# R&D activities and innovation performance of MNE subsidiaries: The moderating effects of government support and entry mode

**ABSTRACT**

In the past few decades, the extant literature has examined the impact of R&D internationalization on innovation performance at the individual team member, team or project, subsidiary, and organizational levels. Despite this progress, however, research on conditional and contextual variables that may underpin the relationships between R&D internationalization and firm innovation performance at the subsidiary level remains scarce, and this area deserves further investigation. Using a large, unique dataset containing 524 foreign firms (216 wholly-owned subsidiaries (WOSs) and 308 international joint ventures (IJVs) with R&D subsidiaries in China), we show that: (a) local government support positively moderates the effect of foreign firms' local R&D investment on their local subsidiaries' innovation performance in China; (b) this relationship is stronger for IJVs than for WOSs; and (c) local government support appears to have a stronger moderating effect for IJVs than for WOSs on this relationship. Our study contributes to the growing literature on foreign firms' internationalization of R&D, emerging market innovations and organizational entry modes.

Keywords: internationalization of R&D; local government; entry mode; China

## 1. Introduction

Researchers have long examined R&D internationalization by multinational enterprises (MNEs), with studies dating back to the late 1950s and 1960s (Dunning, 1958; Hymer, 1960/1976). Since the 1970s, there has been a surge in the research on this topic, as MNEs have increasingly expanded their R&D activities in foreign countries (Caves, 1971, 1982; Chen et al., 2012; Edler, 2004; Gassmann and Von Zedtwitz, 1998; Kafouros et al., 2020; Martinez-Roman et al., 2019; Nam and An, 2017; Su, 2017). By establishing R&D subsidiaries in multiple countries, MNEs can exploit firm-specific resources, create new technologies, and develop local responsiveness, thereby sustaining their global competitive advantages (Belderbos, 2003; Birkinshaw, 1997; Ferraris et al., 2017; Frost and Zhou, 2005; Ghoshal and Bartlett, 1990).

The number of papers addressing the various outcomes of R&D internationalization has increased significantly in the past two decades. These studies have shed more light on how R&D internationalization may impact innovation outcomes at the individual team member, team or project, subsidiary, and organizational levels (Papanastassiou et al., 2019; Vrontis and Christofi, 2020). However, studies on the various moderators (e.g., conditional and contextual variables) that may underpin these relationships between R&D internationalization and innovation performance, particularly at the local subsidiary level, remain scarce. The scant attention in this area represents a major omission, as the local subsidiary level is the primary level of analysis, which best captures the effects of MNEs' R&D internationalization efforts. This topic deserves further research in order to fully understand those complex yet important relationships (Vrontis and Christofi, 2020).

In this study, we aim to fill this gap by examining how local government support and organizational mode moderate the impact of R&D internationalization of an MNE on its subsidiary's innovation performance in an emerging market such as China, the largest overseas

R&D market for an increasing number of MNEs. There are two key reasons to focus on these two variables, local government support is indeed one of the most important factors affecting the performance of MNEs in China (Peng et al., 2008; Meyer et al., 2009); second, for an emerging market like China, the entry mode of a firm significantly determines its ability to access markets and critical resources and hence its success, yet the optimal entry mode is not clear from the outset. Our study investigates the abovementioned issues by employing a unique data set combining data from the National Bureau of Statistics of China (NBS) and patent data provided by China's State Intellectual Property Rights Office. Our sample consists of 524 foreign firms with R&D subsidiaries in China.

Drawing on the concepts and theories of government support, entry mode, and local complementary assets (Hennart, 2009; Hall and Reenen, 2000; Teece, 1986), we find that: (a) local government support positively moderates the effect of foreign firms' local R&D investment on their innovation performance; (b) this relationship is stronger for international joint ventures (IJVs) than for wholly-owned subsidiaries (WOSs); and (c) local government support appears to have a stronger moderating effect for IJVs than WOSs on this relationship.

Our study makes a number of contributions both theoretically and managerially. Firstly, our research contributes to the literature examining the linkages between government support and firm innovation. The extant literature shows that the effect of government support on corporate innovation is generally mixed globally (Brown et al., 2017; Szczygielski et al., 2017), but in China, government support may be a significant driver for innovation at least for local firms (Du and Li, 2019; Guo et al., 2016). Our study goes beyond looking at direct effects and suggests that local government support can have a positive moderating effect on the innovation performance of MNE subsidiaries, as it can facilitate accessing local complementary assets (such as

distribution networks), provide a signal of product quality, and/or offset R&D costs.

Secondly, our study demonstrates how the choice of organizational entry mode (WOS or IJV), an important moderator pertaining to the ability to access local complementary assets, further affects foreign firms' innovation performance in host countries. Contrary to the common belief that a WOS should be a preferred mode of entry for foreign firms entering China due to IJVs' ineffectiveness (e.g., bureaucracy, technology leakage, inefficiency of partners, cultural clash, etc.; Yan and Gray 1994; Yiu and Makino, 2002; Isobe et al., 2000), our study illustrates the greater value of forming an IJV in generating better innovation performance for foreign firms' local subsidiaries in China, even though IJVs are perceived as a somewhat "outdated" mode of entry now that China has become more developed as an economy.

Thirdly, we take a first step towards using the theoretical framework of local complementary assets (Hennart, 2009; Teece, 1986) to examine how foreign firms' R&D internationalization strategies (e.g., investment in local R&D) drive their innovation performance at the subsidiary level in an emerging market like China. In contrast to the view that firms compete based on firm-specific advantages only (Rugman, 1981; Rugman and Verbeke, 2001), our study suggests that accessing local complementary assets by gaining local government support and setting up IJVs are equally important and therefore enriches the existing theories on MNEs' R&D internationalization.

Managerially, our findings indicate that foreign firms' internationalization of R&D in emerging economies such as China can be fruitful considering the less established institutional environment, as long as these firms choose the right entry mode to better tap into local government supports. Furthermore, foreign firms should actively seek to form strategic partnerships with local Chinese firms instead of "going solo" to better embed themselves into the

local market context. In fact, such an entry mode may enable a better innovation performance by the local subsidiaries of foreign firms in China.

The remainder of this paper is organized as follows. First, we provide a literature review of studies on R&D internationalization and then develop hypotheses by drawing on the theories of government support, entry mode, and local complementary assets (Hennart 2009; Hall and Reenen, 2000; Teece 1986). We then discuss the research design and the method of data collection and analysis. Subsequently, we present the empirical results. In the concluding section, we discuss the managerial implications and suggest further research directions.

## 2. Theoretical background and hypothesis development

MNEs have internationalized their R&D activities over the past five decades to exploit firm-specific resources, create new technologies, and develop local responsiveness, thus sustaining their global competitive advantages (Bartlett and Ghoshal, 1989; Birkinshaw, 1997; Caves, 1971; Dunning, 1958; Hymer, 1960/1976; Papanastassiou et al., 2019). The research on R&D internationalization and firms' innovation performance can be grouped into four broad categories, comprising research at the individual team member, team or project, subsidiary, and organizational levels (Vrontis and Christofi, 2020). A small number of papers examine this issue at the individual team member and team or project levels. For example, Alnuaimi, Singh and George (2012) show that prior cross-country collaboration by individual team members of R&D subsidiaries improves innovation quality in the future. At the team or project level, Singh (2008) suggests that R&D teams that achieve cross-fertilization of ideas from various locations achieve higher-quality innovations.

Most studies on this topic have been conducted at the subsidiary and organizational levels. At the subsidiary level, the identified mechanisms that affect innovation outcomes by R&D internationalization are: knowledge accessed by subsidiaries in host countries leading to

technological diversity, which elicits a positive impact on innovation (Almeida and Phene, 2004); the subsidiary's role in sourcing local technological knowledge from the host country (Iwasa and Odagiri, 2004); the subsidiary's capabilities associated with knowledge absorption and utilization (Phene and Almeida, 2008); the impact of foreign country factors on choice of R&D location (Hegde and Hicks, 2008); the contribution of locally-recruited R&D personnel to subsidiary innovation (Li et al., 2013); and factors determining the subsidiary mode of overseas R&D (Wang et al., 2017).

At the organizational level, many studies have focused on innovation capacity as one of the outcomes of R&D internationalization. Awate, Larsen and Mudambi (2015) suggests that R&D internationalization enhances competence exploitation and competence creation for advanced economy MNEs compared to the innovation catch-up for emerging market MNEs. Winterhalter, Zeschky, Neumann, and Gassmann (2017) show that frugal innovation is enhanced when MNEs locate their R&D subsidiaries in emerging markets. Zanfei (2000) finds that R&D internationalization leads to genuine forms of knowledge creation. Other scholars indicate that R&D internationalization positively affects radical innovation (Regner and Zander, 2014), product innovation (Belderbos, 2003; Nieto and Rodrigues, 2011), technological innovation (Kafouros et al., 2008; Zeller, 2004), and process innovation (Belderbos et al., 2015).

Despite this progress, very few studies have examined the impact of R&D internationalization on innovation performance at the subsidiary level in emerging markets, and even fewer have examined the impact of various moderators (e.g., the conditional and contextual variables) on this relationship (Vrontis and Christofi, 2020). This is a significant omission because, in an emerging market such as China, these contextual variables may exert tremendous influence on the innovation performance of foreign firms' local R&D subsidiaries. However,

according to prior research on such markets, it remains unclear whether local R&D spending indeed improves firms' innovation performance locally, as the relationship can be complicated by the influence of environmental and institutional factors (Li and Atuahene-Gima, 2001; Sheng et al., 2011). Among these factors, local government support appears to be a prominent factor in the performance of MNEs in China (Sheng et al., 2011).

Research also shows that the positive effect of foreign firms' R&D investments on their performance in China is contingent upon multiple organizational factors, such as firms' export focus or foreign ownership (Zhang et al., 2007). Therefore, the effect of a foreign firm's entry mode on the effectiveness of its R&D efforts in China warrants further investigation. As a result, a thorough examination of the impact of a key contextual variable like government support, as well as a firm's entry mode, will be fruitful to better understand the important and complex relationship between a MNE's R&D internationalization and its subsidiary innovation performance in China.

---Place Figure 1 about here---

*2.1 Local government support*

We postulate that it is in the best interest of foreign MNEs to pursue a proactive strategy by seeking local government support for their R&D efforts. Governmental support reflects the extent to which administrative institutions provide support for firms in order to reduce the adverse effects of inadequate institutional infrastructures in the transition process (Xin and Pearce, 1996). Such support is particularly significant for those in transitional economies such as China given their underdeveloped "factor markets" (Peng and Heath, 1996), as it allows foreign firms to bypass discriminatory institutional pressure exerted by the host country governments (Poynter, 1985).

Local government support may play an important moderating role in the innovation performance of MNE subsidiaries for a number of reasons. First, local government support can help foreign firms to access local complementary assets, such as distribution networks, manufacturing facilities, specialized marketing and so on, allowing them to better market their innovations. In China, foreign innovators need to have access to important local complementary assets to benefit from their own innovations (Hennart, 2009; Teece, 1986). To access local complementary assets, MNEs must know their owners' specific locations and operational characteristics, as they subsequently need to contract for them and enforce the transaction. Doing so usually involves significant costs to MNEs, which may be particularly high in emerging markets (Hennart, 2012). For example, distribution is a crucial asset that foreign subsidiaries need to access in order to commercialize their innovations in an emerging market. While logistical services can usually be bought in competitive markets, MNEs are often prohibited by local governments from establishing a local distribution network in emerging markets such as China (Sun et al., 2010).

Second, the support of the government may increase the demand for a foreign firm's products by serving as a quality signal, enhancing the firm's reputation in the market and promoting the image of their new products (Lee, 2011). Consequently, such backing from the local government helps foreign firms to capture more rents from their innovations and therefore significantly enhancing the effectiveness of their localized R&D efforts. In other words, local government support strengthens the effect of the knowledge application aspect of foreign firms' innovation on their innovation performance.

Third, in China, one primary form of government support is financial. Public financing of innovation has long been studied by researchers (Griliches, 1958; Hall and Reenen, 2000; Link

and Scott, 2013), and in general it has been found to have positive impacts on innovation performance (Howell, 2017; Guo et al., 2016). Yet, few papers have examined the moderating effects of government support on innovation. With the advancement of the Chinese government's national innovation strategies, an increasing number of foreign firms are gaining governmental financial support in their R&D efforts (Segal, 2010). In order to obtain financial funds from local governments, foreign firms need to align their innovation strategies with governmental initiatives (Băzăvan, 2019). For an extremely resource-consuming strategy like R&D, this support alleviates the risks and resource constraints for foreign firms in China, thus helping to offset costs which allow them further invest in R&D activities and/or channel extra resources into the marketing and sales of new products (Guo, 1997; Tsang, 1996). Based on a combination of these possible mechanisms of local government support, we hypothesize that:

**$H_1$:** Local government support positively moderates the effect of foreign firms' local R&D investment on their innovation performance (e.g., new products sales) in emerging markets.

*2.2 Entry mode*

The type of market entry mode to be used is a key decision for foreign firms when entering emerging markets. Identifying the mode that best enables a firm to exploit its internal advantages (Buckley and Casson, 1976) and respond to exogenous factors in the host environment (Davis et al., 2000) also remains an important research topic in global strategy. Two of the most prominent modes are forming international joint ventures (IJVs) with local firms and wholly owned subsidiaries (WOSs) (Tse et al., 1997). In recent years, an increasingly dominant view argues that WOS is a better choice than IJV for foreign firms entering an emerging market for the following reasons. First, WOSs are autonomous in their strategy formulation and execution, and thus it is easier for them to achieve designated strategic goals such as learning, knowledge

absorption and application. This ability is especially important for foreign firms operating in China, where firms often need to adapt their strategies and realign their resources to cope with China's frequent environmental and market shifts (Lau et al., 2002).

Second, normative culture and self-interest may damage IJVs, particularly if advanced technology transfers are involved. Foreign partner firms are often unwilling to share the technology and know-how their local partners are eager to gain. This asymmetry is well-known in technology alliances (Park and Ungson, 1997), where it can increase the chances of knowledge leakage, misappropriation of intellectual property, and opportunistic behaviors, thus reinforcing interfirm distrust (Yan and Gray, 1994). Such problems may distract the technical staff, hindering them from acquiring knowledge and conducting sufficiently focused R&D activities.

Third, IJVs tend to be unstable (Harrigan and Newman, 1990). Opportunistic threats and direct competition between partners are fundamental culprits that cause firm alliances to dissolve unexpectedly (Das and Teng 2000; Inkpen and Beamish, 1997; Park and Ungson, 1997). This instability in turn exerts a negative impact on firm operations, especially those as important and strategic as learning and R&D activities. Most importantly, while transferring knowledge between organizations is always difficult (Szulanski, 1996), differences between firms in established and emerging economies add to the challenge (Lane et al., 2001). Moreover, alliance partners vary in the "transparency" of their organization and skills, and this transparency influences learning between partners (Hamel, 1991).

At the same time, local partners of IJVs in emerging markets generally lag behind their foreign partners in terms of technology (Luo and Park, 2001). Thus, internal transfer of knowledge is significantly constrained by the recipient's lack of absorptive capacity (Szulanski,

1996). Inevitably, the local partners' relative technological incompetence and the lack of adequate absorptive capacity can limit the extent to which IJVs can benefit from their R&D investment (Zhang, et al., 2007). Therefore, a WOS organizational mode appears more autonomous, strategically focused, and stable, as it can facilitate effective R&D activities in an emerging market. Based on this mainstream view, we hypothesize that:

**$H_{2a}$:** The effects of local R&D investment on a foreign firm's innovation performance in emerging markets (i.e., new products sales) are stronger for WOSs than for IJVs.

However, there exists an alternative perspective on the optimal mode of entry in emerging markets, even though it is considered by many somewhat "outdated" given the fast development of emerging markets like China in terms of the country's commercial, legal and institutional environments. Specifically, this perspective suggests that IJV is a better mode of entry for foreign firms entering and innovating in emerging markets.

Hennart (2009, 2012) developed a bundling model of foreign market entry mode. In contrast to MNE-centric views suggesting that WOSs always work better than IJVs, he proposes that IJVs are a better choice than WOSs in emerging markets when local complementary assets are difficult to access. He argues that because appropriability regimes are weak in emerging markets, local complementary assets (e.g., distribution, land, and labor) play a critical role for foreign subsidiaries in obtaining economic returns from innovations.

The determinants of the choice between IJVs and WOSs are their differing impacts on local product innovation and their efficiency in accessing local complementary assets (Hennart, 2009). The knowledge of how to access local complementary assets is often embedded in firms. For example, when owning local complementary assets (e.g., land, permits, licenses, and quotas) becomes crucial, the most efficient way to acquire land may be to joint-venture with the firms

that already own it (Estrin et al., 1997), as the option to take over these local firms may also be blocked by local governments in foreign countries. There are also other, less obvious firm-embedded assets (i.e., assets that cannot be acquired separately from the firm in which they are embedded). For example, customers may have strong emotional attachments to existing brands, as in the case of the beer industry. In such scenarios, IJVs provide an efficient option for MNEs to access local complementary assets and thus improve subsidiary innovation performance. Based on this less common perspective, we put forth the alternative hypothesis that:

**$H_{2b}$:** The effects of local R&D investment on a foreign firm's innovation performance in emerging markets (i.e., new product sales) are stronger for IJVs than for WOSs.

To sum up, existing literature is not clear on which entry mode would be optimal in the context of foreign firms' R&D internationalization strategy based on these theoretical arguments. We will rely on the subsequent empirical analysis to provide supporting evidence for either hypothesis.

*2.3 Local government support and entry mode*

As mentioned earlier, gaining local government support is a proactive strategy that firms can use to access local complementary assets in China. Research shows that IJVs may offer an effective mode to gain such support as well (Luo, 2001; Tse et al., 1997). We argue that, in terms of improving the effectiveness of R&D investment on foreign firms' performance in China, the effect of government support should be stronger for IJVs than for WOSs. Government support for R&D activities lowers individual R&D costs to the firm and constitutes resources that can be internally allocated (Lee, 2011). Local partners of IJVs are comparatively better able to access local complementary assets such as customers and distribution than WOSs. Thus, IJVs can exploit government support more efficiently than WOSs. For example, a product innovation

supported by the local government can possibly lead to more sales for IJVs, because the local partner has access to a wider distribution network. Therefore, we hypothesize that:

**$H_3$:** Local government support has a stronger moderating effect for IJVs than for WOSs on the relationship between foreign firms' local R&D investment and their innovation performance (i.e., new product sales) in emerging markets.

## 3. Methods

### *3.1 Data Collection and Sample*

Three sources were triangulated to produce the unique dataset for this investigation. First, we used the 2008 *Annual Industrial Survey Database* from the National Bureau of Statistics of China (NBS), which annually surveys all "above-scale" manufacturing firms (i.e., those with annual sales greater than RMB 5 million) operating in China. Our research focuses on the impact of MNEs' R&D internationalization on the innovation performance of their subsidiaries in China. Despite the lapse of time, we believe the theoretical mechanisms underlying this phenomenon largely remain the same.

Furthermore, the 2008 survey featured a unique technology section (not included in other years) that surveyed firms' R&D and technology divisions. From this survey, we obtained data about firms' technology resources: R&D investments, number of local research staff by education level, nature and number of patents, new product sales, and so forth. We identified around 600 foreign firms that meet the criteria of having R&D investments and technological staff in China. As our focus is on the extent to which R&D internationalization affects subsidiary innovation performance in China, we chose not to include foreign firms that do not make efforts in this area.

Second, we obtained data from All China Market Research (ACMR.com.cn), a leading provider commissioned by the NBS to collect various operational data about firms operating in

China. Data from this highly regarded provider form the basis for the well-circulated China Market Yearbook. We carefully cross-referenced the sample from the first data source with this data set and obtained each firm's operations data for 2008 (e.g., sales, assets, capital investments, year of establishment, etc.). We also coded additional firm information based on the firm type and country of investment origin.

Lastly, we cross-validated our patent data with China's State Intellectual Property Rights Office to ensure the reliability of the patent data. After data cleaning, we obtained a final sample of 524 firms (216 WOSs, 308 IJVs) representing seven major industries: chemical raw materials and chemical products, medicine manufacturing, general machinery, special equipment, transportation equipment, electrical machinery and equipment, and electronic and communication equipment (see Table 1 for industry descriptive statistics). In addition, we also obtained, from ACMR, firm operations data for 2009. As the NBS only surveyed firms' technology data in 2008, most of the technology variables were not measured for 2009. However, we were able to obtain new product sales for 2009 for most of the WOSs (200 of 216) in our study. The correlation between the sales numbers in 2008 and 2009 was high for these firms (.874), indicating that firm performance was consistent over the two years.

---Place Table 1 about here---

*3.2 Dependent Variables*

By adapting performance and innovation measures from previous studies (Cassiman and Veugelers, 2006; Horsky and Simon, 1983), we measured a firm's innovation performance in terms of its new product sales. Here, *new product sales* refers to the total value of new products a firm sold in 2008. New products, according to the Annual Industrial Survey Database, are defined as products brought to market in the previous year which exhibit significant

improvements over existing products in terms of technology, design, materials, or production methods. The amount includes a firm's sales of new products in the domestic market as well as sales from exports to other countries. All sales data are at the firm subsidiary level and not the R&D unit level.

*3.3 Independent Variables*

Following previous research, we operationalized *R&D investment* as a natural logarithm of the firm's R&D expenditures (Kim et al., 2012). *Government support* is measured by a natural logarithm of the total amount of financial support provided by various levels of the Chinese government to the particular firm. This proxy was adapted from Li and Atuahene-Gima (2001) and Sheng et al. (2011), who measured government support using surveys. Finally, *organizational mode* is a dummy variable, with WOSs coded as 1 and IJVs coded as 0.

*3.4 Control Variables*

Our study controls for several variables. We measured *firm size* as the natural logarithm of the total number of employees in the foreign subsidiary or joint venture unit (Zhang et al., 2007). *Firm age* is represented by the number of years since the subsidiary or unit was established. *Technical talent* captures the quality of the firm's technical staff, measured by the number of local employees holding doctoral or Master's degrees in the firm's R&D's division, divided by the total number of staff in that division. Previous studies of technological capabilities (Archibugi and Coco, 2005; Romijn and Albaladejo, 2002) have similarly examined internal sources of innovation and the staff's skill levels. *Local knowledge base* is measured by a natural logarithm of the total number of patents (invention, utility, and design) the firm holds in China. Local patents represent the stock of codified technological knowledge that the foreign firm has accumulated since its entry into the market, in line with studies that conceptualize patents as a

measure of firms' knowledge stock or capital (Hall et al., 2005; Oettl and Agrawal, 2008). Lastly, we employed industry dummy variables to capture potential cross-industry variations and heterogeneity.

## 4. Analyses and results

In Table 2, we present the descriptive statistics and correlation matrix for the sample of 524 foreign firms. The correlations for all key independent and moderating variables are reasonably low (below .4), though some are significant, as we expected. Before creating interaction terms for our regression analyses, we mean-centered each variable to reduce the possibility of multicollinearity among the key variables (Aiken and West, 1991). We checked the variance inflation factors (VIFs) for each coefficient in the regression analyses; all VIFs were less than 2.5, far below the commonly used threshold of 10, so multicollinearity does not appear to be an issue in our results.

---Place Table 2 about here---

In our model, the relationships of R&D investments with government support and the local knowledge base are likely endogenous, because a firm's R&D investments may influence how much government support it receives and the local knowledge that it has built. To correct for this potential endogeneity, we employed a three-stage hierarchical regression model (Hamilton and Nickerson, 2003; Li et al., 2010). In the first stage, we regressed government support and knowledge base on R&D investments to obtain residuals of these variables free from the influence of R&D investments, as shown in the equations below.

$$\text{Government Support} = \beta_0 + \beta_1 (\text{R\&D investments}) + \varepsilon$$

$$\text{to obtain Government Support}_{\text{residual}} = \text{Government Support} - \text{Government Support}_{\text{predicted}}$$

$$\text{Local Knowledge Base} = \beta_0 + \beta_1 (\text{R\&D investments}) + \varepsilon$$

$$\text{to obtain Local Knowledge Base}_{\text{residual}} = \text{Local Knowledge Base} - \text{Local Knowledge Base}_{\text{predicted}}$$

Next, we regressed innovation performance (New Product Sales) against the residuals of government support and local knowledge base, along with the other predictors and control variables, as shown in the equation below.

$$\text{New Product Sales} = \beta_0 + \beta_1 (\text{R\&D Investment}) + \beta_2 (\text{Government Support}_{\text{residual}}) + \beta_3 (\text{Organizational Mode}) + \beta\text{controls (Controls)} + \varepsilon$$

where Controls include firm size, firm age, technical talents, local knowledge base, and industry dummies

Lastly, we used residuals of government support to build the interaction terms (two-way and three-way interactions) with other variables to include in the full regression model shown below.

$$\text{New Product Sales} = \beta_0 + \beta_1 (\text{R\&D Investment}) + \beta_2 (\text{Government Support}_{\text{residual}}) + \beta_3 (\text{Organizational Mode}) + \beta_4 (\text{R\&D Investment} \times \text{Government Support}_{\text{residual}}) + \beta_5 (\text{R\&D Investment} \times \text{Organizational Mode}) + \beta_6 (\text{R\&D Investment} \times \text{Government Support}_{\text{residual}} \times \text{Organizational Mode}) + \beta\text{controls (Controls)} + \varepsilon$$

where Controls include firm size, firm age, technical talents, local knowledge base, and industry dummies

Because our dependent variable (new product sales) includes a notable number of observations with a value of 0, we employ a Tobit estimation approach, which is a more appropriate statistical method than ordinary least squares (OLS) regression when dealing with censored data (Tobin, 1958). In the results in Table 3, Model 1 shows the effect of the controls, Model 2 includes the independent variables, Model 3 includes the two-way interaction terms, and Model 4 includes a three-way interaction. Overall, the full regression model (Model 4) achieved high goodness-of-fit measures (Adjusted $R^2 = .328$). Firm size and local knowledge base were the only control variables with significant effects in all of the models. Furthermore, the effect of R&D investments on new product sales was significant in all models.

---Place Table 3 about here---

*4.1 Moderating Effects*

*Government support ($H_1$).* Model 3 (Table 3) showed that government support positively and significantly enhanced the effect of R&D investment on new product sales (β = .254, $p < .001$). This result supported $H_1$, which suggests that foreign firms can acquire government support as a proactive strategy to access local complementary assets and boost the effectiveness of their R&D investments in China.

*IJVs versus WOSs ($H_2$).* To compare IJVs and WOSs with regard to their ability to use their R&D investment to achieve innovative performance, we considered the R&D investment × organizational mode interaction term (Table 3, Model 3). The effect of the interaction term on new product sales was negative and significant (β = -.163, $p < .01$). This result provides support for $H_{2b}$ by empirically showing that IJVs are comparatively more effective in leveraging their R&D investments.

*Government support ($H_3$) for IJVs versus WOSs.* To test the final hypothesis, we examined the effect of the three-way interaction term of R&D investments × government support × organizational mode (Table 3, Model 4). The three-way interaction term exerted a negative but only moderately significant effect on new product sales (β = -.095, $p = 0.128$), marginally supporting $H_3$. Although this effect is not statistically significant, in a broad sense, it appears that IJVs may be better than WOSs at exploiting support from the government to increase the market impact of their R&D investments.

To facilitate interpretations of the significant two-way and three-way interaction terms in $H_1$, $H_2$ and $H_3$, we followed the procedures used by Zhang et al. (2007) and Sheng et al. (2011) to plot high versus low values, using median splits. As shown in Figure 2, the effect of R&D

investments on new product sales is stronger for high government support than for low government support. Similarly, in Figure 3, the effect of R&D investments on new product sales is stronger for IJVs than for WOSs. Lastly, even though the three-way interaction term is moderately significant in the Tobit estimation, the pattern in Figure 4 shows that the effect of R&D investments on new product sales was strongest for IJVs with high government support, compared with the other configurations. Looking at marginal effects from our Tobit analysis, we find that IJVs on average generate RMB 494,274.80 more in new product sales than WOSs (holding all other variables constant at sample means). This gives further evidence that an IJV may be more effective as an organizational mode than a WOS for foreign firms in generating innovation outcomes.

---Place Figure 2-4 about here---

As more foreign firms establish operations in China to capitalize on this rapidly growing economy, the emerging view suggests that firms should establish WOSs, instead of IJVs, to maintain maximal freedom, control, and efficiency (Cantwell et al., 2009; Johnson and Tellis, 2008; Luo, 2001). However, the results from our comparison of WOSs and IJVs show that this view may not be always optimal; in fact, IJVs as an organizational mode may be more effective in their R&D investments and in incorporating local government support to boost their investments.

*4.2 Robustness Checks*

We recognize some causality and endogeneity concerns with our study, because our data set is fundamentally cross-sectional. Although we addressed some endogeneity concerns among the independent variables (e.g., R&D investments and government support) by employing the three-stage hierarchical regression technique, we still must address whether the endogenous

independent variable, R&D investments, is correlated with the error term of the regression equation. In other words, does R&D drive firm performance, or does firm performance encourage more R&D spending?

A panel data set would be ideal for dealing with these issues, but we also undertook efforts to minimize these issues for our study. First, we controlled for necessary firm and industry characteristics. Second, with the partial 2009 firm performance data obtained for a subset of the WOS sample (n = 200), we performed the same moderated regressions and compared the results of firm performance[1] for 2008 against 2009. The estimates remained largely consistent, suggesting that the results of the two-way interactions were robust. We did not employ a two-stage least squares regression with an instrumental variable approach (commonly used to deal with endogeneity), because we were unable to justify, theoretically or empirically, an instrumental variable correlated with the endogenous regressors and uncorrelated with the error term. Although not perfect, the results of this study thus indicate the salience of foreign firms using absorptive capacity in an emerging market such as China.

**5. Discussion**

An increasing number of foreign firms internationalize their R&D activities by locating them in emerging markets such as China and India (Barrett et al., 2011). Despite the growing importance of this new R&D strategy today, very few studies have investigated its effectiveness in helping firms' local subsidiaries achieve superior innovation performance, particularly in the context of emerging markets, or how context-dependent variables such as local government support and organizational mode can moderate this complex relationship. This study attempts to tackle this issue. Using the concepts and theories of government support, entry mode, and local

[1] Due to space limitations, we did not include the 2009 empirical results in this article; these results are available on request.

complementary assets, we demonstrate that local government support, proxied by government financial support, appears to positively moderate this relationship. At the same time, the organizational mode also significantly moderates the relationship between local R&D spending and subsidiary innovation performance in China. This indicates that IJVs may be more successful than WOSs as an organizational mode for MNEs in their efforts to internationalize their R&D.

This study makes several contributions to the innovation and international business literatures. First, we suggest that gaining local government support is important for enhancing the innovation performance of MNE subsidiaries because it can facilitate accessing local complementary assets, provide a signal of quality on products, and/or offset R&D costs allowing subsidiaries to channel resources into improving market performance. This endeavor addresses the increasingly important yet underexplored topic of the effectiveness of R&D internationalization strategy in emerging markets. The extant literature has mainly explored the direct effects of government support on firm innovation (Brown et al., 2017; Howell, 2017; Szczygielski et al., 2017). Our study contributes to this stream of literature on the relationship between government support and innovation by delineating its positive moderating effects on the innovation performance of MNE subsidiaries in an emerging market.

Second, our study demonstrates that the choice of organizational entry mode is another important moderator affecting foreign firms' innovation performance in host countries. It is widely believed that WOSs represent a preferable mode of entry for foreign firms because of their autonomy in strategy formulation and execution, advantages in protecting technology and know-how, and their provision of a more stable organizational structure (Lau et al 2002; Yiu and Makino, 2002; Isobe et al., 2000; Yan and Gray 1994). In contrast, our study suggests that IJVs

may be better than WOSs to appropriate from local innovations, because they are better able to access and utilize local complementary assets in China. Our findings thus lend support to Hennart's (2009) claim that the optimal choice of entry mode depends on the relative efficiency of innovation and local complementary assets.

Third, we suggest that local complementary assets play an important role in innovation performance of MNE subsidiaries. Research on subsidiary innovation performance focuses more on the concept of firm-specific advantages and how subsidiaries transfer knowledge from their headquarters or develop new technologies locally (Rugman, 1981; Rugman and Verbeke, 2001), but it ignores the critical role of country-specific advantages or local complementary assets to profit from innovations. Drawing from the theory of complementary assets, our study shows that local government support and forming IJVs can help foreign firms to access local complementary assets and therefore is equally important for subsidiary innovation performance.

Our findings also raise managerial implications for foreign firms planning their global R&D strategies. Although conducting innovation and technological development in emerging markets may be daunting given the unfamiliarity of the environment and the risks involved, emerging markets still provide lucrative market opportunities. However, the key to the success of foreign firms' R&D strategy in China, or any emerging markets for that matter, is to access local complementary assets, gain local government support and adopt an appropriate organizational mode. Leading foreign firms such as Volkswagen, GM, P&G, and others have already adopted similar strategies by establishing major innovation centers in China. By establishing good relationships with the local government and working closely with local partners, they are conducting innovations for local customers and gaining sustainable competitive advantages in the Chinese market and elsewhere in the world.

Our study has several limitations that point to future research directions. First, despite the uniqueness of our dataset (i.e., a large-scale national innovation survey conducted by the Chinese government in 2008), it is cross-sectional. Therefore, we may not be able to fully capture the intricate relationships (which are dynamic in nature) among various key constructs. Therefore, further research should compile a longitudinal panel data set to better address the dynamic nature of the R&D-performance relationship and related methodological issues such as endogeneity and reverse causality. In addition, the Annual Industrial Survey Database from which we derived our sample does not include any marketing variables (e.g., advertising expenditure) or any characteristics of the foreign parent firm. We acknowledge that including such control variables would have been more ideal.

Second, in this study we employ secondary data to measure all key constructs, and therefore we do not have direct measures for local government support, which is intrinsically unobservable. In China, the financial support from local governments to MNEs often represents governments' high commitment to support the businesses. All else being equal, once local governments make such a concrete investment in MNEs, they will have greater interest in ensuring their success in China. Thus, government financial support, while not ideal, appears to be an adequate proxy for government support. However, future studies may consider alternative measures for this important construct.

Lastly, in this study, we only examine the effectiveness of foreign firms' R&D strategy in China. As we know, India is another main destination for foreign firms to establish R&D centers due to its highly developed software and service industries. It would be interesting to pursue a comparative study examining the differences in the drivers for the success of foreign firms' R&D internationalization strategies in these two leading emerging economies. Such cross-national

studies will certainly shed more light on important issues related to government support, organizational mode and internationalization of R&D in the context of emerging markets.

**Table 1: Industry Affiliation and Descriptive Statistics**

| Industry Classification | # of firms (n = 524) | Mean Firm Size (Employees) | Mean Firm Age (Years) |
|---|---|---|---|
| Chemical Raw Material & Chemical Products | 76 | 394.6 | 20.9 |
| Medicine Manufacturing | 58 | 542.5 | 24.2 |
| General Machinery | 67 | 786.6 | 22.9 |
| Special Equipment | 65 | 543.3 | 21.2 |
| Transportation Equipment | 66 | 1367.4 | 22.2 |
| Electrical Machinery & Equipment | 154 | 2291.4 | 20.5 |
| Electronic & Communication Equipment | 38 | 640.4 | 21.2 |

**Table 2: Descriptive Statistics and Correlation Matrix of Overall Sample (524 firms)**

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| **1. New product sales** | 1.000 | | | | | | |
| **2. R&D investment** | .448** | 1.000 | | | | | |
| **3. Government support** | .169** | .215** | 1.000 | | | | |
| **4. Technical talent** | .129** | .097* | .161** | 1.000 | | | |
| **5. Local knowledge base** | .227** | .271** | .117** | .067 | 1.000 | | |
| **6. Firm size** | .404** | .675** | .035 | .146** | .273** | 1.000 | |
| **7. Firm age** | .116** | .157** | -.010 | .106* | .176** | .179** | 1.000 |
| **Minimum** | 0 | 1.790 | 0 | 0 | 0 | 3.220 | 2 |
| **Maximum** | 18.3m | 13.960 | 1.000 | 11.720 | 6.500 | 10.670 | 68.00 |
| **Mean** | 0.45m | 8.743 | 0.121 | 2.759 | 1.218 | 6.098 | 21.634 |
| **Standard deviation** | 1.60m | 1.666 | 0.198 | 3.613 | 1.514 | 1.307 | 6.530 |

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

**Table 3: Tobit Model Results**
**(524 Firms; 208 WOSs, 316 IJVs)**

| | | DV: New Product Sales | | | |
|---|---|---|---|---|---|
| **Variables** | | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
| Constant | | -.316 (1.30) | -.333 (1.50) | -.346 (1.24) | -.355 (1.06) |
| *Controls* | | | | | |
| Firm size | | .393 (7.30)*** | .154 (2.34)* | .138 (2.22)* | .132 (2.11)* |
| Firm age | | .080 (1.63) | .038 (0.80) | .028 (0.64) | .023 (0.51) |
| Technical talent (TT) | | .120 (2.51)* | .071 (1.51) | .045 (1.01) | .054 (1.20) |
| Local knowledge base | | .110 (2.17)* | .089 (1.81)† | .084 (1.80)† | .082 (1.77)† |
| Industry dummies | | Included | Included | Included | Included |
| *Independent Variables* | | | | | |
| R&D investment (RDI) | | | .367 (5.60)*** | .537 (7.44)*** | .543 (7.53)*** |
| Government support (GS) | | | .108 (2.27)* | .056 (1.24) | .066 (1.44) |
| Org. mode (OM) | | | -.139 (-2.87)** | -.167 (-3.61)*** | -1.52 (-3.23)** |
| *2-way Interactions* | | | | | |
| RDI × GS | $H_1$ | | | .254 (5.59)*** | .310 (5.31)*** |
| RDI × OM | $H_2$ | | | -.163 (-2.71)** | -.185 (-3.01)** |
| *3-way Interaction* | | | | | |
| RDI × GS × OM | $H_3$ | | | | -.095 (-1.52) |
| *N (Obs)* | | 524 | 524 | 524 | 524 |
| *Chi²* | | 110.96*** | 163.31*** | 204.63*** | 206.94*** |
| *df* | | 10 | 13 | 15 | 16 |
| *LogL* | | -6427.57 | -6401.40 | -6308.74 | -6379.59 |
| *Sigma* | | 1.033 | 0.984 | 0.932 | 0.929 |
| *Adj R²* | | 0.186 | 0.238 | 0.322 | 0.328 |

† $p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$; Standardized coefficients shown (t-statistics in parentheses); Industry dummy estimates are omitted; Adjusted $R^2$ is derived from corresponding OLS regressions

**Figure 1: Conceptual Framework**

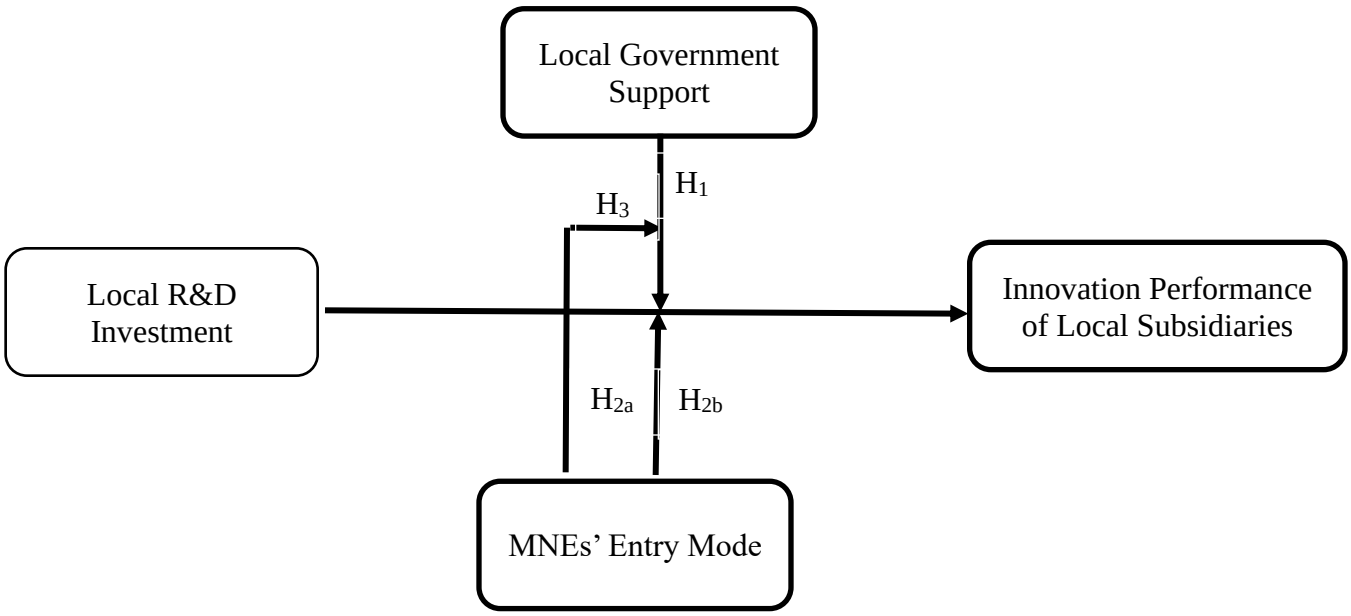


**Figure 2: Two-way Interaction Effect of R&D Investments and Government Support on New Product Sales (H1)**

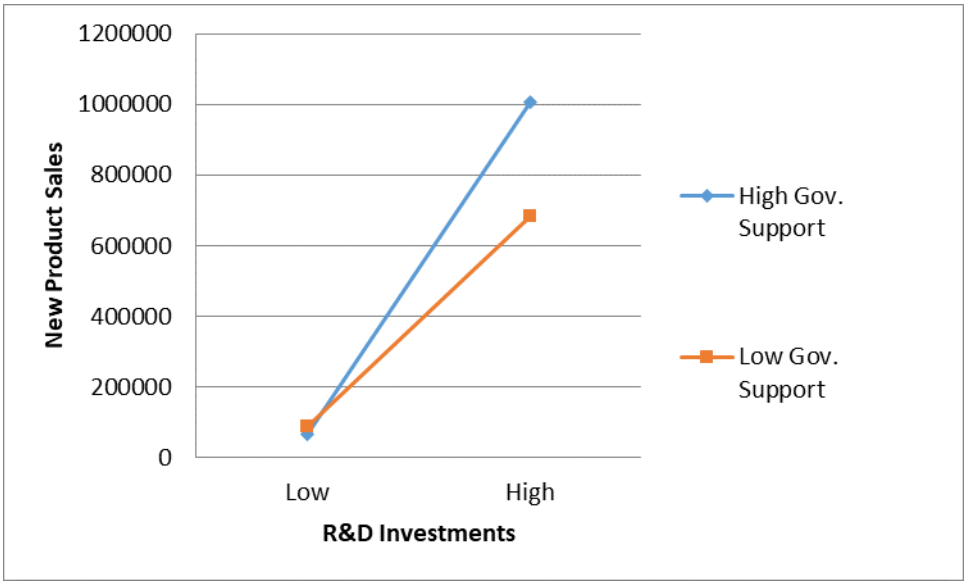



**Figure 3: Two-way Interaction Effect of R&D Investments and Ownership on New Product Sales (H2)**

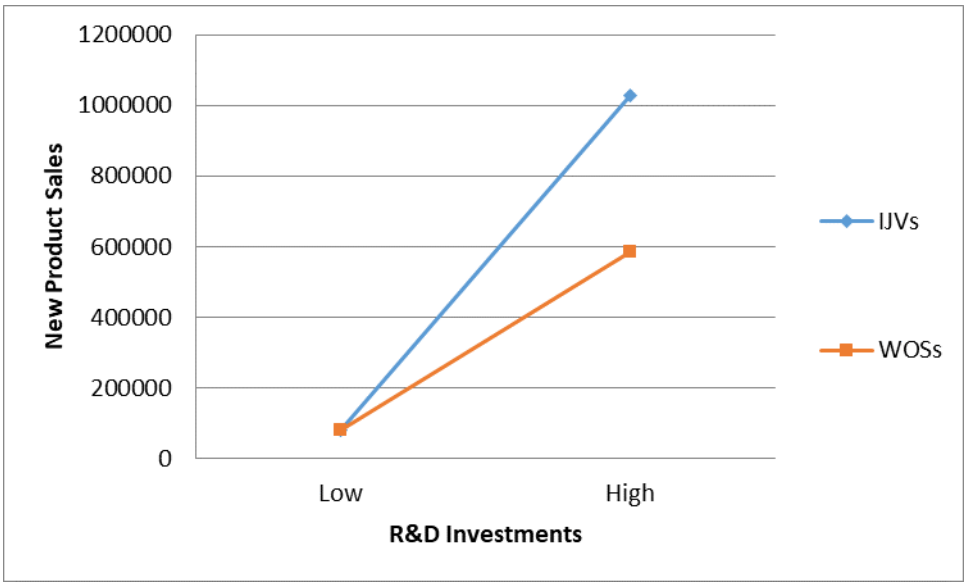
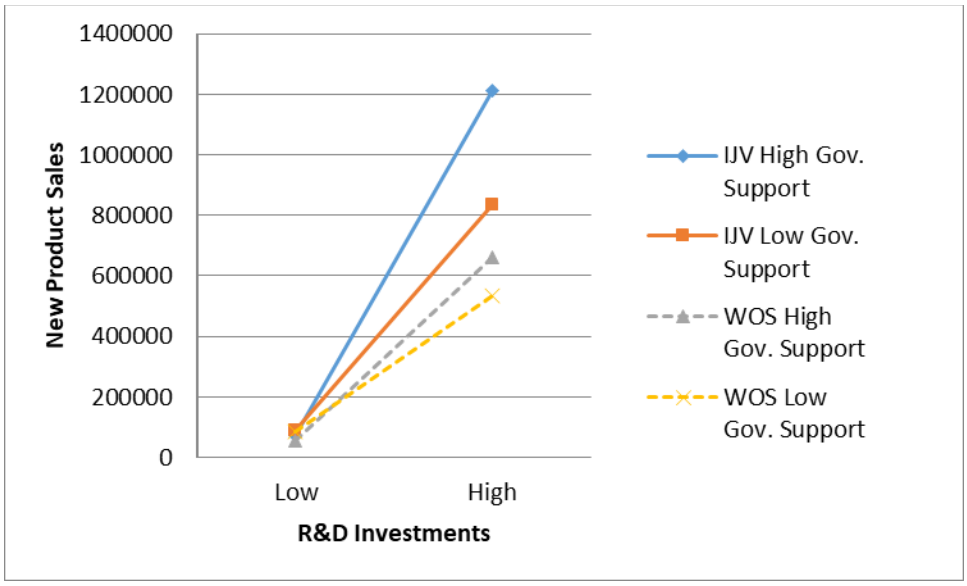


**Figure 4: Three-way Interaction Effect of R&D Investments, Government Support and Ownership on New Product Sales (H3)**



## References


Aiken, L.S., West, S.G., 1991. Multiple Regression: Testing and Interpreting Interactions. Sage: Newbury Park, CA.

Almeida, P., Phene, A., 2004. Subsidiaries and knowledge creation: the influence of the MNC and host country on innovation. Strategic Management Journal. 25, 847-864.

Alnuaimi, T., Singh, J., George, G., 2012. Not with my own: Long-term effects of cross-country collaboration on subsidiary innovation in emerging economies versus advanced economies. Journal of Economic Geography, 12(5), 943-968.

Archibugi, D., Coco, A., 2005. Measuring technological capabilities at the country level: A survey and a menu for choice. Research Policy. 34, 175-194.

Awate, S., Larsen, M.M. Mudambi, R., 2015. Accessing vs sourcing knowledge: A comparative study of R&D internationalization between emerging and advanced economy firms. Journal of International Business Studies, 46(1), 63-86.

Barrett, C., van Biljon, P., Musso, C., 2011. R&D strategies in emerging economies. McKinsey Quarterly. 1-9.

Bartlett, C. A., Ghoshal, S., 1989. Managing across borders: the transnational solution. Boston: Harvard Business School Press.

Băzăvan, A., 2019. Chinese government's shifting role in the national innovation system. Technological Forecasting and Social Change, 148, 119738.

Belderbos, R., 2003. Entry mode, organizational learning, and R&D in foreign affiliates: evidence from Japanese firms. Strategic Management Journal. 24(3), 235-259.

Belderbos, R., Lokshin, B., Sadowski, B., 2015. The returns to foreign R&D. Journal of International Business Studies. 46(4), 491-504.

Birkinshaw, J., 1997. Entrepreneurship in multinational corporations: the characteristics of subsidiary initiatives. Strategic Management Journal. 18(3), 207-229.

Brown, J.R., Martinsson, G., Petersen, B.C., 2017. What promotes R&D? Comparative evidence from around the world. Research Policy, 46(2), 447-462.

Buckley, P.J., Casson, M., 1976. The Future of the Multinational Enterprise. Holmes & Meier, NY.

Cantwell, J., Dunning, J.H., Lundan, S.M., 2009. An evolutionary approach to understanding international business activity: the co-evolution of MNEs and the institutional environment. Journal of International Business Studies. 41, 576-586.

Cassiman, B., Veugelers, R., 2006. In search of complementarity in innovation strategy: internal R&D and external knowledge acquisition. Management Science. 52(1), 68–82.

Caves, R. E., 1971. International operations: the industrial economics of foreign investment. Economica. 38, 1-27.

Caves, R. E., 1982. Multinational Enterprise and Economic Analysis. Cambridge, UK: Cambridge University Press.

Chen, C., Huang, Y., Lin, B., 2012. How firms innovate through R&D internationalization? An S-curve hypothesis. Research Policy. 41, 1544-1554.

Das, T.K., Teng, B., 2000. Instability of strategic alliances: an internal tensions perspective. Organization Science. 11(1), 77-101.

Davis, P.S., Desai, A.B., Francis, J.D., 2000. Mode of international entry: an isomorphism perspective. Journal of International Business Studies. 31(2), 239-258.

Du, W. and Li, M., 2019. Government support and innovation for new energy firms in China.

Applied Economics, 51(25), 2754-2763.
Dunning, J. H., 1958. American investment in British manufacturing industry. London: Allen & Unwin.
Edler J., 2004. International research strategies of multinational corporations: a German perspective. Technological Forecasting and Social Change. 71(6), 599-621.
Estrin, S., Hughes, K., Todd, S., 1997. Foreign direct investment in Central and Eastern Europe. London: Pinter.
Ferraris A., Santoro G., Dezi L., 2017. How MNC's subsidiaries may improve their innovative perfomance? The role of external sources and knowledge management capabilities. Journal of Knowledge Management. 21(3): 540-552.
Frost, T.S., Zhou, C., 2005. R&D co-practice and 'reverse' knowledge integration in multinational firms. Journal of International Business Studies. 36(6), 676-687.
Gassmann, O., Von Zedtwitz, M., 1998. Organization of industrial R&D on a global scale. R&D Management. 28(3), 147-161.
Ghoshal, S., Bartlett, C.A., 1990. The multinational corporation as an interorganizational network. Academy of Management Review.15(4), 603–625.
Griliches, Z., 1958. Research costs and social returns: hybrid corn and related innovations. Journal of Political Economy. 66(5), 419-431.
Guo, K., 1997. The transformation of China's economic growth pattern- conditions and methods. Social Sciences in China. 18, 12-20.
Guo, D., Guo, Y., Jiang, K., 2016. Government-subsidized R&D and firm innovation: evidence from China. Research Policy. 45, 1129-1144.
Hall, B.H., Jaffe, A., Trajtenberg, M., 2005. Market value and patent citations. Rand Journal of Economics. 36(1), 16-38.
Hall, B., Reenen, J., 2000. How effective are fiscal incentives for R&D? A review of the evidence. Research Policy. 29, 449-469.
Hamel, G., 1991. Competition for competence and interpartner learning within international strategic alliances. Strategic Management Journal. 12, 83-103.
Hamilton, B.H., Nickerson, J.A., 2003. Correcting for endogeneity in strategic management research. Strategic Organization. 1(1), 51-78.
Harrigan, K.R., Newman, W.H., 1990. Bases of interorganization co-operation: propensity, power, persistence. Journal of Management Studies. 27(4), 417-434.
Hegde, D., Hicks, D., 2008. The maturation of global corporate R&D: evidence from the activity of U.S. foreign subsidiaries. Research Policy. 37, 390-406.
Hennart, J., 2009. Down with MNE-centric theories! Market entry and expansion as the building of MNE and local assets. Journal of International Business Studies. 40(9), 1432-1454.
Hennart, J., 2012. Emerging market multinationals and the theory of the multinational enterprise. Global Strategy Journal. 2(3), 168-187.
Hymer, S., 1960/1976. The international operations of national firms. Cambridge, MA: MIT Press.
Horsky, D., Simon, L.S., 1983. Advertising and the diffusion of new products. Management Science. 2(1), 1-17.
Howell, S., 2017. Financing innovation: evidence from R&D grants. American Economic Review. 107(4), 1136-1164.
Inkpen, A.C., Beamish, P.W., 1997. Knowledge, bargaining power and international joint venture instability. Academy of Management Review. 22(1), 177–202.

Isobe, T., Makino, S., Montgomery, D.B., 2000. Resource commitment, entry timing, and market performance of foreign direct investments in emerging economies: the case of Japanese international joint ventures in China. Academy of Management Journal. 43(3), 468-484.
Iwasa, T., Odagiri, H., 2004. Overseas R&D, knowledge sourcing, and patenting: an empirical study of Japanese R&D investment in the US. Research Policy. 33(5), 807-828.
Johnson, J., Tellis, G.J., 2008. Drivers of success for market entry into China and India. Journal of Marketing, 72(3), 1-13.
Kafouros, M., Buckley, P. J., Sharp, J., Wang, C., 2008. The role of internationalization in explaining innovation performance. Technovation. 28, 63-74.
Kafouros M., Love J., Ganotakis P., Kanora P., 2020. Experience in R&D collaboration, innovative performance and the moderating effect of different dimensions and absorptive capacity. Technological Forecasting and Social Change. 150, https://doi.org/10.1016/j.techfore.2019.119757.
Kim, J., Kim, Y., Flacher, D., 2012. R&D investment of electricity-generating firms following industry restructuring. Energy Policy, 48, 103-117.
Lane, P.J., Salk, J.E., Lyles, M.A., 2001. Absorptive capacity, learning, and performance in international joint ventures. Strategic Management Journal. 22, 1139-1161.
Lau, C.M., Tse, D.K., Zhou, N., 2002. Institutional forces and organizational culture in China: effects on change schemas, firm commitment and job satisfaction. Journal of International Business Studies. 33(3), 533-550.
Lee, C.Y., 2011. The differential effects of public R&D support on firm R&D: theory and evidence from multi-country data. Technovation. 31(5), 256-269.
Li, X., Wang, J., Liu, X., 2013. Can locally-recruited R&D personnel significantly contribute to multinational subsidiary innovation in an emerging economy? International Business Review. 22(4), 639-651.
Li, H., Atuahene-Gima, K., 2001. Product innovation strategy and the performance of new technology ventures in China. Academy of Management Journal. 44(6), 1123-1134.
Link, A., Scott, J., 2013. The theory and practice of public-sector R&D economic impact analysis. In A. Link, & N. Vonortas (Eds.), Handbook on the theory and practice of program evaluation. Cheltenham, UK: Edward Elgar.
Luo, Y.D., 2001. Determinants of entry in an emerging economy: a multilevel approach. *Journal* of Management Studies. 38(3), 443-472.
Luo, Y., Park, S.H., 2001. Strategic alignment and performance of market-seeking MNCs in China. Strategic Management Journal. 22, 141-155.
Martinez-Roman, J., Gamero, J., Delgado, M., Tamayo, J., 2019. Innovativeness and internationalization in SMEs: An empirical analysis in European countries. Technological Forecasting and Social Change. 148, https://doi.org/10.1016/j.techfore.2019.119716.
Meyer K.E., Estrin S., Bhaumik S., Peng M., 2009. Institutions, resources, and entry strategies in emerging economies. Strategic Management Journal. 30, 61-80.
Nam, H., An, Y., 2017. Patent, R&D and internationalization for Korean healthcare industry. Technological Forecasting and Social Change. 117, 131-137.
Nieto, M., Rodrigues, A., 2011. Offshoring of R&D: Looking abroad to improve innovation performance. Journal of International Business Studies. 42(3), 345-361.
Oettl, A., Agrawal, A., 2008. International labor mobility and knowledge flow externalities. Journal of International Business Studies. 39, 1242-1260.
Papanastassiou, M., Pearce, R., Zanfei, A., 2019. Changing perspectives on the

internationalization of R&D and innovation by multinational enterprises: A review of the literature. Journal of International Business Studies. https://dio.org/10.1057/s41267-019-00258-0.
Phene, A., Almeida, P., 2008. Innovation in multinational subsidiaries: the role of knowledge assimilation and subsidiary capabilities. Journal of International Business Studies. 39, 901-919.
Park, S.H., Ungson, G.R., 1997. The effect of national culture, organizational complementarity, and economic motivation on joint venture dissolution. Academy of Management Journal. 40(2), 279-307.
Peng, M.W., Heath, P. S., 1996. The growth of the firm in planned economies in transition: institutions, organizations and strategic choice. Academy of Management Review. 21, 492-528.
Peng M., Wang D., Jiang Y., 2008. An institutional-based view of international business strategy: a focus on emerging economies. Journal of International Business Studies. 39, 920-936.
Poynter, T.A., 1985. Multinational Enterprises and Government Intervention. Croom Helm, London.
Romijn, H., Albaladejo, M., 2002. Determinants of innovation capability in small electronics and software firms in southeast England. Research Policy.31(7), 1053-1067.
Regner, P., Zander, U., 2014. International strategy and knowledge creation: The advantage of foreignness and liability of concentration. British Journal of Management. 25, 551-569.
Rugman, A., 1981. Inside the multinationals: the economics of internal markets. New York: Columbia Press.
Rugman, A., Verbeke, A., 2001. Subsidiary-specific advantages in multinational enterprises. Strategic Management Journal. 22, 237-250.
Segal, A., 2010. Beijing's push for homegrown technology. Foreign Affairs. 28, September, www.foreignaffairs.com/articles/66753/adam-segal/chinas-innovation-wall
Sheng, S.B., Zhou, K.Z., Li, J.J., 2011. The effects of business and political ties on firm performance: evidence from China. Journal of Marketing. 75, 1-15.
Singh, J., 2008. Distributed R&D, cross-regional knowledge integration and quality of innovative output. Research Policy, 37(1), 77-96.
Su, H., 2017. Collaborative and legal dynamics of international R&D - evolving patterns in East Asia. Technological Forecasting and Social Change. 117: 217-227.
Sun, P., Mellahi, K., Thun, E., 2010. The dynamic value of MNE political embeddedness: The case of the Chinese automobile industry. Journal of International Business Studies, 41(7), 1161-1182.
Szczygielski, K., Grabowski, W., Pamukcu, M.T. and Tandogan, V.S., 2017. Does government support for private innovation matter? Firm-level evidence from two catching-up countries. Research Policy, 46(1), 219-237.
Szulanski, G., 1996. Exploring internal stickiness: impediments to the transfer of best practice within the firm. Strategic Management Journal. 17, 27-43.
Tobin, J., 1958. Estimation of relationship for limited dependent variables. Econometrica. 26, 24–36.
Teece, D. J., 1986. Profiting from technological innovation: implications for integration, collaboration, licensing and public policy. Research Policy. 15, 285-305.
Tsang, E.W.K., 1996. In search of legitimacy: the private entrepreneur in China. Entrepreneurship Theory and Practice. 20, 21-30.

Tse, D.K., Pan, Y.G., Au, K.Y., 1997. How MNCs choose entry modes and form alliances: the China experience. Journal of International Business Studies. 28, 779-805.
Xin, K.K., Pearce, J.L., 1996. Guanxi: connections as substitutes for formal institutional support. Academy of Management Journal. 39, 1641-1658.
Yan, A.M., Gray, B., 1994. Bargaining power, management control, and performance in United States-China joint ventures: a comparative case study. Academy of Management Journal. 37(6), 1478-1517.
Yiu, D.W., Makino, S., 2002. The choice between joint venture and wholly owned subsidiary: an institutional perspective. Organization Science. 13(6), 667-683.
Vrontis, D., Christofi, M., 2020. R&D internationalization and innovation: a systematic review, integrative framework and future research directions. Journal of Business Research. https://dio.org/10.1016/j.jbusres.2019.03.031.
Wang, Y., Xie, W., Li, J., Liu, C., 2017. What factors determine the subsidiary mode of overseas R&D by developing-country MNEs? Empirical evidence from Chinese subsidiaries abroad. R&D Management. 48, 253-265.
Winterhalter, S., Zeschky, M.B., Neumann, L., Gassmann, O., 2017. Business models for frugal innovation in emerging markets: The case of the medical device and laboratory equipment industry. Technovation, 66-67, 3-13.
Zanfei, A., 2000. Transnational firms and the changing organisation of innovative activities. Cambridge Journal of Economics, 24(5), 515-542.
Zhang, Y., Li, H.Y., Hitt, M.A., Cui, G., 2007. R&D intensity and international joint venture performance in an emerging market: moderating effects of market focus and ownership structure. Journal of International Business Studies. 38(6), 944–961.
Zeller, C., 2004. North Atlantic innovative relations of Swiss pharmaceuticals and the proximities with regional biotech arenas. Economic Geography. 80(1), 83-111.