross-check the alumni list with the two firm directories (i.e., ACMR and various chambers of commerce in China) and identify those alumni who work in foreign firms listed in the firm

directories. Research assistants then pre-screened the selected alumni list based on two criteria. Only senior executives from (1) foreign, wholly owned subsidiaries and foreign, majority-owned equity joint ventures with one foreign parent and (2) foreign subsidiaries in B2C manufacturing industries were considered. After careful selection, research assistants contacted the executives from the pre-screened list and asked them to help their alma mater on this academic project. We solicited director-manager pairs in the same firm as these executives (i.e., alumni), as well as from their referred business contacts who also work in foreign subsidiaries in B2C manufacturing industries. We distributed the surveys to qualified informants and asked them to return the surveys by email within two weeks. Follow-up emails were sent to non-respondents. To minimize social desirability bias, informants were assured that their responses would be anonymous and would not be seen by their corresponding director or manager. Contact information for one of the authors was provided to informants to corroborate the survey's academic purpose. Informants were asked to provide their business cards or contact information, which helped to match the director-manager pairs and avoid misreporting by research assistants.

The data collection process took the research assistants three months to complete. In total, we contacted more than 650 director-manager pairs and received 262 surveys (response rate of 41%), of which 65% were listed in ACMR and 35% were members of the various chambers of commerce in China. After eliminating surveys with mismatched respondents or excessive missing responses, our final sample comprised 238 firms. To assess potential non-response bias, we compared the differences in means between early and late informants on the main study variables and demographic variables such as firm age and size (Armstrong and Overton 1977). We found no significant differences for any of the variables. Thus, non-response bias did not appear to be a problem in testing our framework.

Average firm experience was 7.65 and 5.58 years among director and manager respondents, respectively. The sample MNCs have an average age of 80 years and an average size of 47,834 employees, indicating that these are well-established MNCs of reasonable size. We categorized the sample firms into eight industries: fast-moving consumer goods (21.01%), automobiles (20.17%), consumer electronics (17.65%) and equipment (15.97%), health care products (14.29%), household appliances (7.14%), home furnishings (2.52%), and others (1.26%). We found that of our sample firms, 41.18% are headquartered in North America, 39.08% in Europe, 16.39% in Asia, and 3.36% on other continents.

Measures

We adapted the measures used in the surveys from prior studies. Unless otherwise indicated, all survey items were measured with a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Appendix B presents the descriptive statistics and correlations of the constructs. The measurement items and validity assessments appear in Appendix C.

New Product Innovativeness and Knowledge Leakage. New product innovativeness (seven items) was adapted from Fang (2008) to capture the extent to which the subsidiary's new products are novel to the industry and offer new ideas in the host country. Knowledge leakage (four items) was adapted from Jiang et al. (2013) to assess the degree to which the subsidiary's unique and proprietary knowledge is imitated by competitors in the host country.⁴

Customer Co-creation. This construct was measured with three items adapted from Fang (2008) to assess the extent to which customers (or end users) are involved as co-developers in the subsidiary's NPD process in the host country.

Subsidiary Decision Involvement and Task Coordination. Subsidiary decision involvement (four items) was adapted from Grewal et al. (2013) to measure the extent to which HQ involves

the subsidiary in decisions about its markets and legitimizes decisions of the subsidiary. Task coordination (three items) was adapted from Grewal et al. (2013) to assess the degree to which product-related operations of various MNC subsidiaries are coordinated globally (vs. locally).

Subsidiary Local Embeddedness and Local R&D Staff Influence. Subsidiary local embeddedness (three items) was adapted from Andersson, Björkman, and Forsgren (2005) to assess the degree to which the subsidiary adapts its business conduct to its external business partners in the host country. We developed the measure for local R&D staff influence (four items) because prior research tends to use the proportion of local versus expatriate R&D staff as a proxy for this measure (Gupta and Govindarajan 2000; Li, Wang, and Liu 2013). It captures the extent to which the subsidiary's local staffs, relative to expatriates, have substantial influence over decision-making and performance of the R&D unit in the host country.

Control Variables. At the firm level, we controlled for *firm size* (logarithm of the number of employees), *firm age* (logarithm of the number of years since establishment), and *subsidiary type* (wholly owned subsidiaries or joint ventures). In relation to HQ–subsidiary dynamics, we controlled for *headquarters control* and *relational disharmony* (Schotter and Beamish 2011). Headquarters control (three items) was adapted from Chandy and Tellis (1998) to assess the extent of authority HQ has over the subsidiary in making decisions relating to the subsidiary. Relational disharmony (three items) was adapted from Grewal et al. (2013) to measure the degree of disagreement between HQ and the subsidiary regarding the goals of the MNC, processes the subsidiary uses to achieve the MNC's objectives, and terms of their relationship. These two variables were included because the former could have direct effects on knowledge transfer and innovation development (Almeida and Phene 2004), as well as subsidiary opportunism (Mudambi and Navarra 2004), while the latter could account for possible effects of

HQ-subsidiary relationship dynamics on subsidiary performance (Schotter and Beamish 2011) and “principal’s problems” (Li 2005). In relation to subsidiary competences, we controlled for *absorptive capacity* and *organizational support*, because they could influence new product innovativeness and knowledge leakage, respectively (Cohen and Levinthal 1990). Absorptive capacity (four items) was adapted from Schleimer and Pedersen (2014) to assess the subsidiary’s ability to recognize, assimilate, and apply technological knowledge transferred from HQ. Organizational support (three items) was adapted from Turker (2009) to measure the extent to which the subsidiary takes actions that improve employees’ well-being. At the industry level, we controlled for *industry competitiveness* (three items adapted from Fang, Palmatier, and Grewal 2011) to measure the intensity of competitive rivalry within an industry, *environmental turbulence* (three items adapted from Atuahene-Gima 2005) to assess the rapidity of market and technological changes in the host country, and *industry heterogeneity* (industry dummies).

Measurement Model and Common Method Bias

We used confirmatory factor analysis to assess the unidimensionality and convergent validity of the multi-item measures. Our measurement model included all latent constructs and the control variables with multiple items. The overall measurement model exhibited an acceptable fit with the data ($\chi^2(954) = 1497.94, p < .001; \chi^2/d.f. = 1.57; CFI = .91; IFI = .91; TLI = .90; RMSEA = .05$). All standardized factor loadings were statistically significant ($p < .05$), the Cronbach’s alphas and composite reliabilities were greater than .70, and the average variances extracted (AVEs) exceeded .50. The AVE of each construct was always greater than its highest shared variance (HSV) with other constructs, providing support for discriminant validity (Fornell and Larcker 1981). Overall, the measures possessed adequate reliability and validity.

To minimize common method bias, this study adopted both ex ante and ex post approaches.

Ex ante, we used a multi-informant survey design to provide different sources for our key measures. Ex post, we first performed the Harman's single-factor test (Podsakoff and Organ 1986), which yielded a factor solution that accounted for 74.1% of the total variance, while the first factor only accounted for 21.2% of the variance. Second, we employed Lindell and Whitney's (2001) marker variable assessment test with the number of years the director respondent had worked in the company as a marker variable, which had no significant correlations with the variables in our study. We partialled out this coefficient from bivariate correlations and compared the results with those obtained from the unadjusted correlations between study predictors and outcomes. We found that the unadjusted correlations maintained their size and pattern of significance. These results indicate that common method bias is not a significant issue in our data.

RESULTS

We used seemingly unrelated regression (SURE) (Zellner 1962) to estimate our model (see Table 1), because error terms of the equations related to new product innovativeness and knowledge leakage could be correlated. To test the moderating effects, we mean centered both the independent and moderating variables to reduce the potential problem of multicollinearity (Aiken and West 1991). In addition, the significant interactions were analyzed using simple slope analysis, which shows whether the regressions of CC on new product innovativeness and knowledge leakage are positive or negative at high (one and two standard deviations above the mean) and low (one and two standard deviations below the mean) levels of the moderators. The results appear in Figures 2 through 5.⁵

[Insert Table 1 about here]

As Table 1 indicates, the interaction between CC and subsidiary decision involvement

demonstrates a significant, positive effect on new product innovativeness ($\beta = .13, p < .05$), supporting H_{1a}. Simple slope analysis in Figure 2, Panel A indicates that CC has a positive but insignificant effect on new product innovativeness when subsidiary decision involvement is high (2SDs: $\beta = .15, p = .17$; 1SD: $\beta = .05, p = .51$), but this effect becomes negative and significant when subsidiary decision involvement is low (2SDs: $\beta = -.26, p < .05$; 1SD: $\beta = -.16, p < .10$). The interaction between CC and subsidiary decision involvement has a significant negative effect on knowledge leakage ($\beta = -.13, p < .05$), supporting H_{1b}. As Figure 2, Panel B shows, CC has no significant effect on knowledge leakage when subsidiary decision involvement is high (2SDs: $\beta = -.08, p = .46$; 1SD: $\beta = .02, p = .80$) but has a significant positive effect when subsidiary decision involvement is low (2SDs: $\beta = .33, p = .01$; 1SD: $\beta = .23, p = .01$).

Task coordination negatively moderates the effect of CC on new product innovativeness with a significant coefficient ($\beta = -.17, p < .05$), supporting H_{2a}. Simple slope analysis reveals that CC has a significant, negative effect on new product innovativeness when task coordination is high (2SDs: $\beta = -.29, p < .05$; 1SD: $\beta = -.17, p < .05$), but this effect becomes positive but insignificant when task coordination is low (2SDs: $\beta = .18, p = .14$; 1SD: $\beta = .06, p = .42$) (see Figure 3, Panel A). The moderating effect of task coordination on the relationship between CC and knowledge leakage is insignificant ($\beta = -.03, p = .67$); thus, H_{2b} is not supported.

Subsidiary local embeddedness positively moderates the effect of CC on new product innovativeness with a significant coefficient ($\beta = .14, p < .05$), supporting H_{3a}. Simple slope analysis reveals that the effect of CC on new product innovativeness is positive but insignificant when subsidiary local embeddedness is high (2SDs: $\beta = .17, p = .19$; 1SD: $\beta = .06, p = .51$), but this effect becomes negative and significant when subsidiary local embeddedness is low (2SDs: $\beta = -.28, p < .05$; 1SD: $\beta = -.17, p < .05$) (see Figure 4, Panel A). The moderating effect of

subsidiary local embeddedness on the relationship between CC and knowledge leakage is negative and significant ($\beta = -.14, p = .05$), supporting H_{3b}. CC has a negative but insignificant effect on knowledge leakage when subsidiary local embeddedness is high (2SDs: $\beta = -.09, p = .49$; 1SD: $\beta = .01, p = .88$), but this effect is positive and significant when subsidiary local embeddedness is low (2SDs: $\beta = .34, p < .01$; 1SD: $\beta = .23, p < .01$) (see Figure 4, Panel B).

Finally, the interaction between CC and local R&D staff influence has a significant negative effect on new product innovativeness ($\beta = -.20, p < .01$), supporting H_{4a}. Simple slope analysis reveals that when local R&D staff influence is high, CC has a significant negative effect on new product innovativeness (2SDs: $\beta = -.36, p < .01$; 1SD: $\beta = -.21, p < .05$); when local R&D staff influence is low (two standard deviations below the mean), this effect is positive and significant (2SDs: $\beta = .26, p < .05$; 1SD: $\beta = .10, p = .17$) (see Figure 5, Panel A). The interaction between CC and local R&D staff influence has a significant positive effect on knowledge leakage ($\beta = .15, p < .05$), supporting H_{4b}. As Figure 5, Panel B shows, CC has a significant positive effect on knowledge leakage when local R&D employee influence is high (2SDs: $\beta = .35, p < .01$; 1SD: $\beta = .24, p < .01$), but an insignificant negative effect emerges when local R&D employee influence is low (2SDs: $\beta = -.11, p = .34$; 1SD: $\beta = .01, p = .92$).

[Insert Figures 2 to 5 about here]

DISCUSSION

Theoretical Implications

As market opportunities continue to migrate to emerging economies, triggering fierce local competition, MNCs are increasingly involving customers in subsidiary-level NPD to sustain their market competitiveness. As this trend is gaining momentum, Griffith and Lee (2016) point out the complexity of managing CC in an MNC context. Indeed, a salient gap lies in the literature,

which calls for studies to evaluate both benefits (e.g., new product innovativeness) and risks (e.g., knowledge leakage) of CC as an innovation strategy. This study extends the international marketing literature by exploring the interactive effects between CC and MNC management mechanisms on the bright- and dark-side effects of CC. We focus on CC, or customers' participation in the NPD process as co-developers rather than merely as information sources, because the latter is found to have diminishing returns to firms' NPD (Griffith and Lee 2016).

Regarding moderating effects of the two global integration mechanisms, we find that new product innovativeness is maintained and the chance of knowledge leakage arising from CC is not heightened when subsidiary decision involvement is high. Although a high level of subsidiary decision involvement does not significantly enhance product innovativeness as desired, the results reveal the importance of maintaining rich HQ–subsidiary communication as a preventive mechanism against producing less innovative products when the subsidiary engages CC. The significant main effect of CC on knowledge leakage suggests that involving customers in NPD increases leakage of proprietary knowledge to competitors. However, this dark-side effect might be attenuated when subsidiary decision involvement is high.

As theorized, we find that CC has a negative influence on new product innovativeness only when task coordination is high. This finding is important because it implies that the negative effects associated with high task coordination, such as procedural formality and international interdependence, which hinder the subsidiary's ability to combine insights in CC flexibly, may trump the positive effects of cross-subsidiary information sharing. Another explanation might be that when subsidiaries' operations are highly coordinated, their common knowledge platform and experiences pertaining to specific product-related tasks lead to the exchange of generalized resources and redundant knowledge (Hansen 1999), thus hurting innovativeness. The negative

but insignificant moderating effect of task coordination on knowledge leakage warrants further investigation. Presumably, when task coordination is high, greater knowledge complementarity among subsidiaries and HQ oversight over subsidiary operations should mitigate risks of knowledge leakage arising from CC. However, greater operational linkages with other subsidiaries may also broaden the channels through which proprietary knowledge can leak to outsiders. These mechanisms might work in opposite directions, and thus their effects likely cancel each other. Additional research can explore these opposing mechanisms to obtain a more nuanced view of when task coordination influences the effect of CC on knowledge leakage.

With regard to the two local adaptation mechanisms, we find that CC negatively affects new product innovativeness only when subsidiary local embeddedness is low. However, even though subsidiary local embeddedness does not enhance product innovativeness as desired, it is still important for the subsidiary to maintain a high level of local embeddedness, because it is needed as a preventive mechanism to maintain the development of innovative products from CC. When subsidiary local embeddedness is high, the dark-side effect of CC on knowledge leakage is also attenuated, which further signifies the importance of building local embeddedness. By providing further support for the positive effect of maintaining high embeddedness in local business networks, these findings theoretically extend the international marketing literature and address the mixed effects of embedded network ties on firm innovation (e.g., Noordhoff et al. 2011).

CC also negatively affects new product innovativeness when local R&D staff influence is high, suggesting that overlapping knowledge with local customers and less active involvement in intrafirm knowledge transfer may override positive effects of greater cross-understanding and efficient interactions with customers. In fact, engaging CC can increase new product innovativeness when local R&D staff influence is low. Finally, high local R&D staff influence,

which is expected to facilitate subsidiary performance (Lam and Yeung 2010; Law et al. 2009), might exacerbate knowledge leakage when the subsidiary engages in CC.

Overall, our study offers new insights regarding MNCs' strategy to delegate their subsidiaries to involve local customers as co-developers in the NPD process, which has been rarely examined in prior research. Specifically, our findings caution MNCs about their local CC strategy when applied to an emerging economy. MNCs can control knowledge leakage by implementing proper global integration (e.g., high subsidiary decision involvement) and local adaptation (e.g., high subsidiary local embeddedness and low local R&D staff influence) mechanisms. However, CC may not necessarily produce the desired result in terms of new product innovativeness, except when a subsidiary has low local R&D staff influence. It is possible that subsidiaries operating in markets with less developed institutional environments are more likely to exhibit the "principal's problem" (Kostova, Nell, and Hoenen 2018), which render their CC efforts less effective in producing innovative products.

Although emerging research (e.g., Belkahla and Triki 2011) has begun to acknowledge the risk of knowledge leakage in CC, empirical evidence remains scarce. Our study provides evidence to substantiate this dark side in that a marginally significant positive effect of CC on knowledge leakage is confirmed. The results also suggest that certain MNC global integration and local adaptation mechanisms could have opposite interaction effects with CC on product innovativeness versus knowledge leakage. For example, the moderating effect of subsidiary decision involvement is positive on product innovativeness, but negative on knowledge leakage. This implies that CC does not necessarily have double-edged effects on benefits versus risks. In fact, by developing the "right" mechanism (i.e., low local R&D staff influence), CC could contribute positively in developing innovative products while minimizing knowledge leakage.

Our study also helps enhance the understanding of CC in the context of MNC organizations. Extant research on CC has mainly focused on characteristics of the focal firm and the firm's relation to co-creating partners (Coviello and Joseph 2012; Fang 2008). However, this bounded perspective is insufficient for understanding subsidiary-level CC (Lee and Griffith 2019). Our findings demonstrate that outcomes of CC cannot be fully revealed in analyses at the subsidiary level; rather, they require considerations in the broader MNC organizational context. Specifically, we show that how a subsidiary integrates with its MNC network and how it adapts to its local environment can support or undermine its CC efforts. In so doing, we join emerging marketing studies that investigate the spillover effects of the MNC organizational context on subsidiary-level marketing strategies (e.g., Grewal et al. 2013). We also answer recent calls for research in the MNC literature on subsidiary dual embeddedness (Meyer, Mudambi, and Narula 2011) that underscores the importance of simultaneously managing the subsidiary's external linkages within the local context and its internal linkages within the MNC network.

Finally, by adopting the broader agency perspective (Hendry 2002; Hoenen and Kostova 2015), our work departs from prior marketing studies on principal-agent relationships (e.g., Bergen, Dutta, and Walker, Jr. 1992). It highlights the dual causes—opportunism and honest incompetence of subsidiaries—when they engage local CC, which might be mitigated by the MNCs' global and local management strategies that we studied. Nevertheless, our overall results echo prior studies' conclusions (e.g., Fang 2008; Griffith and Lee 2016) that involving customers in the NPD process does not always lead to desirable innovation outcomes.

Managerial Implications

Marketers in general know that involving customers in NPD may foster greater product innovativeness, but doing so may also increase the chances of leaking important knowledge to

competitors; this creates a difficult balancing act that may deter some from employing this strategy. Our findings allow us to advise international marketers to explore boundary conditions for the effect of CC among MNCs' global integration and local adaptation mechanisms. With the development of proper mechanisms, a subsidiary's CC effort may lead to positive results in producing innovative products without necessarily increasing knowledge leakage.

For HQ executives, striking a balance in the use of global integration mechanisms is important. A high extent of decision involvement with their foreign subsidiaries could serve as a basic prevention mechanism to maintain the innovativeness of new products co-created with customers while also containing knowledge leakage arising from CC. Thus, HQ executives should note that greater communication and involvement with subsidiary managers have ancillary benefits in overseas performance. However, HQ's mechanism of instigating a greater degree of task coordination among the global organizational network may hamper a subsidiary's CC efforts toward increasing product innovativeness. Instead, HQ executives should allow foreign subsidiaries to coordinate product-related functions in their respective host countries as a prevention mechanism against the negative innovation outcome of CC.

For subsidiary managers, it is similarly important to achieve a balance in the use of local adaptation mechanisms. The adaptation of operational practices to conform with those of local business partners (i.e., subsidiary local embeddedness) not only fosters trust and lubricates business transactions, but also plays a role in aiding the subsidiary's CC efforts: greater local embeddedness can protect against knowledge leakage and maintain new product innovativeness. In contrast, as subsidiary managers leverage local R&D talents in a host country, they should exercise caution in empowering the local R&D staff, as doing so may hinder the subsidiary from generating innovative products through CC. With greater influence in the subsidiary, local R&D

staff may also exacerbate governance and opportunism problems, exposing the subsidiary to greater knowledge leakage.

Finally, we contend that engaging CC as an innovation strategy for MNC subsidiaries operating in an emerging economy is a difficult process and one that does not easily yield superior performance (Chang and Taylor 2016). As both MNCs' global integration mechanisms and local adaptation mechanisms are often entrenched and difficult to change, some MNCs may not be suited for adopting CC as an innovation strategy.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

We acknowledge several limitations in our study, which suggest fruitful avenues for future research. First, our study focuses on China as a representative and appropriate context to examine CC among MNC subsidiaries because of its huge market opportunities for MNCs, prevalence of knowledge leakage hazards, and high likelihood of subsidiaries' opportunism and incompetence per the broader agency perspective. Future studies should consider other foreign market contexts or employ a multi-country design to confirm and extend the theoretical model presented in this study regarding the impact of MNCs' global integration and local adaptation mechanisms on the local CC efforts of their international subsidiaries.

Second, we examined how task coordination across MNC subsidiaries influences CC efforts. Future research can investigate a subsidiary's relational linkages to other subsidiaries in greater depth. Foreign subsidiaries vie for limited resources within the MNC and compete for market and technology opportunities in external markets (Tsai 2002). Thus, future studies can examine how specific factors such as inter-subsidiary network size, strength, and level of competition influence CC in host countries. In addition, a subsidiary's within-subsidiary network, inter-subsidiary network, and transfer network can affect knowledge sharing outcomes in different

ways (Hansen, Mors, and Løvås 2005). Future studies can adopt a multiple-network perspective to explore how different subsets of social networks within MNCs affect the outcomes of CC.

Third, in addition to the internal organizational context, the external social context in which a subsidiary is embedded, such as its cultural and institutional makeup, can also influence the agency situation in the HQ-subsubsidiary dyad. For example, individualism–collectivism may have implications for the trade-off between new product innovativeness and speed to market caused by CC (Fang 2008). On one hand, subsidiaries in a collectivistic culture may focus more on building harmonious relationships with customers when co-developing products (Chan, Yim, and Lam 2010), possibly enhancing their access to customer inputs for generating new product ideas (Ho and Ganesan 2013). On the other hand, subsidiaries in individualistic cultures tend to be goal-oriented in saving time and hassle (Chan, Yim, and Lam 2010), possibly enhancing their capability to speed up the development process when collaborating with customers. In adopting the broader agency perspective, future research can examine how different aspects of the social context influence CC among MNC subsidiaries by heightening or mitigating the “principal’s problem” arising from the subsidiary’s incompetence and opportunism.

Fourth, we did not explicitly differentiate between knowledge leakage from CC occurring in B2C versus business-to-business (B2B) context. Although our sample involved the B2C context, we believe that the mechanisms of knowledge leakage from CC would likely be similar in B2B contexts; that is, leakages can occur either through a focal B2B firm’s employees and/or through its business customers (i.e., employees or end-user consumers of the business customers). However, we acknowledge that there are notable differences, which we do not explore in this study. For example, B2C co-creation typically involves a one-to-many collaboration where the focal firm unilaterally shares some aspect of its sensitive knowledge to consumers, while B2B

co-creation involves a one-to-one (or one-to-few) inter-firm collaboration where both the focal firm and business customer may share sensitive information with each other. Thus, incentives to leak knowledge and the rate of occurrences may differ according to the context. Future research can compare knowledge leakage in the B2C versus B2B context and explore other boundary conditions (e.g., level of technological knowledge in a co-creation project) that may affect the rate and consequences of knowledge leakage.

Fifth, we believe both the bright and dark sides of CC in terms of new product innovativeness and knowledge leakage, respectively, proposed in our model will hold and can be generalized to contexts beyond the MNC-subsidiary relationship (e.g., in the context of domestic firms). For example, a specific division (e.g., marketing division) of a domestic firm, or a regional office of a national firm, engaging CC may similarly create the “principal’s problem” due to the division/office’s honest incompetence and opportunism. The same problems may surface in situations when domestic firms co-create with upstream partners (i.e., suppliers) in their NPD process. However, we expect these issues to be less pronounced in domestic firms because they do not face such cross-border differences and cultural distance as MNCs do (Beugelsdijk et al. 2018). Future research can explore specific management mechanisms within a domestic firm (e.g., interdepartmental coordination, knowledge sharing) that would enable the firm to overcome its incompetence and reduce opportunism when it engages in co-creation.

Lastly, new product innovativeness and knowledge leakage were selected as our dependent variables because they relate directly to our research focus on examining both the bright- and dark-side effects of CC. Future research can examine whether these innovation-related outcomes ultimately affect different performance outcomes, such as customer loyalty and profit growth, to assess performance tradeoffs of foreign MNC subsidiary operations (Katsikeas et al. 2016).

ENDNOTES

1. Some prior papers (e.g., Chang and Taylor 2016) use the terms *co-production*, *customer participation*, and *co-creation* interchangeably, while others (e.g., Cui and Wu 2016) argue for clear distinctions among these terms. Co-production refers to customer involvement in service production and delivery (Auh et al. 2007). It is a goods-dominant lexicon and has a narrower emphasis on the collaboration between the firm and its customers in the “production” process of service/product offerings (Vargo and Lusch 2016). Fang (2008) and Griffith and Lee (2016) define customer participation (CP) with a broader focus on “the extent to which the customer is involved in the manufacturer’s NPD process” (Fang 2008, p. 91) and delineate its two dimensions in terms of CP as an information resource and CP as a co-developer. The former dimension focuses on activities such as sharing information about customer needs with the manufacturer during the NPD process, while the latter dimension emphasizes the customer’s task involvement that constitutes a significant portion of the overall development effort. Following Cui and Wu’s (2016) argument that “in the context of innovation, customers participate in value co-creation by playing a more active role in NPD” (p. 516), we label our construct as customer co-creation to differentiate it from customers’ involvement in providing feedback through more traditional means of market research or merely as an information source (Fang 2008; Griffith and Lee 2016).
2. Although subsidiary local embeddedness and task coordination may be related, they are considered separate dimensions and not opposite ends of a spectrum (Ghoshal and Nohria 1993). They may also vary not only across functions but also across tasks and activities within the same function (Devinney, Midgley, and Venaik 2000). Thus, we consider them as distinct constructs.
3. This is regarded as one of the most comprehensive firm lists in China, and its data have been used by papers published in top-tier strategy and international business journals (e.g., Buckley, Clegg, and Wang 2007; Chang and Xu 2008).
4. Ideally, objective data on innovativeness and knowledge leakage could improve the external validity of this study. However, such data are unavailable or prone to bias. For example, patent data, though widely used as an objective proxy of innovation (Fang, Palmatier, and Grewal 2011), are problematic in China, as foreign firms are reluctant to apply for patents to maintain secrecy (Keupp, Beckenbauer, and Gassmann 2009), and patents from domestic firms may be inflated in reporting to take advantage of government subsidies and incentives (Dang and Motohashi 2015).
5. Following Spiller et al.’s (2013) suggestion, we conduct the simple slope analysis at ± 1 and 2 standard deviations from the mean of the moderators. Figures 2 to 5 present the results at ± 2 standard deviations.

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TABLE 1. RESULTS OF SURE ANALYSIS

Variables	Hypotheses	New Product Innovativeness		Knowledge Leakage	
		Model 1		Model 2	
Main Effect					
Customer co-creation (CC)		-.06	(-.93)	.12 ⁺	(1.89)
Subsidiary decision involvement		.10	(1.48)	.10	(1.40)
Task coordination		.02	(.26)	.15 [*]	(2.09)
Subsidiary local embeddedness		.12 ⁺	(1.80)	.14 ⁺	(1.94)
Local R&D staff influence		.07	(.93)	.21 ^{**}	(2.58)
Moderating Effect					
CC × Subsidiary decision involvement	H _{1a} /H _{1b}	.13 [*]	(2.04)	-.13 [*]	(-1.98)
CC × Task coordination	H _{2a} /H _{2b}	-.17 [*]	(-2.16)	-.03	(-.42)
CC × Subsidiary local embeddedness	H _{3a} /H _{3b}	.14 [*]	(2.10)	-.14 [*]	(-1.95)
CC × Local R&D staff influence	H _{4a} /H _{4b}	-.20 ^{**}	(-3.04)	.15 [*]	(2.18)
Control Variable					
Firm size		.07 ^{**}	(2.76)	-.05 ⁺	(-1.82)
Firm age		-.07	(-.83)	.24 ^{**}	(2.75)
Subsidiary type		-.18	(-1.61)	.23 [*]	(2.02)
Headquarters control		.05	(.89)	.14 [*]	(2.45)
Relational disharmony		.13 [*]	(2.15)	.10	(1.48)
Absorptive capacity		.30 ^{***}	(3.38)	-.04	(-.41)
Organizational support		.10	(1.35)	-.22 ^{**}	(-3.01)
Industry competitiveness		.02	(.34)	-.10	(-1.49)
Environmental turbulence		.10	(1.57)	.08	(1.33)
Industry dummies				Included	
Constant		-.61	(-1.16)	-.12	(-.22)
Observations		238		238	
R ²		.35		.24	
χ ²		129.98		73.96	
p-value		.00		.00	

⁺ $p < .10$, ^{*} $p < .05$, ^{**} $p < .01$, ^{***} $p < .001$.

Notes: Unstandardized coefficients are reported; t -statistics appear in parentheses.

FIGURE 1. CONCEPTUAL MODEL

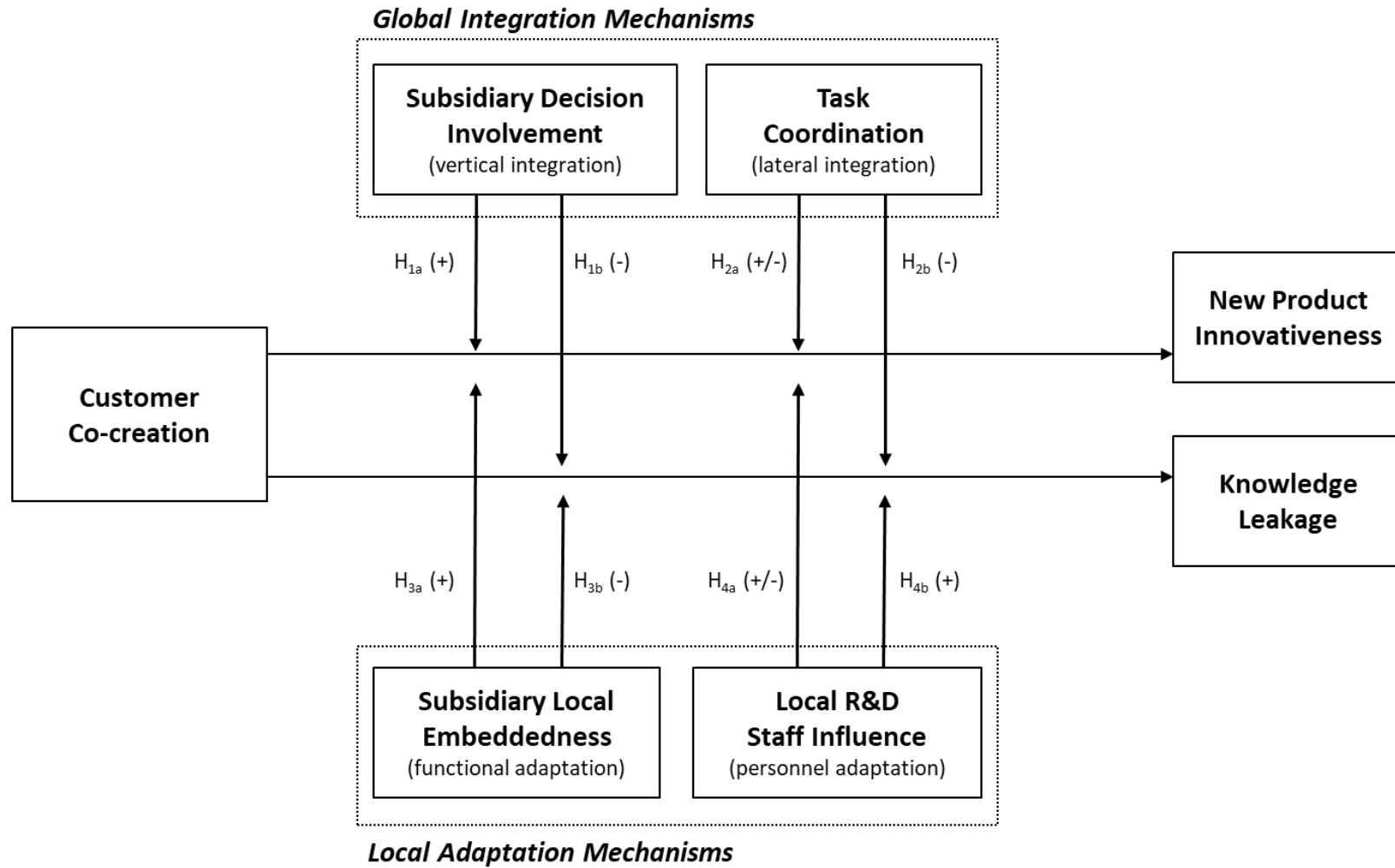


FIGURE 2. MODERATING EFFECTS OF SUBSIDIARY DECISION INVOLVEMENT

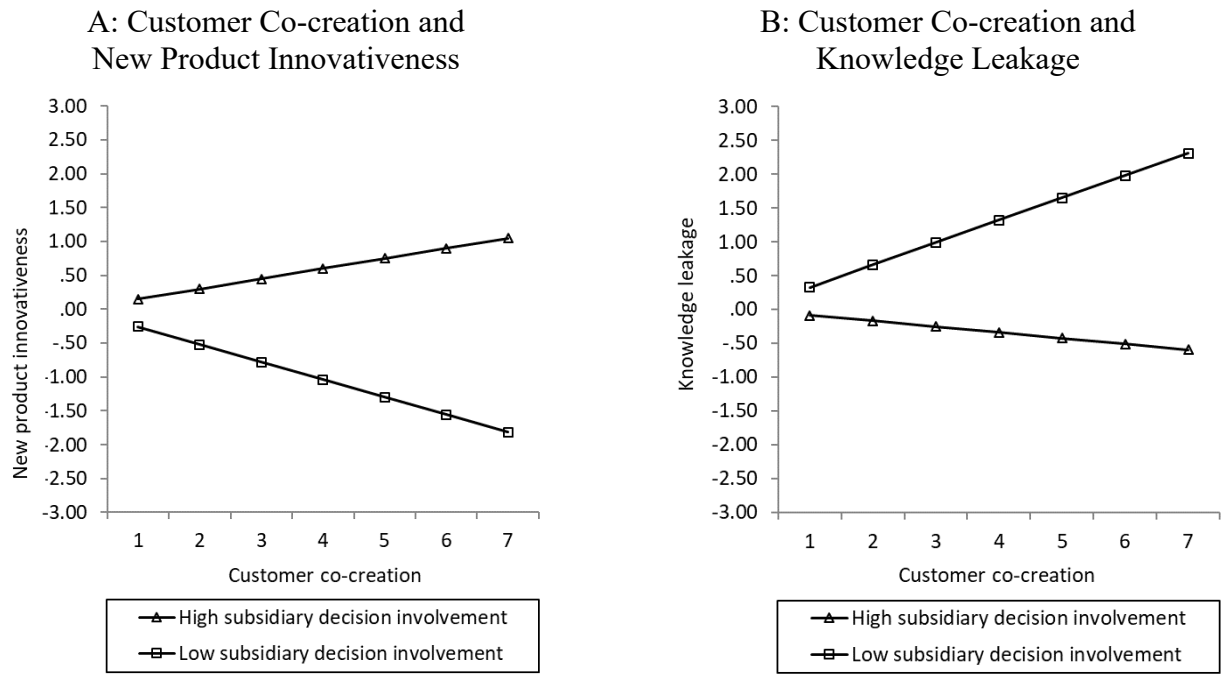


FIGURE 3. MODERATING EFFECTS OF TASK COORDINATION

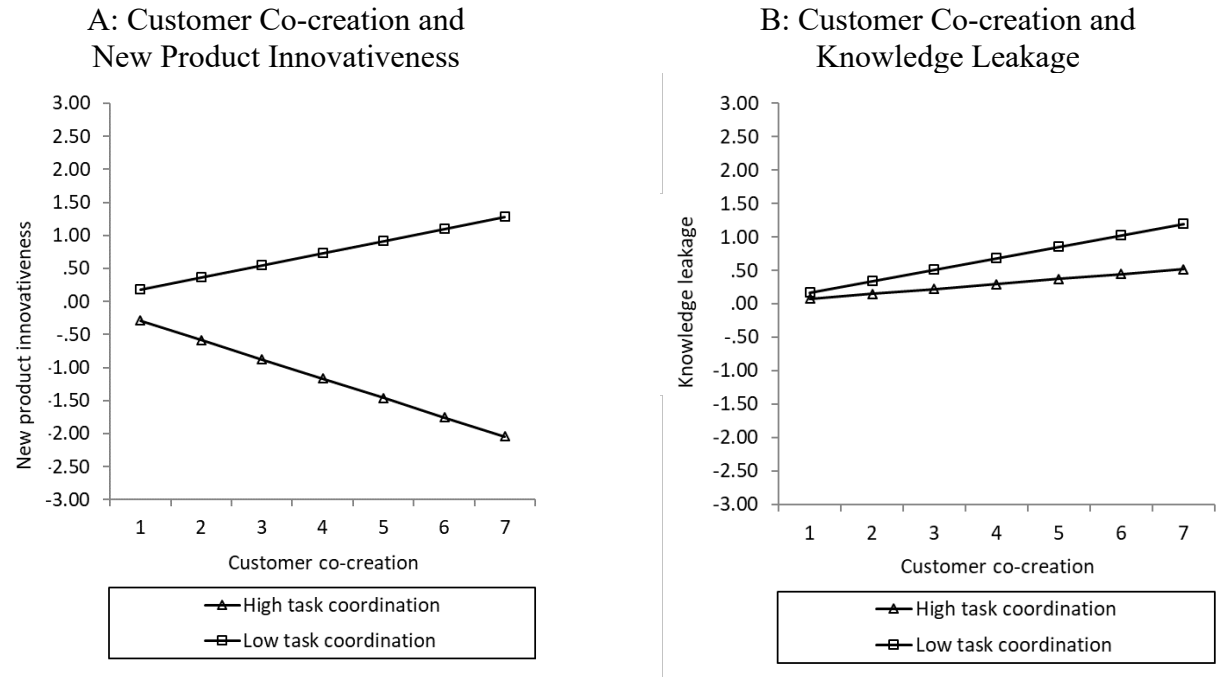


FIGURE 4. MODERATING EFFECTS OF SUBSIDIARY LOCAL EMBEDDEDNESS

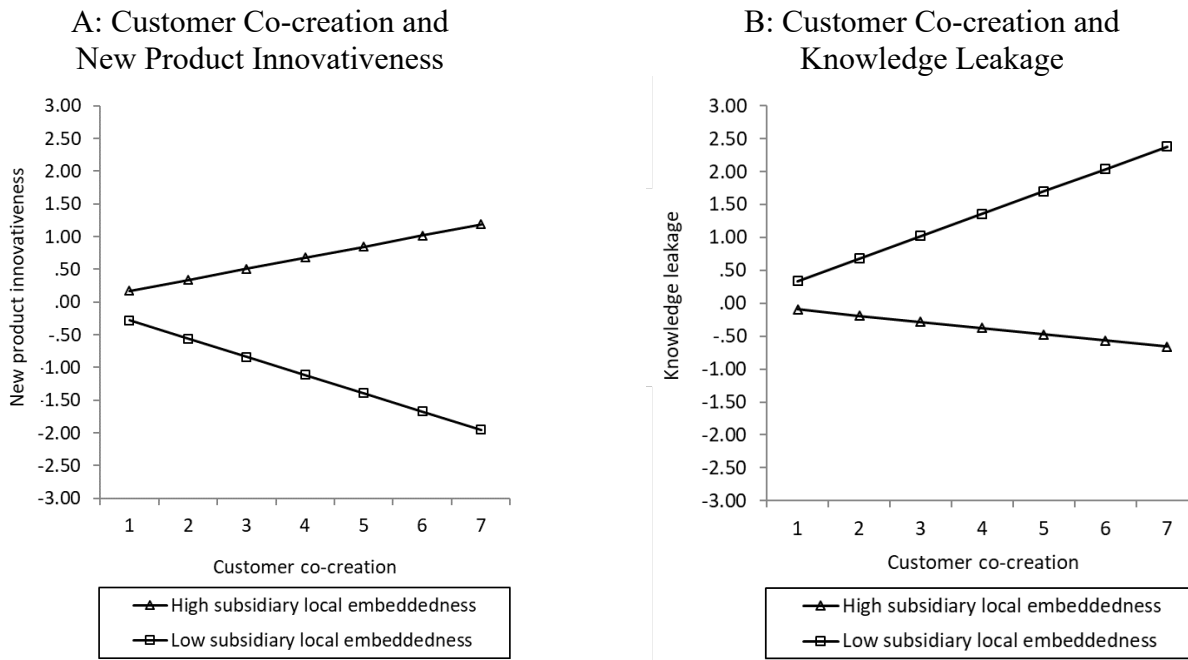
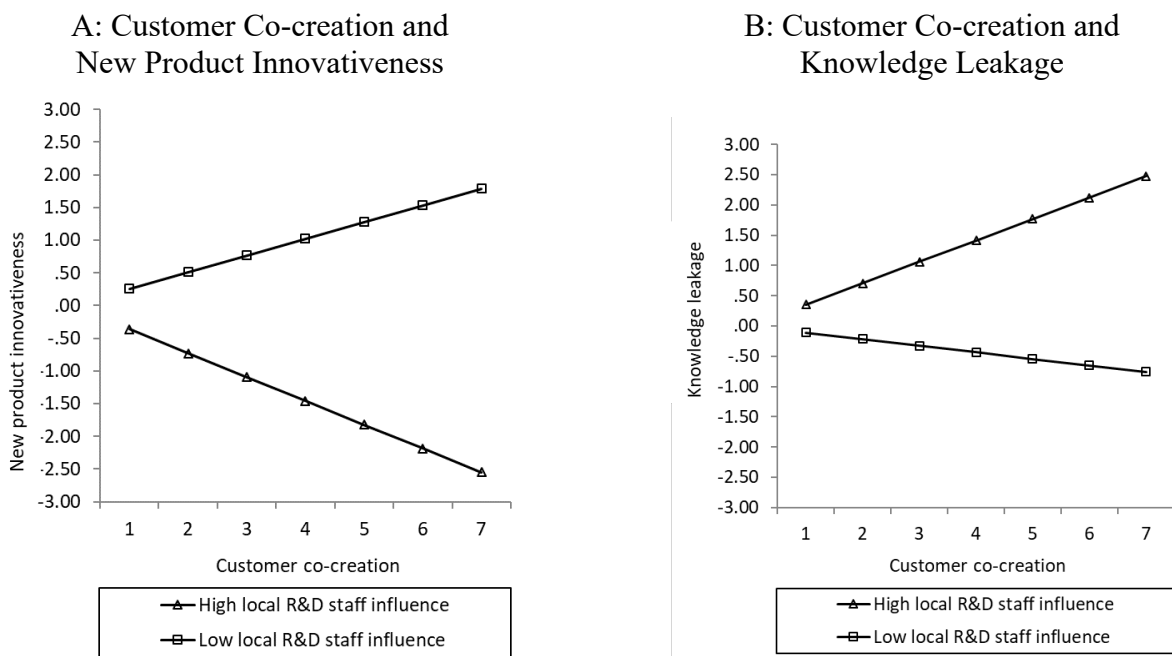


FIGURE 5. MODERATING EFFECTS OF LOCAL R&D STAFF INFLUENCE



APPENDIX A. EFFECTS OF CUSTOMER CO-CREATION AND MNC MANAGEMENT MECHANISMS ON INNOVATION OUTCOMES: A SUMMARY OF HYPOTHESES DEVELOPMENT

<i>Innovation Outcomes</i>	<i>Underlying Causes of the "Principal's Problem"</i>	MNC Global Integration		Subsidiary Local Adaptation	
		Vertical Integration	Lateral Integration	Functional Adaptation	Personnel Adaptation
		Subsidiary Decision Involvement	Task Coordination	Subsidiary Local Embeddedness	Local R&D Staff Influence
New Product Innovativeness	Honest Incompetence	[H_{1a}] Frequent HQ-subsidiary information sharing allows HQ to better specify objectives and the subsidiary to source diverse global knowledge, improving product innovativeness from customer co-creation.	[H_{2a}] Cross-subsidiary communication allows the subsidiary to source diverse foreign knowledge (through training and guidance) from other units to complement customer co-creation.	[H_{3a}] Joint trust and commitment between the subsidiary and external partners allow the subsidiary to source proprietary knowledge from the business network more easily.	[H_{4a}] Local staffs' insights likely overlap with knowledge that local customers can offer. Local staffs are less likely to be actively involved in intrafirm knowledge transfer.
		[H_{1a}] Responsiveness and flexibility provided by the HQ-subsidiary link allow the subsidiary to creatively explore novel linkages and combine diverse knowledge in the development process.	[H_{2a}] Procedural formality and international interdependence in product-related tasks hinder a subsidiary's ability to combine insights in customer co-creation flexibly and creatively.	[H_{3a}] A subsidiary can adjust its business activities flexibly to combine and integrate creative inputs throughout the customer co-creation process.	[H_{4a}] Local staffs with extensive local knowledge may understand, integrate, and combine customer inputs in the development process more easily.
Knowledge Leakage	Honest Incompetence	[H_{1b}] Co-created innovations involve greater knowledge complementarities from HQ that are not readily available to imitators. Aligned interest with the overall corporation motivates the subsidiary to strengthen knowledge protection mechanisms.	[H_{2b}] Complementarity in knowledge and resources among subsidiaries makes the insights generated in conjunction with customers harder for competitors to imitate.	[H_{3b}] A high degree of embeddedness takes time and effort to develop. Complementarity in resources and processes with business partners is difficult for competitors to access and imitate.	[H_{4b}] Local staffs are less identified with an MNC's global strategic goals and thus are less incentivized to implement knowledge protection mechanisms. They may underestimate the need for knowledge protection and overestimate their ability to defend key resources from competitors.
		Opportunism	[H_{1b}] Ideological agreement and goal compatibility lessen subsidiary employees' tendency to disclose proprietary knowledge from customer co-creation to competitors.	[H_{2b}] Greater HQ oversight over subsidiary operations decreases opportunistic behaviors of subsidiary employees.	[H_{3b}] Firms in an embedded network have joint interests to protect knowledge against leakage, so information on opportunistic behavior will be readily disseminated and the behavior sanctioned.

APPENDIX B. DESCRIPTIVE STATISTICS AND CORRELATIONS

Variables	M	SD	Correlation Matrix																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. New product innovativeness	3.50	.84	1.00																
2. Knowledge leakage	3.40	.81	.08	1.00															
3. Customer co-creation	3.65	.92	.25***	.15*	1.00														
4. Subsidiary decision involvement	3.79	.77	.28***	.15*	.22***	1.00													
5. Task coordination	2.27	.72	.04	.09	-.07	.04	1.00												
6. Subsidiary local embeddedness	3.70	.79	.28***	.18**	.29***	.40***	-.10	1.00											
7. Local R&D staff influence	3.69	.79	.31***	.12	.46***	.26***	-.12	.32***	1.00										
8. Firm size	9.49	2.04	.14*	-.08	.09	-.00	.08	-.02	.03	1.00									
9. Firm age	4.24	.66	.02	.04	-.07	.07	.16*	-.03	-.14*	.44***	1.00								
10. Subsidiary type	.37	.48	-.08	-.01	.03	-.18**	-.32***	-.01	.08	-.03	-.24***	1.00							
11. Headquarters control	3.18	.95	.06	.11	.08	-.07	.14*	-.10	-.05	-.05	-.10	-.13*	1.00						
12. Relational disharmony	3.32	.80	.26***	.16*	.23***	.21***	-.01	.19**	.16*	.07	-.05	.10	.10	1.00					
13. Absorptive capacity	3.89	.67	.35***	.07	.42***	.33***	.00	.24***	.52***	.06	-.02	-.01	-.08	.16*	1.00				
14. Organizational support	3.90	.85	.30***	-.03	.42***	.27***	-.05	.25***	.56***	-.04	-.12	.10	-.04	.19**	.53***	1.00			
15. Industry competitiveness	3.64	.83	.18**	.04	.22***	.15*	.03	.18**	.10	.14*	.01	-.03	.23***	.13*	.10	.04	1.00		
16. Environmental turbulence	3.09	.87	.22***	.13	.14*	.15*	.12	.21**	.12	.13*	-.13*	-.03	.17**	.22***	.17**	.06	.37***	1.00	

* $p < .05$, ** $p < .01$, *** $p < .001$.

Notes: n = 238 firms.

APPENDIX C. MEASUREMENT ITEMS AND VALIDITY ASSESSMENTS

Scale Items	Factor Loadings
New Product Innovativeness ($\alpha = .94$, CR = .94, AVE = .69, HSV = .12)	
In regard to new product creativity, the new products generated by our China subsidiary are:	
Very novel for our industry	.79
Challenging to existing ideas in our industry	.85
Offering new ideas to our industry	.86
Creative in the eyes of customers	.89
Interesting to customers	.82
Capable of generating ideas for other products	.80
Promoting fresh thinking	.80
Knowledge Leakage ($\alpha = .75$, CR = .80, AVE = .52, HSV = .03)	
Our proprietary knowledge and core technologies have risks of being appropriated by competitors in China	.85
Our proprietary knowledge is imitated by competitors behind our back	.59
When our technological knowledge is imitated by competitors in China, it is based on our:	
Proprietary technological functions	.54
Unique technological know-how	.84
Customer Co-creation ($\alpha = .90$, CR = .90, AVE = .76, HSV = .21)	
In regard to our interactions with our customers:	
Our customers' efforts played an important role in the completion of our product development tasks	.91
Our customers' contributions constituted a significant portion of the overall product development effort	.92
Our customers' involvement as co-developer of new products was quite active	.76
Subsidiary Decision Involvement ($\alpha = .88$, CR = .88, AVE = .65, HSV = .16)	
In regard to the relationship of our China subsidiary with the HQ:	
Excellent bilateral communications exist between managers of the HQ and China subsidiary	.80
The HQ involves the subsidiary managers while it makes important strategic decisions	.78
The HQ justifies and gives full account of its actions and decisions which are likely to impact the China subsidiary	.86
While making decisions relevant for the China subsidiary, the HQ managers are well informed about the local conditions	.78
Task Coordination ($\alpha = .77$, CR = .77, AVE = .54, HSV = .02)	
Please indicate where the following activities are performed in your firm: (1 = Performed and coordinated in China; 2 = Performed in multiple countries and coordinated within Asia region; 3 = Performed in multiple countries and coordinated globally)	
Raw materials and parts procurement	.78
Manufacturing	.83
New product design	.57
Subsidiary Local Embeddedness ($\alpha = .82$, CR = .83, AVE = .62, HSV = .16)	
Our China subsidiary has adapted the following functions with local business partners:	
Product technology	.75
Production practices	.86
Standard operating procedures	.75
Local R&D Staff Influence ($\alpha = .88$, CR = .90, AVE = .69, HSV = .31)	
Relative to the expatriate R&D staffs in our China subsidiary, the local R&D staffs:	
Have substantial influence over technological and product development decisions	.60
Are an important group of employees	.88
Behave in ways that help the performance of our R&D unit	.92
Contribute in a positive way to the performance of our R&D unit	.89

Scale Items	Factor Loadings
Headquarters Control ($\alpha = .81$, CR = .82, AVE = .60, HSV = .05)	
In regard to the relationship of our China subsidiary with the HQ:	
The HQ has much more influence than the subsidiary managers in formulating the subsidiary's strategy	.75
Few strategic actions can be taken in the subsidiary level until the HQ approves the decisions	.86
Even small product strategy issues have to be referred to someone in the HQ for final answer	.71
Relational Disharmony ($\alpha = .72$, CR = .75, AVE = .51, HSV = .07)	
There is a high level of disagreement between our China subsidiary and the HQ over:	
The goals and priorities of the China subsidiary	.68
The specific way in which work is done or services are provided by the China subsidiary	.87
The specific terms of relationship between the China subsidiary and the HQ	.55
Absorptive Capacity ($\alpha = .82$, CR = .83, AVE = .55, HSV = .28)	
In regard to the technological knowledge transferred from the HQ, our China subsidiary:	
Recognizes the potential to create value with the knowledge	.75
Understands how the knowledge is different from existing knowledge	.82
Adapted the knowledge to fit the conditions in local market	.68
Applied the knowledge successfully to improve firm performance	.69
Organizational Support ($\alpha = .89$, CR = .90, AVE = .74, HSV = .31)	
In the last five years, our China subsidiary:	
Has policies that encourage employees to develop their skills and careers	.84
Is primarily concerned with employees' needs and wants	.94
Makes fair managerial decisions related to employees	.79
Industry Competitiveness ($\alpha = .73$, CR = .85, AVE = .65, HSV = .13)	
In the last five years:	
Competition in our industry was cutthroat	.88
There were many "promotion wars" in our industry	.59
One hears of a new competitor move almost every day	.91
Environmental Turbulence ($\alpha = .84$, CR = .84, AVE = .63, HSV = .13)	
In the last five years:	
Technological changes in our industry were rapid and unpredictable	.81
The market competitive conditions were highly unpredictable	.79
Changes in customers' needs were unpredictable	.78

Fit indexes:

$\chi^2(954) = 1497.94$, $p < .001$; $\chi^2/d.f. = 1.57$; CFI = .91; IFI = .91; TLI = .90; RMSEA = .05.

Notes: α : Cronbach's alpha; CR: Composite reliability; AVE: Average variance extracted; HSV: Highest shared variance. All factor loadings are significant at $p < .001$.