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Subsidiary roles and dual knowledge flows between MNE subsidiaries and headquarters: The moderating effects of organizational governance types

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ABSTRACT

In this paper, we investigate how various types of subsidiary roles affect dual knowledge flows between a focal subsidiary and the multinational enterprise's headquarters, a thus far overlooked topic in the knowledge management literature. We propose that subsidiaries with a world mandate have a stronger positive impact on dual knowledge flows than subsidiaries with a specialized contributor role. In contrast, we argue that subsidiaries with a local implementer role have a negative impact on dual knowledge flows. Further, we investigate the moderating effect of two different organizational governance types, namely, belonging to a South Korean business group (i.e., *Chaebol*), and being a small and medium-sized enterprise. Overall, our results from a sample of 1213 foreign manufacturing subsidiaries from 191 South Korean MNEs provide empirical evidence that validates our hypotheses.

1. Introduction

Knowledge transfer within multinational enterprises (MNEs) has been in the spotlight of academic research for over two decades (Kong, Ciabuschi, & Martín, 2018; Xie, Fang, & Zeng, 2016). Generally, the literature on MNE knowledge management revolves around either traditional forward knowledge transfer (Eden, 2009; Kuemmerle, 1999) or less conventional reverse knowledge transfer (Driffield, Love, & Yang, 2016; Fu, Sun, & Ghauri, 2018; Najafi-Tavani, Giroud, & Sinkovics, 2012; Rabbiosi & Santangelo, 2013). Nevertheless, both these literature streams focus on one-way knowledge flows (Eden, 2009; Mudambi, Piscitello, & Rabbiosi, 2014; Yang, Mudambi, & Meyer, 2008). However, knowledge flows within an MNE usually take place in a dual way, resembling the notion of global integration as Berry (2014) proposed in the context of MNEs in both developed and emerging countries. For example, in the past, Samsung Electronics' headquarters transferred its technological know-how and skills to many of its foreign subsidiaries, particularly in emerging markets, by dispatching expatriate engineers or R&D personnel, and building advanced facilities (Lee, MacMillan, & Choe, 2010; Lee, Ryu, & Kang, 2014). Simultaneously, the foreign subsidiaries of Samsung Electronics in developed countries/regions, such as the U.S. or Western Europe, have transferred their absorbed knowledge to the headquarters by strategic asset-seeking in advanced host economies.

As time passed, some emerging markets (e.g., China and India) have grown in both market size and technology levels based not only on learning by hiring from, or joint ventures with, foreign-invested companies (Kumaraswamy, Mudambi, Saranga, & Tripathy, 2012; Shi, Sun, Pinkham, & Peng, 2014), but also making vast R&D investments in technologies (Choudhury & Khanna, 2014; Li & Xie, 2016) and burgeoning software power (Lema, Quadros, & Schmitz, 2012). Hence, the MNE headquarters in newly industrialized countries (NICs) can benefit from absorbing knowledge originating from their worldwide network of subsidiaries. This reversely transferred knowledge can be integrated with existing knowledge in the headquarters, which then retransfers integrated knowledge to the focal subsidiary where the basic knowledge originated. This is gradually becoming the typical pattern of dual knowledge flows in MNEs from emerging markets or NICs (Kang & Lee, 2017).

However, this critical type of dual knowledge transfer or flow has been largely ignored in prior knowledge studies (e.g., Driffield et al., 2016; Eden, 2009; Mudambi et al., 2014; Yang et al., 2008). Therefore, we contribute to the knowledge-based view (KBV) literature by conceptually and empirically addressing the topic of dual knowledge flows

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between a focal subsidiary and its MNE headquarters. In so doing, we link KBV to the internationalization learning process view (Fu et al., 2018), and emphasize that the process of acquiring knowledge and learning critically determines the internationalization process (Ghauri, Elg, Wang, & Rosendo, 2016; Ling-Yee, 2004; Petersen, Pedersen, & Lyles, 2008). Moreover, we argue that the subsidiary's role can critically affect the dual knowledge flows and can be interpreted as the imposed function of configuring the focal subsidiary, its headquarters, and peer affiliates association as formal and informal management systems (Birkinshaw & Morrison, 1995). The roles of subsidiaries may have insinuated meanings in terms of the degree of competence and autonomy that the focal subsidiary has (Birkinshaw & Morrison, 1995; Nair, Demirbag, & Mellahi, 2015). We thus hypothesize they have crucially differential effects on dual knowledge flows. Finally, going one step further, we also propose that different organizational governance types, i.e., business groups vs. small and medium-sized enterprises (SMEs), moderate the relationship between subsidiary roles and dual knowledge flows. To validate our hypotheses on the relationship between subsidiary roles, dual knowledge flows, and the moderating effects of organizational governance types on this relationship, we investigate a sample of 1213 foreign manufacturing subsidiaries of 191 MNEs from a NIC country, namely, South Korea (hereafter, Korea).

2. Theoretical framework

2.1. Headquarters-subsidiary knowledge flows

As mentioned in the introduction, the majority of prior literature (Eden, 2009; Mudambi et al., 2014; Yang et al., 2008) focuses on one-way knowledge flow, either traditional forward or reverse transfer. However, dual knowledge flows between headquarters and subsidiaries, i.e., when the parent company utilizes knowledge originating from a focal subsidiary and later transfers integrated knowledge back to this focal subsidiary, have been largely overlooked despite their growing relevance for many MNEs today.

Traditionally, MNEs are conceptualized as creators of knowledge that is later transferred and exploited abroad to earn rents from the knowledge-based assets created at the headquarters and exploited in local markets as a primary motivation for foreign direct investments (FDI) (Eden, 2009; Kuemmerle, 1999). Building on the knowledge-based view of the firm, knowledge is considered not just a strategic resource (Rabbiosi & Santangelo, 2013) but the pivotal component of competitive advantage explaining the MNE's existence (Ambos, Ambos, & Schlegelmilch, 2006; Driffield et al., 2016; Kogut & Zander, 1993). In exploiting knowledge, early studies considered only forward knowledge transfers from the headquarters to the subsidiary (Eden, 2009; Michailova & Mustaffa, 2012; Vernon, 1966).

However, a more recent conceptualization of the firm positions the headquarters within a horizontally and/or vertically integrated network of knowledge flows (Eden, 2009). Multinationals are considered "a geographically distributed innovation network, with the capacity to assimilate, generate and integrate knowledge on a worldwide basis" (Frost & Zhou, 2005, p. 676). Dispersed subunits of the firm, if they possess the required absorptive capacity (Cohen & Levinthal, 1990) and social capital (Jiménez-Jiménez, Martínez-Costa, & Sanz-Valle, 2014), can use knowledge generated in other subunits, enhancing organizational learning via knowledge transfer (Darr & Kurtzberg, 2000). In this new perspective, the headquarters in the home country is no longer the only source of knowledge, and instead, knowledge generated in the subsidiaries and shared with the rest of the network critically contributes to innovation performance (Subramaniam & Venkatraman, 2001; Yamin & Otto, 2004), parent firm performance (Driffield et al., 2016), and the creation and sustainment of the MNE's competitive advantage (Haas & Hansen, 2005; Najafi-Tavani et al., 2012; Yang et al., 2008). Thus, although knowledge (especially tacit) can be sticky and sometimes difficult to transfer within organization (Szulanski, 1996), the headquarters can also benefit from subsidiary-generated knowledge in multiple ways, including, for instance, enhancing the coordination of a global strategy, improving processes at the headquarters or in other subunits, contributing to the development of new products (Ambos et al., 2006).

Previous studies have therefore argued that MNEs need to be able to integrate and combine the diverse sources of knowledge within their network of subunits, and focus on the determinants of reverse knowledge transfers from subsidiaries to the headquarters (Frost & Zhou, 2005; Najafi-Tavani et al., 2012; Yang et al., 2008). These determinants include not only subsidiary-level characteristics such as age, host country experience, entry mode, R&D investments, distance, and intra-MNE trust (Driffield et al., 2016; Rabbiosi & Santangelo, 2013), but also headquarter-level traits such as the degree of involvement and cooperation in facilitating reverse knowledge transfers (Mudambi et al., 2014).

Despite the fact that the abundant body of research on reverse knowledge flows has clearly advanced the field, some gaps in the literature remain. Specifically, the possibility and potential effects of dual knowledge flows have been largely ignored, and only recent contributions emphasize the circular nature of knowledge circulation (Fu et al., 2018). Moreover, early studies on reverse knowledge flows deem that the more sophisticated resource endowments of developed nations make reverse knowledge flows more likely from subsidiaries located in advanced economies (Ambos et al., 2006; Gupta & Govindarajan, 2000; Porter, 1990). However, Michailova and Mustaffa (2012) recommend investing in understanding and explaining the contextual conditions and moving away from the Western-centred dominant logic. While previous research focuses on MNEs from developed countries with subsidiaries located in emerging markets (Yang et al., 2008), the recent development of some newly industrialized countries (NICs) provides fertile ground to also investigate knowledge flows from MNEs headquartered in emerging markets. While some progress has been made with studies focusing notably on India (see, for instance, Nair et al., 2015; Nair, Demirbag, & Mellahi, 2016), further studies analysing other emerging countries are needed to understand the knowledge transfer phenomenon beyond this context.

2.2. Subsidiary role

Birkinshaw and Morrison (1995) argue the subsidiary's role as a deterministic process of formal and informal management systems where the subsidiary fulfils its imposed function and determines the relationship of the focal subsidiary to its parent and sister affiliates. Headquarters' mandates or the subsidiary's own entrepreneurial initiatives have made some subsidiaries take a much more proactive role as knowledge creators, whereas others maintain a more traditional role of exploiting the competencies developed by their parent company in their local country environment (Mudambi et al., 2014). Thus, the MNE is a globally interconnected network that spans geographically dispersed units wherein each unit has its own unique strategic role and responsibilities to contribute to the knowledge inflows and outflows in the context of internal and external embeddedness (Gupta & Govindarajan, 1991; Nair et al., 2015).

Extending previous studies (e.g., Birkinshaw & Morrison, 1995; Nair et al., 2015), we conceptualize three subsidiary roles in this study: the local implementer (LI), specialized contributor (SC), and subsidiary with world mandate (SWM). First, LI's operations are usually geographically limited to a single host country with critically restricted products or value-added scope. LIs tend to show a high level of integration within the MNE's network of international operations, adapting products to the specific local demands and needs of the host country. Second, SCs are usually assigned the strategic role of focusing on specific functions or activities that require substantial expertise. Yet, their activities tend to be interconnected with those of other

subsidiaries within the MNE's network, and employed in environments where the pressure for integration is high but low for local responsiveness. Finally, SWMs have the role of operating in a strategically critical market with high levels of tangible and intangible resources with considerable global expertise (Birkinshaw & Morrison, 1995; Nair et al., 2015). Contrary to LIs, SWMs tend to have broad products or value-added scope (White & Poynter, 1984), and high levels of autonomy to manage activities and develop and implement strategies (Roth & Morrison, 1992). Typically possessing high levels of resources and expertise, they are frequently employed in environments in which both global integration and local responsiveness are needed (Birkinshaw & Morrison, 1995).

Previous research emphasizes the significant effect of the subsidiary's embeddedness in the MNE's network (Driffield et al., 2016), its role (Ambos et al., 2006; Iwasa & Odagiri, 2004; Rabbiosi, 2011; Yang et al., 2008), and autonomy (Ghoshal, Korine, & Szulanski, 1994; Noorderhaven & Harzing, 2009; Schulz, 2001) on the knowledge transfer of subsidiaries. Each of these three roles has a respective implicit meaning of the level of the focal subsidiary's competencies and autonomy (Birkinshaw & Morrison, 1995; Nair et al., 2015), and we therefore expect different and significant effects on dual knowledge flows. In the next section, we develop our hypotheses, comparing the impact of dual knowledge flows on the different types of subsidiary roles, focusing on the specific cases of business groups and SMEs.

3. Hypothesis development

Subsidiary level competencies and capabilities are crucial to initiate and determine the impact of knowledge transfer on achieving sustainable competitive advantage and long-term performance (Gupta & Govindarajan, 2000; Song, 2014). The competency level of the subsidiary is determined based on the role that it plays in the network and its host country endowments. A subsidiary unit is a knowledge-exploiting entity that is directly and indirectly connected to its headquarters within a horizontally and/or vertically integrated network of knowledge flows (Eden, 2009). Due to the complexity of knowledge to be transferred through the network, dual knowledge flows demand symbiotic collaboration between a focal subsidiary unit and the MNE headquarters. Moreover, each subsidiary has its own role in the MNE network mechanism (Minbaeva, Pedersen, Björkman, & Fey, 2014), and this unique role influences dual knowledge flows between the focal subsidiary and the MNE headquarters.

Building on previous research, we conceptualize three subsidiary roles: the *local implementer* (LI), *specialized contributor* (SC), and *subsidiary with world mandate* (SWM) (Birkinshaw & Morrison, 1995; Nair et al., 2015). The operational focus of LIs is on local production generally, and as such, the specific local knowledge created is likely to be more useful in its host countries than to the MNE headquarters. Hence, we argue that there is little motivation for knowledge transfer from a focal subsidiary to the MNE headquarters for both the subsidiary and the headquarters. In contrast, the knowledge of SWMs is extremely valuable to the MNE headquarters, since SWMs operate in a strategically important host market with high levels of resources and global expertise. SCs' resources are also valuable to the MNE headquarters since SCs possess specialized capabilities (Nair et al., 2015), although they have much narrower foci than SWMs. Hence, MNEs' headquarters need to absorb knowledge originating from SWMs and SCs, and re-transfer integrated knowledge to the SWMs and SCs, constituting future *reciprocal resource contributions* (Minbaeva et al., 2014; Song, 2014) for coordination and win-win sustainability.

Moreover, although the MNEs headquarters is interested in the knowledge held by both SWMs and SCs, we argue that SWM knowledge is more attractive to the MNE headquarters, since it is more global and its expertise is embedded in strategically critical markets with a higher contribution to the headquarters than the narrower scope of capability specialties of SCs (Blomkvist, Kappen, & Zander, 2010; Feinberg, 2000). In turn, when the MNE headquarters absorbs the SWM's knowledge compared to the SC's knowledge, it may feel the need to leverage global network learning rather than the narrower scope of the specific knowledge of SCs. Accordingly, in the case of SWMs, the MNE headquarters is inclined to more strongly allocate resources for dual knowledge flows (Blomkvist et al., 2010; Feinberg, 2000) between the focal subsidiary and the headquarters than in the case of SCs as specialists. Therefore, we hypothesize the following:

H1A. The subsidiary with a world mandate (SWM) has a stronger positive impact on dual knowledge flows between a focal subsidiary and the MNE headquarters than the specialized contributor (SC).

H1B. The local implementer (LI) has a negative impact on dual knowledge flows between a focal subsidiary and the MNE headquarters.

We argue that the above hypotheses may have different characteristics for business groups or SMEs in emerging markets, and thus draw attention to the significant impact of organizational governance types on dual knowledge flows. First, we develop hypotheses on the nature and type of dual knowledge flows in different subsidiary role types for business groups, and subsequently, for SMEs.

A business group refers to "a collective gathering of formally independent firms under the single common administrative and financial control of one family" (Chang & Hong, 2000, p. 429). A business group's "typical structure that has emerged comprises a parent with an interactive network of headquarter companies, each of which has foreign subsidiaries" (Lee & MacMillan, 2008, p. 533). Business groups are not a unique organization type in a country or region, but are a prevailing diversified organization form in a substantial number of emerging markets or NICs, even if their specific features differ case by case (Carney, Gedajlovic, Heugens, Van Essen, & Van Oosterhout, 2011; Chang & Hong, 2000; Gaur, Kumar, & Singh, 2014; Ghemawat & Khanna, 1998; Granovetter, 1994).

Business groups in emerging markets have the form of diversified corporations, which "consists of several strategic business units possessing their own resources and competencies". Hence, "the level of synergies across all business units in a diversified firm" may similarly occur in the case of synergies across all group-affiliated companies in a business group (Chang & Hong, 2000, pp. 429-430). In so doing, they can leverage beneficial resource heterogeneity among business units within the diversified corporation. In the past, business groups from emerging markets or NICs have focused on enhancing their tangible resources (e.g., financial resources or fixed assets), but over time, these business groups have become more focused on enhancing intangible resources, particularly knowledge (Lee et al., 2010). Although each individual group-affiliated company has its own knowledge reservoir or pool of knowledge accumulated in each company as a result of knowledge inflows and outflows across nodes within its globally interconnected and embedded network, the business group as a whole is a complex interconnected network of many nodes (Lee, Park, Ghauri, & Park, 2014).

A business group's complex diversified network may have knowledge flow barriers such as tacitness, complexity, and departmentalization (Lee et al., 2010; Nonaka & Takeuchi, 1995; Prahalad & Hamel, 1990). For this reason, many business groups from emerging markets or NICs, notably *Chaebols* (i.e., Korean business groups), are vertically integrated. This is an effective and efficient mechanism to overcome knowledge flow barriers, with the tight control of group headquarters, effective strategic job rotations, and cross-functional teams across group-affiliated companies (Lee et al., 2014). Furthermore, some *Chaebols*, such as the Samsung Group, have group-level R&D centres that coordinate group-level innovative knowledge exchanges using joint taskforce teams (Lee et al., 2010).

Chaebols are generally internationally diversified, with often more than hundreds of foreign subsidiaries operating in almost all host countries in the world. Until recently, some, such as the Samsung, LG,

and Hyundai Motor groups, were global leaders in their industries, and role models of successful globally-linked learning for less-developed emerging market business groups (Lee et al., 2014; Lee, 2016). These globally-leading *Chaebol* subsidiaries also have a three-fold typology of subsidiary roles (SWMs, SCs, and LIs) (Birkinshaw & Morrison, 1995). We argue that *Chaebol* subsidiaries are also characterized by a more international-orientated value chain configuration in SWMs and SCs than LIs. *Chaebol* LIs are relatively outside the scope of their MNE headquarters in terms of dual knowledge flows, since knowledge that LIs create is largely used/consumed in their respective host countries rather than at the MNE's headquarters (Spencer, 2003). Unlike other Western MNEs, *Chaebols* usually pursue a strategic position for LIs as outposts for *host-country market infiltration,* aiming to quickly penetrate and achieve robust competitive positions in these markets based on the fast-follower strategy to overcome late-mover disadvantages (Suh, Wang, Nam, & Zhang, 2014). In contrast, dual knowledge flows from SCs are more useful, *Chaebol* MNEs are highly unrelatedly diversified so that each business unit needs specialized proprietary knowledge to become a global innovator or fast follower in each highly-specialized field (Choi, Michell, & Palihawadana, 2008).

Finally, we argue that the value of dual knowledge flows for *Chaebol* MNE SWMs is the highest among subsidiary types, since to leverage, coordinate, and integrate the multi-directional knowledge flows of highly complex and unrelatedly diversified units, *Chaebol* MNEs need to focus on a multifocal strategy by coordinating both global integration and local responsiveness (Lee, 2016; Roth & Morrison, 1990, 1992; White & Poynter, 1984). Indeed, for globalized Korean business groups, globally linked learning is the most critical learning mechanism (Lee et al., 2014; Lee, 2016). This learning is created by accumulating shared learning resources that derive from all the sources of dual-layered globally networked group-affiliated MNEs. Hence, due to the characteristics of these Korean business groups, *Chaebol* headquarters seek to absorb knowledge originated from SWMs or SCs through globally linked networks, and in turn, retransfer the integrated knowledge back to the focal SWMs or SCs to apply such upgraded knowledge to their operations and further innovations (Lee et al., 2014). In addition, the group-affiliated MNE headquarters is likely to more easily leverage the globally linked knowledge flows from SWMs than SCs given their more strategically important role in terms of connecting locally-leveraged and globally-linked knowledge flows (Lee et al., 2014). Therefore, we hypothesize the following:

H2A. Within Korean business groups, the subsidiary with world mandate (SWM) has a stronger positive impact on dual knowledge flows between a focal subsidiary and the MNE headquarters than the specialized contributor (SC).

H2B. Within Korean business groups, the local implementer (LI) has a negative impact on dual knowledge flows between a focal subsidiary and the MNE headquarters.

We now turn attention to the specific characteristics of SMEs that affect the relationship between dual knowledge flows and subsidiary roles. SMEs, especially from emerging markets or NICs, suffer from both *the liabilities of smallness* and *emergingness* (Cheng & Yu, 2008; Lu & Beamish, 2001; Madhok & Keyhani, 2012). Thus, their bargaining power with subsidiaries is often limited when compared to group-affiliated MNEs, which benefit from large size and high levels of resources. Generally, as firms grow larger, knowledge sharing shows a sharp decline due to the complexity of the formal structure, weaker interpersonal relationships, lower trust, decreased connective efficiency, and less effective communications (Serenko, Bontis, & Hardie, 2007). SMEs are therefore fertile ground for knowledge flows within an organizational unit or inter-organizational units. Knowledge management can be a key capability for SMEs if they leverage it properly (Hughes, Cesinger, Cheng, Schuessler, & Kraus, 2017). However, there are significant differences in knowledge flow practices between large organizations and SMEs. In our view, the concept of looking at SMEs as a scaled-down version of MNEs is not appropriate, since SMEs face different realities, such as resource constraints, compared to MNEs (Kraus, Mitter, Eggers, & Stieg, 2017). Thus, SMEs need to be creative in leveraging the contingencies created by smallness, resource constraints, and emergingness (Desouza & Awazu, 2006).

Serenko et al. (2007) argue that the effectiveness of knowledge flows depends on the size of the firm. When the size of an organization increases, the complexity creates inertia, and the internal knowledge flows decrease. Such complexity also decreases the intra-organizational knowledge flows. Thus, our assertion is that SMEs are not a scaled-down version of MNEs or business groups. Hence, from the perspective of SMEs' headquarters, they need to integrate knowledge with the SWMs located in a strategically important market where the strategic knowledge assets exist. Further, unlike larger organizations, SMEs have limited slack resources that can be useful for dual knowledge flows between their headquarters and subsidiaries under the limited condition of leveraging "resource orchestration capabilities" (Wales, Patel, Parida, & Kreiser, 2013). Due to their liability of smallness, SMEs must develop proficiency at structuring, bundling, and leveraging their organizational resources toward new opportunities (Sirmon, Hitt, & Ireland, 2007; Sirmon, Hitt, Ireland, & Gilbert, 2011). While various strategic activities can be utilized to enact each of these processes (Sirmon et al., 2011), "the conceptual framework of resource orchestration suggests that organizations – particularly those more prone to suffer from resource-related liabilities – are dependent on their ability to efficiently and effectively structure, bundle, and leverage their resources" (Wales et al., 2013, p. 96). Hence, SMEs can achieve dual knowledge flows when the need for resource orchestration capabilities exists, e.g., the case of the world mandate subsidiary role. In contrast, we expect that SCs and LIs are less likely to conduct dual knowledge flows with the SME.

While in the previous hypotheses related to business groups we argued that SCs have a positive effect on dual knowledge flows, in the case of SMEs, we expect a negative effect, since in the SME context, SCs like LIs have a lesser willingness to share their knowledge (Mudambi & Navarra, 2004; Tsai & Ghoshal, 1998). Moreover, if SCs and/or LIs in an SME are not highly motivated, these subsidiaries can act defensively as knowledge holders and curtail knowledge flows to the SME headquarters, particularly when the knowledge is specialized and owned by limited specialist companies (Gupta & Govindarajan, 2000; Najafi-Tavani et al., 2012; Simonin, 2004). However, we expect this effect to be more pronounced for SCs than LIs, as they normally hold unique knowledge and may be reluctant to share it with others. In the case of SME SCs, the role of external embeddedness (for example, a close relationship with local suppliers and customers) is strong. If SCs have higher external embeddedness, the effect of dual knowledge flows on subsidiary power is likely to be negative since this condition can create a lesser need for knowledge transfer between the subsidiary and the headquarters (Najafi-Tavani, Zaefarian, Naudé, & Giroud, 2015). Therefore, we hypothesize the following:

H3A. Within SMEs, the subsidiary with world mandate (SWM) has a positive impact on dual knowledge flows between a focal subsidiary and the SME headquarters.

H3B. Within SMEs, the specialized contributor (SC) has a stronger negative impact on dual knowledge flows between a focal subsidiary and the SME headquarters than the local implementer (LI).

4. Data and method

4.1. Sample

The data used in this study were collected in the first quarter of 2015 to the fourth quarter of 2017 with information on 1213 foreign

manufacturing subsidiaries located in 44 countries in Asia, North America, Central and South America, Europe, Oceania, Middle East, and Africa. These subsidiaries belong to 191 MNEs, 65 of which are large firms affiliated to 30 Korean business groups (i.e., *Chaebols*), 114 are independent Korean SMEs not affiliated to business groups, and 12 are classified as other organizational types, e.g., big companies not affiliated to Korean *Chaebols*, etc.

We conceptualized dual knowledge flows between a focal subsidiary and its MNE headquarters using pre-specified criteria based on prior literature. In fact, our sampling approach and that of Dellestrand and Kappen (2011, 2012) are alike. First, the dual knowledge flows subject to investigation had to have occurred 1–10 years prior to the interview. This technique allowed us to cover relatively recent dual knowledge flows, thereby reducing the problem of respondents' retrospective recall (Cannell, Marquis, & Laurent, 1977). Second, the focal subsidiary had estimated the knowledge in joint technical activities between the subsidiary and its MNE headquarters in major projects (Downs & Mohr, 1976). Third, the knowledge had the potential to be transferable.

To collect our data, we sent a letter to each MNE's headquarters asking them to take part in this research with the help of 21 trained researchers at a leading survey institute in Korea. The first meeting was held at each MNE's headquarters in Korea to familiarize with the respective MNE management and request information for subsidiary-level details, including contacts. Our researchers concentrated on subsidiaries, as they are better informed regarding the continuous dual knowledge flows particularly in joint technical activities, they hosted with their MNE headquarters. Using a structured questionnaire, the researchers conducted face-to-face and/or telephone interviews with senior managers, middle management, and/or regular engineers and R&D personnel who took charge of joint technical projects at each subsidiary – in each case, the person(s) responding was(were) the most appropriate to answer the questions.

We performed tests for any potential dissimilarity in the responses between the different categories of respondents and found no significant difference between different groups. By conducting three pilot interviews, we pre-tested our questionnaire with minor revisions to delete ambiguous questions, items, and problematic indicators. Our researchers' meeting with respondents enhanced the reliability and validity of the data. We matched our interview data with multiple secondary data sources to allow triangulation and also collect additional information on the Korean MNEs and their foreign subsidiaries. We collected secondary data from multiple sources, including financial and accounting information on Korean MNEs from the KISLINE and KISVALUE databases, Korean outward FDI information from the Korean Ministry of Strategy and Finance (KMSF) database, and the Korea Listed Companies Association (KLCA). We also compiled data from the archives of each firm's annual reports from the Korea Information Service as well as the DART (Data Analysis, Retrieval, and Transfer System) of the Korean Financial Supervisory Service.

In addition, comparisons of firm age and firm size between the responding and nonresponding firms revealed no significant differences; nor did comparisons between early and late respondents.

4.2. Measures

4.2.1. Dependent variable

The dependent variable in this study is dual knowledge flows between a focal subsidiary and its MNE headquarters. Extending prior studies (Frost & Zhou, 2005; Gupta & Govindarajan, 2000), we captured this variable with a four-item construct in which respondents were asked to indicate on a seven-point Likert scale (1 = not at all – 7 = a very great deal), the extent to which, "In joint technical activities between the parent corporation and our subsidiary, the parent corporation utilizes knowledge originating in our subsidiary and eventually transfers integrated knowledge to us" in relation to four items: (1) packaging design/technology, (2) product design/technology, (3) process design/technology, and (4) R&D design/technology. We used the mean value of these four items to form the dependent variable. The internal reliability of the construct has a coefficient alpha of 0.858, which is regarded as a high value given the recommendation of 0.7 as a satisfactory cut-off level (Nunnally, 1978).

Table 1
Factor analysis of the dependent variable: Varimax rotation.

Dual knowledge flows between a focal subsidiary and its MNE headquarters	Components	Communality
"In joint technical activities between the parent corporation and our subsidiary, the parent corporation utilizes knowledge originating in our subsidiary and eventually transfers integrated knowledge to us" in relation to four items:		
Packaging design/technology	0.938	0.880
Product design/technology	0.957	0.915
Process design/technology	0.962	0.925
R&D design/technology	0.915	0.838
Eigenvalue	3.559	
% of Variance	88.975	

Note: The eigenvalue for the second factor is 0.332.

We undertook a principal component factor analysis with varimax rotation and Kaiser normalization to assess the indicators for dual knowledge flows between a subsidiary and its headquarters. The Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy has a value of 0.761, exceeding the acceptable cut-off level of 0.6 (Tabachnick & Fidell, 2001). The Bartlett test of sphericity returned a 0.001 significance level. As Table 1 shows, the eigenvalue for the one factor extracted is 3.559 and the value for the second factor is 0.332, indicating that only one factor could be extracted from the items used in the dependent variable. This construct explains 88.975% of the variance in relation to the extraction of the sum of squared loadings.

4.2.2. Explanatory variables

In this study, the key explanatory variables include subsidiary roles, business groups, and SMEs.

Subsidiary roles. Extending the typology of previous studies based on geographic scope and autonomy (Birkinshaw & Morrison, 1995; Nair et al., 2015), we surveyed respondents to capture three subsidiary roles: i.e., local implementer (LI), specialized contributor (SC), and subsidiary with world mandate (SWM). We obtained these three subsidiary roles through two questions: (1) Is your subsidiary currently selling products outside your host country national market; and (2) if yes, is your product responsibility rationalization/specialization or world product mandate. Detailed descriptions of the two types followed question 2 (Birkinshaw & Morrison, 1995, p. 741). Based on the interviews with respondents, we double-checked our questionnaire criteria were correct for the categorization of the three subsidiary roles, and the results show very high consistency between our questionnaire categorization and interviews. In case of inconsistency or ambiguousness in terms of a specific role of a subsidiary, we categorized the subsidiaries with an unclear role, left them out of the analyses, and assigned them as the baseline.

Organization types. First, in line with prior literature (Chang & Hong, 2000; Guillén, 2000), we coded an MNE's business group (affiliation) as whether the MNE is affiliated to one of the 30 largest Korean *Chaebols* that have undertaken foreign direct investments and listed in the Korea Fair Trade Commission (KFTC) of the largest Korean business groups. Considering KFTC maintains the list to undertake mandatory auditing for cross-subsidizations across affiliates, this list provides a robust set of firms affiliated to business groups. Our sample includes all the 30 largest Korean business groups.

Second, consistent with prior literature (Eshima & Anderson, 2017), we coded an SME MNE if that Korean MNE is a member of the Korean

Venture Business Association (KOVA), a representative Korean SME trade organization with over 11,000 member firms. To code SMEs, we constrained our sample to those with between 5 and 250 employees (Anderson & Eshima, 2013; Eshima & Anderson, 2017; Nakos, Brouthers, & Dimitratos, 2014).

Lastly, if an MNE is neither a business group nor SMEs, e.g., independent large enterprises, we assigned it as the baseline.

4.2.3. Control variables

We included in our model various controls identified in the literature as determinants with a potential effect on dual knowledge flows. First, we included each subsidiary's size, age, and ownership share as control variables at the subsidiary level. Subsidiary size is predicted to affect dual knowledge flows, as subsidiaries with greater resources or capabilities have additional organizational slack that supports dual knowledge flows between a subsidiary and its MNE headquarters (Gupta & Govindarajan, 2000). We operationalized subsidiary size as the natural log of total assets for each subsidiary, and subsidiary age as the natural log of the months from the establishment to the year of observation. We included subsidiary age as a control variable since the older the subsidiary, the more likely it is to have accumulated more knowledge based on experiential learning (Kim, Lu, & Rhee, 2012), and hence, may support knowledge creation and transfer to and from the headquarters. Following prior studies (Chan & Makino, 2007), we also included subsidiary ownership share as a proxy for subsidiary ownership structure, representing the percentage of ownership stake of a parent firm in a subsidiary in the year of establishment. Subsidiary ownership reflects the MNE's involvement in investment and effective control of a subsidiary's operation. If the MNE headquarters has more involvement and resource allocation in subsidiaries, it can help dual knowledge flows between the subsidiary and the headquarters (Dellestrand & Kappen, 2012).

Second, at the parent company level, we controlled for parent company age, size, R&D intensity, and international experience. Older, larger, more knowledge-intensive parent companies may have additional tangible and intangible resources, as well as human capital, thus supporting dual knowledge flows between the subsidiary and the headquarters (Dellestrand & Kappen, 2011, 2012). We measured parent company age as the natural log of the number of years since its founding, size as the natural log of its total assets, and R&D intensity as the percentage of R&D expenses divided by total sales (Chung, Park, Lee, & Kim, 2015). As previous studies find that MNE international learning may help the knowledge flow between subsidiaries and headquarters (Lee, 2016), we also controlled for international experience, measured by the natural log of the number of years since the first establishment of a foreign subsidiary.

Third, we considered host country effects by controlling for the cultural distance between Korea and each host country, and each host country's growth domestic product (GDP) and its growth. We operationalized cultural distance between Korea and each host country using Kogut and Singh (1988) calculation method, but unlike Kogut & Singh's use of Hofstede (1980) cultural dimensions index, our measure is based on the GLOBE cultural dimensions index (House, Hanges, Javidan, Dorfman, & Gupta, 2004), which has more up-to-date cultural values compared to Hofstede's index or other cultural frameworks (e.g., Schwartz, 1994). When cultural distance is greater, the liability of foreignness is likely to increase, and hence may be harmful for subsidiary knowledge creation and transfer, potentially reducing dual knowledge flows. Consistent with prior literature (Chung et al., 2015), each host country's GDP was measured by the natural log of annual GDP, and GDP growth was measured by the percentage of GDP decrease/growth, since these might allow firms to capture greater market advantages or market growth opportunities (Delios, Xu, & Beamish, 2008).

Finally, we also controlled for seven industry dummies, i.e., electronics and telecommunications, metal, automobile, chemical, rubber and plastic, textile, and other industries (other industry as the baseline), since industry orientation might affect resource flows in the MNE (Mudambi & Aulakh, 2005).

4.3. Common method variance

We used surveys to measure the dependent variable (dual knowledge flows) and the independent variable (subsidiary roles). To minimize the potential risk of common method variance, we collected these two variables from different respondents with a time gap of approximately 9–12 months between the survey of the dependent variable and that of the independent variable. Moreover, we collected the moderating variable (organization types) and control variables via secondary sources. These techniques can lessen the risk of common method variance that may bias accurate estimations (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Lastly, we introduced a marker variable to control for common method variance (Lindell & Whitney, 2001) and any effect on the partial correlations of the perceptual measurements. When we included the marker variable, all significant correlations remained the same, and the market variable did not significantly correlate with the perceptual measurements. Thus, common method variance would unlikely affect the outcomes of the estimations (Malhotra, Kim, & Patil, 2006; Noorderhaven & Harzing, 2009).

4.4. Statistical approach

We conducted the analysis using the multilevel model approach, given that our explanatory variables operate at different levels. Moreover, in order to address the potential self-selection bias, we implemented Heckman (1979) selection model. Hence, we ran a probit model and acquired the inverse Mills ratio values. Specifically, in the first-stage probit model we also included the *demographic distance* from Korea to host countries as measured by the Euclidean distance calculation of four component variables (i.e. life expectancy, birth rate, population under 14, and population above 65) (Kang, Lee, & Ghauri, 2017); as this factor is likely to be associated with 'the probability to report dual knowledge flows' (the dependent variable for this first-stage probit model), but not necessarily with 'the degree of dual knowledge flows' (the dependent variable for the second-stage multilevel model). When we included the demographic distance variable in our second stage model, this variable was insignificant, confirming that our choice of this variable was accurate. In this way, we could minimize the identification problem (Sartori, 2003).

In addition to the two-stage self-selection model (i.e., the first-stage probit model and the second-stage multilevel model), we also employed one-year lagged variables for both independent and control variables to further minimize potential endogeneity problems (Oetzel & Oh, 2014).

It is worth noting that not all multilevel data structures, such as ours, have a pure hierarchical structure, in which case it is required to employ a cross-classified multilevel analysis (Hillman & Wan, 2005). A foreign subsidiary's dual knowledge flows may be affected by both the parent firm to which that subsidiary is affiliated to and the host country where it is located. However, each single parent firm is likely to have subsidiaries in more than one host country. In this regard, the parent firms and the host countries are not nested. Although our data have a multilevel structure at three levels (level 3: parent firm-, level 2: host country-, and level 1: subsidiary-level), it is not a complete-three-level hierarchical structure as lower-level units (level 1) in our sample cross-classify by other higher-level units. As Hillman and Wan (2005) point out, ignoring this cross-classified multilevel nature of the data would lead to two adverse consequences. (1) "[B]ecause the model does not include all sources of variation, it can be underspecified, thus inflating the standard errors"; and (2) "using separate models to estimate cross-classified data structure is unreliable because estimation outcomes may change substantially with the inclusion of the other level…unit in a single model (Rasbash & Browne, 2001)" (Hillman & Wan, 2005, p.

332). Thus, we utilize cross-classified multilevel models to test our hypotheses in the present study (Rabe-Hesketh & Skrondal, 2008; Rasbash & Browne, 2001)[1]:

The equation for our full Stage 2 model is as follows[2]:

$$\begin{aligned} Dual\ \ KF &= \gamma_0 + \gamma_1 LIs_{t-1} + \gamma_2 SCs_{t-1} + \gamma_3 SWMs_{t-1} + \gamma_4 BGs_{t-1} + \gamma_5 \\ & SMEs_{t-1} + \gamma_6 (LIs \times BGs)_{t-1} + \gamma_7 (SCs \times BGs)_{t-1} + \gamma_8 \\ & (SWMs \times BGs)_{t-1} + \gamma_9 (LIs \times SMEs)_{t-1} + \gamma_{10} (SCs \times SMEs)_{t-1} + \gamma_{11} \\ & (SWMs \times SMEs)_{t-1} + \gamma_{12}\ \ Inverse\ \ Mills\ \ Ratio + Controls_{t-1} + Erro \\ & r \end{aligned}$$

In addition, we also conducted an OLS regression model analysis in the second-stage model as a robustness test and found consistent results.

5. Results

Table 2 shows the descriptive statistics for our sample and the correlation matrix. The highest correlation (0.87, $p < 0.001$) is between business groups and SMEs, the only one with a coefficient over 0.50. Although this correlation is relatively high, our results did not significantly change by excluding either business groups or SMEs from the estimations. To test for collinearity, we estimated our models using many different specifications and regression estimators and removed the variables with the highest correlation. None of these changes influenced our primary results. We also visually inspected plots of the raw data and residual plots and found no serious problems. To diagnose any potential multicollinearity among the variables, we checked the variance inflation factor (VIF) for each as shown in Table 2; a VIF of more than 10 is indicative of a multicollinearity problem. Yet, all VIF scores are considerably below the cut-off rate, meaning that the risk of multicollinearity is restrained (Hair, Black, Babin, Anderson, & Tatham, 2006). All VIFs are also below the stricter limit of 5.30 suggested by Hair, Anderson, Tatham, and Black (1999), therefore confirming that no multicollinearity problem influenced the sample.

As we mentioned in model specifications, in the second stage, we conducted a cross-classified multilevel model analysis including the inverse Mills ratio to study the effects of subsidiary roles and organization types on dual knowledge flows between the subsidiary and MNE headquarters at the subsidiary level. Table 3 shows the results of the cross-classified multilevel models with self-selection parameter values. Model 1 shows the results for the control variables, and Model 2 adds the main effects. Model 3 adds the interaction terms between subsidiary roles and business groups, while Model 4 adds the interaction terms between subsidiary roles and SMEs. Lastly, Model 5 includes the main effects and all interaction terms as a full model.

As the results of the control variables in Model 1 of Table 3 show, parent company age and international experience, electronics and telecommunications, metal, automobile, chemical, and rubber and plastic industries are positively and significantly associated with dual knowledge flows, while cultural distance is negatively and significantly associated with dual knowledge flows. Moreover, all of these control variables are consistently significant across all models (Models 1–5).

Model 2 introduces three subsidiary roles and two organization types as main effects, showing that both SCs ($\beta = 0.188$, $p < 0.001$) and SWMs ($\beta = 0.358$, $p < 0.001$) are positively and significantly associated with dual knowledge flows, while LI ($\beta = -0.293$, $p < 0.001$) is negatively and significantly associated with dual knowledge flows. Moreover, when comparing the beta coefficients sizes between SCs and SWMs, the latter is much larger than the former. We conducted the beta slope test for SCs and SWMs and found that the difference of beta coefficient sizes between SCs and SWMs are highly significant ($t = 4.778$, $p < 0.001$). These results are consistent in Models 3–5, and therefore H1A and H1B are supported.

Model 3 adds the interaction terms between three subsidiary roles and business groups. Model 3 shows that both the interaction term between SCs and business groups ($\beta = 0.320$, $p < 0.001$) and the interaction term between SWMs and business groups ($\beta = 0.534$, $p < 0.001$) are positively and significantly associated with dual knowledge flows, while the interaction term between LIs and business groups ($\beta = -0.288$, $p < 0.001$) is negatively and significantly associated with dual knowledge flows. Furthermore, when comparing the beta coefficient sizes between (SCs × business groups) and (SWMs × business groups), the latter is much larger than the former. As in the above test of H1A, we performed the beta slope test for (SCs × business groups) and (SWMs × business groups) and found a significant difference in beta coefficient sizes ($t = 1.975$, $p < 0.05$) between (SCs × business groups) and (SWMs × business groups). These results are consistent in Model 5, and therefore H2A and H2B are supported.

Model 4 includes the interaction terms between three subsidiary roles and SMEs. Model 4 shows that the interaction term between SWMs and SMEs ($\beta = 0.063$, $p < 0.05$) is positively and significantly associated with dual knowledge flows. In contrast, the interaction term between SCs and SMEs, and the interaction term between LIs and SMEs are both negatively associated with dual knowledge flows, but the interaction term between SCs and SMEs ($\beta = -0.091$, $p < 0.05$) is significant, whereas the interaction term between LIs and SMEs ($\beta = -0.013$, $p > 0.10$) is insignificant. These results are consistent in Model 5, and therefore H3A and H3B are supported.

Fig. 1 presents a graphical representation of our research model and the results obtained.

6. Discussion

Prior research emphasizes the significant effect of subsidiary embeddedness in the MNE network (Driffield et al., 2016) in terms of the roles of subsidiaries in knowledge transfer. In this study, we conceptually and empirically examine the effects of subsidiary- and MNE-level factors on dual knowledge flows between a focal subsidiary and its headquarters, and the impact of two common organizational governance types in South Korea – business-group (*Chaebol*) affiliated and SME MNEs. In so doing, we contribute to the field and take one step further with respect to prior literature that focuses on traditional forward and/or reverse knowledge transfers, mostly in the contexts of MNEs headquartered in advanced economies (e.g., Ambos et al., 2006). Dual knowledge flows between the focal subsidiary and the MNE headquarters is, therefore, a current and prominent phenomenon, yet only one notable exception partially analyses this in a case study of two Chinese MNEs in the communications industry, i.e., Huawei and ZTE (Fu et al., 2018), even if the authors themselves acknowledge that their study does not cover specific subsidiary-level characteristics. Further empirical analyses are called for to advance the field, and we aimed to fill this gap in the literature by studying South Korea as a representative NIC economy, focusing on the impact of subsidiary roles and organization governance types.

Drawing on a sample of 1213 foreign manufacturing subsidiaries that belong to 191 Korean MNEs, our results show that each of the three

[1] A basic three-level cross-classified intercept-only model can be expressed as follows: $Y_{i(jk)} = \gamma_{00} + \mu_{oj} + \nu_{0k} + e_{i(jk)}$, where $Y_{i(jk)}$ is the dual knowledge flows of the ith subsidiary from the (jk)th parent/host country cross-classification which is modeled by the overall intercept γ_{00}, plus residual error term $+\mu_{oj}$ for subsidiary j, a residual error term $+\nu_{0k}$ for host country k and a subsidiary level error term ei(jk) for the ith subsidiary from the cross-classification of parent firm/host country. In contrast, a simple two-level intercept-only model can be expressed written as $Y_{ij} = \gamma_{00} + \mu_{oj} + e_{ij}$.

[2] This equation includes all the effects terms proposed in the hypotheses. However, in the empirical models, we also test them separately for robustness purposes.

Table 2
Means, standard deviations, and correlations.

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	VIF
1.	Dual knowledge flow	5.14	1.46																						
2.	Subsidiary size (log)	8.08	2.93	0.11																					2.01
3.	Subsidiary age (log)	4.84	0.61	0.13	0.36																				2.24
4.	Ownership share (%)	70.91	30.57	0.02	−0.04	−0.04																			1.14
5.	Cultural distance (GLOBE)	2.33	1.06	−0.05	−0.02	−0.01	0.08																		1.99
6.	Host country GDP (log)	27.89	2.06	0.11	0.07	0.01	0.06	−0.04																	2.01
7.	Host country GDP growth	3.89	5.83	0.01	0.03	0.07	−0.03	−0.22	0.13																1.68
8.	Parent company size (log)	29.97	1.90	0.16	0.15	−0.02	0.05	−0.04	0.18	0.04															3.30
9.	Parent company age (log)	5.45	0.85	0.20	0.02	0.03	−0.02	−0.02	0.06	0.01	−0.02														1.79
10.	Parent company R&D intensity (%)	2.01	2.88	0.09	0.13	0.09	0.05	0.02	0.04	0.05	0.15	0.07													1.88
11.	International experience	5.44	1.27	0.21	0.19	0.21	0.01	−0.02	−0.10	0.11	0.15	0.07	0.03												4.07
12.	Electronics and telecommunications	0.44	0.50	0.11	0.27	0.17	0.01	0.07	0.12	−0.10	0.22	−0.17	0.16	0.29											2.93
13.	Metal	0.13	0.33	0.07	−0.12	0.01	0.01	0.06	−0.01	0.15	0.17	0.22	−0.13	0.08	−0.33										2.32
14.	Automobile	0.08	0.28	0.01	0.16	0.00	−0.04	0.03	0.06	0.02	0.01	0.11	−0.11	0.02	−0.27	−0.11									1.60
15.	Chemical	0.08	0.28	0.01	−0.07	0.08	−0.08	0.02	0.06	−0.05	−0.11	−0.13	−0.14	0.03	−0.27	−0.11	−0.09								1.51
16.	Rubber and plastic	0.06	0.23	0.01	0.07	−0.01	0.02	0.06	0.07	0.09	−0.06	−0.04	−0.13	0.02	−0.22	−0.09	−0.07	−0.07							1.38
17.	Textile	0.01	0.12	−0.02	−0.01	0.00	0.01	0.04	0.01	0.06	−0.08	0.02	−0.06	0.00	−0.11	−0.04	−0.04	−0.04	−0.03						1.09
18.	Local implementers	0.58	0.49	−0.30	−0.06	−0.11	0.01	−0.03	−0.02	0.02	−0.11	0.20	0.09	−0.16	−0.08	−0.21	0.04	0.05	0.08	0.03					4.17
19.	Specialized contributors	0.15	0.36	0.24	0.03	0.02	−0.03	−0.02	0.00	−0.02	0.04	−0.03	−0.05	0.06	0.06	0.14	0.00	−0.07	−0.08	0.01	−0.45				3.23
20.	Subsidiaries with world mandate	0.21	0.41	0.11	0.06	0.09	0.02	0.03	0.02	−0.03	0.16	−0.06	0.06	0.10	0.15	−0.01	−0.03	−0.04	−0.07	−0.04	−0.50	−0.22			3.96
21.	Business groups	0.86	0.32	0.23	0.12	0.10	−0.06	0.03	0.05	0.00	0.06	0.14	0.10	0.25	0.22	0.01	0.02	−0.02	0.02	−0.04	−0.22	0.07	0.16		5.15
22.	Small and medium-sized enterprises	0.11	0.32	−0.06	−0.13	−0.10	0.05	−0.02	−0.04	0.01	−0.06	−0.14	−0.10	−0.24	−0.22	−0.01	−0.01	0.01	−0.02	0.05	0.22	−0.06	−0.16	−0.87	5.20

Notes: Coefficients above 0.056 and below −0.056 are significant at $p < 0.05$, and those above 0.074 and below −0.074 are significant at $p < 0.01$ (two-tailed significance levels).

Table 3
Results of cross-classified multilevel analyses for dual knowledge flow.

Variables	DV: Dual knowledge flows (subsidiary level)									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE
Fixed effects										
Intercept	5.790***	0.760	7.466***	0.926	6.400***	0.924	7.235***	0.934	6.442***	0.924
Subsidiary level										
Subsidiary age (log)	0.021	0.059	0.015	0.056	0.013	0.056	0.015	0.056	0.013	0.056
Subsidiary size (log)	0.027	0.012	0.029	0.011	0.031	0.011	0.027	0.011	0.029	0.011
Ownership share (%)	0.003	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.001	0.001
(Host) Country level										
Cultural distance (GLOBE Kogut & Singh)	−0.068**	0.032	−0.066**	0.030	−0.065**	0.030	−0.066**	0.030	−0.065**	0.030
Host country GDP (log)	0.001	0.017	0.000	0.016	0.000	0.016	0.000	0.016	0.001	0.016
Host country GDP growth	0.033	0.005	0.032	0.005	0.031	0.005	0.033	0.005	0.031	0.005
Parent firm level										
Parent company age (log)	0.257***	0.035	0.276***	0.036	0.274***	0.036	0.274***	0.036	0.277***	0.036
Parent company size (log)	0.024	0.018	0.030	0.022	0.038	0.022	0.037	0.022	0.036	0.022
Parent company R&D intensity (%)	0.033	0.011	0.014	0.011	0.026	0.011	0.029	0.011	0.028	0.011
International experience (log)	0.223***	0.043	0.213***	0.041	0.217***	0.041	0.223***	0.041	0.228***	0.041
Electronics and telecom industries	0.153***	0.081	0.179***	0.077	0.181***	0.077	0.162***	0.071	0.151***	0.066
Metal industry	0.208***	0.105	0.187***	0.104	0.184***	0.104	0.172***	0.099	0.165***	0.096
Automobile industry	0.073***	0.108	0.082***	0.103	0.082***	0.103	0.071***	0.097	0.065***	0.095
Chemical industry	0.051*	0.105	0.041*	0.100	0.034†	0.101	0.033†	0.102	0.035†	0.103
Rubber and plastic industries	0.044*	0.120	0.035†	0.114	0.032†	0.114	0.032†	0.115	0.033†	0.116
Textile industry	−0.004	0.349	−0.005	0.326	−0.006	0.327	−0.007	0.322	−0.006	0.327
Subsidiary level										
Local implementers (LIs)			−0.293***	0.107	−0.275***	0.109	−0.287***	0.108	−0.264***	0.109
Specialized contributors (SCs)			0.188***	0.115	0.127***	0.117	0.199***	0.115	0.082**	0.118
Subsidiaries with world mandate (SWMs)			0.358***	0.112	0.254***	0.113	0.363***	0.112	0.365***	0.112
Parent firm level										
Business groups			0.186†	0.467	0.201†	0.478	0.177†	0.467	0.191†	0.478
Small and medium-sized enterprises (SMEs)			−0.014	0.474	−0.016	0.473	−0.005	0.472	−0.007	0.475
Cross level interactions										
LIs × Business groups					−0.288***	0.108			−0.290***	0.108
SCs × Business groups					0.320***	0.279			0.195***	0.115
SWMs × Business groups					0.534***	0.283			0.367***	0.112
LIs × SMEs							−0.013	0.474	−0.009	0.474
SCs × SMEs							−0.091*	0.536	−0.080*	0.531
SWMs × SMEs							0.063*	0.622	0.058*	0.627
Inverse Mills ratio	−0.025	0.057	−0.021	0.057	−0.023	0.057	−0.021	0.057	−0.019	0.058
Random effects										
(Host) Country level	0.046**	0.017	0.043**	0.015	0.041**	0.015	0.042**	0.016	0.041**	0.015
Parent firm level	0.068**	0.026	0.056*	0.025	0.059*	0.024	0.054*	0.024	0.057*	0.024
N	1213		1213		1213		1213		1213	
Deviance	1190.62		1134.40		1088.56		1089.87		1072.09	
χ^2	249.96		334.76		423.63		418.87		534.85	

Notes: Standardized beta coefficients reported except for the intercept and random effects. All tests are two-tailed.
† $p < 0.10$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

subsidiary roles (i.e., LIs, SCs, and SWMs) has a distinct effect on the dual knowledge flows between the focal subsidiary and its headquarters as a consequence of the specific and particular level of competency and autonomy of the focal subsidiary towards the MNE headquarters (Birkinshaw & Morrison, 1995; Nair et al., 2015). Finally, we also find empirical evidence showing that the relationship between dual knowledge flows and subsidiary roles differs for business groups and SMEs.

Our empirical evidence shows that, in general, SWMs have the strongest positive impact on dual knowledge flows, followed by SCs. In contrast, LIs have a negative impact on dual knowledge flows due to their particular mandate focused on specific adaptation to the host country. However, we further contribute by showing that these relationships are contingent on the company's specific organizational governance type. Thus, while these relationships apply to subsidiaries in business groups, SMEs have some specific characteristics that distinguish them. For SMEs, and despite SWMs maintaining their positive impact on dual knowledge flows, SCs have a negative effect, even more so than LIs. This is because, in the context of SMEs, SCs tend to have a lesser willingness to share knowledge (Mudambi & Navarra, 2004; Tsai & Ghoshal, 1998), which, together with their high external embeddedness, can create conflict and distrust, leading the subsidiary to curtail knowledge flows to the headquarters.

Moreover, the present study contributes to the KBV literature (Kogut & Zander, 1992, 1993) by linking it to the internationalization learning process view (Fu et al., 2018). The internationalization process view acclaims that learning can be positioned as an input of the internationalization process (Petersen et al., 2008), and that internationalization can be defined as a learning and knowledge acquisition process (Ghauri et al., 2016). By combining the different research streams of (1) knowledge acquisition of a focal subsidiary, (2) knowledge transfers through intra-firm networks, and (3) integration of knowledge for MNE learning capability enhancement in learning subunits, i.e., MNE headquarters and a subsidiary (Fu et al., 2018), we

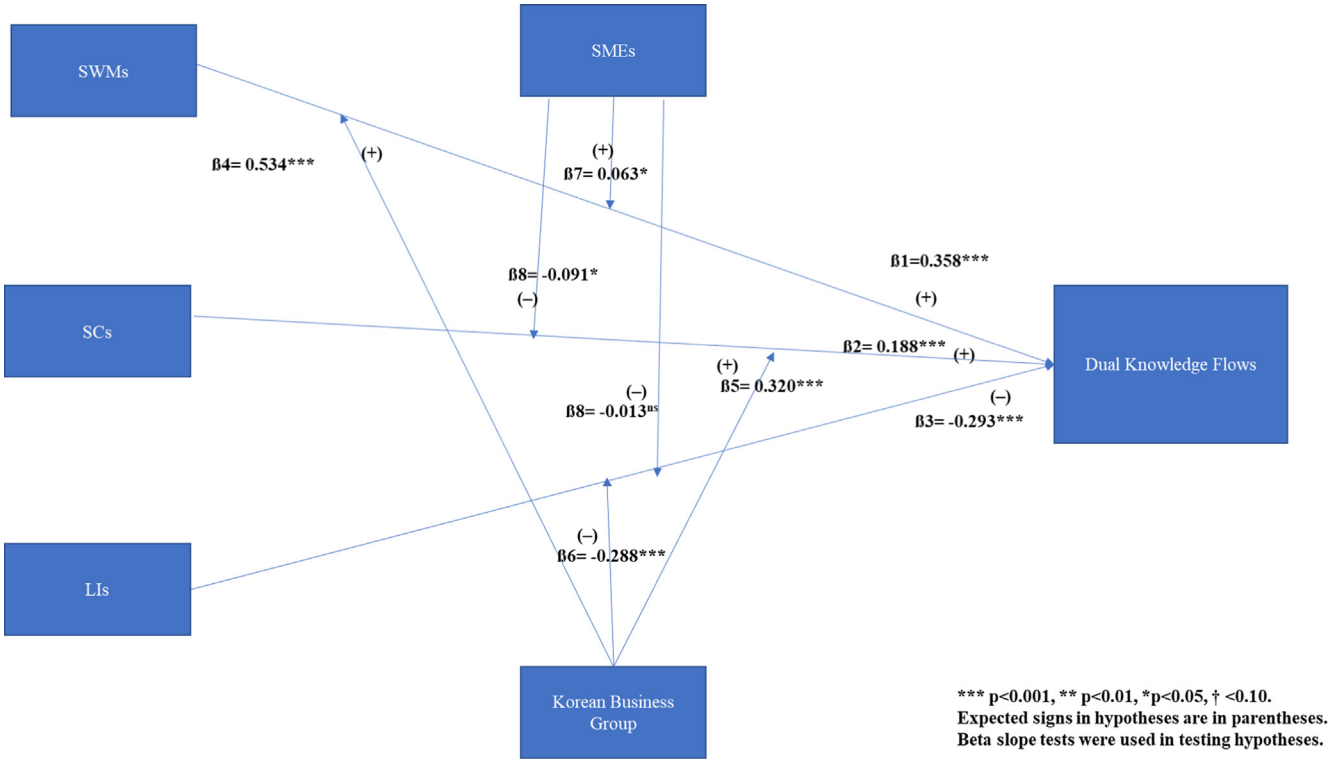

Fig. 1. Research model and results.

conceptually and empirically explore dual knowledge flows between a subsidiary and its headquarters, thus enriching the literature on the strategic management of emerging market or NIC MNEs.

Our findings of similarities and dissimilarities in the moderating effects of organizational governance types (business groups and SMEs) on the relationship between the three subsidiary roles and dual knowledge flows are meaningful for both scholars and managers. In fact, a substantial number of MNE studies overlook the critical impact of organizational governance types. However, unlike in advanced economy MNEs, in the context of emerging market MNEs there is a critical prevalence of the organizational governance form of diversified business groups with an originally domestic backgrounds, but an increasing international orientation to absorb knowledge from foreign countries and expand their global value-added networks by connecting internal trading networks with global value chain networks (Chang & Hong, 2000; Guillén, 2000; Lee et al., 2014). Vice versa, in the past, SMEs have been an emblem of advanced economies, but gradually emerging market SMEs appear frequently and successfully in the global arena to leverage their "resource orchestration capabilities" (Wales et al., 2013) as a way of developing, structuring, and bundling prowess, leveraging their organizational resources to create novel opportunities to beat their counterparts (Sirmon et al., 2007, 2011). Our findings support the notion that our distinction between business groups and SMEs is needed to fully disentangle and understand the mechanism of subsidiary roles and dual knowledge flows. This critical relevance of dual knowledge flows (and not just forward knowledge transfer or reverse knowledge flows) mean that managers should carefully design the architecture of the network of subsidiaries of the company in terms of their specific mandate, as this mandate crucially determines the incentives of the subsidiary to share knowledge with the rest of the units of the network.

In this vein, and echoing the above findings, in interviews with senior managers of one *Chaebol* firm (Samsung Electronics) and two Korean SMEs (INTOPS and MOBASE) about the impact of organizational governance for the relationship between subsidiary roles and dual knowledge flows, the importance of this managerial implication was highlighted. According to our interview with a managing director (in the business unit of IT & Mobile Communications) of Samsung Electronics, Samsung has strongly emphasized dual knowledge flows between its headquarters and the focal subsidiaries which are typically in charge of both R&D and manufacturing activities for the cases of SWM and SC. However, SWMs are generally larger than SCs so that SWMs, such as Samsung R&D Institute China-Guangzhou (SRC-G) in China, have more strongly focused on their innovative knowledge creation activities in terms of dual knowledge flows compared to SCs. Moreover, Samsung Electronics' LIs, such as Tianjin Samsung Electronics (Tianjin) and Samsung Electronics Huizhou (Guangdong Province), have a more minor role in terms of dual knowledge flows, up to the point that they have lost their attractiveness and will be closed down in 2018 and 2020 respectively.

INTOPS and MOBASE operate SWMs in China, India, and Vietnam in order to manufacture external casts of Samsung smartphones' plastic and metal-based front and rear cases. According to our interviews with senior managers of these Korean SMEs, in order to perform effective and efficient, technical cooperation with Samsung, both SMEs have strengthened their dual knowledge flows from/to their Chinese, Indian, and Vietnamese SWMs. However, INTOPS and MOBASE, as well as many other Korean SMEs, do not have SCs and Lis and the few of them to not possess enough resources and capabilities to contribute to dual knowledge flows.

We acknowledge that our paper is subject to some limitations that open up potential opportunities for further research. Our analyses and findings are aligned with the study of Song, Lee, and Khanna (2016) on the use of Samsung's dynamic capabilities to optimize internal co-opetition within the business group. This approach aims to balance both competition and cooperation within the business group. Based on our dual knowledge flows measurement model, this dynamic capability is possible due to absorptive capacity and network embeddedness in terms of learning units within the business group. However, we acknowledge that we were unable to distinguish between competition and cooperation across MNE subsidiaries. As a future research avenue, it would be interesting to investigate the issue of co-opetition between learning

units and across subsidiary roles within globalized business groups or internationally diversified MNEs.

Future research may consider the potential dark side of dual knowledge flows between a focal subsidiary and its headquarters. Indeed, knowledge integration through dual knowledge flows may generate benefits for both headquarters and subsidiaries. Nevertheless, excessive knowledge integration can be detrimental if the specific knowledge in each learning subunit is not efficiently used (c.f., Mudambi et al., 2014). Since transferred knowledge can be tacit, ambiguous, complex, and sticky (Kogut & Zander, 1992, 1993; Szulanski, 1996), the integration of knowledge can be a burden for learning units due to knowledge transfer barriers and higher costs.

Lastly, our sample is only based on a cross-sectional study of Korean MNEs. Unfortunately, we were unable to track the time evolution on subsidiary roles and dual knowledge flows in association with organizational governance types. Future studies with more available data could use longitudinal approaches to unveil the dynamics over time. Also, MNEs from other countries may have unique subsidiary roles or different organizational governance types. Since this study covers only MNEs headquartered in Korea, the generalization of our results to other geographic contexts must be undertaken with caution, and future studies could study and compare the results from other countries.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jbusres.2019.10.065.

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