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ARTICLE

Horizontal FDI and Internal R&D of Local Firms in Emerging Economies: A Coopetition Perspective

Jun Xia[1], Qian Cecilia Gu[2], Marshall S. Jiang[3], and Zhouyu Lin[4]

[1]Jindal School of Management, University of Texas at Dallas, Richardson, TX, USA, [2]J. Mack Robinson College of Business, Georgia State University, Atlanta, GA, USA, [3]Goodman School of Business, Brock University, St. Catharines, ON, Canada, and [4]School of Management, Jinan University, Guangzhou, China
Corresponding author: Zhouyu Lin (linzhouyu@jnu.edu.cn)

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Abstract
This study advances a coopetition perspective to argue that an intangibility gap, defined as the difference in intangible asset intensity between industry-frontier foreign firms and local firms, generates both competitive threats and cooperative opportunities for local firms. Thus, an intangibility gap may affect local firms' internal research and development (R&D) efforts beyond a linear, catching-up way of thinking. Using a sample of manufacturing firms in China, we find that intangibility gap has an inverted U-shaped relationship with the internal R&D intensity of local firms such that a moderate intangibility gap is more likely to stimulate local firms' R&D than a small or large intangibility gap. Moreover, the results show that export intensity and state ownership of local firms serve as two boundary conditions under which the inverted U-shaped relationship becomes less and more pronounced, respectively.

摘要
本研究提出了一个竞合的观点，认为无形资产的差距（定义为行业前沿外国公司与本地公司之间无形资产密度的差异）会为本地公司既带来竞争威胁又带来合作机会。因此，无形资产的差距可能会非线性地影响本地公司的内部研发，而不仅仅是现行文献中的线性追赶的理论模式。我们以中国制造企业为样本进行研究，发现本地企业在无形资产上的差距会与企业内部研发强度呈现出倒U型的关系。换言之，适度的无形资产差距最有可能刺激本地企业的内部研发活动，而更小或更大的无形资产差距则不然。此外，我们的结果表明，本地企业的出口强度和国有资产权是这个倒U型关系的两个边界条件，会分别使关系变得更弱和更强。

Keywords: a coopetition perspective; emerging economy; export intensity; intangibility gap; internal research and development; inward foreign direct investment; state ownership

关键词：内部研发; 无形资产差距; 出口强度; 国有资产权; 竞合视角; 新兴经济体; 外商对内直接投资

Introduction

How horizontal foreign direct investment (FDI) in emerging economies affect local firms has attracted considerable attention in the management literature (Spencer, 2008; Zhang, Li, & Li, 2014). The literature has advanced our knowledge by emphasizing the spillover mechanism to explain the relationship between foreign and local firms (Spencer, 2008). Studies drawing on the spillover mechanism have mainly focused on the effects of productivity gap between the industry-frontier foreign firm[1] and local firms. This line of research implies that spillover from productivity gap can come through cooperation and competition (Giuliani, Martinelli, & Rabellotti, 2016; Gu & Lu, 2011; Parente, Melo, Andrews, Kumaraswamy, & Vasconcelos, 2021; Young, Huang, & McDermott, 1996). However, the coexistence of cooperation and competition represents some paradoxical relations, and it remains ambiguous regarding how they evolve and jointly affect local firms' strategic decisions.

Moreover, while previous studies have largely emphasized the importance of tangible assets in spillover, recent research has indicated that intangible assets of horizontal FDI, such as patents, trademarks, and copyrights (Tian, 2007), can serve as barriers to imitation and reduce the foreign-firm spillover effect (Zhang et al., 2014). According to a recent study (He, Tong, & Xu, 2022), intangible assets can be distinguished from tangible assets along three dimensions (i.e., excludability, tradability, and divisibility). First, intangible assets have lower excludability because they are often invisible. Second, intangible assets are less tradable because resource-specific contingencies impede market formation. Third, intangible assets are less divisible because such assets are difficult to evaluate and quantify (He et al., 2022: 297–298). However, we know little about how and to what extent the difference in intangible assets between industry-frontier foreign firms and local firms influences the local firms' behavior. Addressing these under-studied issues is important to identify new mechanisms to explain the complex relationships between foreign and local firms.

To address these issues, we adopt the coopetition perspective (Brandenburger & Nalebuff, 1996), which suggests that (two or more) rival firms may simultaneously compete and cooperate (Bengtsson & Kock, 1999). Researchers have developed different typologies to examine the implications of coopetition on firm strategies and performance (for reviews, see Czachon & Mucha-Kuś, 2014; Devece, Ribeiro-Soriano, & Palacios-Marqués, 2019; Walley, 2007). One notable typology is the categorization of coopetition into (a) an equal relationship, (b) a competition-dominated relationship, and (c) a cooperation-dominated relationship (Bengtsson & Kock, 2000; Rusko, 2011). An equal relationship appears when cooperation and competition are equally distributed; a competition-dominated relationship consists of more competition than cooperation; and a cooperation-dominated relationship consists of more cooperation than competition (Bengtsson & Kock, 2000). We argue that coopetition is an important mechanism underlying the strategic responses of local firms in emerging economies when they are under a disadvantageous situation facing horizontal FDI.

We start with the concept of *intangibility gap*, defined as the difference in intangible asset intensities between industry-frontier foreign firms and local firms in emerging economies. In this context, frontier refers to a firm in the leading position in intangible resource development (Kaufmann & Schneider, 2004) due to its highest intangible asset intensity in an industry-region segment (Zhang et al., 2014). Foreign firms often occupy this frontier position in many industries and regions within an emerging economy (Ozkan et al., 2022). Intangible assets that include knowledge and skills have been regarded as an important source of a firm's competitive advantage (He et al., 2022; Kaufmann & Schneider, 2004). We argue that the intangibility gap between industry-frontier foreign firms and local firms may create three types of coopetitive relationships (Bengtsson & Kock, 2000; Lacoste, 2014) and influence local firms' selection of internal research and development (R&D) strategies accordingly.[2]

From the coopetition perspective, we propose an inverted U-shaped relationship between intangibility gap and the internal R&D effort of local firms. When the gap is small, it creates a situation of 'equal relationship' (Bengtsson & Kock, 2000). Local firms are less motivated to invest in R&D as they face limited threats from industry-frontier foreign competitors. However, when intangibility gap is moderate, local firms are highly motivated and have the potential to alter their disadvantageous positions by increasing internal R&D. That is, local firms may become contenders in the competition-dominated relationship to catch up. Nonetheless, when intangibility gap is too large to overcome, a cooperation-dominated relationship may materialize. Local firms may not be able to rely on internal R&D to catch up (Hudson, 1994; Levinthal & March, 1993). Instead, these firms may seek cooperation with foreign firms. Research has shown that emerging economy firms have benefited tremendously from inward horizontal FDI at home by cooperating with global players through R&D alternatives such as original equipment manufacturing (OEM) (Luo & Tung, 2007).

Moreover, as coopetition has not been frequently used as a mechanism to explain the relationship between foreign and local firms (Devece et al., 2019), it is useful to clarify its boundary conditions – conditions that would influence local firms' competitive status against foreign firms

either through internal characteristics or through external help. We propose that local firms' resource distribution and provision may serve as boundary conditions of the effect of intangibility gap. Accordingly, we introduce local firms' export intensity and state ownership as two moderators in the inverted U-shaped relationship between intangibility gap and local-firm R&D effort. We choose these two moderators because they correspondingly represent a firm's resource distribution and provision that may change local firms' cooperative and competitive positions with inward horizontal FDI in distinct ways. Specifically, exports reduce the direct competition of local firms against foreign firms at home. Thus, when the export intensity of local firms is high, the inverted U-shaped effect will be flattened. Moreover, state ownership is widely observed in emerging economies such as China (Wang, Hong, Kafouros, & Wright, 2012). Local governments tend to encourage state-owned firms to innovate by providing policy support. Thus, local firms with higher levels of state ownership may be more responsive in a competition-dominated relationship. Thus, when the state ownership of local firms is high, the inverted U-shaped effect will be steepened.

To examine the ideas, we use a sample of manufacturing firms in China and find evidence that supports for our hypothesized relationships. Our study makes two primary contributions. First, we advance the understanding of local firms' strategic responses to advantaged foreign firms from a coopetition perspective. Second, we introduce the intangibility gap construct to capture various coopetitive relationships and unravel the mechanism of coopetition by introducing export intensity and state ownership as boundary conditions. We detail our contributions in the discussion section.

Theoretical Background and Hypotheses Development

As postulated by the coopetition perspective, coopetition captures the idea of 'duality in every relationship' (Brandenburger & Nalebuff, 1996: 39). Competition and cooperation are not two ends of a continuum but rather two independent dimensions (Dowling, Roering, Carlin, & Wisnieski, 1996; Gomez-Casseres, 1999). Thus, firm strategies cannot be reduced to a simple choice between competition and cooperation but respond to complex combinations of competition and cooperation (Le Roy & Sanou, 2014; Luo, 2005). Accordingly, coopetition models have been generated from coopetitive relationships (Chin, Chan, & Lam, 2008). It has been argued that peer-firm relations can be dominated by coexistence, competition, or cooperation (Bengtsson & Kock, 1999, 2000). After making appropriate decisions, successful firms can benefit from these relations (Brandenburger & Nalebuff, 1996). Thus, firms may adopt a range of strategic stances toward other firms in the same industry when responding to such different relations (Lado, Boyd, & Hanlon, 1997; Luo, 2007).

Observations show that horizontal FDI creates a conundrum in understanding innovation engagement as a strategic response of local firms (Ayyagari, Dau, & Spencer, 2015; Gu & Lu, 2011; Spencer, 2008). On the one hand, local firms may increase their R&D effort to upgrade their capabilities in response to the competitive threat of advanced foreign firms (Blomström & Persson, 1983; Zhang, Li, Li, & Zhou, 2010). On the other hand, local firms may decrease their R&D effort and seek cooperation with advanced foreign firms (Agosin & Machado, 2005; De Backer & Sleuwaegen, 2003; Kosova, 2010). Although coopetition has attracted substantial attention in the organization literature, little effort has been made to understand how coopetition affects firm innovation. In particular, few empirical studies have examined how horizontal FDI affects emerging market firms' innovation efforts. To address the conundrum, we advance the theoretical discussion of how coopetitive relations can be activated by introducing an intangibility gap construct.

Coopetition as a Mechanism of the Intangibility Gap Effect

As noted above, recent research has pointed out that intangible assets can be distinguished from tangible assets in terms of their excludability, tradability, and divisibility (He et al., 2022). These three dimensions, put together, suggest that intangible assets are more ambiguous about the link between firm resources and competitive advantages. The value of intangible assets is more difficult to be

measured, evaluated, and thus traded in a marketplace. These fundamental differences between tangible and intangible assets imply that the previous findings regarding spillovers based on tangible asset may not be readily applicable to explain the effect of intangible assets (Zhang et al., 2014). It has been widely acknowledged that foreign firms in emerging economies often possess more superior intangible resources than local firms (Blomström & Sjöholm, 1999), thereby making it difficult for local firms to imitate (Zhang et al., 2014). Up to date, however, we know little about how and to what extent the differences apply to the context of competition–cooperation dynamics.

To provide additional insight, we focus on the effect of intangibility gap by considering differences between the intangible assets of both foreign and local firms. Foreign firms in an emerging market often find themselves on the frontier, whereas local firms are at a distance. The intangibility gap conceptualized in our study captures various coopetitive local–foreign firm relationships. Although the presence of frontier foreign firms can impose substantial competitive threats to local firms in emerging economies (Lamin & Livanis, 2013; Lewin, Massini, & Peeters, 2009), the intangibility gap varies across local firms.

From the coopetition perspective, the relationship between local and foreign firms may be differentiated when intangibility gap is at the low, moderate, or high level. Local firms may take different actions (e.g., aggressive or cooperative) to change the disadvantageous position and mitigate the competitive threat. In a competition-dominated relationship, for example, competitive threats were observed in emerging economies, as demonstrated by research on 'market-stealing' (Aitken & Harrison, 1999) and 'labor-stealing' (Wang & Yu, 2007). The former refers to local firms' market loss because of the competitive advantage of horizontal FDI. The latter occurs when local firms lose their human capital to advantaged foreign competitors (Gu & Lu, 2011; Lu & Ma, 2008). Although local firms may benefit from technical and skilled personnel turnovers from foreign firms, the latter may also attract skilled personnel from the former. Thus, in these situations, local firms may take action to compete.

Coopetition research has focused on either balanced relationships (i.e., high cooperation–high competition and low cooperation–low competition) or imbalanced relationships (i.e., cooperation-dominated and competition-dominated relationships) (Czachon & Mucha-Kuś, 2014). Research on imbalanced relationships suggests that while cooperation-dominated relationship is more about value creation, competition-dominated relationship is more about value sharing (Zerbini & Castaldo, 2007). However, this approach ignores balanced relationships. Our study considers both balanced and imbalanced relationships simultaneously to theorize that the degree of intangibility gap (low, moderate, or high) can capture such coopetitive relations as equal, competition-dominated, and cooperation-dominated relations (e.g., Bengtsson & Kock, 2000; Chin et al., 2008; Lado et al., 1997; Le Roy & Sanou, 2014; Luo, 2007). This theorization challenges the linear way of thinking, suggesting that the intangibility gap impact on firm strategies, such as innovation decisions, may be curvilinear.

Intangibility Gap and Local-Firm R&D Effort

We propose that intangibility gap may have an inverted U-shaped effect on local firms' internal R&D efforts. According to Haans, Pieters, and He (2016), developing the inverted U-shaped relationship needs to clarify the underlying causal mechanisms to explain why the causal quadratic relationship comes into existence. Moreover, we need to separately explain the relationship before and after the turning point based on different mechanisms. In addition, we need to explain the combination of different mechanisms resulting in an inverted U-shaped relationship. In line with its procedure, we argue that coopetition is the underlying mechanism of our argument. Given the coexistence of competition and cooperation between foreign and local firms. Our argument is additive. That is, before the turning point, the competition between foreign and local firms may dominate. In the competition-dominated situation (i.e., high competition, low cooperation), we argue that intangibility gap may increase internal R&D. In contrast, after the turning point, the cooperation between foreign and local firms may dominate. In the cooperation-dominated situation (i.e., low competition, high cooperation), intangibility gap may decrease the internal R&D of local firms. Taken together, the additive argument leads to an inverted U-shaped effect on local firms' internal R&D efforts.

Specifically, before the turning point, intangibility gap changes from a very small or nonexistent equilibrium situation to a moderate level. This change will create a competition-dominated situation in which competitive threats may stimulate laggard local firms to close the gap through an R&D effort (Blomström & Kokko, 1998; Spencer, 2008; Zhang et al., 2014). Local firms may become contenders that vie with foreign competitors for the technological upper hand (Chin et al., 2008; Osarenkhoe, 2010). Internal R&D can enhance the absorptive capacity of local firms (Blalock & Gertler, 2009; Cohen & Levinthal, 1989) to identify, assimilate, and exploit external knowledge (Cohen & Levinthal, 1989). In the same industry-region segment, foreign and local firms share many similarities in managerial know-how, materials and equipment, human resource management, fundamental technologies, and marketing activities. These commonalities lay the foundation for absorbing observable knowledge (Martin & Salomon, 2003). As catch-up is possible, local firms are likely to pursue internal R&D 'to understand, interpret, and appraise knowledge that has been placed upon the shelf' (Rosenberg, 1990: 171). In their study of more than 900 manufacturing firms in India, Basant and Fikkert (1996) found significant returns to in-house R&D investment when such an investment is used to assimilate knowledge from foreign firms.

Moreover, research on the leapfrog effect has suggested that technically laggard firms may catch up by engaging in innovation activities (Dore, 1990). Internal R&D allows local firms to enhance their capabilities to neutralize competitive threats from foreign firms. Intangible resources, such as knowledge creation, trademarks, and operation process (Steward, 1999), allow firms to create barriers to imitation (Barney, 1991; Wernerfelt, 1984). When intangibility gap is large, FDIs generate a high barrier to imitation, hindering local firms from absorbing foreign knowledge. In such a case, R&D may enhance firm competitiveness through process improvement or new product development (Grossman & Helpman, 2015) to enhance efficiency or generate new knowledge to differentiate from advanced rivals (Cheung, 2010; Katrak, 1997; Lall, 1989, 1993). In the competition-dominated situation, catching up may occur as emerging market firms tend to develop technological capabilities and improve competitiveness through innovative activities against frontier foreign firms (Kumaraswamy, Mudambi, Saranga, & Tripathy, 2012; Lamin & Livanis, 2013; Mudambi, 2008).

However, after the turning point, a very large intangibility gap may create a cooperation-dominated situation (Bengtsson & Kock, 2000) as internal R&D efforts may not be enough to push local firms to the industry-frontier. Developing new technologies may prove too costly for local firms to catch up. It has been argued that although competition stimulates innovation (for a review, see Gilbert, 2006), substantial competitive threats may also discourage laggard firms from innovating via R&D (Aghion, Bloom, Blundell, Griffith, & Howitt, 2005). Due to the risky, expensive, and time-consuming nature of internal R&D, local firms may seek cost-effective strategies (e.g., reducing R&D investment) (Hudson, 1994; Levinthal & March, 1993). In their study of Belgian manufacturing firms, Veugelers and Houte (1990) found that local firms had low innovation expenses when the share of FDI in the focal industry was high. Katz (2000) showed that the massive arrival of foreign firms in the 1980s hindered local firms from overcoming the imitation barrier. Consequently, local firms' gradual accumulation of technological development in Mexico, Brazil, and Argentina abruptly stopped.

Moreover, a large intangibility gap may separate local and foreign firms into different strategic groups for laggard local firms to avoid direct competition with frontier foreign firms. Hunt (1972) coined the term 'strategic group' to identify firms that share similar resource combinations and strategic preferences, such as trademarks and product quality (Porac, Thomas, Wilson, Paton, & Kanfer, 1995; Porter, 1980; Reger & Huff, 1993; Sonenshein, Nault, & Obodaru, 2017). Variations in these factors across strategic groups create intergroup mobility barriers (Dranove, Peteraf, & Shanley, 1998; Smith, Grimm, Young, & Wally, 1997).

In addition, when intangibility gap is very large, local firms are unable to compete with foreign firms. In this situation, advantaged foreign firms tend to exploit their superiority in emerging markets (McDermott & Corredoira, 2010; Ozkan et al., 2022). They may focus on core business for efficiency and outsource noncore business to disadvantaged local firms. This type of cooperation typically takes the form of OEM, which has been commonly observed in emerging economies (Lee, Song, & Kwak, 2015; Luo & Tung, 2007; Park, Kim, Kim, & Lee, 2007). As a result, technically laggard local firms are

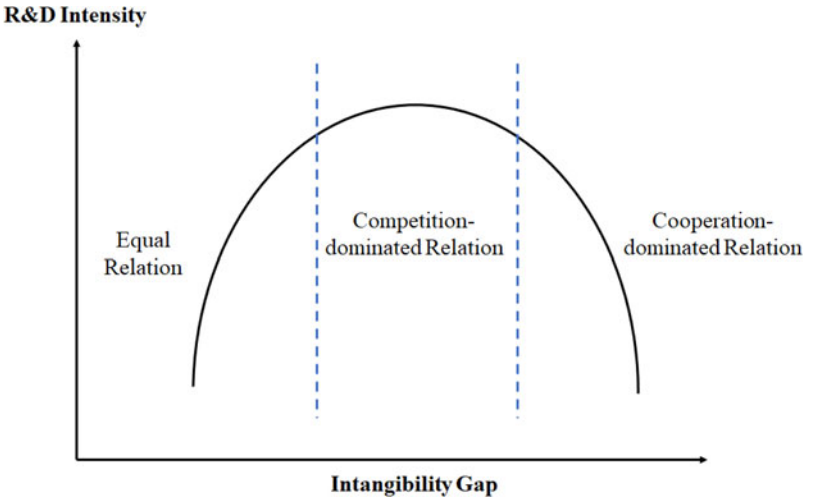

Figure 1. Theoretical framework

more likely to accumulate knowledge from cooperation with foreign firms through OEM arrangements, rather than conducting internal R&D.

Research shows that emerging market firms may benefit from the spillover effect of transferred technology in mass production through OEM arrangements (Luo & Tung, 2007).[3] Such firms may focus on production efficiency with minimum R&D investments during the OEM stage (Lee et al., 2015). As Hobday (1995) showed, emerging market firms chose not to invest in R&D in the original stage when facing a large intangibility gap, but focused on OEM as preparation for their later technology catch-up. Such firms may then move on to original design manufacturing (ODM) by designing a few of the products they previously manufactured (Lee & Lim, 2001) and gradually upgrade to original brand manufacturing (OBM) by developing and marketing differentiated products (Park et al., 2007). This approach is effective for laggard local firms facing a large intangibility gap to survive and grow (Lee et al., 2015). Thus, a large intangibility gap between laggard local firms and industry-frontier foreign firms may stimulate joint cooperation, reducing local firms' internal R&D efforts. Taken together, we propose the following curvilinear hypothesis:

Hypothesis 1 (H1): In an emerging economy, the intangibility gap, captured by the difference in intangible asset intensity between foreign and local firms, has an inverted U-shaped relationship with the internal R&D intensity of local firms.

Figure 1 summarizes the arguments above leading to the curvilinear relationship between intangibility gap and local firms' internal R&D intensity.

Boundary Conditions of the Coopetition Perspective

As noted, coopetition is a central mechanism that explains the relationship between an intangibility gap and local firms' strategic response in emerging economies. For a better understanding of the coopetition mechanism, we further examine how variations in local firms' resource distribution and provision serve as boundary conditions of the above-proposed relationship. Specifically, we argue that export intensity and state ownership may allow local firms to respond differently to foreign competitive threats.

First, export intensity represents a firm's resource distribution. Coopetitive relationships between local and foreign firms are often geographically constrained within a host country. Thus, local firms with more proportional sales in international markets may be better able to avoid the home-market competition by taking advantage of market differences in terms of price or quality across countries, a strategy known as

arbitrage (Ghemawat, 2007). As a result, export-intensive firms may harness market opportunities abroad where competition is not as strong as in their home market and deploy fewer resources in the home market. Therefore, we consider local firms' export intensity as a boundary condition.

Second, state ownership represents a firm's resource provision. Compared to private firms, state-owned enterprises (SOEs) in emerging economies are more likely to leverage the resource support and protection of local governments to manage coopetitive relationships. SOEs are more likely to benefit from government innovation policies than other firms (Li, Xia, & Zajac, 2018). For example, SOEs would petition the government to set up an infant–industry–protection scheme to fend off foreign competition in their home country (Grossman & Horn, 1988). Thus, we also consider state ownership as a salient boundary condition of coopetition since local firms receive external resources and support from their governments.

Export intensity as a moderator

Export intensity, which is often defined as the ratio of exports over total sales (Bonaccorsi, 1992; Verwaal & Donkers, 2002), not only reflects a reduced dependence of local firms on the home market for sales (Carpenter, Sanders, & Gregersen, 2001; Sullivan, 1994), but also allows them to benefit from knowledge in foreign markets (Buckley, Clegg, & Wang, 2002; Liu, Lu, Filatotchev, Buck, & Wright, 2010; Wei & Liu, 2006). We propose that by relying on foreign markets for sales, export-intensive local firms may be less responsive to coopetition with foreign firms in their home market compared with other local firms. In particular, they can avoid direct competition with foreign firms in the local market. Thus, export intensity will attenuate the curvilinear effect of intangibility gap on local firms' internal R&D efforts.

More specifically, export-intensive local firms have a better ability to resort to foreign markets for sales and survival than other local firms (Carpenter et al., 2001; Sullivan, 1994). When intangibility gap is small, the relationship between local and foreign firms is in an equal situation in which export-intensive firms may be more likely to seek a relative advantage abroad than less-export-intensive firms. When intangibility gap is moderate, a competition-dominated situation will prevail. Export-intensive firms are less vulnerable to domestic competition and market risks as they can diversify through foreign markets. Thus, they are less susceptible to foreign competition and less likely to respond through internal R&D. In contrast, local firms with a higher dependence on domestic markets for sales are more vulnerable to the competitive threats of foreign firms at home given that these local firms are less able to avoid competitive threats from inward FDI compared with export-intensive firms. Thus, less-export-intensive local firms have a stronger incentive to catch up with the industry-frontier by pursuing internal R&D than export-intensive firms.

When intangibility gap exceeds the turning point and becomes very large, a cooperation-dominated situation will prevail in which organizations search for synergies created from complementary resources (Chin et al., 2008; Osarenkhoe, 2010). Local firms with a higher home-market dependence are more likely to reduce their internal R&D since a very large gap is more likely to drive such firms to seek cooperation with foreign firms through OEM arrangements (Luo, 2004). By contrast, competition in international markets still exists among export-intensive firms, forcing them to maintain R&D efforts for adaptation (e.g., Ito & Pucik, 1993; Laursen, Masciarelli, & Prencipe, 2012). For example, Isenberg (2008) showed that Tecsis, an export-intensive Brazil-based wind turbine blade manufacturer, focused its R&D only on foreign customers in the US and Europe instead of those in its home market due to competition outside the home market. Therefore, export-intensive firms are less likely to reduce internal R&D compared with their local market-focused counterparts when intangibility gap is large. Taken together, we propose the following hypothesis:

Hypothesis 2 (H2): When the export intensity of a local firm is higher, the inverted U-shaped relationship between the intangibility gap and internal R&D intensity will become flatter.

State ownership as a moderator

Governments in emerging economies rely more on SOEs than private firms to fulfill administrative mandates and political agendas. Hence, they often play important supportive and protective roles in

helping SOEs cope with the competitive threats of inward FDIs (Buckley et al., 2002; Chang & Xu, 2008). When SOEs are able to catch up, they may rely on government support to make more R&D efforts. In contrast, when intangibility gap with foreign frontier firms becomes too large for SOEs to catch up, they can rely more on the government to seek cooperation with foreign firms. The critical distinction is whether they have the capacity to catch up. Thus, we propose that local firms with higher state ownership are more likely to adjust their R&D accordingly when responding to an intangibility gap in a competition-dominated situation (Lado et al., 1997).

If addressing foreign competitive threats is possible when an intangibility gap is at a moderate level, competition-dominated relationship may hold sway. Local firms with higher state ownership are more likely to maintain their R&D efforts in a 'contending situation' (Luo, 2007) and become contenders due to stronger government support. Emerging market firms may catch up with the industry-frontier through innovation (Ernst & Kim, 2002; Lee & Lim, 2001). Since SOEs are typically less efficient than private firms, they face a higher risk of bankruptcy or privatization (Xu, Lu, & Gu, 2014) and are under greater pressure to innovate to stay alive (Zhou, Gao, & Zhao, 2017). As innovation improves competitiveness, the government may view it as a national priority to encourage SOEs to invest in R&D. Therefore, local firms with higher state ownership are more likely to respond to foreign competitive threats through innovation.

Moreover, SOEs are likely to leverage government resources when a moderate intangibility-gap level can be bridged by pursuing internal R&D. Such resources may include government-subsidized financial capital and access to state-controlled infrastructure. Research shows that SOEs often enjoy greater privileges granted by the government, including subsidized credits, strategic planning, antitrust policies, financing, and bank regulations (Zhou et al., 2017). For example, governments are more likely to support SOEs by providing bank loans with favorable terms, such as long-term, low interest rates, compared with private firms (Buckley et al., 2002; Buckley, Cross, Tan, Xin, & Voss, 2008). Governments may also provide SOEs with relevant resources to enhance their competitive position in addressing foreign competitive threats (Jiang, Branzei, & Xia, 2016). Thus, local firms with high state ownership tend to actively respond to moderate intangibility-gap levels by investing more aggressively in R&D to catch up with foreign firms than those with low or no state ownership.

However, when intangibility gap reaches a high level, cooperation-dominated relationship will prevail. Firms with high state ownership may decrease their R&D investment more quickly than those with low or no state ownership. SOEs tend to hire numerous employees to maintain social stability, conduct businesses critical to economic development, and perform certain administrative functions (Bai, Lu, & Tao, 2006; Lin, Cai, & Li, 1998). Hence, they are likely to be protected by the government against serious competitive threats. When intangibility gap is very large, SOEs can leverage their connections with important government agencies (Brødsgaard, 2012) and persuade them to adjust policies and regulations to the SOEs' advantage, such as allowing monopolistic control and increasing segment-entry barriers (Hillman, Zardkoohi, & Bierman, 1999). For example, the government can make special arrangements to secure critical raw materials and distribution channels for SOEs (Buckley et al., 2002). In contrast, local firms with low or no state ownership may not attract sufficient attention from the government for such policy protections or arrangements. These firms are more likely to maintain their R&D to stay competitive.

Government connections can also help SOEs cooperate with foreign firms through OEM arrangements. In a cooperation-dominated relationship, leading competitors are more likely to share expertise with technically laggard firms (Ulaga, 2003). Governments may facilitate foreign–local collaboration through FDI policies when SOEs experience difficulty catching up with technology advances (Buckley, Clegg, & Wang, 2007; Chang & Xu, 2008). For example, Chinese government regulations restrict wholly owned foreign subsidiaries, but allow international joint ventures in the automotive industry to pave the way for local–foreign technology development collaboration (Thun, 2018). Local firms expect that the government will step in to arrange technology transfer either through purchase or through international joint ventures (Chang & Xu, 2008). In this situation, foreign firms are also likely to cooperate with the host government (Luo, 2004). Hence, when intangibility gap is very

large, local firms with high state ownership may be more likely to reduce their in-house R&D than those with low or no state ownership. Taken together, we propose that:

Hypothesis 3 (H3): When the state ownership of a local firm is higher, the inverted U-shaped relationship between the intangibility gap and internal R&D intensity will become steeper.

Methods

Sample

As an emerging economy that has amassed the largest inward FDI in the world over the past decades, China provides an ideal setting to test our theory. We collected data from the *Chinese National Bureau of Statistics* (CNBS) database that includes manufacturing firms in China. According to regulations, all firms in China must cooperate in surveys conducted by CNBS and submit their annual financial and organizational information. The CNBS database is the most comprehensive information provider on local and foreign firms in China (Xu et al., 2014; Zhang et al., 2014) and has been widely used in previous studies (Chang & Xu, 2008; Zhang et al., 2010, 2014; Zhou & Li, 2008). CNBS provides firm-level financial and R&D-related information from its Industry Department and Science and Technology Department, respectively. We merged these two data sources from the 2001–2007 period during which R&D data are available. The Chinese economy grew steadily without significant interruptions during this time, providing a proper window for our investigation. Given we lagged our independent variables by one year, our sample period ranged from 2002 to 2007.

Our conceptualization focuses on the catch-up strategies of local firms (i.e., 100% domestic-owned firms) with industry-frontier foreign firms (i.e., 100% foreign-owned firms or international joint ventures in which foreign firms have more than 50% ownership). Our final sample consisted of 27,972 firm-year observations from 2002 to 2007, including 10,097 local firms across 34 manufacturing industries at the two-digit level. We used the entire CNBS database rather than the selected sample to calculate all FDI-related variables.

Dependent Variable

R&D intensity

Consistent with previous studies (e.g., Cohen & Levinthal, 1990; Gentry & Shen, 2013), we measured R&D intensity as the ratio of internal R&D expenditures over sales each year. According to CNBS (2004), internal R&D expenditures include expenses on research, design, making and testing of prototypes, and experimentation; whereas external R&D expenditures refer to the expenses on delegating R&D tasks to other organizations (e.g., universities, research institutions, or other firms). We also used firms' patent applications as an alternative dependent variable and found consistent results.

Independent and Moderating Variables

Intangibility gap was measured by the difference in intangible asset intensity between the frontier foreign firm and a local firm in the same two-digit industry sector and the same province in the past year (Girma, Greenaway, & Wakelin, 1999; Kumaraswamy et al., 2012). Intangible-asset intensity is the ratio of intangible assets over a firm's total assets (Zhang et al., 2014). According to CNBS, intangible assets are nonphysical assets utilized by the firm, including patents, nonpatented technologies, trademarks, copyrights, and goodwill (He et al., 2022; Tian, 2007; Zhang et al., 2014). We defined foreign firms as 100% foreign-owned firms or international joint ventures in which foreign firms have more than 50% ownership. Data for the intangible-asset intensities of foreign firms were obtained from the CNBS database.

Following previous studies (e.g., Verwaal & Donkers, 2002; Zhang et al., 2014), we measured *export intensity* by the percentage of export value over a firm's total sales. We captured *state ownership* with the ratio of a firm's capital received from the government to its total capital (Jia, 2014; Marquis & Qian, 2014).

Control Variables

We controlled for four firm-level variables: *firm age*, *firm size*, *firm performance*, and *leverage*, which might influence internal R&D intensity (Zhang et al., 2014). *Firm age* was the natural logarithm of the number of years since a firm was established. Old firms are prone to the influence of organizational inertia, which may affect their internal R&D tendency. *Firm size* was calculated using the natural logarithm of total assets, which is related to the availability of a firm's slack resources that can be used as inputs to develop internal R&D. *Firm performance* was calculated as the return on assets (*ROA*) or percentage of net income over total assets because a better performing firm has more R&D resources. *Leverage*, which may limit a firm's ability to engage in R&D, was measured by the ratio of liabilities over assets. *Marketing intensity* was calculated as the ratio of advertising investment over total sales. This variable accounts for marketing costs that would have a complementary impact on firms' R&D strategies.

At the macro level, we controlled for regional and industry effects. For regional effect, we constructed *market environment* to capture the level of institutional development in each province. This variable was developed by Fan, Wang, and Zhu (2009) based on the following five factors: (1) development of market intermediary organizations, (2) producers' legal rights and interests protection, (3) intellectual property protection, and (4) consumer rights protection. Higher scores indicate a better legal institution for R&D activities. This provincial-level marketization index, developed in 1997, is updated yearly and has been widely applied in economics and finance studies (e.g., Chen, Firth, Gao, & Rui, 2006; Fan, Wong, & Zhang, 2013), management (e.g., Markóczy, Li Sun, Peng, & Ren, 2013), and international business (e.g., Gao, Murray, Kotabe, & Lu, 2010). For industry effect, we constructed *industry complexity* and *industry dynamism*. *Industry complexity* was measured by the degree of competition in the industry using a transformation of the Herfindahl index (Herfindahl, 1950; Raghunathan, 1995). The Herfindahl index was computed by squaring the market shares of each competitor among n competitors in an industry. We calculated industry complexity as:

$$\text{Industry complexity} = 1 - \text{Herfindahl index} = 1 - \sum_{i=1}^{n}\left[\frac{\text{Sales}_i}{\sum_{i=1}^{n}\text{Sales}_i}\right]^2.$$

Industry dynamism was captured by a volatility index calculated as the standard error of the regression slope coefficient in a regression of industry sales for each year over the five-year period against a time (year) variable (Keats & Hitt, 1988).

The Sino-U.S. trade friction may also impact firms' R&D strategies. We thus controlled for *Sino-U.S. trade volume*, measured by the natural logarithm of yearly bilateral trade volume between China and the US.

Finally, we added year dummies in all models to control for unobservable temporal effects. Since we used the fixed effect regression to estimate the results, time-invariant variables, such as industry dummies, were dropped from the analysis.

Data Analysis

We used the Breusch–Pagan Lagrange multiplier test to identify unobserved individual firm effects in the sample. After confirming the existence of such effects, we used the panel data method instead of the generalized ordinary least squares approach to test our model (Wooldridge, 2002). We also conducted a Hausman test to determine whether fixed or random effects models should be used to test our hypotheses. Correlations were observed between the explanatory variables and the unobserved effects in the sample. Hence, the fixed effect regression was more appropriate for estimating our results. Therefore, we used fixed-effects models to estimate our predicted relationships.

Given the proportional nature of our dependent variable – internal R&D intensity bound between 0 and 1 – arbitrary limits on the range of variation in the dependent variable need to be imposed in the estimation (Papke & Wooldridge, 1996). Thus, we adopted a fixed-effects Tobit model to conduct our

statistical analyses. The Tobit model, also known as a censored regression model, allows accurate estimation when the dependent variable is censored from above and/or below (i.e., limited dependent variable) (Long, 1997; Tobin, 1958). We used *metobit* command in *STATA 15* in performing the analyses.

Results

Table 1 presents the correlation matrix, means, and standard deviations of the variables. The variance inflation factor (VIF) test shows that all VIF values are below 1.21. Hence, multicollinearity is not a problem in our regression analyses.

Table 2 presents estimations of the fixed-effects models. Model 1 only includes the control variables. Model 2 adds the main effects. Model 3 adds the square term of intangibility gaps. Models 4 and 5 include the interaction terms using export intensity as the moderator. Models 6 and 7 include the interaction terms using state ownership as the moderator. Model 8 is the full model that includes all individual and interactive effects. The results show model improvements as we added the independent variables and interactions in the regressions. Among significant controls, larger, older firms with high advertising fees or a lower level of debt financing tend to maintain higher levels of internal R&D compared with their counterparts, as expected. We also find that firms located in better market environments or in more dynamic and complex industries have higher levels of internal R&D.

Hypothesis 1 suggests an inverted U-shaped relationship between intangibility gap and R&D intensity of local firms. The coefficient of the linear term of intangibility gap is positive and significant ($b = 0.067$, $p < 0.001$), and that of the square term of intangibility gap is negative and significant ($b = -0.077$, $p < 0.001$), as shown in Model 3. Following suggestions in prior studies (Haans et al., 2016; Lind & Mehlum, 2010), we further tested whether the slope is sufficiently steep at both ends of the data range and whether the turning point locates well within the data range. Slope tests showed that both the positive slope at the lower bound (t-value = 2.959, $p < 0.01$) and the negative slope at the upper bound (t-value = −2.49, $p < 0.01$) are significant. As shown in Figure 2, local firm's R&D intensity first increases and then decreases as the intangibility gap increases, thereby supporting the inverted U-shaped prediction in Hypothesis 1.

Hypothesis 2 proposes that the inverted U-shaped relationship between intangibility gap and internal R&D intensity will be less pronounced when the local firm's export intensity is high. In Model 5, the coefficient of the interaction between export intensity and intangibility gap is negative and significant ($b = -0.118$, $p < 0.001$). The interaction between export intensity and the square term of intangibility is positive and significant ($b = 0.123$, $p < 0.01$). Figure 3 demonstrates the moderating effect. Consistent with Hypothesis 2, the inverted U-shaped relationship becomes flatter when the local firm's level of export intensity is higher.

Hypothesis 3 posits that state ownership strengthens the inverted U-shaped relationship between intangibility gap and internal R&D intensity. Model 7 shows that the coefficient of the interaction between state ownership and intangibility gap is positive and significant ($b = 0.109$, $p < 0.001$) and that of the interaction between export intensity and the square term of intangibility gap is positive and significant ($b = -0.123$, $p < 0.001$). Figure 4 shows the moderating effect of state ownership. As expected, the inverted U-shaped relationship becomes steeper when the local firm has a higher level of state ownership.

Given that R&D intensity is a limited dependent variable, we must interpret our results with caution. Following suggestions in prior studies (Hoetker, 2007; Wiersema & Bowen, 2009; Zelner, 2009), we examined the marginal effects of all interaction terms to provide more accurate interpretations of the predicted moderating effects. We found that all marginal effects are statistically significant with clear plots supporting our hypotheses.

Robustness Checks

We conducted two sensitivity analyses to check the robustness of our results. First, we used firm affiliation with the central government as an alternative measure to state ownership to capture the state

Table 1. Descriptive statistics and correlations of variables

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	R&D intensity												
2	Intangibility gap	0.025											
3	Export intensity	0.012	0.168										
4	State ownership	0.016	−0.148	−0.120									
5	Firm age (logged)	0.071	−0.037	−0.023	0.278								
6	Firm asset (logged)	0.102	−0.101	−0.115	0.216	0.122							
7	Firm performance	−0.004	0.093	−0.003	−0.162	−0.092	−0.078						
8	Leverage	−0.037	0.005	0.049	0.028	0.019	−0.051	−0.324					
9	Marketing intensity	0.030	0.011	−0.042	−0.017	0.029	0.036	0.048	−0.072				
10	Market environment	0.067	0.319	0.231	−0.190	0.001	−0.022	0.013	−0.025	−0.013			
11	Industry dynamism	0.022	0.048	0.009	−0.043	−0.055	−0.063	−0.017	0.043	0.016	−0.084		
12	Industry complexity	0.008	0.173	0.078	−0.136	−0.054	−0.072	0.051	0.006	0.019	0.149	−0.048	
	Mean	0.009	0.303	0.147	0.158	2.506	12.224	0.055	0.619	0.003	7.192	0.055	0.989
	S.D.	0.027	0.174	0.275	0.344	0.919	1.115	0.099	0.217	0.017	2.686	0.06	0.013

Notes: a. $N = 27{,}972$. b. Correlation coefficients with a magnitude greater than 0.01 are significant at the $p < 0.05$ level (two-tailed test).

Table 2. Results of fixed-effects Tobit models

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Firm age (logged)	0.007*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)
Firm asset (logged)	0.011*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)
Firm performance	0.005 (0.005)	0.002 (0.005)	−0.000 (0.006)	−0.001 (0.006)	−0.001 (0.006)	−0.000 (0.006)	0.000 (0.006)	−0.000 (0.006)
Leverage	−0.009** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)	−0.010*** (0.003)
Marketing intensity	0.167*** (0.043)	0.167*** (0.043)	0.164*** (0.042)	0.164*** (0.042)	0.163*** (0.042)	0.164*** (0.042)	0.163*** (0.042)	0.163*** (0.042)
Market environment	0.003*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Industry dynamism	0.047*** (0.010)	0.045*** (0.010)	0.045*** (0.010)	0.045*** (0.010)	0.044*** (0.010)	0.044*** (0.010)	0.043*** (0.010)	0.043*** (0.010)
Industry complexity	0.159*** (0.046)	0.128** (0.045)	0.104* (0.045)	0.103* (0.045)	0.101* (0.045)	0.103* (0.045)	0.101* (0.045)	0.099* (0.045)
Sino-U.S. trade volume	−0.016*** (0.002)	−0.016*** (0.002)	−0.015*** (0.002)	−0.015*** (0.002)	−0.015*** (0.002)	−0.015*** (0.002)	−0.015*** (0.002)	−0.015*** (0.002)
Intangibility gap		0.011*** (0.003)	0.067*** (0.011)	0.068*** (0.011)	0.079*** (0.012)	0.060*** (0.011)	0.044*** (0.011)	0.055*** (0.013)
State ownership		−0.004† (0.002)	−0.003† (0.002)	−0.003† (0.002)	−0.003† (0.002)	−0.010*** (0.003)	−0.020*** (0.004)	−0.019*** (0.004)
Export intensity		0.006** (0.002)	0.005* (0.002)	0.014** (0.004)	0.029*** (0.007)	0.005** (0.002)	0.006** (0.002)	0.025*** (0.007)
Intangibility gap square			−0.077*** (0.013)	−0.074*** (0.013)	−0.088*** (0.015)	−0.073*** (0.013)	−0.050*** (0.014)	−0.061*** (0.016)

(*Continued*)

Table 2. (*Continued.*)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intangibility gap × Export intensity				−0.024* (0.010)	−0.118*** (0.034)			−0.098** (0.035)
Intangibility gap square × Export intensity					0.123** (0.042)			0.101* (0.042)
Intangibility gap × State ownership						0.025** (0.008)	0.109*** (0.025)	0.103*** (0.026)
Intangibility gap square × State ownership							−0.123*** (0.033)	−0.116*** (0.033)
Log likelihood	5,598.118	5,619.683	5,644.918	5,648.241	5,652.311	5,651.603	5,660.498	5,665.813
Wald Chi-square	401.673	406.673	414.909	417.841	419.466	423.357	427.152	430.026

Notes: a. $N = 27{,}972$. b. Robust standard errors in parentheses. c. †$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. d. Year dummies are included.

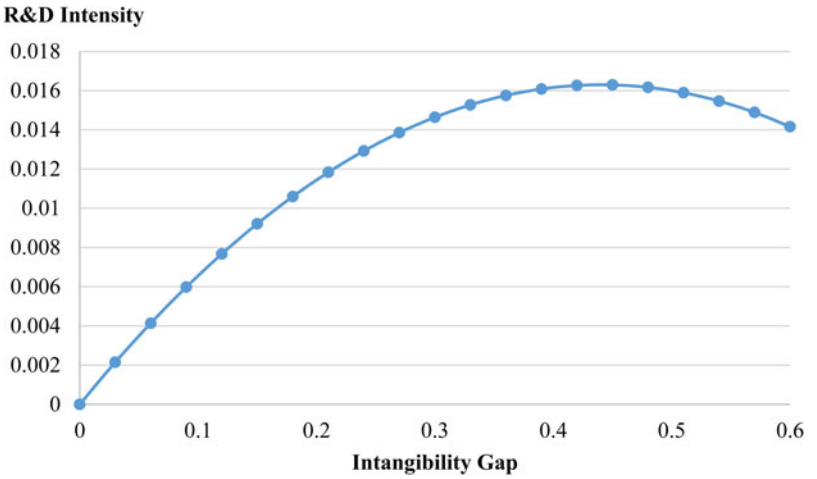

Figure 2. Intangibility gap and R&D intensity

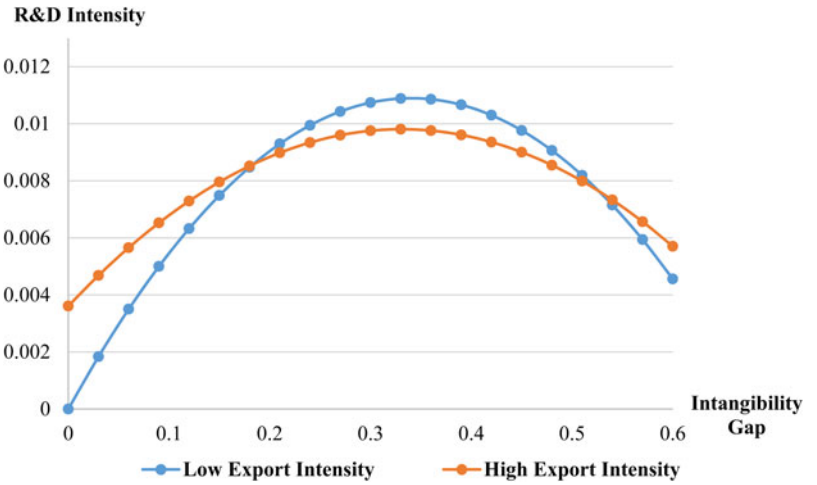

Figure 3. Moderating effect of export intensity

influence. Firm affiliation captures the degree to which a local firm is under government administrative control. Each firm may be affiliated (have a *lishu* relationship) with the central, provincial, city/district, county, or town/township/street governments (Tan, Li, & Xia, 2007; Wang et al., 2012). A local firm's affiliation with the central government can be associated with its institutional support and protection, which influences its motivation to invest in R&D. We coded the variable *affiliation with the central government* as 1 for firms affiliated with the central government and 0 otherwise. The results are consistent with the findings as reported.

Second, we recalculated intangibility gap using the maximum value of foreign firms in the same two-digit industry sector and city, as different operationalizations in geographic scope may capture different magnitudes of foreign competitive threats. The results also remain consistent with our predictions. All robustness test results are available upon request.

Discussion

From a cooperation perspective, we have examined how local firms in emerging economies respond to the intangibility gap between industry-frontier foreign firms and local firms through internal R&D. We

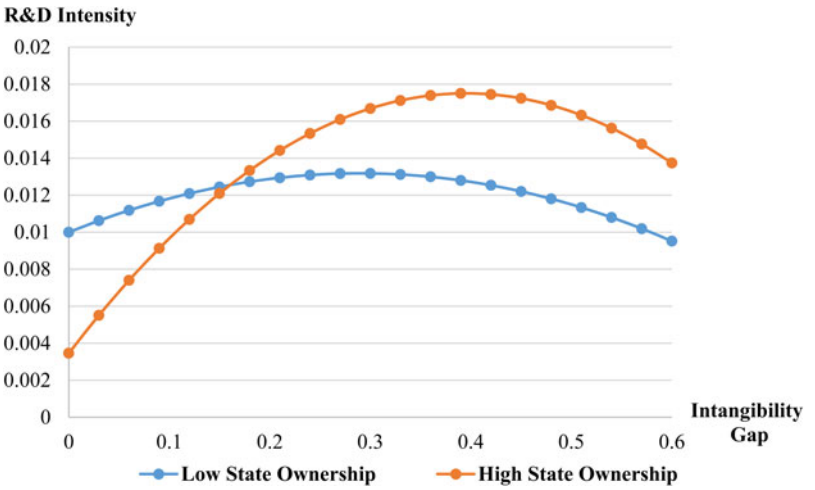

Figure 4. Moderating effect of state ownership

find that a moderate level of intangibility gap is more likely to stimulate local firms' internal R&D than a small or large intangibility gap. Moreover, export intensity weakens the inverted U-shaped relationship, whereas state ownership strengthens such a relationship. Our findings have important theoretical and practical implications.

Theoretical Contribution

Our study contributes to the coopetition perspective by developing a construct of intangibility gap to link different combinations of cooperation and competition. This contribution is important for two reasons. First, we advance the understanding of local firms' strategic responses to advantaged foreign firms from the coopetition perspective, which extends the existing literature that has emphasized the spillover mechanism underlying productivity gap in explaining local firms' strategic decisions (Aitken & Harrison, 1999; Zhang et al., 2014). This literature falls short in accounting for intangibility gap between foreign and local firms which may increase barriers to imitation and reduce spillover effects. By focusing on how the coopetitive relationships between foreign and local firms change with different levels of intangibility gap, we advance the understanding of the antecedents of emerging market firms' R&D efforts. Second, prior research drawing from the coopetition perspective has rarely examined how coopetitive relationships among firms may vary (i.e., equal, competition-dominated, and cooperation-dominated relationships) and generate varying effects on firms' strategic decisions (Czachon & Mucha-Kuś, 2014). We extend this perspective by introducing the intangibility gap construct to capture various coopetitive relationships (Bengtsson & Kock, 2000), which explains why some firms tend to catch up through internal R&D investment while others do not (Balasubramanian, 2011).

Importantly, our study shifts attention to show that the relationship between foreign and local firms may differ in coopetitive situations captured by intangibility gap, which departs from traditional approaches relying on coopetition in study of alliance partner relations (Czachon & Mucha-Kuś, 2014). In general, coopetitive actions can be categorized into mono-players (alienators), contenders, partners, and adapters (Chin et al., 2008; Lado et al., 1997; Luo, 2004; Osarenkhoe, 2010). Some firms may become complementors (Dussauge & Garrette, 1997), while others may become rivals (Wilhelm, 2011). In balanced situations of competition and cooperation, local firms can be mono-players or adapters to coexist with foreign firms. In competition-dominated situations, a local firm can be a contender to catch up. In cooperation-dominated situations, local firms can be partners to cooperate with foreign firms. A mismatch of roles and situations may lead to ineffective innovation strategies.

Our study helps address coopetitive relationships in which local firms respond to a foreign competitive threat at home by catching up through developing internal R&D strategies. Research on the effects of

horizontal FDI on local firms' decisions and outcomes can be traced back to the 'technology-gap hypothesis' (Gerschenkron, 1962). The technology gap refers to the relative technology backwardness of local firms vis-à-vis frontier foreign firms that results in technological spillovers and competitive threats from inward FDI in emerging economies (Spencer, 2008; Zhou, Van Witteloostuijn, & Zhang, 2014). Traditionally, the literature examined the local firms' catch-up behaviors either focusing on cooperation with foreign firms (e.g., Giuliani et al., 2016; Gu & Lu, 2011; Parente et al., 2021) or on competition against foreign firms (e.g., Young et al., 1996). Our study looks into local firms' strategic responses from a coopetition perspective, revealing a more complete picture of how local firms' R&D strategies are influenced by local firms' cooperative and competitive relationships with frontier foreign firms.

Furthermore, several studies followed the spillover approach to explore the monotonic effect of productivity gap (Girma et al., 1999; Zhang et al., 2010). This line of inquiry suggests that a larger productivity gap creates greater opportunities for technology upgrades in local firms (Eapen, 2012; Meyer & Sinani, 2009). Nevertheless, research on productivity gap has been questioned in other studies (Perez, 1997; Zhou et al., 2014) because it overlooks foreign firms' intangible assets that can serve as a barrier to the spillover effect (Zhang et al., 2014). Especially, when intangibility gap is large, it creates a barrier for local firms to absorb advanced knowledge from foreign firms. Several studies have suggested that the relationship between competition and innovation can be nonmonotonic (Aghion, Harris, Howitt, & Vickers, 2001; Boone, 2001; Sjöholm & Lundin, 2013). However, even given this theoretical progress, existing studies have not systematically investigated the coopetitive relationships between local and foreign firms in terms of how intangibility gap affects local firms' innovation strategies.

The lack of discussion on this important strategic issue challenges a clear understanding of the relationship between local–foreign coopetition and local firm strategy. For a more nuanced understanding of the effects of horizontal FDI, we focus on the intangibility gap, which captures the equal, competition-dominated, and cooperation-dominated relationships (Bengtsson & Kock, 2000; Rusko, 2011) between local and foreign firms. From the perspective of foreign firms, intangible resources are sources of sustainable competitive advantage (Reed & DeFillippi, 1990). By contrast, this advantage of foreign firms poses competitive threats from the local firms' perspective. Our coopetition approach is fruitful in explaining how technically laggard local firms may coexist, cooperate, or compete with foreign firms.

We further unravel the mechanism of coopetition by introducing export intensity and state ownership as boundary conditions. Therefore, our study also adds to the literature on emerging market firm strategies by providing insights on how local firms adjust their internal R&D in different coopetitive relationships. Specifically, we deepen the understanding of the central mechanism of coopetition by showing export intensity as a boundary condition. The curvilinear relationship between intangibility gap and internal R&D intensity is less pronounced for export-intensive local firms. In a study of Japanese firms entering the U.K. in the 1980s, Dunning (1988) showed that local firms react to mounting competitive threats by diversifying their product portfolios. Export intensity reflects the dependence of a firm on foreign markets (Carpenter et al., 2001; Verwaal & Donkers, 2002) and the degree to which the firm has to face competition beyond the home market (Buckley et al., 2002; Liu et al., 2010; Wei & Liu, 2006). Our study extends this body of research by drawing attention to the moderating effects of export intensity on inward FDI.

In addition, we advance the coopetition perspective by showing that firms with high state ownership are more responsive to the intangibility gap than those with low state ownership. Due to their lack of efficiency, SOEs are under greater pressure than private firms to address competitive threats from the industry-frontier foreign firms in their home market. Thus, SOEs are likely to leverage resources gained from the government to innovate when they can catch up. However, the competitive landscape may change when intangibility gap is very large, because the foreign frontier firms and the local firms may fall into different strategic groups within the industry, and thus the local firms may seek cooperation (Smith et al., 1997). In cooperation-dominated situations, firms with high state ownership are likely to decrease their internal R&D efforts because they are more likely to gain foreign collaborations.

Our study contributes to the catch-up literature (Lamin & Livanis, 2013) by showing how local firms respond strategically to the competitive threat of industry-frontier foreign firms. Traditional approaches

have often treated the local firms' R&D as a given condition (e.g., Kathuria, 2000; Meyer & Sinani, 2009) rather than as a strategic response to horizontal FDI. Our study fills this notable research gap. The inverted U-shaped impact of intangibility gap revealed in our study indicates that coopetition is at play for local firms. In addition, although previous studies have largely focused on imitative catch-up that emphasizes the spillover benefits from foreign firms (Meyer & Sinani, 2009), they have neglected innovative catch-up to address competition via R&D. Given that FDI also brings barriers to imitation and poses competitive threats to local firms (Zhang et al., 2014), our study extends this literature by emphasizing another important approach to address foreign competition: innovative catch-up via internal R&D. Previous studies have shown that the effective deployment of strategic resources may thwart competitive threats (Barney, 1991; Newbert, 2008). We suggest that competition-dominated situations likely stimulate emerging market firms to catch up as they have both the necessity and possibility to do so.

Our study enriches the understanding of cooperation as a strategic response of emerging market firms to inward FDI (Gu & Lu, 2011). Most studies emphasized the competitive advantages of foreign firms as they possess superior resources (Kogut & Zander, 1993). When intangibility gap is small, it only poses limited competitive threats to local firms. Our study implies that in cooperation-dominated situations, technically laggard local firms are more likely to learn from foreign firms through OEM arrangements. More broadly, our findings imply that emerging market firms may use various cooperative strategies to catch up, such as joint ventures, alliances, and networks (McDermott & Corredoira, 2010), buyer–supplier relationships (Kumaraswamy et al., 2012), and location choices (Lamin & Livanis, 2013). Therefore, increasing internal R&D may not be the only choice and means for local firms to catch up. Partitioning foreign and local firms into different strategic groups becomes possible when intangibility gap is enormous, thereby reducing the direct foreign competitive threat to the local firms. In cooperation-dominated situations, local firms may pursue cost-effective strategies to stay alive. The implications of our findings are profound, which suggests that a cooperative strategy may occur in local firms when intangibility gap is large. In other words, when FDI poses serious competitive threats that a specific local firm is unable to address, the firm resorts to cooperation and thus reduces its R&D as a response. Future studies can explore other strategic choices of local firms, such as their decisions of external R&D and their 'make-or-buy' choice for the purpose of catching up.

Practical Implications

Our findings have implications for corporate leaders. In emerging economies, local firms are challenged by their foreign counterparts (Lamin & Livanis, 2013). Technically laggard firms are encouraged to invest in R&D before competing effectively with advanced rivals (Aghion et al., 2001; Boone, 2001; Sjöholm & Lundin, 2013). Indeed, competition encourages innovative thinking, technological development, and the pursuit of internal R&D to upgrade technological capabilities. Investigating R&D strategies of local firms in response to foreign competitive threats in emerging economies yields insightful results that enrich the catch-up literature. However, the ways local firms change their internal R&D strategy as a response to coopetition remains unknown. Our study provides a fine-tuned analysis of the strategic responses of local firms. On the one hand, local firms can invest in internal R&D to improve their disadvantaged position. On the other hand, local firms must keep in mind that a large intangibility gap drives cooperation. Although internal R&D allows local firms to enhance their market positions through differentiation, this process may be costly, risky, and time-consuming. Thus, seeking local–foreign collaborations may be a more viable and rational choice. This approach allows firms to save costs and benefit from inward FDI. Our findings suggest that cooperation and competition strategies can be used in different situations.

In the meantime, managers may actively seek help from local governments to ease their disadvantages. Local governments are likely to step in to establish policies and regulations favorable to SOEs to enable them to survive in the face of foreign firms' powerful aggression when facing a large intangibility gap. Finally, managers may consider using exports to manage competition at home. Increased exports can minimize competitive threats in home markets. Managers can adjust their R&D investments in response to various levels of intangibility gap by referring to the different scenarios identified

in this study. In addition, local firms may turn to technology markets and purchase advanced technology (Arora, Fosfuri, & Gambardella, 2002).

Limitations and Future Research

Our findings must be interpreted in light of certain limitations that may spur new directions for future research. First, the coopetition between foreign and local firms is subject to the complex international competitive environment. Due to data limitations, we are unable to obtain foreign country information. Thus, we used the firm-year design as our unit of analysis. Although the firm-year design is frequently used in the same context in existing studies (e.g., Zhang et al., 2010, 2014), this research design is unable to control the international competitive environment. Thus, future research may use a firm-country-year research design to control for such environmental influences, producing more robust results.

Second, intangible assets include different elements such as patents, trademarks, and copyrights (Tian, 2007; Zhang et al., 2014). Because of data limitations, we are unable to differentiate different types of intangibility gap. Given that our study as a first step to test the coopetition in this field, the overarching approach may provide fresh insights for future research. Thus, we encourage future research to use separate measures of intangibility gaps that may provide a more nuanced understanding of the influences of specific intangible assets.

Third, we identify internal R&D as a strategic response to local–foreign coopetition. However, local firms can also use other strategies to stay competitive. For example, disadvantaged local firms prompted by increased competitive threats from horizontal FDI may rely on other solutions such as diversification, technology purchasing, or cooperative relationships through international joint ventures. Future research could examine how various strategies respond to intangibility gap in different ways.

Fourth, we tested our theoretical framework using data from a single-country setting (i.e., manufacturing firms in China). We believe that our theory can be applied to other countries where intangibility gap exists between foreign and local firms. Specifically, our theoretical framework on coopetition may provide a foundation for understanding the strategies of local firms to catch up in other emerging and transition economies that have attracted substantial FDI. Future research can extend our framework to other contexts to provide further insights.

Finally, future research may benefit from considering other boundary conditions of the coopetition perspective. We provide evidence on how export intensity and state ownership serve as boundary conditions of the inverted U-shaped relationship between intangibility gap and internal R&D in opposite directions. However, other boundary conditions may exist. Future research could investigate such conditions using other nuanced approaches.

Conclusion

This study advocates a coopetition perspective and provides insights into how intangibility gap, as a proxy of coopetition, affects local firms' internal R&D decisions. Our study is among the first to unpack the black box on local firms' strategic responses to the existence of advanced foreign counterparts through internal R&D. We also introduce the export intensity and state ownership of local firms as boundary conditions to clarify the mechanism that explains the proposed relationship. We show that as export intensity and state ownership increase, the inverted U-shaped relationship between the intangibility gap and local firms' internal R&D effort is less and more pronounced, respectively. We hope that our theory and findings will inspire further research on the strategies of local firms in response to FDI externalities in different contexts.

Notes

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1. An industry-frontier foreign firm in our research context refers to the foreign firm that has the highest level of intangible asset intensity in an industry-region segment.

2. R&D can be conducted internally and externally. This study focuses on internal R&D, which is the most promising way of enhancing a firm's capability to catch up (Cohen & Levinthal, 1990). According to CNBS (2004), internal R&D expenditures include expenses on research, design, developing and testing of prototypes, and experimentation. In contrast, external R&D relies on external sources of innovation through outsourcing (Nicholls-Nixon & Woo, 2003), which may not necessarily reflect a firm's capacity to catch up. We also calculated the ratio of a firm's annual expenditure on total R&D (i.e., the sum of both internal and external R&D) over its sales as an alternative measure. The results are consistent.
3. We thank an anonymous referee for pointing out this argument.

References

Aghion, P., Harris, C., Howitt, P., & Vickers, J. 2001. Competition, imitation and growth with step-by-step innovation. *The Review of Economic Studies*, **68**(3): 467–492.

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. 2005. Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics*, **120**(2): 701–728.

Agosin, M. R., & Machado, R. 2005. Foreign investment in developing countries: Does it crowd in domestic investment? *Oxford Development Studies*, **33**(2): 149–162.

Aitken, B. J., & Harrison, A. E. 1999. Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review*, **89**(3): 605–618.

Arora, A., Fosfuri, A., & Gambardella, A. 2002. *Market for technology: The economics of innovation and corporate strategy*. Cambridge, MA: The MIT Press.

Ayyagari, M., Dau, L. A., & Spencer, J. 2015. Strategic responses to FDI in emerging markets: Are core members more responsive than peripheral members of business groups? *Academy of Management Journal*, **58**(6): 1869–1894.

Bai, C.-E., Lu, J., & Tao, Z. 2006. The multitask theory of state enterprise reform: Empirical evidence from China. *American Economic Review*, **96**(2): 353–357.

Balasubramanian, N. 2011. New plant venture performance differences among incumbent, diversifying, and entrepreneurial firms: the impact of industry learning intensity. *Management Science*, **57**(3): 549–565.

Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, **17**(1): 99–120.

Basant, R., & Fikkert, B. 1996. The effects of R&D, foreign technology purchase, and domestic and international spillovers on productivity in Indian firms. *The Review of Economics and Statistics*, **78**(2): 187–199.

Bengtsson, M., & Kock, S. 1999. Cooperation and competition in relationships between competitors in business networks. *The Journal of Business and Industrial Marketing*, **14**(3): 178–194.

Bengtsson, M., & Kock, S. 2000. 'Coopetition' in business networks—To cooperate and compete simultaneously. *Industrial Marketing Management*, **29**(5): 411–426.

Blalock, G., & Gertler, P. J. 2009. How firm capabilities affect who benefits from foreign technology. *Journal of Development Economics*, **90**(2): 192–199.

Blomström, M., & Kokko, A. 1998. Multinational corporations and spillovers. *Journal of Economic Surveys*, **12**(3): 247–277.

Blomström, M., & Persson, H. 1983. Foreign investment and spillover efficiency in an underdeveloped economy: Evidence from the Mexican manufacturing industry. *World Development*, **11**(6): 493–501.

Blomström, M., & Sjöholm, F. 1999. Technology transfer and spillovers: Does local participation with multinationals matter? *European Economic Review*, **43**(4–6): 915–923.

Bonaccorsi, A. 1992. On the relationship between firm size and export intensity. *Journal of International Business Studies*, **23**(4): 605–635.

Boone, J. 2001. Intensity of competition and the incentive to innovate. *International Journal of Industrial Organization*, **19**(5): 705–726.

Brandenburger, A., & Nalebuff, B. 1996. *Co-opetition*. New York, NY: Doubleday.

Brødsgaard, K. E. 2012. Politics and business group formation in China: The party in control? *The China Quarterly*, **211**: 624–648.

Buckley, P. J., Clegg, J., & Wang, C. 2002. The impact of inward FDI on the performance of Chinese manufacturing firms. *Journal of International Business Studies*, **33**(4): 637–655.

Buckley, P. J., Clegg, J., & Wang, C. 2007. Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. *Journal of International Business Studies*, **38**(3): 447–459.

Buckley, P. J., Cross, A. R., Tan, H., Xin, L., & Voss, H. 2008. Historic and emergent trends in Chinese outward direct investment. *Management International Review*, **48**(6): 715–748.

Carpenter, M. A., Sanders, W. G., & Gregersen, H. B. 2001. Bundling human capital with organizational context: The impact of international assignment experience on multinational firm performance and CEO pay. *Academy of Management Journal*, **44**(3): 493–511.

Chang, S. J., & Xu, D. 2008. Spillovers and competition among foreign and local firms in China. *Strategic Management Journal*, **29**(5): 495–518.

Chen, G., Firth, M., Gao, D. N., & Rui, O. M. 2006. Ownership structure, corporate governance, and fraud: Evidence from China. *Journal of Corporate Finance*, **12**(3): 424–448.

Cheung, K. Y. 2010. Spillover effects of FDI via exports on innovation performance of China's high-technology industries. *Journal of Contemporary China*, **19**(65): 541–557.

Chin, K.-S., Chan, B. L., & Lam, P.-K. 2008. Identifying and prioritizing critical success factors for coopetition strategy. *Industrial Management and Data Systems*, **108**(4): 437–454.
CNBS. 2004. *The first national economic census program*. Beijing, China: The National Bureau of Statistics of China.
Cohen, W. M., & Levinthal, D. A. 1989. Innovation and learning – The 2 faces of R and D. *Economic Journal*, **99**(397): 569–596.
Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, **35**(1): 128–152.
Czachon, W., & Mucha-Kuś, K. 2014. Coopetition research landscape – a systematic literature review 1997–2010. *Journal of Economics & Management*, **17**: 122–150.
De Backer, K., & Sleuwaegen, L. 2003. Does foreign direct investment crowd out domestic entrepreneurship? *Review of Industrial Organization*, **22**(1): 67–84.
Devece, C., Ribeiro-Soriano, D. E., & Palacios-Marqués, D. 2019. Coopetition as the new trend in inter-firm alliances: Literature review and research patterns. *Review of Managerial Science*, **13**(2): 207–226.
Dore, R. P. 1990. *British factory: Japanese factory*. Oakland, CA: University of California Press.
Dowling, M. J., Roering, W. D., Carlin, B. A., & Wisnieski, J. 1996. Multifaceted relationships under coopetition: Description and theory. *Journal of Management Inquiry*, **5**(2): 155–167.
Dranove, D., Peteraf, M., & Shanley, M. 1998. Do strategic groups exist? An economic framework for analysis. *Strategic Management Journal*, **19**(11): 1029–1044.
Dunning, J. H. 1988. *Multinationals, technology, and competitiveness*. London, UK: Unwin Hyman.
Dussauge, P., & Garrette, B. 1997. Anticipating the evolutions and outcomes of strategic alliances between rival firms. *International Studies of Management & Organization*, **27**(4): 104–126.
Eapen, A. 2012. Social structure and technology spillovers from foreign to domestic firms. *Journal of International Business Studies*, **43**(3): 244–263.
Ernst, D., & Kim, L. 2002. Global production networks, knowledge diffusion, and local capability formation. *Research Policy*, **31**(8-9): 1417–1429.
Fan, G., Wang, X., & Zhu, H. P. 2009. *NERI index of marketization of China's provinces 2009 report*. Beijing, China: Economic Science Press (in Chinese).
Fan, J. P., Wong, T., & Zhang, T. 2013. Institutions and organizational structure: The case of state-owned corporate pyramids. *The Journal of Law, Economics, and Organization*, **29**(6): 1217–1252.
Gao, G. Y., Murray, J. Y., Kotabe, M., & Lu, J. 2010. A 'strategy tripod' perspective on export behaviors: Evidence from domestic and foreign firms based in an emerging economy. *Journal of International Business Studies*, **41**(3): 337–396.
Gentry, R. J., & Shen, W. 2013. The impacts of performance relative to analyst forecasts and analyst coverage on firm R&D intensity. *Strategic Management Journal*, **34**(1): 121–130.
Gerschenkron, A. 1962. *Economic backwardness in historical perspective: A book of essays*. Cambridge, MA: Belknap Press of Harvard University Press.
Ghemawat, P. 2007. *Redefining global strategy: Crossing borders in a world where differences still matter*. Boston: Harvard Business Press.
Gilbert, R. 2006. Looking for Mr. Schumpeter: Where are we in the competition-innovation debate? *Innovation Policy and the Economy*, **6**: 159–215. The MIT Press.
Girma, S., Greenaway, D., & Wakelin, K. 1999. *Wages, productivity and foreign ownership in UK manufacturing*. Vol. Working Paper No. 99/14. Nottingham, UK: University of Nottingham.
Giuliani, E., Martinelli, A., & Rabellotti, R. 2016. Is co-invention expediting technological catch up? A study of collaboration between emerging country firms and EU inventors. *World Development*, **77**: 192–205.
Gomez-Casseres, B. 1999. *The alliance revolution*. Cambridge: Harvard University Press.
Grossman, G. M., & Helpman, E. 2015. The 'new' growth theory: Trade, innovation, and growth [yeni büyüme teorisi: ticaret, İnovasyon ve büyüme]. *Journal of Economics Library*, **2**(1): 32–38.
Grossman, G. M., & Horn, H. 1988. Infant-industry protection reconsidered: The case of informational barriers to entry. *Quarterly Journal of Economics*, **103**(4): 767–787.
Gu, Q., & Lu, J. W. 2011. Effects of inward investment on outward investment: The venture capital industry worldwide 1985–2007. *Journal of International Business Studies*, **42**(2): 263–284.
Haans, R. F., Pieters, C., & He, Z. L. 2016. Thinking about U: Theorizing and testing U- and inverted U-shaped relationships in strategy research. *Strategic Management Journal*, **37**(7): 1177–1195.
He, W., Tong, T. W., & Xu, M. 2022. How property rights matter to firm resource investment: evidence from China's property law enactment. *Organization Science*, **33**(1): 293–310.
Herfindahl, O. C. 1950. *Concentration in the steel industry*. Unpublished PhD dissertation, Columbia University, New York.
Hillman, A. J., Zardkoohi, A., & Bierman, L. 1999. Corporate political strategies and firm performance: Indications of firm-specific benefits from personal service in the US government. *Strategic Management Journal*, **20**(1): 67–81.
Hobday, M. 1995. East Asian latecomer firms: Learning the technology of electronics. *World Development*, **23**(7): 1171–1193.
Hoetker, G. 2007. The use of logit and probit models in strategic management research: Critical issues. *Strategic Management Journal*, **28**(4): 331–343.
Hudson, B. T. 1994. Innovation through acquisition. *Cornell Hotel and Restaurant Administration Quarterly*, **35**(3): 82–88.
Hunt, M. S. 1972. *Competition in the major home appliance industry, 1960–1970*. Unpublished PhD dissertation, Harvard University.

Isenberg, D. J. 2008. The global entrepreneur. *Harvard Business Review*, **86**(12): 107–111.

Ito, K., & Pucik, V. 1993. R&D spending, domestic competition, and export performance of Japanese manufacturing firms. *Strategic Management Journal*, **14**(1): 61–75.

Jia, N. 2014. Are collective political actions and private political actions substitutes or complements? Empirical evidence from China's private sector. *Strategic Management Journal*, **35**(2): 292–315.

Jiang, M. S., Branzei, O., & Xia, J. 2016. DIY: How internationalization shifts the locus of indigenous innovation for Chinese firms. *Journal of World Business*, **51**(5): 662–674.

Kathuria, V. 2000. Productivity spillovers from technology transfer to Indian manufacturing firms. *Journal of International Development*, **12**(3): 343–369.

Katrak, H. 1997. Developing countries' imports of technology, in-house technological capabilities and efforts: An analysis of the Indian experience. *Journal of Development Economics*, **53**(1): 67–83.

Katz, J. 2000. The dynamics of technology learning during the import-substitution period and recent structural changes in the industrial sector of Argentina, Brazil and Mexico. In L. S. Kim & R. R. Nelson (Eds.), *Technology, learning, and innovation: Experiences of newly industrializing economies*: 307–334. Cambridge, UK: Cambridge University Press.

Kaufmann, L., & Schneider, Y. 2004. Intangibles: A synthesis of current research. *Journal of Intellectual Capital*, **5**(3): 366–388.

Keats, B., & Hitt, M. A. 1988. Causal model of linkages among environmental dimensions, macro organizational characteristics, and performance. *Academy of Management Journal*, **31**(3): 570–598.

Kogut, B., & Zander, U. 1993. Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*, **24**(4): 625–645.

Kosova, R. 2010. Do foreign firms crowd out domestic firms? Evidence from the Czech Republic. *The Review of Economics and Statistics*, **92**(4): 861–881.

Kumaraswamy, A., Mudambi, R., Saranga, H., & Tripathy, A. 2012. Catch-up strategies in the Indian auto components industry: Domestic firms' responses to market liberalization. *Journal of International Business Studies*, **43**(4): 368–395.

Lacoste, S. M. 2014. Coopetition and framework contracts in industrial customer-supplier relationships. *Qualitative Market Research: An International Journal*, **17**(1): 43–57.

Lado, A. A., Boyd, N. G., & Hanlon, S. C. 1997. Competition, cooperation, and the search for economic rents: A syncretic model. *Academy of Management Review*, **22**(1): 110–141.

Lall, S. 1989. *Learning to industrialize: The acquisition of technological capability by India*. London: MacMillan.

Lall, S. 1993. Promoting technology development: The role of technology transfer and indigenous effort. *Third World Quarterly*, **14**(1): 95–108.

Lamin, A., & Livanis, G. 2013. Agglomeration, catch-up and the liability of foreignness in emerging economies. *Journal of International Business Studies*, **44**(6): 579–606.

Laursen, K., Masciarelli, F., & Prencipe, A. 2012. Trapped or spurred by the home region? The effects of potential social capital on involvement in foreign markets for goods and technology. *Journal of International Business Studies*, **43**(9): 783–807.

Lee, K., & Lim, C. 2001. Technological regimes, catching-up and leapfrogging: Findings from the Korean industries. *Research Policy*, **30**(3): 459–483.

Lee, K., Song, J., & Kwak, J. 2015. An exploratory study on the transition from OEM to OBM: Case studies of SMEs in Korea. *Industry and Innovation*, **22**(5): 423–442.

Le Roy, F., & Sanou, F. H. 2014. Does coopetition strategy improve market performance? An empirical study in mobile phone industry. *Journal of Economics & Management*, **17**: 64–92.

Levinthal, D. A., & March, J. G. 1993. The myopia of learning. *Strategic Management Journal*, **14**(S2): 95–112.

Lewin, A. Y., Massini, S., & Peeters, C. 2009. Why are companies offshoring innovation? The emerging global race for talent. *Journal of International Business Studies*, **40**(6): 901–925.

Li, J., Xia, J., & Zajac, E. J. 2018. On the duality of political and economic stakeholder influence on firm innovation performance: Theory and evidence from Chinese firms. *Strategic Management Journal*, **39**(1): 193–216.

Lin, J. Y., Cai, F., & Li, Z. 1998. Competition, policy burdens, and state-owned enterprise reform. *American Economic Review*, **88**(2): 422–427.

Lind, J. T., & Mehlum, H. 2010. With or without U? The appropriate test for a U-shaped relationship. *Oxford Bulletin of Economics and Statistics*, **72**(1): 109–118.

Liu, X., Lu, J., Filatotchev, I., Buck, T., & Wright, M. 2010. Returnee entrepreneurs, knowledge spillovers and innovation in high-tech firms in emerging economies. *Journal of International Business Studies*, **41**(7): 1183–1197.

Long, J. S. 1997. *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage Publications.

Lu, J. W., & Ma, X. 2008. The contingent value of local partners' business group affiliations. *Academy of Management Journal*, **51**(2): 295–314.

Luo, Y. 2004. *Coopetition in international business*. Copenhagen: Copenhagen Business School Press.

Luo, Y. 2005. Toward coopetition within a multinational enterprise: A perspective from foreign subsidiaries. *Journal of World Business*, **40**(1): 71–90.

Luo, Y. 2007. A coopetition perspective of global competition. *Journal of World Business*, **42**(2): 129–144.

Luo, Y., & Tung, R. L. 2007. International expansion of emerging market enterprises: A springboard perspective. *Journal of International Business Studies*, **38(4)**: 481–498.

Markóczy, L., Li Sun, S., Peng, M. W., & Ren, B. 2013. Social network contingency, symbolic management, and boundary stretching. *Strategic Management Journal*, **34**(11): 1367–1387.

Marquis, C., & Qian, C. 2014. Corporate social responsibility reporting in China: Symbol or substance? *Organization Science*, **25**(1): 127–148.

Martin, X., & Salomon, R. 2003. Knowledge transfer capacity and its implications for the theory of the multinational corporation. *Journal of International Business Studies*, **34**(4): 356–373.

McDermott, G. A., & Corredoira, R. A. 2010. Network composition, collaborative ties, and upgrading in emerging-market firms: Lessons from the Argentine autoparts sector. *Journal of International Business Studies*, **41**(2): 308–329.

Meyer, K. E., & Sinani, E. 2009. When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies*, **40**(7): 1075–1094.

Mudambi, R. 2008. Location, control and innovation in knowledge-intensive industries. *Journal of Economic Geography*, **8**(5): 699–725.

Newbert, S. L. 2008. Value, rareness, competitive advantage, and performance: A conceptual-level empirical investigation of the resource-based view of the firm. *Strategic Management Journal*, **29**(7): 745–768.

Nicholls-Nixon, C. L., & Woo, C. Y. 2003. Technology sourcing and output of established firms in a regime of encompassing technological change. *Strategic Management Journal*, **24**(7): 651–666.

Osarenkhoe, A. 2010. A coopetition strategy-a study of inter-firm dynamics between competition and cooperation. *Business Strategy Series*, **11**(6): 343–362.

Ozkan, K. S., Khan, H., Deligonul, S., Yeniyurt, S., Gu, Q. C., Cavusgil, E., & Xu, S. 2022. Race for market share gains: How emerging market and advanced economy MNEs perform in each other's turf. *Journal of Business Research*, **150**: 208–222.

Papke, L. E., & Wooldridge, J. M. 1996. Econometric methods for fractional response variables with an application to 401(k) plan participation rates. *Journal of Applied Econometrics*, **11**(6): 619–722.

Parente, R., Melo, M., Andrews, D., Kumaraswamy, A., & Vasconcelos, F. 2021. Public sector organizations and agricultural catch-up dilemma in emerging markets: The orchestrating role of Embrapa in Brazil. *Journal of International Business Studies*, **52**(4): 646–670.

Park, W.-M., Kim, S.-H., Kim, Y.-Z., & Lee, K. 2007. Making a transition from the OEM to the OBM in consumer goods industry: Cases of three companies in Korea. *Journal of Technology Innovation*, **15**(2): 61–81.

Perez, T. 1997. Multinational enterprises and technological spillovers: An evolutionary model. *Journal of Evolutionary Economics*, **7**(2): 169–192.

Porac, J. F., Thomas, H., Wilson, F., Paton, D., & Kanfer, A. 1995. Rivalry and the industry model of Scottish knitwear producers. *Administrative Science Quarterly*, **40**(2): 203–227.

Porter, M. E. 1980. *Competitive strategy: Techniques for analyzing industries and competitors*. New York: The Free Press.

Raghunathan, S. P. 1995. A refinement of the entropy measure of firm diversification: Toward definitional and computational accuracy. *Journal of Management*, **21**(5): 989–1002.

Reed, R., & DeFillippi, R. J. 1990. Causal ambiguity, barriers to imitation, and sustainable competitive advantage. *Academy of Management Review*, **15**(1): 88–102.

Reger, R. K., & Huff, A. S. 1993. Strategic groups: A cognitive perspective. *Strategic Management Journal*, **14**(2): 103–123.

Rosenberg, N. 1990. Why do firms do basic research (with their own money)? *Research Policy*, **19**(2): 165–174.

Rusko, R. 2011. Exploring the concept of coopetition: A typology for the strategic moves of the Finnish forest industry. *Industrial Marketing Management*, **40**(2): 311–320.

Sjöholm, F., & Lundin, N. 2013. Foreign firms and indigenous technology development in the People's Republic of China. *Asian Development Review*, **30**(2): 249–275.

Smith, K. G., Grimm, C. M., Young, G., & Wally, S. 1997. Strategic groups and rivalrous firm behavior: Towards a reconciliation. *Strategic Management Journal*, **18**(2): 149–157.

Sonenshein, S., Nault, K., & Obodaru, O. 2017. Competition of a different flavor: How a strategic group identity shapes competition and cooperation. *Administrative Science Quarterly*, **62**(4): 626–656.

Spencer, J. W. 2008. The impact of multinational enterprise strategy on indigenous enterprises: Horizontal spillovers and crowding out in developing countries. *Academy of Management Review*, **33**(2): 341–361.

Steward, T. 1999. *Intellectual capital: The new wealth of organizations*. New York: Doubleday.

Sullivan, D. 1994. Measuring the degree of internationalization of a firm. *Journal of International Business Studies*, **25**(2): 325–342.

Tan, J., Li, S., & Xia, J. 2007. When iron fist, visible hand, and invisible hand meet: firm-level effects of varying institutional environments in China. *Journal of Business Research*, **60**(7): 786–794.

Thun, E. 2018. Innovation at the middle of the pyramid: State policy, market segmentation, and the Chinese automotive sector. *Technovation*, **70**: 7–19.

Tian, X. 2007. Accounting for sources of FDI technology spillovers: Evidence from China. *Journal of International Business Studies*, **38**(1): 147–159.

Tobin, J. 1958. Estimation of relationships for limited dependent variables. *Econometrica*, **26**(1): 24–36.

Ulaga, W. 2003. Capturing value creation in business relationships: A customer perspective. *Industrial Marketing Management*, **32**(8): 677–693.

Verwaal, E., & Donkers, B. 2002. Firm size and export intensity: Solving an empirical puzzle. *Journal of International Business Studies*, **33**(3): 603–613.

Veugelers, R., & Houte, P. V. 1990. Domestic R&D in the presence of multinational enterprises. *International Journal of Industrial Organization*, **8**(1): 1–15.

Walley, K. 2007. Coopetition: An introduction to the subject and an agenda for research. *International Studies of Management & Organization*, **37**(2): 11–31.

Wang, C., & Yu, L. 2007. Do spillover benefits grow with rising foreign direct investment? An empirical examination of the case of China. *Applied Economics*, **39**(3): 397–405.

Wang, C., Hong, J., Kafouros, M., & Wright, M. 2012. Exploring the role of government involvement in outward FDI from emerging economies. *Journal of International Business Studies*, **43**(7): 655–676.

Wei, Y., & Liu, X. 2006. Productivity spillovers from R&D, exports and FDI in China's manufacturing sector. *Journal of International Business Studies*, **37**(4): 544–557.

Wernerfelt, B. 1984. A resource-based view of the firm. *Strategic Management Journal*, **5**(2): 171–180.

Wiersema, M. F., & Bowen, H. P. 2009. The use of limited dependent variable techniques in strategy research: Issues and methods. *Strategic Management Journal*, **30**(6): 679–692.

Wilhelm, M. M. 2011. Managing coopetition through horizontal supply chain relations: Linking dyadic and network levels of analysis. *Journal of Operations Management*, **29**(7–8): 663–676.

Wooldridge, J. M. 2002. *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Xu, D., Lu, J. W., & Gu, Q. 2014. Organizational forms and multi-population dynamics economic transition in China. *Administrative Science Quarterly*, **59**(3): 517–547.

Young, S., Huang, C.-H., & McDermott, M. 1996. Internationalization and competitive catch-up processes: Case study evidence on Chinese multinational enterprises. *MIR: Management International Review*, 36(4): 295–314.

Zelner, B. A. 2009. Using simulation to interpret results from logit, probit, and other nonlinear models. *Strategic Management Journal*, **30**(12): 1335–1348.

Zerbini, F., & Castaldo, S. 2007. Stay in or get out the Janus? The maintenance of multiplex relationships between buyers and sellers. *Industrial Marketing Management*, **36**(7): 941–954.

Zhang, Y., Li, Y., & Li, H. 2014. FDI spillovers over time in an emerging market: The role of entry tenure and barriers to imitation. *Academy of Management Journal*, **57**(3): 698–722.

Zhang, Y., Li, H., Li, Y., & Zhou, L.-A. 2010. FDI spillovers in an emerging market: The role of foreign firms' country origin diversity and domestic firms' absorptive capacity. *Strategic Management Journal*, **31**(9): 969–989.

Zhou, C., & Li, J. 2008. Product innovation in emerging market-based international joint ventures: An organizational ecology perspective. *Journal of International Business Studies*, **39**(7): 1114–1132.

Zhou, C., Van Witteloostuijn, A., & Zhang, J. 2014. The internationalization of Chinese industries: Overseas acquisition activity in Chinese mining and manufacturing industries. *Asian Business & Management*, **13**(2): 89–116.

Zhou, K. Z., Gao, G. Y., & Zhao, H. 2017. State ownership and firm innovation in China: An integrated view of institutional and efficiency logics. *Administrative Science Quarterly*, **62**(2): 375–404.

Jun Xia (jun.xia@utdallas.edu) is a professor in Management and Strategy at the University of Texas at Dallas. His research interests include resource dependence and power, institutional theory, social networks, and corporate strategies. His work has been published in the *Strategic Management Journal*, *Academy of Management Journal*, *Organization Science*, *Journal of Management*, *Journal of Management Studies*, and *Organizational Research Methods*. He is a Senior Editor of *Management and Organization Review* and a review board member of *Academy of Management Review* and *Journal of International Business Studies*.

Qian Cecilia Gu (qgu@gsu.edu) is an associate professor at Georgia State University. Her research interests lie at the intersection of strategy, international business, and entrepreneurship. Her research advances the understanding of how emerging market firms address evolving stakeholder demands and global competition, and how these strategic choices affect firm performance. Her works have appeared in the *Administrative Science Quarterly, Journal of Business Venturing, Journal of International Business Studies, Journal of Management, Organization Science, Personnel Psychology*, and *Strategic Management Journal*.

Marshall S. Jiang (mjiang@brocku.ca) is a professor of International Business at Brock University. He received his PhD from York University. His research interests cover the areas of foreign entry mode (particularly licensing and joint ventures), international knowledge transfer, indigenous technology and management innovation, the effect of FDI on emerging markets, organizational learning through partnering. His papers have been published in the *Journal of International Business Studies*, *Management International Review*, *Journal of World Business*, and *Journal of International Management*.

Zhouyu Lin (linzhouyu@jnu.edu.cn) is an associate professor of Management School, Jinan University. He received his PhD from the University of International Business and Economics. His research focuses on innovation, corporate strategies, and foreign market expansion. His research has appeared in journals such as *Strategic Management Journal*, *Journal of Management Studies*, and *Journal of World Business*.

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