country R&D determinants of MNE entry strategy
: A study of ownership in the automobile industry

류성호, ChristopherWilliams · AlinaVrabie

Research industry how host-country R&D impacts entry strategy of technology-intensive MNEs.
E-mail: willChris@mne.res.co

[ABSTRACT]

We investigate how host country R&D influences ownership decisions made by technology-intensive multinational enterprises (MNEs) as they internationalize. We draw from institutional and resource based theories, as well as literature on agglomeration and clusters, and construct a unique dataset of 1324 foreign investments recorded by German automobile manufacturers between 2005 and 2012 for our empirical tests. We find that in host countries that are cluster-abundant there will be a greater likelihood that technology-intensive MNEs will adopt joint ventures over wholly-owned subsidiaries, and will more likely use a lower equity stake in any joint venture. We find partial support for the influence of other aspects of host country R&D, including innovation output and inward technology FDI. Various robustness tests and insights from selected cases provide further support. Importantly, findings demonstrate the importance of multi-dimensional characteristics of host country R&D over and above those such as market size, political stability and cultural distance that are more commonly utilized and discussed in the entry strategy literature. The findings have implications for host country policy as well as strategy-makers in MNEs seeking to compete on the basis of globalized R&D.

[KEYWORDS] *ownership decisions, Patenting, Clusters, Technology transfer, Automobile industry*

1. INTRODUCTION

The internationalization of R&D by multinational enterprises (MNEs) has been taking place for over 40 years (Wortmann, 1990), and has continued relentlessly (OECD, 2007). MNEs have increasingly internationalized in order to be close to sources of R&D in host countries. Overseas subsidiaries of MNEs act as a vital link between host country R&D and MNE networks, allowing the MNE to update strategic assets through internationalization (Cantwell and Mudambi, 2005; Dunning, 2000). Industries such as pharmaceuticals, IT development, aerospace, and smart phones have become characterized by MNEs with vast, continually evolving global networks of R&D.

Given this phenomenon, the relationships between R&D characteristics of host countries and internationalization strategy of MNEs are important to understand. Berry, Guillén and Zhou (2010) touched on this in their discussion of distance measures in international business research, showing how knowledge distance (i.e., the difference between home and host country in terms of numbers of patents and scientific articles) has a significant impact on foreign market entry choice. Hennart (2009) argued that entry mode is determined by the need to bundle local complementary assets with MNE assets, acknowledging the role that host country R&D characteristics might have in MNE internationalization. Meyer et al. (2009)highlighted the connection between access to host country tacit and intangible knowledge and entry mode.

Unfortunately, the bulk of research on MNE entry strategy, and ownership decisions in particular, does not explicitly capture host country R&D and its various forms (Canabal and White, 2008). One stream of literature on host country R&D and MNE strategy implicitly assumes the internationalization/entry mode choice has already been made, i.e., the MNE has already internationalized (e.g., Almeida and Phene, 2004; Frost, 2001). However, host country R&D matters pre-entry because it represents future-oriented technological opportunity for the MNE. It may not only attract technology-intensive MNEs to consider investing in the host country, it has the potential to determine *how* they invest in the country. While extensive research has looked at location advantages and disadvantages (Dunning, 1998, 2000), the vast body on ownership has tended to emphasize features such as market characteristics, legal barriers, cultural distance and country risk factors (e.g., Agarwal and Ramaswami, 1992; Canabal and White, 2008; Delios and Henisz, 2003; Hennart and Larimo, 1998; López-Duarte and Vidal-Suárez, 2013; Yiu and Makino, 2002). Furthermore, some research on MNE entry strategy focusses on variance in firm and industry characteristics, ignoring the potential that host country R&D may account for entry decisions (e.g., Brouthers and Hennart, 2007; Chen and Hennart, 2002; Dikova, and Van Witteloostuijn, 2007).

We believe there is a gap in the literature with respect to the links between host country R&D and MNE entry strategy. Host country R&D is particularly relevant for technology-intensive MNEs that are 'on the look-out' for R&D capabilities and technological opportunities in host countries. For technology-intensive MNEs, host country attractiveness is not just about market size and various sources of non-commercial risk, it also relates to R&D opportunities. Following their extensive literature review on entry strategy research, Ahsan and Musteen (2011) called for more research on the effect of host country attractiveness on entry strategy. We believe this should extend to upstream features of host countries, as well as the demand-side. Also, there have been calls for entry strategy research to consider the role played by local complementary assets (Hennart, 2009) and for more research on entry strategy using specific industry samples (Brouthers and Hennart, 2007).

We address this research gap by examining the links between three dimensions of host country R&D and ownership decisions (mode and equity level). These dimensions are host country innovation output (captured through patenting, an indication of the health of the country's national innovation system), the extent of clusters and R&D collaboration in the host country (an indication of its policy towards agglomeration and related institutions for economic development through proximity and networks), and inward technology FDI (an indicator of whether the host country seeks to receive and absorb technology through internationally transferable resources). Drawing on institutional and resource-based theories we develop hypotheses for the effects of these determinants. Empirical tests using data on 1324 foreign

investments made by technology-intensive German automobile manufacturers in 65 countries reveal: (1) host country R&D determinants are an important predictor of ownership decisions adopted by technology-intensive MNEs in their internationalization; (2) host country R&D determinants are more important for these types of companies than market size, political stability and cultural distance, which are commonly used independent variables in the entry strategy literature; (3) clustering is the most consistent host country R&D determinant, although innovation output and inward tech FDI play a role; (4) as JVs are defined at higher equity thresholds, the effects for host country clustering and inward technology FDI become stronger; (5) different aspects of a host country's R&D environment have different impacts on MNE entry strategy.

Our study makes three important contributions. Firstly, we add to the literature on host country R&D determinants of entry strategy by technology-intensive MNEs. We show the importance of clustering over innovation output and inward technology FDI as a factor encouraging inward investors to opt for a JV and lower equity stakes within JVs. Secondly, we show how institutional and resource-based explanations of this phenomenon are relevant to explaining entry strategy of technology-intensive MNEs. This suggests technology-intensive MNEs are more concerned about legitimacy and knowledge seeking imperatives than economizing on transaction costs as they expand abroad. Thirdly, we shed new light on internationalization patterns in the global automotive industry, an industry that had $105B of spending on R&D in 2014 (Strategy&, 2015) and one that accounted for 15.4% of global R&D spending in 2016.1 We identify reasons why MNEs in the automotive industry seek JVs and lower equity stakes in foreign markets, despite the overarching tendency towards full control and higher equity stakes in foreign investments made by automotive companies possessing formidable firm-specific advantages (Pfaffmann and Stephan, 2001; Talay and Cavusgil, 2009; Yiu and Makino, 2002).

2. Understanding MNE ownership decisions

Early work on ownership drew largely from transaction cost and internalization theory and the need for firms to economize on transaction costs as they internationalize. More recently scholars have devoted considerable attention to alternative theoretical bases for understanding ownership (i.e., the choice between a wholly-owned subsidiary (WOS) and a joint venture (JV)) and the underlying equity stake in international markets, prominently institutional and resource-based theories (Brouthers and Hennart, 2007; Mani et al., 2007). Yiu and Makino (2002), for instance, built on institutional theory (DiMaggio and Powell, 1983; Scott, 1995) to argue that MNE ownership decisions can be seen as a response to isomorphic pressures in the external environment, as well as internal organizational practices and routines. Institutions provide the structure for investments to occur (North, 1990). This structure consists of regulative, normative (social obligations) and cognitive (collective constructions of social reality) dimensions (Scott, 1995). In this sense, institutions set "the rules of the game" through coercive, mimetic and normative mechanisms (DiMaggio and Powell, 1983; Rodriguez et al., 2005). They determine the degree of stability in society as well as the extent to which property rights are undermined (Brouthers, 2002). Williams et al. (2017) showed how institutions at supra-national level can also play a role in influencing levels of ownership adopted by MNEs in host countries. Such institutions not only provide a basis against which the MNE seeks legitimacy, they also provide "reassurance power" (Williams et al., 2017) that will help the MNE to overcome risk and uncertainty in the host country. Institutional theory suggests that in countries where the institutional environment undermines confidence, businesses will seek a lesser degree of control (North, 1990). A weak institutional environment encompasses conditions that compromise property and contract rights, therefore increasing the investment hazards. When a country has a weak institutional environment, firms are less likely to commit because a greater degree of ownership implies greater responsibility and risks (Brouthers, 2002). Hence, the institutional environment has an impact on the suitability of governance structures. MNEs will waive full ownership for their subsidiaries abroad and prefer shared ownership to counteract their subjection to institutional hazard (Delios and Beamish, 1999; Gomes-Casseres, 1990). Henisz (2000)argued a more nuanced line in that MNEs will choose shared ownership when political hazards increase but will opt

for full ownership as contractual hazards increase (i.e., possible opportunistic behaviour from local partners and/or host governments).

A further approach for understanding ownership in foreign markets revolves around resources, capabilities and knowledge. MNEs can exploit their assets in international markets, or can use international markets to augment these assets (Brouthers and Hennart, 2007). Mutinelli and Piscitello (1998) showed how MNEs opt for JVs over WOS when they need to complement in-house R&D resources. Drawing on Italian FDI data, these authors shone the spotlight on how a lack of specialized resources and capabilities in firms can be a motive for pursuing JVs in foreign markets. Such JVs help the investing firm to develop new technology and specialized capabilities. Research has also highlighted links between resource-based advantages of firms and the use of WOS mode (Brouthers and Hennart, 2007; Gomes-Casseres, 1990). Nonetheless, knowledge sourcing and learning remain a major motive for the internationalization of MNEs (Dunning, 2000; Kuemmerle, 1999), especially in knowledge-intensive industries where developing an R&D capability through overseas linkages with innovative companies and prominent knowledge centres such as universities and research institutions can be crucial to long-term performance (Iwasa and Odagiri, 2004).

3. HYPOTHESIS DEVELOPMENT

These theoretical perspectives suggest specific areas of concern for technology-intensive MNEs: gaining legitimacy and responding to isomorphic pressure in institutional theory, and augmenting and exploiting assets in resource-based logic. We examine the relevance of these concerns as MNEs consider different dimensions of host country R&D during internationalization. A summary of the core arguments is given in Appendix A (Table A1).

3.1. The host country as a generator of innovation

A technology-intensive MNE can be attracted to invest in a country because it sees the country as a generator of innovation. However, countries vary considerably in terms of their capacities to generate innovation. Innovation output, often assessed in terms of patenting productivity, is associated with sophisticated and high grade technological activity taking place in a country (Athreye and Cantwell, 2007; Frost, 2001). The occurrence of this activity will appeal to technology-intensive MNEs seeking to tap into globalized R&D.

In terms of formal institutions, countries that are large scale generators of innovation are likely to have strong and stable institutional profiles both in terms of political and regulatory environments (Waguespack et al., 2005). Such countries will have a highly regarded protection regime for intellectual property rights and investors will be able to trust in the governance infrastructure of the country in case those rights are not respected. This institutional quality of the host country can influence ownership decisions. In Dikova and van Witteloostuijn's (2007) study, for instance, JVs were seen as more preferable over WOS in countries with high levels of institutional advancement (i.e., high levels of governance quality).

In terms of isomorphic pressure in institutional theory (DiMaggio and Powell, 1983), there is unlikely to be regulative pressure to choose a specific ownership mode in connection with levels of patenting in the country. However, there may be cognitive or normative pressure for the MNE to engage in exploring new technologies in the host country and to become involved in the generation of innovations in the host country. Castellani and Zanfei (2002)briefly mentioned this as a possible factor that could explain gradual involvement of MNEs in creative activities in host countries (Castellani and Zanfei, 2002: 6). Yiu and Makino (2002)demonstrated empirically a link between isomorphic pressures and levels of ownership. MNEs will be more likely to seek legitimacy within the R&D environment of an innovation-productive host country by making lower equity stakes in JVs. These will demonstrate a willingness to explore new early stage technologies with partners (Dittrich et al., 2007) over a fully controlled WOS that is designed to exploit firm specific advantages and buffer against contextual risk (Yiu and Makino, 2002). What matters from an institutional perspective is the need to establish legitimacy in the R&D environment of the country.

From a resource-based perspective, high innovation output in a host country is seen as an indicator of high grade intangible assets and national competence in R&D. Foreign MNEs in technology-intensive industries increasingly need to tap into innovative capabilities wherever they may be in the world, they are not necessarily assumed to originate from a home country (Cantwell and Mudambi, 2005, 2011; Kuemmerle, 1999; Meyer et al., 2009). Host countries that are highly productive in patenting will possess locational factors conducive to MNEs pursuing competence-creating mandates (Cantwell and Mudambi, 2005). In March's (1991) terms, such subsidiaries will pursue explorative activities, augmenting home-based assets (Kuemmerle, 1999). According to March (1991), an exploring enterprise is one that seeks to discover new possibilities, takes on risk, and which needs to be flexible. JVs provide the structural answer to this flexibility (Dittrich et al., 2007). Exploitation, on the other hand, is aligned with competence-exploiting mandates – achieving efficiency, production, implementation and execution. Exploration is conducive to partnerships between firms from different business areas – this providing diversity in the actors involved in the innovation process and access to previously unknown knowledge and resources.

H1

The greater the innovation output of a host country, the more likely a technology-intensive foreign MNE will (a) choose a JV over a WOS, and (b) will use a lower equity stake in any JV in the host country.

3.2. The host country as a domain for clustering and R&D collaboration

A technology-intensive MNE may also consider a host country because of the state of development of its industrial clusters, i.e., concentrations of infrastructure and organizations arising through a process of agglomeration over time. This concentration can act as an inducement for MNEs to invest. Through collaborative linkages with other firms within a cluster, MNEs can benefit from spillovers, gaining knowledge and accessing specialized labor markets (De Propris and Driffield, 2006; Porter, 2000). The physical proximity promotes learning and innovation as communication becomes extensive. In certain industries – including the automotive industry – product architecture means that a change in one component will lead to changes in others (Sturgeon et al., 2008). Participating in clusters allows coordination of changes to happen quickly and efficiently. MNEs also will be able to learn about the nature of local competition (Saxenian, 1994).

From an institutional theory perspective, government policy will have a role to play in the development of advanced clusters in a host country. In this view, an MNE's ownership decision is a response to isomorphic pressures in the external environment, including regulative aspects (DiMaggio and Powell, 1983; Scott, 1995). MNEs yield to coercive pressures (Rodriguez et al., 2005) to conform and align to host country policy with respect to clusters. Porter (2000) referred to the importance for governments to continually upgrade clusters, "removing obstacles, relaxing constraints, and eliminating inefficiencies that impede productivity and innovation in the cluster" (Porter, 2000: 26), and in so doing becoming "magnets for attracting foreign investment" (Porter, 2000: 16). Given this core aim of government policy to establish and nurture clusters within its national borders (Casper, 2007), such cluster upgrading policy will be apparent to MNEs considering investment in the country. Beyond regulative institutions, Casper (2007) showed the importance of social networks linking managers across organizations within clusters. This suggests normative institutions will encourage investing MNEs to seek network advantages using lower equity stakes. In other words, MNEs will be attentive to the norm that JVs will support complementarities, alignment of activities and coordination between members (Porter, 2000).

While the flow of geographically localized knowledge facilitates the growth of technologically specialized regions, scholars also have pointed out how firms in clusters may develop 'pipelines' with other non-local clusters and institutions in other countries (Bathelt et al., 2004). Clusters can therefore have an 'outward looking' dimension with knowledge and resources flowing locally through ongoing informal personal interactions as well as across clusters (Bathelt et al., 2004). Understanding the "different institutional regimes" (Bathelt et al., 2004: 43) in different parts of the world where pipelines between clusters are connected will be a concern for an inwardly

investing MNE. Using a lower equity stake and working with partners will allow the MNE to negotiate the complexity of this and to "develop a joint interpretive context in order to engage in interaction" (Bathelt et al., 2004: 43). From a resource-based perspective, we believe it is more likely the MNE will use a JV in host countries characterized by advanced cluster development and R&D collaborations in order to engage in knowledge and resource co-creation in both local cluster (e.g., Jaffe et al., 1993) and through these pipelines that clusters will inevitably form with other clusters in the world (Bathelt et al., 2004).

H2

The greater the extent of well-developed clusters and R&D collaborations in a host country, the more likely a technology-intensive foreign MNE will (a) choose a JV over a WOS, and (b) will use a lower equity stake in any JV in the host country.

3.3. The host country as a recipient of inward technology FDI

A technology-intensive MNE considering making an investment in a host country will also be faced with the possibility that the host country receives inward technology FDI from other MNEs from other countries. This can be as a direct consequence of the host country's policies, particularly its demand-pull policies (Fabrizio et al., 2017). This increases the competitive threats facing the MNE in the host country and brings into sharp focus its need to protect its innovative assets as they are deployed to that country.

From an institutional theory perspective, a question arises relating to the legitimacy of a given MNE's strategy in the country. Mimetic and normative isomorphic pressures to conform to what is acceptable in terms of inward FDI will be present. An MNE will consider it necessary to seek legitimacy in the host country by also pursuing a strategy in which the MNE brings its proprietary technology into the country. While the emphasis here may be on gaining influence over host country actors and securing long standing relationships and acceptance into the institutional environment of the host country, the MNE will nevertheless need to ensure that it has control of this process. A fully-controlled investment will allow technology to be transferred in an ordered manner consistent with the MNE's overall strategy for asset protection.

From a resource-based perspective, technology being transferred into a host country by other MNEs from other home countries may be considered a threat. A question arises for a given MNE regarding how to deal with this threat using its own assets, capabilities and know-how. It is more likely the MNE will need to transfer its own assets from other parts of its global organization in order to defend against the threat implied by other MNEs transferring their technology into the host country. Kogut and Zander's (1993) seminal work showed the less codifiable (and therefore more difficult to transfer) the knowledge, the more likely the knowledge will be transferred within the MNE using a WOS. Others have shown MNE proprietary assets to be linked with greater equity stakes (e.g., Mani et al., 2007). When the host country becomes a battle ground for competing MNE assets, a WOS can act as a competitive weapon, allowing proprietary knowledge to be deployed to the host country in a controlled way. Using a lower equity share (especially a minority stake) presents commercial risk in this line of thinking. Proprietary assets and technology can be lost through subtle forms of intellectual property (IP) infringement with partners eager to build their own asset bases. The MNE will be able to control its assets better through higher equity stakes (Brouthers and Hennart, 2007), and this will be useful if the MNE needs to re-allocate resources to the subsidiary as and when required given competitive moves by other MNEs. Furthermore, the MNE will be able to control its internal knowledge network more effectively when these are fully internalized through a WOS (Kogut and Zander, 1993).

H3

The greater the extent that the host country is a recipient of technology through FDI, the more likely a technology-intensive foreign MNE will (a) choose a WOS over a JV, and (b) will use a higher equity stake in any JV in the host country.

4. DISCUSSION

The present study was motivated by two observations. The first of these was the growing importance of globalized R&D as well as the prevalence of technology-intensive MNEs in the global economy. The second was that, despite extensive research on MNE internationalization, there is limited empirical work on how host country R&D influences MNE entry strategy. Host country R&D matters to entry strategy because of its importance as a source of learning for the MNE and as a source of assets that can be bundled with MNE assets (e.g., Hennart, 2009; Mutinelli and Piscitello, 1998). This is particularly salient for technology-intensive MNEs seeking to benefit from tacit and intangible location advantages (Meyer et al., 2009). Precisely *how* they matter in specific technology-intensive industries has not been established in prior research. While some entry strategy research has touched on the role played by host country R&D (Mutinelli and Piscitello, 1998), most influential research does not consider host country R&D determinants explicitly, focusing instead on institutions, firm and industry characteristics, and various distances and sources of uncertainty and risk (e.g., Berry et al., 2010; Chen and Hennart, 2002; Delios and Henisz, 2003; Dikova and Van Witteloostuijn, 2007; Filatotchev et al., 2008; Gatignon and Anderson, 1988; Hennart and Larimo, 1998; López-Duarte and Vidal-Suárez, 2013; Makino and Neupert, 2000; Yiu and Makino, 2002). Entry strategy literature that does consider R&D does so from a firm-centric perspective, e.g., in terms of a firm's R&D intensity or asset specificity (Brouthers and Hennart, 2007; Canabal and White, 2008; Dikova and Van Witteloostuijn, 2007) or as an intensity variable distributed unequally across subsidiaries (Cantwell and Mudambi, 2005). Our perspective differs as we consider host country R&D as part of the opportunity space in a specific industry. This opportunity space is multidimensional and its features differ by country.

Our analysis diverges from prior studies because we put an explicit focus on host-country R&D determinants of the ownership decision, and highlight how different aspects of host country R&D will be salient. Findings are reinforced through various tests that control for locational characteristics and different operationalization. Case examples illustrate the foreign engagement of our sample companies in R&D and these reinforce the patterns we find in regression models. Such case examples are not commonly shown alongside large sample models in the MNE entry strategy literature and we think these can help interpreting the results.

There are three sets of contributions from the analysis. Firstly, we add to literature on location advantages and how these matter in determining entry strategy of technology-intensive MNEs. We extend earlier work on location advantages that considered market size and uncertainties (Agarwal and Ramaswami, 1992; Brouthers and Hennart, 2007; Dunning, 1998, 2000), and highlight how host country R&D represents technological opportunity for foreign MNEs. Note the case examples in Appendix A in Table A2 in support of this. Host country technological opportunity has been somewhat neglected in entry strategy research in favor of firm-centric and risk-related characteristics of host countries. We put a more explicit focus on host country R&D determinants and show how these matter in different ways to the ownership aspect of entry strategy.

Secondly, the results show how institutional theory and resource-based explanations relate to entry strategy of technology-intensive MNEs in the modern era. In countries where innovation output and clustering are deemed location advantages, behavioral and contextual uncertainty are not as important to our understanding of MNE internationalization as institutional conformity and knowledge seeking logics. While this may reflect our focus on MNEs whose technology-intensity is indicative of high levels of proprietary knowledge, the fact that this knowledge may be put at risk in such host countries raises questions for transaction cost explanations of entry strategy. As indicated by the cases, international JVs by technology-intensive MNEs can be used to gain legitimacy, seek out new knowledge, and engage in explorative research. We see this very clearly in the Kringlan, ParkatmyHouse and Sauber investments for BMW, the INE and STARCAM investments for Daimler, and the TTTech Computertechnik and Cummins-Scania high pressure injection investments for VW. These partners all also collaborate with other institutions and firms in other industries (e.g., INE and TTTech), and some have had links with other competitors in the automotive industry (Sauber and

STARCAM). Investing MNEs would appear to put the value of exploring new technological opportunities above the costs associated with behavioral concerns. In this sense our study of technology-intensive MNEs provides support to scholars (e.g., Mani et al., 2007) who find the influence of transaction cost considerations on ownership to be modest.

Thirdly, the study provides insight into internationalization in the automotive industry. Scholars have called for industry-specific samples in studies on MNE internationalization (Brouthers and Hennart, 2007). The automotive industry is a global one, increasingly driven by R&D in areas such as transmission, fuel cells, sensors, entertainment, communication, ADAS and autonomous driving (as well as related areas such as those shown in Appendix A(Table A2)). In our sample alone, nearly € 100 Billion was spent on R&D by the parent companies over an 8 year period. Findings provide reasons why MNEs in this industry seek JVs as they expand, despite their formidable firm-specific advantages in innovation. In this industry, we see the development of clustering and R&D collaborations in host countries influencing JV choice, and for choosing a lower equity stake within a JV. Innovation output and inward tech FDI into a host country also matter but to a lesser extent. Other R&D factors, such as technology absorption, have little impact on the ownership decision. Taken collectively, this is interesting because it shows us how this particular global industry is forward-thinking (i.e., has a 'future-orientation') in terms of how it sees location advantages in host countries. Examples that reinforce this point include Kringlan and ParkatmyHouse for BMW, INE and MB SIM Tech for Daimler and TTTech for VW. Host country clustering and R&D collaborations have future potential in the eyes of large, technology-intensive firms competing in this industry. Previously registered patents and innovation output that occurred in prior years represent efforts of the past: a 'past-orientation'. While these do matter, they may not reflect what firms believe could happen in the future by engaging in cluster-abundant environments through JVs.

Our study has a number of implications for managers and policy-makers in host countries seeking to attract inward FDI. For MNE managers, an appropriate level of equity for new overseas investments matters as the investment becomes an important source of learning and asset augmentation. Managers will need to understand the nature of the R&D environment in host countries as a part of this decision-making process. Findings also stress the need to develop partnering capabilities for JVs in countries where clustering and innovation networks are advanced. Partnering capability involves identifying and evaluating partners, negotiating and formalizing contracts, as well as the ongoing management of relationships in host countries. Knowledge management systems can be used by the MNE to capture and share knowledge as the company learns and explores through JVs. Mechanisms to rotate engineers and technicians between JV partners also will help with knowledge transfer; we see this in the case of BMW's investment in Sauber.

In terms of host country government policy, findings suggest conditions under which host countries can encourage foreign MNEs to seek JVs in their jurisdiction. Host countries may prefer to encourage JVs with foreign technology-intensive MNEs in order to boost the economy through spillover benefits. With high levels of clustering and R&D collaboration, and with proven innovation outputs, the host country is more likely to achieve this, even with foreign MNEs that traditionally had a tendency for WOS, such as in the automotive industry. Host country governments can provide reassurance on concerns that MNEs might have with JVs, by offering a set of location advantages based on R&D characteristics that helps the MNE to overcome any perceived risks.

The present study comes with a number of limitations, and also raises fresh research questions. In terms of limitations, firstly, the findings are limited to one home country and large, highly internationalized firms from one industry. We caution against generalizing to other countries and industries. Secondly, we did not look at establishment mode, the choice between acquisition and Greenfield, and we did not look at non-equity modes such as licensing and franchising. This may limit the interpretations in terms of wider implications for internationalization amidst globalized R&D. Thirdly, we were limited in terms of our use of indicators from secondary sources, including WIPO, World Bank and WEF sources. We could not tap into the depth of

managerial and organizational dynamics for all investments. We also limited our focus to three areas of R&D characteristics in a host country: the country as a generator of innovation, as a domain for clustering, and as a recipient of inward FDI in technology. There are other dimensions of host country R&D that can be used in future work.

We believe MNE researchers should include host country R&D determinants more prominently, especially when researching industries where globalized R&D is important for competitive advantage. Researchers could note our findings that different dimensions of host country R&D will have different effects on entry strategy. A more nuanced approach going beyond rather top-level locational advantages is therefore needed, looking at innovation inputs and outputs, and future-oriented technological opportunities versus past-oriented innovation performance. Finally, we suggest future research could study the phenomenon of MNE entry strategy from the point of view of the host country R&D, examining the role played by government policy and R&D institutions on MNE investment using a range of indicators, including non-equity modes and the establishment mode choice. We hope these recommendations and the analysis in the present study will allow future work to provide greater insight into host country R&D determinants of MNE strategy.

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CONTRIBUTORS:

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