ABSTRACT

Researchers who take a network perspective argue that insidership in foreign market networks is a necessary condition for internationalization. In this study, we argue that insidership in home market networks also matters. The effect of home network insidership on outward foreign direct investment (OFDI) depends on both individual and joint effects of structural and relational network attributes. Our study based on a survey of 194 Chinese firms shows that firms in a central network position are more likely to engage in OFDI than those in a brokerage position. Furthermore, we find the interaction between firms' centrality and their connections to foreign-invested enterprises to be significantly and positively associated with OFDI, whereas a significantly negative effect is evidenced when a firm is connected more to domestic firms.

Keywords: network perspective, insidership, structural attribute, relational attribute, OFDI

The Impact of Home Business Network Attributes on Chinese Outward Foreign Direct Investment

1. Introduction

The ability to leverage overseas social and business networks has become increasingly critical for firms to compete internationally (Gaur et al., 2018; Johanson & Vahlne, 2009; Meschi & Wassmer, 2013). Networks provide a web of connections that allow firms to secure strategic information about foreign markets, to screen business opportunities, to evaluate country and commercial risks, and to decide whether and how to commit to foreign markets (Al-Laham & Souitaris, 2008; Oparaocha, 2015). To acquire these network benefits, firms seek to attain insider status by virtue of being "well established in a relevant network or networks" (Johanson & Vahlne, 2009, p. 1,415). From a network perspective, internationalization is understood as the process of building "insidership" in relevant networks (Johanson & Vahlne, 2009).

The current analysis of such networks tends to focus on insidership within host country networks, mainly because of the challenges that firms face in penetrating unfamiliar markets (Forsgren, 2016; Johanson & Vahlne, 2009). Furthermore, studies on host country network effects tend to address either the relational (e.g., Li & Fleury, 2020; Zhang et al., 2016) or the structural (e.g., Al-Laham & Amburgey, 2010; Shijaku et al., 2018) attributes of networks, ignoring that both dimensions of attributes can coexist and simultaneously shape "network advantages" (Johanson & Vahlne, 2009, p. 1,091). Extant work on network effects is thus underdeveloped with respect to the role of network insidership in the home country and the interactions between relational and structural network attributes.

In this paper, we argue that insidership in business networks matters not only overseas (Johanson & Vahlne, 2009) but also, and crucially, at home. Insidership in home market business networks provides firms with the initial relational endowment to initiate the

internationalization process (Johanson & Mattsson, 1988). Despite the longstanding

acknowledged importance of home country business networks (Guler & Guillén, 2010;

Johanson & Mattsson, 1988; Welch & Luostarinen, 1993), our understanding of how home

country networks evolve and enable firms to internationalize remains underdeveloped.

Research on outward foreign direct investment (OFDI) has yet to sufficiently incorporate the

determining effects of home business networks on firms' engagement in foreign markets.

Furthermore, although network attributes have both relational and structural

dimensions (Andersson et al., 2002; Gulati, 1998), existing studies tend to consider these two

dimensions separately and as independent constructs (Kurt & Kurt, 2020; Yamin & Kurt,

2018). The literature on structural effects suggests that central and brokerage positions (Burt,

1992; Coleman, 1988) play different roles in determining international expansion (Guler &

Guillén, 2010; Podolny, 2005). Researchers on relational effects argue that

internationalization can occur when firms start to develop relationships with other firms that

directly or indirectly connect to a network in a foreign country (Andersson et al., 2002; Gu &

Lu, 2011). This ignores the fact that both types of network embeddedness can coexist and

possibly interact (Rowley et al., 2000) and offers only a partial examination of potential

business network effects on OFDI (Yiu et al., 2007). We argue that a holistic approach must

be taken to emphasize the multiplicity of different dimensions of home business networks

and to consider the extent to which each dimension may affect firms' OFDI engagement.

Networks are prevalent in any country but may be particularly important for firms from

countries with strong and complex social networks (Gaur et al., 2018; Guler & Guillén, 2010;

Zaheer & Bell, 2005). In the case of China, for example, the development of inward FDI

promoted by the "open-door" policy co-evolved with outward FDI, as encouraged by the "go

global" policy. These dual FDI policies provide domestic firms with a particular institutional

setting for their business development (Yiu et al., 2007). We therefore analyze the impact of

network position and network relations on the degree of internationalization of 194 Chinese firms. We also provide empirical evidence on the partial interaction of structural and relational networks.

Our findings reveal that when domestic firms enjoy close relationships with foreign firms, they are more likely to obtain initial access to overseas networks, information about foreign markets, and referential trust (Eapen, 2012; Meyer & Thaijongrak, 2013). When domestic firms are mainly connected with other domestic firms but take a central position in these networks, they are then best positioned to access and accumulate knowledge and expertise from within the network. Domestic firms with a brokerage position usually find the knowledge connected to their position to be location-bound and thus harder to utilize in foreign markets (Guler & Guillén, 2010; Koka & Prescott, 2008; Shi et al., 2009).

In this study, we thus extend the prior work on network theory in international business studies in two ways: First, we theorize a relationship exists between insidership in home business networks and OFDI. Extending the concept of network insidership to the home market adds a critical dimension to the internationalization of the firm that could explain, for example, overseas investments by under-resourced firms. The impact of network insidership in the home market on a firm's activities and the development of its international competitiveness warrant further investigation. Second, we argue and empirically demonstrate the extent to which relational and structural attributes of the home country network individually and jointly affect firms' internationalization. We then demonstrate that these attributes should not be treated as separate factors. Furthermore, our results suggest that network effects on OFDI are dynamic and context dependent.

This paper is structured as follows: In Section 2, we provide the theoretical background; in Section 3, we outline the hypotheses; in Section 4, we describe the

methodology; in Section 5, we present the results; and in Section 6, we discuss the empirical findings and conclude with policy and managerial implications.

2. Insidership in Home Country Networks

International business scholars have long studied why and how firms go abroad. According to economic theory, firms go abroad when the expected benefits outweigh the costs (Caves, 1996; Hymer, 1976). Adherents of the network perspective argue that international expansion requires "exchange relationships" (Johanson & Mattsson, 1987, p. 34) through which firms can gain market-specific knowledge and build legitimacy. Both these attainments are preconditions for success in new markets (Johanson & Mattsson, 1988; Johanson & Vahlne, 1990). Through specific relationships with actors within a network, firms acquire knowledge that helps offset "liabilities of foreignness" (Zaheer, 1995).

Notably, relationships relevant to foreign markets are often outside a focal firm's existing business networks. The lack of such connections causes firms to suffer from a "Liability of Outsidership" (LoO; Johanson & Vahlne, 2009, p. 1,415), particularly at the early stage of its internationalization when exchanges with actors in foreign markets are limited. However, the impact of "outsidership" as an impediment to internationalization can be crucial. As Johanson and Vahlne (2009, p. 1,415) pointed out, "insidership [in the overseas market] is a necessary but insufficient condition for successful business development."

In our view, a firm's insidership in its home business networks offers a crucial condition to ensure its internationalization success by providing a foundation from which to overcome outsidership. Existing business networks in their home country facilitate firms' access to critical resources for developing firm-specific advantages (FSAs) and enabling internationalization, such as information (Laursen et al., 2012), financial capital (Yiu et al.,

2007), and human capital (Podolny, 2005). By definition, "a firm that is well established in a relevant network or networks is an 'insider'" (Johanson & Vahlne, 2009, p. 1,415). With this rather generic definition, firms' existing insidership in largely home-based networks cannot be ignored (Mo & Yusuf, 2018).

Beyond this, current outsidership does not completely block opportunities for focal firms to develop insidership in foreign networks. As Johanson and Vahlne (2009) pointed out, an exchange relationship can develop based on existing networks, which may ease the negative effect of outsidership. The participation of firms in global value chains can allow them to nurture insidership in foreign markets (Luo & Tung, 2007). For example, firms engaged in exporting can gradually identify new foreign markets and there build new insidership positions (D'Angelo et al., 2020; Lindstrand et al., 2009). Furthermore, firms that connect with foreign entrants into their home markets may also obtain opportunities to develop new insidership (Milanov & Fernhaber, 2014).

The network view of internationalization emphasizes that "contextual aspects often play a more important role" (Johanson & Vahlne, 2009, p. 1,422). In line with this argument, we posit that, for firms located in countries with strong and complex social networks, such as China and Japan, the impact of their home networks can be even more important (Hitt et al., 2002). Taking China as an example, local networks (or *guanxi* in the Chinese context) have been found to provide core competencies that help Chinese firms internationalize (Ramasamy et al., 2012). China also has highly diverse institutions across subnational regions (Chan et al., 2010). In regions with underdeveloped formal institutions, firms rely on *guanxi* relations even more to mitigate risks (Shi et al., 2012). Moreover, evidence indicates that Chinese firms associated with business networks in their home country are more likely to invest overseas (Yiu et al., 2007).

For another example, Japanese automobile *keiretsu* became well known for utilizing their vertically connected business groups when expanding into North America, with large manufacturers at the core and domestic suppliers following sequentially (Martin et al., 1995). Chang (1995) and Guillén (2002) similarly demonstrated that home country business networks have helped Japanese automobile firms overcome the intrinsic disadvantages of operating abroad through sharing technology, resources, and experience. These studies suggest that the advantages derived from home networks allow firms to overcome difficulties faced when entering new and/or foreign markets.

Along with the discourse on network advantages, empirical studies have indicated the positive effects of network structure or relations on firms' internationalization, including the rate of foreign market entry (Coviello, 2006; Patel et al., 2014) and internationalization speed (Kontinen & Ojala, 2011; Oviatt & McDougall, 2005). However, studies associated with home business network attributes remain limited. The literature includes few direct references to social network theory, such as network positions, structural holes, and the impact on internationalization of the structural density of firms' existing home networks (Kurt & Kurt, 2020; Yamin & Kurt, 2018). To address this gap, Li and Fleury (2020) argued that we need to understand firms' current positioning within domestic business networks to suggest how they may build favorable positions within foreign countries' business networks. We identify two dimensions of network attributes—structural attributes and relational attributes—to be the basis from which to address this gap.

The structural network attribute refers to the structural position a firm occupies within (home country) business networks (Burt, 1992; Gaur et al., 2018; Gulati, 1998), which may help to transfer useful information and knowledge, as well as reputational benefits to international activities (Meschi & Wassmer, 2013). A relational network attribute refers to the closeness between a firm and other firms in dyadic relationships, and it stresses the role of

direct cohesive connections as a mechanism for gaining fine-grained information (Andersson et al., 2001; Gulati, 1998; Rowley et al., 2000). Our theory development addresses these network attributes in two steps: first, we examine the effects of structural attributes and relational attributes on OFDI, separately; second, we investigate the interaction of structural and relational attributes in combination on OFDI.

3. Hypotheses Development

3.1. Structural Network Attributes and OFDI

Structural network attributes emphasize the structural position firms occupy in a network (Burt, 1992; Gulati, 1998). Focal firms may exhibit different degrees of insidership in home business networks, depending on its network positions. Through its network positions, focal firms can also build strategic resources such as knowledge and reputational assets that significantly influence FSAs in internationalization activities (Guler & Guillén, 2010; Meschi & Wassmer, 2013). The two most important network positions identified in the structural network literature (Burt, 1992; Podolny, 2001), relevant for international business (Lin et al., 2009; Shi et al., 2014), are centrality and brokerage.

3.1.1. Centrality

Centrality refers to the extent to which focal firms are connected to others (Tortoriello et al., 2012). Two types of FSAs are associated with firms' central position within their home business networks. The first advantage regards relationship-specific knowledge, whereby a central position enables the focal firm to potentially create a superior knowledge base with its partners (Ahuja, 2000). This reflects that a knowledge base is built not only by the focal firm itself but also with its directly connected partners—who, in turn, also exchange knowledge

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with their partners—enabling the focal firm to benefit from the knowledge creation process beyond its own organizational boundaries (Johanson & Vahlne, 2009).

Therefore, a well-established central position in home business networks is more likely to increase learning opportunities for focal firms (Powell et al., 1996), expand their knowledge base (Kogut, 2000), and consequently help them attain advantages in foreign markets (Patel & Terjesen, 2011). Echoing this view, researchers in empirical studies also found that a central position encourages cross-border knowledge transfer (Guler & Guillén, 2010; Iurkov & Benito, 2018), indicating it is a nonlocation-bound attribute favorable for OFDI.

The second advantage of having a central position is its positive signal effect of trustworthiness. Jensen (2008) and Podolny (2005) argued that a central position enhances trustworthiness to new partners—including those connected to or based in overseas networks—to exchange relationships with the focal firm. For example, Shi et al. (2014) found that firms with a central position in their home market can better signal the quality of their products or services to new markets. They further argued that gaining benefits through such signal effects is important for firms facing high information asymmetries such, as those based in emergent economies.

In summary, we argue that a focal firm's central position within its home business network is an important precondition for OFDI. An established central position provides transferable relationship-based knowledge and signals trustworthiness, both enabling the focal firm to engage more effectively in OFDI.

H1$_a$. Firms with a central position in their home business networks are more likely to engage in OFDI.

3.1.2. Brokerage

Brokerage refers to a network position in which focal firms act as brokers between clusters of firms that are disconnected from one another (Burt, 1992). Similar to a central position, which allows firms to gain relationship-specific knowledge, brokers tend to possess novel, diverse, and nonredundant information about market opportunities and risks and have control over information diffusion (Burt, 2005; McEvily & Zaheer, 1999). Indeed, such a structural position enables firms to generate more innovative ideas, identify better market opportunities, and gain benefits from information asymmetry between disconnected parties (Gnyawali & Madhavan, 2001).

However, the brokerage advantage within home business networks is usually location-bound and is much harder to transfer to foreign markets. Such an advantage relies on arbitraging asymmetric information in more proximate and familiar environments. Outside brokers' immediate network, they may lose strategic control over the generation of benefits (Burt, 2007; Shi et al., 2014). For instance, empirical studies have evidenced the "stickiness" of brokerage advantages for multinational enterprises (MNEs) within their home countries and the risk of failure when entering more distant locations (Guler & Guillén, 2010; Iurkov & Benito, 2018).

Second, in contrast to a central network position in signaling high trustworthiness, a brokerage position tends to signal the opportunistic characteristics of the focal firm, potentially lowering its trustworthiness and consequently making it less attractive in the eyes of new partners (Guler & Guillén, 2010; Koka & Prescott, 2008). Without trust, "an important lubricant" in exchange relationships (Johanson & Vahlne, 2009, p. 1,420), both knowledge sharing and transfer are less likely to happen or will be unproductive due to high switching costs (Coleman, 1988; Hansen, 1999). Empirical evidence further suggests that how brokers manage networks of relationships and manipulate information flows in the local

market may be viewed as inappropriate elsewhere (Stam et al., 2014; Xiao & Tsui, 2007), potentially preventing the firm from gaining insidership beyond its home location.

In summary, we argue that a brokerage position is different from a central position because it tends to generate relationship-based knowledge that "sticks" to home business networks and signals less trustworthiness to new partners. Both are unfavorable for OFDI.

$H1_b$. Firms with a brokerage position in their home business networks are less likely to engage in OFDI.

3.2. Relational Network Attributes and OFDI

Relational network attributes address the value of connections between focal firms and their partners (Andersson et al., 2001; Rowley et al., 2000). Depending on network relations, focal firms may have different degrees of insidership in home business networks. Relational network studies highlight that foreign invested enterprises (FIEs) and domestic firms can access varying knowledge and information (Guillén, 2002; Hansen, 1999; Li & Fleury, 2020).

3.2.1. FIEs

With the goal of OFDI, networking with FIEs can help focal firms obtain some insidership within foreign business networks (Johanson & Vahlne, 2009; Milanov & Fernhaber, 2014). Compared with domestic firms, FIEs possess a knowledge base that is more relevant to foreign markets. In developing relationships with FIEs, firms can learn and accumulate new relationship-specific knowledge to support becoming an insider in foreign markets. Existing studies show that FIEs help firms gain both business knowledge (Deng, 2004; Zhou et al., 2007) and institutional knowledge (Zhang, 2015) about foreign markets. Furthermore, through FIEs, firms can become connected to overseas firms and strengthen their insidership.

In addition, through exchange relationships with FIEs, focal firms may obtain referral trust from those FIEs, which is otherwise less possible if firms only develop relationships with other domestic firms (Kontinen & Ojala, 2011; Luo et al., 2011). This referral trust enhances focal firms' credibility and reputation in foreign markets (Gulati & Higgins, 2003; Zaheer & Bell, 2005) and reduces uncertainties perceived by potential foreign partners (Kontinen & Ojala, 2011; Zaheer, 1995). Both affect the extent to which focal firms engage in knowledge learning and trust building, which reduces the LoO (Johanson & Vahlne, 2009), and which further affects the extent to which focal firms may obtain opportunities to identify new foreign markets (Andersson et al., 2013; Gu & Lu, 2011).

H2$_a$. Firms with more connections to FIEs in their home business networks are more likely to engage in OFDI.

3.2.2. Domestic Firms

Exchange relationships with other domestic firms provide focal firms with only limited knowledge about foreign markets, which may hinder the exploration of overseas market opportunities and slow down the internationalization processes (Patel et al., 2014). Mariotti and Delbridge (2012) found that when firms intensively engage with mainly domestic firms, they face the problem of information overload and knowledge redundancy. Because such firms share a similar knowledge base with less diverse viewpoints, their internationalization processes can decelerate (Eapen, 2012). Furthermore, compared to partnering with FIEs, exchange relationships with domestic firms are less effective in helping firms establish referential trustworthiness and credibility overseas (Deng, 2004; Zhou et al., 2007). Therefore, firms in exchange relationships with domestic firms are more likely to concentrate their activities in their home countries, with fewer opportunities to overcome LoO in foreign markets.

H2$_b$. Firms with more connections to domestic firms in their home business networks are less likely to engage in OFDI.

3.3. Interaction of Structural and Relational Network Attributes and OFDI

So far, we have discussed the effects of structural and relational network attributes on OFDI separately. We will now consider interactions between focal firms' structural positions and exchange relations.

As mentioned earlier, a central position can offer the advantage of accessing relationship-specific knowledge via network breadth (Koka & Prescott, 2008; Meschi & Wassmer, 2013). By connecting to FIEs, central firms are more likely to command privileged knowledge and information about business partners, customers, and suppliers both at home and in foreign markets and therefore able to develop new market opportunities (Oviatt & Mcdougall, 2005; Zhang, 2015). Furthermore, having a central position with connections to FIEs signals referral trust and visibility, therefore showing firms can earn acceptance among businesses in both home and overseas markets (Jensen, 2008; Podolny, 2005). An initial opportunity to develop an insider position within foreign markets can be created through collaboration with home country FIEs (Johanson & Vahlne, 2009). With absent or limited connections to FIEs, it would otherwise be more costly for noncentral firms to obtain such opportunities (Li & Fleury, 2020).

H3$_a$. Firms' connections to FIEs within their home business networks strengthen the positive effect of their central position on OFDI.

When the key partners of the centrally positioned firm are mainly domestic firms, the depth and breadth of the knowledge base that the focal firm can obtain from its central position are more likely to be limited to the home country market only—and thus are less

relevant to foreign markets. In this case, the more and the closer the connections among domestic firms within home business networks, the more likely firms will suffer from the so-called domestic "information lock-in" effect (Grabher, 1993; Lin & Chaney, 2007). With limited knowledge about foreign markets, firms become path-dependent on domestic markets (Etemad, 2004; Manolova et al., 2010) and find it harder to develop market opportunities overseas (Patel et al., 2014).

Furthermore, connecting to domestic firms is less likely to help firms build trustworthiness and create initial insider opportunities in foreign markets (Johanson & Vahlne, 2009). Consequently, a central position connecting to domestic firms contributes less to overcoming LoO and thus impedes internationalization (Forsgren et al., 2005; Kim et al., 2006).

H3$_b$. Firms' connections to domestic firms within their home business networks weaken the positive effect of their central position on OFDI.

As mentioned earlier, a brokerage position tends to be location-bound, generating information "sticky" to home business networks and signaling less trustworthiness to new overseas partners (Burt, 2007; Guler & Guillén, 2010; Shi et al., 2014). By connecting to FIEs, broker firms have a chance to access relationship-based knowledge about foreign markets and thus gain market opportunities to internationalize (Coviello & Munro, 1997; Sharma & Blomstermo, 2003). In contrast, connecting to FIEs helps provide broker firms with more visibility and trustworthiness (Kontinen & Ojala, 2011; Zaheer & Bell, 2005), which is conducive to overcoming LoO during its internationalization (Johanson & Vahlne, 2009). In summary, connections to FIEs may mitigate the impeding effect of brokerage on OFDI.

H4$_a$. Firms' connections to FIEs within their home business networks weaken the negative effect of their brokerage position on OFDI.

When broker firms are mainly connecting with domestic firms, they can gain even less relationship-based knowledge about foreign markets (Mariotti & Delbridge, 2012). Because exchange relationships with domestic firms are usually path dependent (Etemad, 2004; Manolova et al., 2010), connecting to domestic firms is more likely to lock the focal brokerage firm into the domestic business. Furthermore, connecting to domestic firms is less helpful in earning referral trust for focal firms in foreign markets (Kontinen & Ojala, 2011; Luo et al., 2011) and in overcoming LoO in the process of internationalization (Johanson & Vahlne, 2009). In summary, a brokerage position connecting to domestic firms is more likely to exhibit greater network inertia in home business networks and therefore reduce focal firms' internationalization opportunities.

H4$_b$. Firms' connections to domestic firms within their home business networks strengthen the negative effect of their brokerage position on OFDI.

4. Methods

4.1. Sample and Data Collection

We chose to test our hypotheses using a sample of Chinese firms. China is the leading source country of OFDI, accounting for 36% of the world total (The World Bank, 2017). China's fast growth in OFDI provides us an opportunity to sample firms with actual internationalization experience. The Chinese context is also rooted in a communitarian culture in which insidership and *guanxi* are important (Burt et al., 2018). For this study, we thus collected survey data from Chinese domestic firms that have engaged in OFDI by using a questionnaire developed in English, that was then translated into Chinese by one of the

researchers. To avoid cultural biases, and to ensure internal validity (Wright et al., 2000), we back translated the Chinese version of the survey into English independently using two other researchers. We then conducted an in-depth discussion among 11 professors and senior doctoral students to verify the relevance and completeness of each survey item (Zhou & Wu, 2010). We then followed this process by a pilot survey with 30 Chinese senior managers and used their feedback to refine the final survey.

We targeted executive managers of middle and high seniority (C-suite level) to ensure that respondents had appropriate knowledge of OFDI. Executive managers must have at least three years of management experience and have accumulated rich information in their management positions (Kumar et al., 1993). The survey was conducted in 2013 through three channels: an online survey supported by a third-party research agent; face-to-face surveys with executive managers in their companies; and face-to-face surveys with executive managers in an executive MBA training course. We targeted a total of 357 firms, with 194 providing valid data, yielding a valid response rate of 54.3%.[1] Table 1 shows the response rate for each channel, analysis of variance (ANOVA) for firm size ($F = 0.263$, $p > 0.05$), firm age ($F = 1.518$, $p > 0.05$), international experience ($F = 0.009$, $p > 0.05$), and degree of internationalization ($F = 1.5246$, $p > 0.05$), showing that the data collected from the three groups of respondents does not exhibit sample bias.

Insert Table 1 about here

We also randomly selected 50 respondents and cross-checked their answers against publicly available information about their companies and positions. Through this, we found

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[1] Data will be made available through a data depository. Details will be displayed in this footnote upon acceptance.

high consistencies between their answers and the secondary information concerning the year and location of foreign market entries, firm age, and key business networks, which suggested that the survey was truthfully answered.

Table 2 shows the descriptive statistics of the 194 firms included in this study. The average firm size was 723.6 employees ($SD = 352.2$); the average firm age was 14.94 years ($SD = 6.35$); the average number of years of foreign operation was 8.95 ($SD = 5.81$); and the firms encompassed a wide range of industries (e.g., machinery manufacturing 26.8%, electronics and telecommunication 20.1%, textile 12.9%, new material 10.8%, software 9.3%, biotechnology 7.7%, and others 12.4%) and represented both stated-owned (30.9%) and nonstated-owned (69.1%) firms. The diverse types of industries, sizes, and ownerships ensured that the sample was broadly representative.

Insert Table 2 about here

4.2 Variables and Measures

4.2.1 Dependent Variable

OFDI. We used the degree of internationalization as a proxy for OFDI. Sullivan (1994) suggested that the degree of internationalization can be viewed from three key aspects: performance, structure, and attitude. Specific measures include the following: the ratio of foreign assets to total assets (FATA), the ratio of foreign sales to total sales (FSTS), the ratio of overseas subsidiaries to total subsidiaries (OSTS), international experience of top management (TMIE), the degree of psychological discreteness of international operation (PDIO), and the proportion of overseas employees to total employees (FETE). We chose FATA, FSTS, and FETE and employed a 10-grade scale for capturing degree differences

(Özdemir et al., 2017). A ratio that is less than 10% is graded 1, a ratio in the range of 11–20% is graded 2, and so on. The Cronbach's alpha for this scale was 0.762.

4.2.2 Independent Variables

Centrality. We adopted a three-item scale based on Wu et al. (2015) to measure centrality. The participants indicated the extent to which they agreed with each of the following statements using a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"): (a) most firms in the local domestic market know our firm's name; (b) the relationship between our firm and cooperating partners is very stable; and (c) cooperating partners tend to expect that our firm provides new knowledge and experience when they need advice or support for technology, production, and marketing. The Cronbach's alpha for this scale was 0.566, which is above the 0.5 cut-off (Pedhazur & Schmelkin, 1991), confirming the reliability of the scale.

Brokerage. Following McEvily and Zaheer (1999), we adopted the use of nonredundancy to proxy brokerage. Nonredundancy is defined as the extent to which the contacts in a focal firm's advice network are not linked to one another (McEvily & Zaheer, 1999). To operationalize nonredundancy, we created an ego-centered network (Koka & Prescott, 2008). First, we asked respondents to write the initials of the five most important organizations among their partners. Then, using a matrix table, we checked with the respondents on whether those five organizations knew each other or not. Using this matrix, we computed a nonredundancy score as follows:

Nonredundancy = (Potential Ties – Actual Ties)/Number of Partners

where, *Potential Ties = the maximum number of ties that could exist among partners (0 to 10, namely n(n−1)/2, where n is the total number of partners listed), Actual Ties = the number of ties that do exist among partners (0 to 10)*

Number of = the total number of partners listed (0 to 5)

The value of nonredundancy falls in the range of 0–2, with a low value indicating low nonredundancy and a high value meaning high nonredundancy. If all five organizations know each other, nonredundancy equals 0. If none of the five organizations know each other, nonredundancy equals 2, meaning there is no overlap in their network ties. Using this method, a finding of low percentage of partners who know each other indicates that a firm's network is rich in brokerage.

Connections to FIEs or Domestic Firms. Adapted from Xu et al. (2012), we utilized a four-item scale to measure a focal firm's connections to FIEs (*CtoF*) and to domestic firms (*CtoD*). The participants indicated the extent to which they agreed with the following statements regarding FIEs and domestic firms using a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"): (a) keeping promises to each other; (b) sharing required information with each other as far as possible; (c) working together to overcome difficulties; and (d) completing tasks jointly. The Cronbach's alpha for each scale was 0.701 and 0.670, respectively.

4.2.3 Control Variables

Firm-Level Control Variables. We included six controls in all models to address concerns about unobserved heterogeneity. Consistent with prior literature, we controlled for *firm size* (natural log of total number of employees) and *firm age* (Cui & Jiang, 2012; Mesquita & Lazzarini, 2008; Zaheer, 1995). We used a dummy variable to control for *state ownership* (=1; 0 otherwise; Cui & Jiang, 2012; Kling & Weitzel, 2011). We also controlled for *international experience* (Goerzen & Beamish, 2003; Guler & Guilen, 2010), measured by the total number of years of foreign operation (natural logarithmic) and for scale of *country scope* measured by the total number of countries in which a firm has foreign operations (Hitt et al., 1997). Finally, we controlled for the degree of *foreign involvement* (Zhang, 2015), where: 1 = internationalization without equity investment (e.g., overseas

franchising, exporting, or importing), 2 = internationalization with equity investment but without operation (e.g., overseas representative office), and 3 = internationalization with both equity investment and actual operation (e.g., overseas sales or manufacturing or R&D).

Industry-Level Control Variables. We controlled for competition intensity using the *Herfindahl-Hirschman Index (HHI)* computed at industry level $HHI_i = \sum_{i=1}^{n}(MS_i)^2$, where MS_i represents the market share of firm i and there are n firms in the industry (Rhoades, 1993). We also controlled for industry openness in both trade and FDI using data obtained from the *China Industry Statistical Yearbook* and the *UN Comtrade Database*. We measured *FDI openness* by the industry-level FDI inflows as a percentage of GDP (*FDI open*) and *trade openness*, as measured by the industry-level export value as a percentage of GDP (*trade open*). Both are matched to the industry of the focal firm (Gu & Lu, 2012). Finally, we controlled industry policy on innovation by using the total R&D investments by the government as a proportion of the total revenue of each industry (Gov. R&D). We took data from the *China Science and Technology Statistics Yearbook*.

4.3 Data Analysis

A major concern in using a survey methodology is that a single respondent may answer all of the questions in a consistent manner, which can result in a common method bias (Podsakoff et al., 2003). To assess potential common method bias, we conducted a Harman's post-hoc single factor test, wherein we allowed all variables to load onto a single factor. Our analytical results revealed the presence of three distinct factors with an eigenvalue greater than 1.0, which together accounts for 54.04% of the total variance. The largest factor accounts for 28.42% of the variance, indicating no significant common method bias in this study.

To test the reliability and validity of the measurements, we conducted confirmative factor analysis (CFA; see Table 3). The four-order model exhibits a better fit (Root Mean

Square Error of Approximation [RMSEA] = 0.026, Goodness of Fit Index [GFI] = 0.946, Tucker-Lewis Index [TLI] = 0.983, Comparative Fit Index [CFI] = 0.987). We also estimated a three-factor model (all 11 items loading onto three factors), a two-factor model (all 11 items loading onto two factors), and a one-factor model (all 11 items loading onto the same factor) separately to assess more parsimonious models. We conducted $\chi 2$ difference tests and found that the four-factor model has a significantly better fit to the data ($p < 0.001$). This analysis provides statistical support for construct validity.

Insert Table 3 about here

Table 4 presents the means, standard deviations, and correlations for all variables included in our analysis. The correlation coefficients are less than 0.6, and the variance inflation factors (VIF) for the regression models do not exceed 10.0 (the largest VIF is 2.07). Therefore, multicollinearity does not appear to be a significant issue in our study (Neter et al., 1990).

Insert Table 4 about here

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5. Results

To test our hypotheses, we employed a stepwise hierarchical regression approach that revealed the explanatory power of each set of variables (Aiken & West, 1991). Table 5 provides a summary of the estimation results. Model 1 is the baseline model, covering constant and control variables. According to Model 1, firm age is negatively associated with OFDI ($\beta = -1.093$, $p < 0.05$), which is consistent with previous studies in that older firms

tend to be conservative and less motivated to invest abroad (e.g., D'Angelo et al., 2020; Yiu et al., 2007). We found both international experience and country scope to be significantly and positively associated with OFDI ($\beta = 1.069$, $p < 0.01$; $\beta = 0.012$, $p < 0.05$), confirming that firms with considerable international experience are more likely to engage in foreign expansion (Hitt et al., 1997; Zhang, 2015). Furthermore, we found industry trade openness to be significantly and positively related to OFDI ($\beta = 0.692$, $p < 0.05$) confirming Gu and Lu's (2012) findings. We discuss estimations from Model 2 to Model 15 below.

Insert Table 5 about here

Models 2–4 consider the impact of structural network attributes: namely, centrality and brokerage. Model 2 shows that a focal firm's central position has a significant and positive relationship with OFDI ($\beta = 0.523$, $p < 0.01$). In contrast, Model 3 shows that a focal firm's brokerage position has a significant and negative relationship with OFDI ($\beta = -0.445$, $p < 0.05$). The results are consistent in Model 4 ($\beta_{centrality} = 0.503$, $p < 0.01$; $\beta_{brokerage} = -0.42$, $p < 0.05$) and Model 8 ($\beta_{centrality} = 0.535$, $p < 0.05$; $\beta_{brokerage} = -0.444$, $p < 0.05$) when relational network attributes are also included. Therefore, Hypothesis 1a and Hypothesis 1b are both supported. The results suggest that Chinese firms tend to benefit more from a central position than from brokerage when engaging in OFDI.

Models 5–7 consider the impact of relational network attributes: focal firms' connections to FIEs and to domestic firms. Model 5 shows that focal firms' close connections to FIEs have a significant and positive relationship with OFDI ($\beta = 0.425$, $p < 0.01$), which remains consistent in Model 7 ($\beta = 0.581$, $p < 0.001$). Thus, Hypothesis 2a is supported. In comparison, focal firms' connections to domestic firms have a significant and negative relationship with OFDI in Model 7 ($\beta = -0.546$, $p < 0.01$). This finding is confirmed again in

Model 8 (β_{FIEs} = 0.392, p < 0.05; $\beta_{Domestic}$ = −0.706, p < 0.01), when centrality and brokerage are included in the estimation. However, it is not significant in Model 6 (β = −0.290, p > 0.1). Therefore, the influence of connections to domestic firms is not very stable, showing Hypothesis 2b can be marginally supported. The results suggest that Chinese firms tend to benefit more from connecting with FIEs than from connecting with domestic firms when engaging in OFDI.

Models 9–11 explore the moderation effect of a central position on OFDI. Model 9 shows that the interaction between focal firms' centrality and their connections to FIEs have a significant and positive relationship with OFDI (β = 0.685, p < 0.05). This finding is also supported in Model 11 (β = 1.087, p < 0.01), where the interaction between focal firms' centrality and their connections to domestic firms are considered simultaneously. Thus, Hypothesis 3a is supported. Model 10 shows that the interaction between focal firms' centrality and their connections to domestic firms has a marginally significant relationship with OFDI (β = −0.660, p > 0.05). This finding is also supported in Model 11 (β = −1.105, p < 0.01), where the interaction between focal firms' centrality and their connections to FIEs are also considered. Therefore, Hypothesis 3b is supported.

Models 12–14 explore the moderation effect of the brokerage position on OFDI. The interaction between focal firms' brokerage and their connections to FIEs has a positive—but not significant—relationship with OFDI (β = 0.253, p > 0.1) in Model 12. Model 13 shows that the interaction between focal firms' brokerage and their connections to domestic firms also suggests a positive—but not significant—relationship with OFDI (β = 0.253, p > 0.1). Therefore, Hypotheses 4a and 4b are not supported. This result may indicate that firms in a brokerage position are less likely to internationalize, regardless of the presence of domestic firms or FIEs in their networks.

Model 15 represents the full model. In addition to the existing variables, the moderation effect of brokerage positions on OFDI is considered, and, accordingly, two interaction effects are added: the interaction between brokerage and focal firms' connections to FIEs; and the interaction between brokerage and focal firms' connections to domestic firms. Based on the full test results, hypotheses 3a and 3b are supported again.

To gain further insights, we plotted Figure 1 to illustrate the interaction effect of focal firms' centrality and their connections to FIEs on OFDI. The degree of a firm's OFDI is higher when samples have closer network connections with FIEs in home business networks. In Figure 1, moving from a low level (−1 SD) of network connections to FIEs to a high level (+1 SD), the slope of centrality changes from −0.157 ($p = 0.497$) to 1.141 ($p = 0.000$). Nonetheless, we have observed a negative relationship between centrality and OFDI for firms with low levels of connections to FIEs. The reason might be that focal firms with a low level of connections to FIEs lack the necessary resources to expand internationally. Even if their centrality is high domestically, they have little choice but to focus on the home market. Therefore, their degree of OFDI is limited.

Insert Figure 1 about here

We also plotted Figure 2 to illustrate the interaction effect between focal firms' centrality and their connections to domestic firms on OFDI. Similarly, when moving from a low level (−1 SD) of network connections with other domestic firms to a high level (+1 SD), the slope of centrality changed from 1.047 ($p = 0.000$) to −0.063 ($p = 0.840$). For focal firms with low levels of connections to FIEs, there is a significantly positive relationship between centrality in home business networks and OFDI. Nonetheless, for focal firms with high levels of connections to domestic firms, there is no significant relationship between centrality and

the degree of OFDI. A high level of domestic connections might strengthen the focal firm's home country "lock-in" effect.

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<center>Insert Figure 2 about here</center>

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6. Discussions and Conclusions

Taking a network perspective on internationalization (Johanson & Vahlne, 2009; Vahlne & Johanson, 2013), in this study, we examine the extent to which insidership in home business networks explains the degree of a firm's OFDI. Unlike the current debate, which concentrates on the characteristics of the overseas network in which firms need to become insiders to internationalize successfully (e.g., Kurt & Kurt, 2020), we argue that insidership in home business networks offers "network advantages" (Vahlne & Johanson, 2017, p. 1091) that enable overseas expansion. Our argument is based on a network analysis of Chinese firms engaged in OFDI. This study contributes to the scarce theoretical and empirical literature regarding the impact of home country network attributes on internationalization (Kurt & Kurt, 2020; Yamin & Kurt, 2018) with two theoretical contributions.

The first contribution lies in our disentangling of the theory concerning the relationship between insidership within home business networks and OFDI. We do so by analyzing four network attributes to express a focal firm's possible insidership in its home business networks: centrality, brokerage, connections to FIEs, and connections to domestic firms. We argue that the concept of insidership is not specific to foreign markets. A focal firm might be an outsider in a target country's network, but it might also be an insider in its home network. Our approach avoids treating these networks as generic and metaphorical concepts, which, according to Kurt and Kurt (2020) is a shortcoming in current network-oriented IB

research. Our conceptualization of insidership allows us to assess the extent to which each home-based network attribute may allow a focal firm to become an insider (i.e., "a member of a useful network"; Vahlne & Johanson, 2017, p. 1091) when engaging in OFDI.

On the effect of the structural attributes of a home network, we find that Chinese firms in a central network position are more likely to engage in international expansion than those in a brokerage position. Our results extend similar findings on the relationship between structural attributes and the international expansion of firms from developed economies to an emerging market context (Guler & Guillén, 2010; Podolny, 2005). This finding affirms that centrality and brokerage are two fundamentally different structural traits (Burt, 1992) with contrasting implications for international expansion. Central network positions promote cohesion between focal firms and the many other firms with which they currently or potentially have relationships (Shijaku et al., 2018). Therefore, focal firms with high centrality will find it easier to acquire knowledge from others. Such a superior network position also helps focal firms amplify their influence over other firms through signaling effects. These potential home-based network advantages can significantly and positively influence OFDI (H1a). In comparison, brokerage network positions lead to connections with fewer local firms, but these offer access to sensitive and locally embedded information (Laursen et al., 2012). Therefore, brokers' resources and capabilities are local (Burt, 2007), context-specific (Guler & Guillén, 2010), and temporal (Shi et al., 2014). This makes a stronger brokerage position less likely to be beneficial for OFDI (H1b).

Our findings on the effect of the relational attributes of a home network suggest that Chinese firms' relational attributes in their home business networks are significantly related to OFDI when they are closely connecting to FIEs (H2a). This result is consistent with evidence that an increase in interaction opportunities with FIEs stimulates Chinese OFDI (Li et al., 2017; Luo & Tung, 2007). On the effect of the focal firm's connections to other

domestic firms, despite no significant finding based on Model 6, the result shows a consistent, and significantly negative, effect of this attribute on OFDI. This finding confirms our hypothesis (H2b), suggesting that if focal firms only connect to domestic firms, the more such relationships are developed, the less likely the focal firm engages in OFDI.

Our second contribution lies in exploring the dynamic effects of insidership in home networks in association with OFDI. These dynamic effects highlight the importance of considering firms as embedded within heterogenous and complex contexts (e.g., Forsgren, 2016; Johanson & Vahlne, 2009), and yet, the current understanding regarding the effect of the network context in internationalization is still limited (Ahuja et al., 2012; Johanson & Vahlne, 2009; Kurt & Kurt, 2020). Specifically, we emphasize that the four network attributes of insidership in home business networks do not operate separately. Rather, they may influence focal firms' OFDI interactively. Subsequently, the interaction of these attributes can be seen in focal firms' responses to specific network contexts at home. Our study thus contributes to the understanding of structural and relational attributes by considering how they interact, and our exploration reveals some interesting results that enrich the debate on the role and importance of network insidership.

We find that, when Chinese firms are in a central position within home business networks, they benefit more from close connections with FIEs than with domestic firms. We draw three implications from this finding. First, the results support existing arguments on the moderation effect of centrality on domestic firms' FIE connections (e.g., Lin et al., 2009; Shi et al., 2012; Shijaku et al., 2018). The observed moderation effect shows that centrality is indeed a crucial attribute that helps focal firms potentially extend insidership from home country networks to overseas networks. Second, the result confirms Yamin and Kurt's (2018) argument that, when focal firms are willing to open their network to outsiders—in our case to FIEs (H3b)—then it gains the opportunity to access overseas networks and obtain insidership.

In addition, our finding indicates that Chinese firms in a central position within home business networks benefit less from their close connections to other domestic firms (H3a). Chinese firms seem to be hampered by their close connections with other domestic firms when engaging in OFDI.

We offer two possible explanations for this finding: First, there is a trade-off between enjoying connections with domestic firms that are important for competing in the domestic market and connecting to firms that are closer to foreign markets, such as FIEs. This explanation is consistent with the discourse on the "information lock-in" effect (Grabher, 1993; Lin & Chaney, 2007). Arguably, centrality may worsen the information lock-in situation because the more cohesively focal firms are connected to other domestic firms, the harder it will be to engage in the entrepreneurial transformation needed for OFDI (Yiu et al., 2007).

Second, given the size and growth potential of the Chinese market, there is a lack of motivation to engage in OFDI when focal firms' success relies on close connections with domestic firms. The contrasting developments of the Fuyao Group and the Wahaha Group illustrate these two mechanisms. Initially, Fuyao was a leading glass manufacturer in China. In 2005, it started supplying window glass to a Volkswagen (VW) joint venture in China, and the two companies began a long-term business relationship. In the same year, Fuyao became a qualified supplier to Audi, a subsidiary of VW. This led Fuyao to supply and serve the German market directly. In 2007, Fuyao acquired a German firm and started supplying the VW Group globally. During 2013–2014, Fuyao completed further acquisitions in Russia and the USA. Since 2017, Fuyao Group has become China's largest automotive supplier and the world's second-largest automotive glass producer.

Fuyao's internationalization path is representative of Chinese manufacturers. They often connect to global production networks by establishing relationships with FIEs in China

and gradually become global suppliers and outward foreign direct investors (Ge & Wang, 2013; Hertenstein et al., 2017). In contrast, the Wahaha Group has a central position in the beverage industry and enjoys close networks with many domestic suppliers and distributers (Shang, 2002). However, the Wahaha Group has so far seen limited overseas expansion success, primarily because it is difficult for Wahaha to replicate its business model in the overseas market. Until the domestic market becomes saturated and margins drop significantly, firms like Wahaha will be less interested in engaging seriously in OFDI. In fact, the closer they connect to the other domestic firms and the more competitive they become in their domestic market, the less likely they will commit to OFDI.

The importance of the centrality-FIE relationship is strengthened by our findings that the brokerage position is not moderated by connections to either FIEs or domestic firms (H4a/H4b). We found that the relationship between brokerage and connections to FIE is less likely to have a positive impact on OFDI. From the FIE's viewpoint, domestic firms with strong brokerage attributes may lose their strategic value as a bridge between the FIE and domestic firms. As the FIE becomes an insider in the local network, it becomes less motivated to deepen its relationships with the brokerage firm. From the brokerage firm's viewpoint, it prefers weak rather strong ties anyway (Burt, 1992). Even if the brokerage firm is attracted by foreign markets, currently weak and temporal relations with FIEs are less likely to be helpful for the brokerage firm when engaging in OFDI. In contrast, the closer the brokerage firm connects to FIEs, the fewer opportunities the brokerage firm may identify for other FIEs in China, and the less competitive the broker becomes. This worsens its limited opportunities to tap into foreign markets.

The relevance and role of home country networks in enabling OFDI also has implications for managers and policy makers. Our findings suggest that managers need to be aware of, and take into consideration, their structural positions and relational connections

when deciding to internalize. The right connection can benefit them in developing and executing an OFDI strategy. Our findings call for managerial attention to the importance of interacting with FIEs who provide a unique and functional network mechanism to enable firms to gain insidership for OFDI.

Businesses that aim to invest overseas should therefore actively seek out and nurture links with FIEs. This strategy should also include a (re)positioning of the firm in existing networks to obtain a more central role. We also find a potential negative effect on OFDI when focal firms are over-embedded with domestic firms. Firms in such a position need to form their OFDI strategies cautiously because it can be more difficult for them to derive network-based advantages that are beneficial for OFDI. Businesses that either lack links with FIEs, or are too locally embedded, should not overcommit and should approach overseas investment opportunities cautiously.

This study offers several policy implications for countries that strategically encourage OFDI. First, policy makers need to incentivize and manage the entry of FIEs. As evidenced in this study, focal firms with high centrality and/or close connections to FIEs are more likely to engage in OFDI. These findings suggest that simply opening the market is not sufficient. Policy makers need to go further and facilitate the establishment of relationships between focal firms and FIEs and encourage local–foreign coevolution (Saranga et al., 2019). On the one hand, policies should encourage firms to embed FIEs in their networks. On the other hand, policies should also encourage firms to obtain relationship-specific knowledge and enhanced network positions (Li & Fleury, 2020). Policy makers should realize that protectionism through market entry barriers not only depresses inflow FDI but also deters focal firms from connecting to potentially advanced "outsiders" (Yamin & Kurt, 2018) and impedes their leverage of "insidership" for OFDI.

Second, policy makers need to carefully consider home market and institutional conditions when formulating OFDI polices. As evidenced in this paper, the brokerage position and having deep connections to domestic firms do not seem to offer beneficial conditions for OFDI. These network attributes tend to be associated with knowledge that is context-specific and location-bounded, and therefore hard to transfer from one market to another (Guler & Guillén, 2010).

Because changing these conditions is time-consuming, we recommend a strategic OFDI policy with multiple approaches to overcome the contextual obstacles. Through a strategic OFDI policy, firms that are currently enjoying favorable network attributes can be identified and prioritized for structural and financial OFDI support. In the meantime, OFDI policies need to correspond with inward FDI policies. For example, preferential inward FDI policies can be oriented toward encouraging both OFDI-leading firms and FIEs to tap into regions or industries that are constrained by unfavorable network attributes, with the aim of leveling up the network and, subsequently, local development.

Our examination of the role and impact of home business networks on OFDI also has limitations and thus opens several lines of inquiry for future research. First, we argue that knowledge and knowledge exchange play crucial roles in generating network advantages. However, in this study, knowledge is considered mainly for the purpose of disentangling attributes of network "insidership." Future researchers should explore what and why certain types of knowledge tend to be associated with certain network attributes. By doing so, the impact of network attributes on OFDI can be examined in conjunction with the influence of knowledge types. For example, in this study, we did not see a significant effect of the brokerage attribute on OFDI. Had we captured brokerage knowledge, we would have been able to explore the mechanism that underpins the brokerage effect further.

Second, for the purpose of theorization, this study focused on the effect of insidership in home business networks on OFDI. However, we must address that the concept of network insidership simply refers to situations where firms possess a well-established and useful relevant network (Johanson & Vahlne, 2009). As focal firms engage in OFDI, they develop network insidership in both home and foreign markets. We suggest that future researchers should consider simultaneously the relationship between home network and foreign network insidership, such as whether these two substitute for or supplement each other over the process of internationalization.

Finally, we examined the impact of network effects on the degree of internationalization, a measurement of focal firms' commitment to foreign markets. However, from the outward direct investor's point of view, the network effect's impact on performance could be more relevant. If home network insidership offers sources of competitive advantages for OFDI, we would expect positive network effects in relation to performance. We would like to note that the network effect on performance relies on evolutions in complex mechanisms governing firms' accessing of information, knowledge exchange, relationship management, learning, and trust-building (Vahlne & Johanson, 2017) and are thus time-dependent. We therefore suggest that future scholars take temporal factors into account in their examination of the relationship between network insidership and performance.

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Table 1 Responding results of the questionnaire

Channels of data collection	Total disseminated	Total returned	Responding rate	Valid response	Rate of valid response
Third party research	200	162	81.0%	127	78.4%
Fieldwork	68	49	72.1%	35	71.4%
EMBA training program	89	43	48.3%	32	74.4%
Total	357	254	71.1%	194	76.4%

Table 2 Sample distribution statistics

	Attributes	Samples	Per cent		Attributes	Samples	Per cent
	Under 50	2	1.0%		Software	18	9.3%
	51-100	15	7.7%		Electronics, telecommunication	39	20.1%
	101-300	38	19.6%		Biotechnology	15	7.7%
Size (employ-ees)	301-500	31	16.0%	Industry	New material	21	10.8%
	501-1000	46	23.7%		Machinery manufacturing	52	26.8%
	1001-10000	47	24.2%		Textile	25	12.9%
	Over 10000	15	7.7%		Others	24	12.4%
Owner-ship	State-owned	60	30.9%		Under 3	35	18.0%
	Non state-owned	134	69.1%	Inter. experience （year）	4-6	46	23.7%
	Zhejiang	42	21.6%		7-10	65	33.5%
	Guangdong	35	18.0%		Over 1	48	24.7%
	Shanghai	26	13.4%		Under 3	2	1.0%
	Beijing	21	10.8%		3-5	9	4.6%
Location	Shandong	13	6.7%		6-10	30	15.5%
	Jiangsu	9	4.6%	Firm age (year)	11-20	88	45.4%
	Henan	8	4.1%		21-30	37	19.1%
	Others	40	20.5%		Over 3	28	14.4%

Table 3 The goodness of fit index of measurement models

Measurement model	χ^2	df	χ^2/df	RMSEA	GFI	TLI	CFI
One-factor	341.297	77	299.026	0.122	0.822	0.618	0.677
Two-factor[a]	213.807	76	2.813	0.097	0.855	0.760	0.799
Three-factor[b]	88.327	74	1.194	0.032	0.941	0.974	0.979
Four-factor	80.011	71	1.127	0.026	0.946	0.983	0.987

Note: a) connections to domestic firms and FIEs were combined into one factor, centrality and degree of internationalization were combined into one factor; b) connections to domestic firms and FIEs were combined into one factor. c) RMSEA means Root Mean Square Error of Approximation. GFI means Goodness of Fit Index. TLI means Tucker-Lewis Index. CFI means Comparative Fit Index.

Table 4 Descriptive statistics and correlation matrix

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Degree of int.	2.749	1.276	1.000													
2.	Firm size(ln)	2.913	0.732	0.016	1.000												
3.	Firm age(ln)	1.211	0.277	-0.065	.463**	1.000											
4.	Ownership	0.690	0.463	0.096	-.335**	-.287**	1.000										
5.	Int. experie(ln)	0.865	0.290	.160*	.389**	.571**	-0.095	1.000									
6.	Foreign involv.	1.453	0.734	0.028	.271**	0.080	-.256**	0.020	1.000								
7.	Country scope	12.570	21.705	.191**	.421**	.214**	-0.069	.306**	-0.083	1.000							
8.	HHI	0.039	0.053	0.054	-0.087	-0.092	0.092	-0.029	.170*	-0.048	1.000						
9.	FDI open	0.150	0.042	-0.056	-0.136	-0.028	0.138	-0.013	-0.138	-0.020	-.354**	1.000					
10.	Trade open	0.308	0.283	.148*	-0.062	0.020	0.044	-0.098	0.023	0.052	-0.024	-0.025	1.000				
11.	Gov. R&D	0.045	0.030	-0.116	-0.067	0.143	-.175*	-0.002	0.068	-0.024	-0.031	-.179*	-0.008	1.000			
12.	Centrality	4.248	0.492	.222**	0.104	0.025	0.049	.148*	0.132	-0.073	-0.037	0.085	-0.088	0.128	1.000		
13.	Brokerage	1.127	0.493	-.225**	-0.129	-0.067	0.041	-0.107	0.018	-.177*	0.029	0.037	.184*	-.153*	-0.082	1.000	
14.	CtoD	4.091	0.580	-0.120	0.065	0.097	0.000	0.086	-0.027	-0.118	-.222**	0.122	-0.003	0.016	.400**	-0.066	1.000
15.	CtoF	4.200	0.479	.244**	0.087	0.016	-0.003	0.129	0.058	0.024	0.009	0.049	-0.116	0.073	.513**	-0.118	.345**

Note： * $p < 0.05$, ** $p < 0.01$ (two-sided). Firm size, firm age, and international experience are in natural logarithmic form.

Table 5 Results of the regression analysis

Hypo.	Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
	Constant	2.344***	2.586***	2.279***	2.516***	2.454***	2.317***	2.445***	2.565***	2.666***	2.633***	2.839***	2.606***	2.525***	2.557***	2.782***
		(0.604)	(0.599)	(0.597)	(0.593)	(0.594)	(0.602)	(0.583)	(0.572)	(0.569)	(0.569)	(0.559)	(0.577)	(0.575)	(0.584)	(0.568)
	Firm size	-0.144	-0.195	-0.152	-0.201	-0.172	-0.114	-0.125	-0.157	-0.169	-0.124	-0.122	-0.147	-0.162	-0.155	-0.129
		(0.174)	(0.172)	(0.172)	(0.17)	(0.171)	(0.175)	(0.169)	(0.164)	(0.163)	(0.164)	(0.16)	(0.165)	(0.165)	(0.166)	(0.161)
	Firm age	-1.093*	-0.987*	-1.099*	-0.996*	-1.003*	-1.065*	-0.917*	-0.839*	-0.675	-0.955*	-0.774+	-0.851*	-0.801+	-0.815+	-0.721+
		(0.439)	(0.432)	(0.434)	(0.428)	(0.432)	(0.438)	(0.426)	(0.415)	(0.418)	(0.416)	(0.41)	(0.416)	(0.418)	(0.421)	(0.416)
	Ownership	0.149	0.099	0.16	0.112	0.141	0.169	0.176	0.151	0.153	0.155	0.16	0.144	0.142	0.14	0.149
		(0.222)	(0.218)	(0.219)	(0.216)	(0.218)	(0.221)	(0.214)	(0.208)	(0.206)	(0.207)	(0.202)	(0.209)	(0.209)	(0.21)	(0.203)
	Int. experience	1.069**	0.858*	1.014*	0.813*	0.923*	1.104**	0.935*	0.747*	0.602	0.847*	0.685+	0.755*	0.753*	0.757*	0.694+
		(0.393)	(0.393)	(0.389)	(0.389)	(0.39)	(0.393)	(0.383)	(0.376)	(0.379)	(0.377)	(0.372)	(0.377)	(0.377)	(0.378)	(0.373)
	Foreign involv.	0.179	0.135	0.176	0.134	0.156	0.178	0.145	0.106	0.09	0.075	0.029	0.102	0.117	0.113	0.044
		(0.138)	(0.136)	(0.136)	(0.134)	(0.135)	(0.137)	(0.133)	(0.13)	(0.129)	(0.13)	(0.128)	(0.13)	(0.131)	(0.132)	(0.129)
	Country scope	0.012*	0.014**	0.01*	0.012**	0.012**	0.01*	0.01*	0.01*	0.009*	0.01*	0.009*	0.01*	0.01*	0.01*	0.01*
		(2.062)	(2.022)	(2.037)	(2.000)	(2.024)	(2.075)	(2.013)	(1.955)	(1.96)	(1.941)	(1.918)	(1.962)	(1.962)	(1.977)	(1.933)
	HHI	-0.023	0.026	0.042	0.085	-0.144	-0.461	-1.013	-1.088	-1.712	-1.031	-1.985	-1.168	-0.978	-1.048	-1.83
		(2.436)	(2.399)	(2.41)	(2.377)	(2.394)	(2.434)	(2.355)	(2.295)	(2.286)	(2.285)	(2.236)	(2.301)	(2.298)	(2.305)	(2.243)
	FDI open	-2.202	-2.827	-1.887	-2.506	-2.57	-1.928	-2.19	-2.2	-2.691	-1.892	-2.464	-2.245	-2.198	-2.226	-2.447
		(3.233)	(3.173)	(3.253)	(3.195)	(3.184)	(3.222)	(3.13)	(3.094)	(3.096)	(3.074)	(3.027)	(3.115)	(3.105)	(3.141)	(3.064)
	Trade open	0.692*	0.538	0.576+	0.434	0.605+	0.711*	0.609+	0.385	0.295	0.423	0.306	0.37	0.404	0.392	0.336
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
	Gov. R&D	-3.913	-3.559	-2.505	-2.245	-3.187	-3.833	-2.77	-1.284	-2.192	-1.056	-2.344	-1.479	-1.118	-1.269	-2.089
		(0.327)	(0.325)	(0.327)	(0.325)	(0.322)	(0.326)	(0.317)	(0.314)	(0.314)	(0.312)	(0.307)	(0.315)	(0.315)	(0.318)	(0.31)
H1a	Centrality		0.523**		0.503**				0.535*	0.657**	0.428+	0.55*	0.516*	0.494*	0.49*	0.492*
			(0.187)		(0.185)				(0.212)	(0.218)	(0.218)	(0.216)	(0.214)	(0.218)	(0.219)	(0.223)
H1b	Brokerage			-0.445*	-0.42*				-0.444*	-0.509**	-0.384*	-0.448*	-0.444*	-0.444*	-0.444*	-0.446*
				(0.195)	(0.191)				(0.185)	(0.186)	(0.186)	(0.183)	(0.185)	(0.185)	(0.186)	(0.183)
H2a	CtoF					0.425**		0.581***	0.392*	0.374*	0.379*	0.34	0.388*	0.428*	0.419*	0.39*
						(0.155)		(0.163)	(0.173)	(0.172)	(0.172)	(0.168)	(0.174)	(0.179)	(0.182)	(0.176)
H2b	CtoD						-0.29	-0.546**	-0.706**	-0.651**	-0.753***	-0.698**	-0.707**	-0.72**	-0.718**	-0.719***
							(0.195)	(0.202)	(0.203)	(0.203)	(0.199)	(0.203)	(0.204)	(0.205)	(0.2)
H3a	Centrality* CtoF									0.685*		1.087**				1.105**
										(0.333)		(0.353)				(0.356)
H3b	Centrality* CtoD										-0.66+	-1.105**				-1.147**
											(0.354)	(0.375)				(0.379)
H4a	Brokerage* CtoF												0.253		0.204	0.354
													(0.321)		(0.35)	(0.341)
H4b	Brokerage* CtoD													0.253	0.155	-0.042
														(0.398)	(0.433)	(0.422)
	R²	0.144	0.181	0.169	0.204	0.180	0.214	0.155	0.268	0.283	0.286	0.322	0.270	0.271	0.271	0.327
	Adj R²	0.094	0.128	0.115	0.148	0.127	0.158	0.100	0.207	0.218	0.222	0.256	0.204	0.205	0.201	0.253
	F	2.868	3.425	3.147	3.611	3.393	3.836	2.827	4.369	4.370	4.439	4.899	4.090	4.110	3.841	4.400

Note: +$p<0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided)
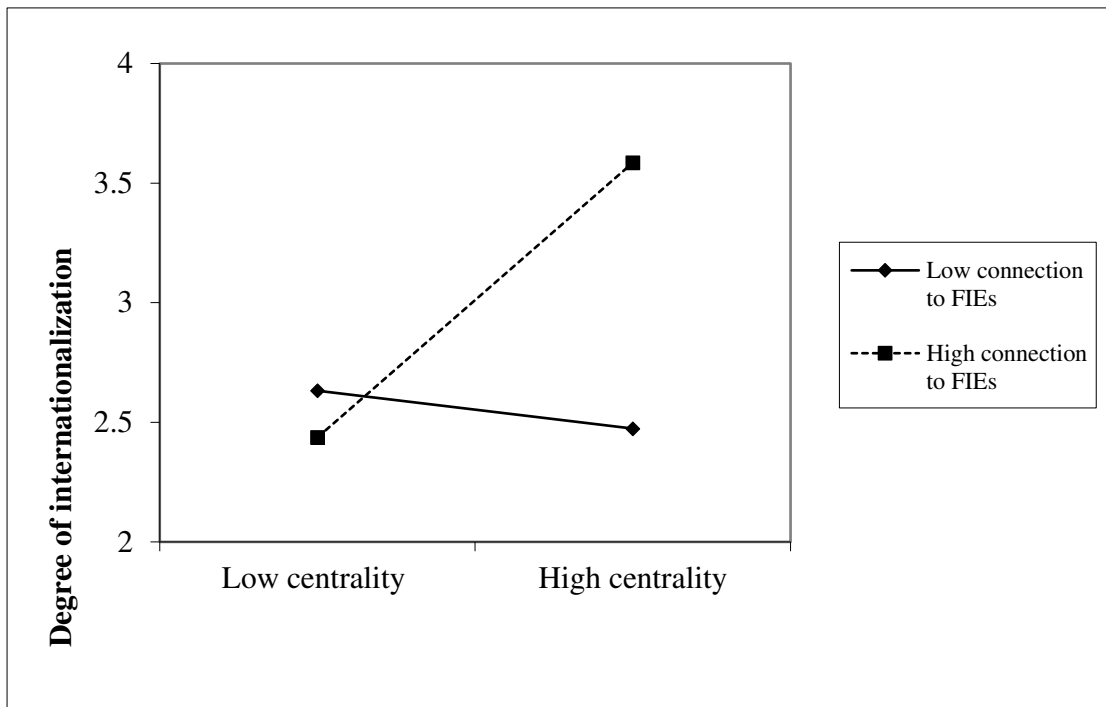
Figure 1 Interaction effect of the connections to FIEs on the relationship between centrality and the degree of internationalization
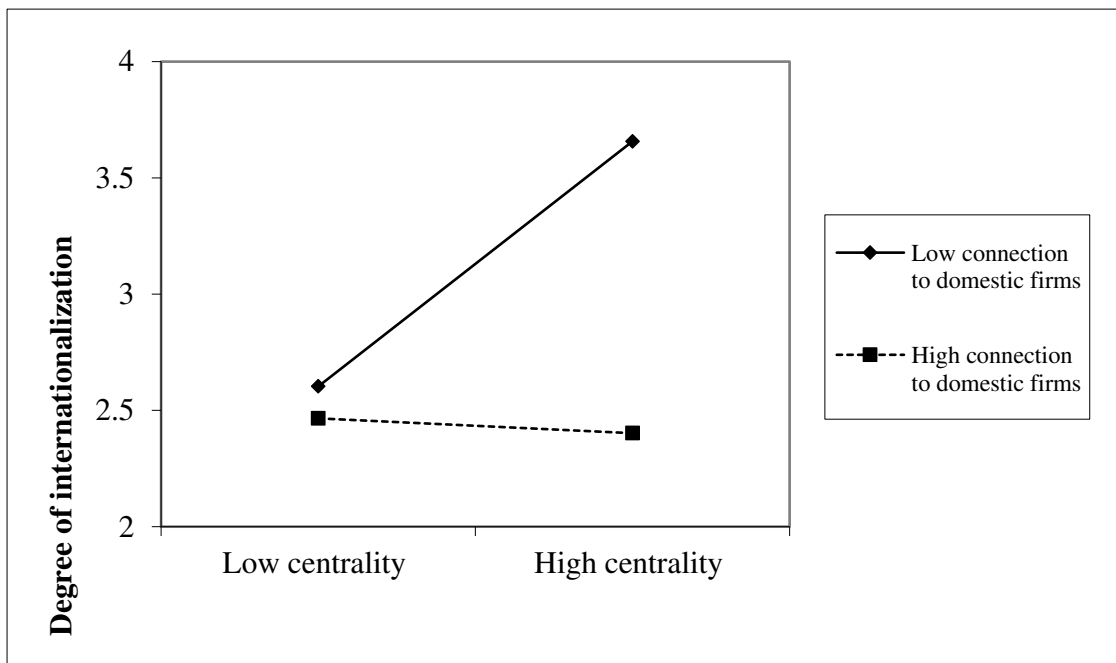

Figure 2 Interaction effect of the connections to domestic firms on the relationship between centrality and the degree of internationalization