The role of internationalization in enhancing the innovation performance of Chinese EMNEs: A geographic relational approach

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ABSTRACT

In attempting to integrate theory on developed and emerging countries, prior research has focused on the antecedents of specific internationalization decisions of Emerging Multinational Enterprises (EMNEs) rather than conceptualizing internationalization as a recurring process. This approach limits the understanding of the ways that different internationalization paths lead to different performance outcomes. Using a geographic relational approach and a portfolio-level analysis, we demonstrate that the ability of Chinese EMNEs to increase innovation performance is driven by *how* and *where* they choose to internationalize over time. Our framework resolves these two strategic choices into six dimensions; namely, entry mode, geographic breadth and depth, cultural and institutional distance, and the economic state of the host country. Accordingly, it explains the geographic relational mechanisms through which these six dimensions influence the benefits and challenges of internationalization and, in turn, innovation performance. Results show that Chinese EMNEs improve their innovation performance where they have a portfolio of subsidiaries that (1) is built through M&As (rather than greenfield investments), (2) is distributed across multiple countries (rather than located in fewer locations), (3) is distant from home in terms of culture (but not in terms of institutions), and (4) is located in emerging (rather than developed) countries.

Keywords: Emerging countries, China, innovation performance, internationalization, economic geography

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Please cite the paper as follows:

Elia, S., Kafouros, M., & Buckley, P. J. (2020). The role of internationalization in enhancing the innovation performance of Chinese EMNEs: A geographic relational approach. *Journal of International Management, 26*(4), 100801.

https://doi.org/10.1016/j.intman.2020.100801

1. INTRODUCTION

International Business (IB) theory postulates that firms from developed countries internationalize – i.e. expand across country borders into new geographic locations – to exploit their technological assets and innovative capabilities (Buckley & Casson, 1976, 2019; Dunning and Lundan, 2008). Recent research, however, has suggested that Emerging country Multinational Enterprises (EMNEs) internationalize in order to become more innovative. Prior research has provided valuable insights into the mechanisms through which internationalization may boost a firm's innovation performance and facilitate the accumulation of intellectual property assets (i.e. intangible assets created from human intellect such as patents, copyrights and trademarks) that help the firm climb the value chain and develop stronger competitive advantages (Kafouros, Buckley, Sharp, & Wang, 2008; Enderwick and Buckley 2019).

Internationalized firms can use their subsidiaries to collaborate with foreign organizations (Mindruta, 2013), access global knowledge reservoirs (Cantwell & Piscitello, 2000; Kafouros, Buckley & Clegg, 2012) and transfer knowledge across subsidiaries (Almeida & Kogut, 1999; Audretsch & Feldman, 1996). Nevertheless, internationalization also increases coordination and communication costs, makes certain processes and the integration of technologies more challenging, and may also lead to knowledge leakage (Fisch, 2003; Alcacer & Chung, 2007). Although internationalization has the potential to increase EMNEs' innovation performance, we have a limited understanding of why some EMNEs succeed in enhancing their innovation performance from internationalization, whereas other EMNEs fail to do so (Amendolagine et al., 2018).

Furthermore, many previous studies, in an attempt to bridge the literatures on developed and emerging country MNEs, have focused on the antecedents of specific individual internationalization decisions instead of looking at internationalization as a recurring process (Deng, Delios and Peng, 2020). This has limited our ability to understand how the idiosyncratic features of emerging

countries lead to different internationalization paths and in turn to different performance effects. For this reason, several IB scholars have called for novel approaches to study EMNEs (e.g. Buckley, Doh, & Benischke, 2017; Delios, 2017; Poulis & Poulis, 2018).

To address these limitations, our study contributes to new theoretical explanations by building on the geographic relational approach (Deng, Delios & Peng, 2020) to capture the different internationalization paths of EMNEs and to investigate how they affect their innovation performance. This theoretical perspective integrates the geography of cross-border investments with the political, economic and cultural dimensions of the locations in which (i.e. *where)* EMNEs invest. We combine these dimensions by employing a portfolio level of analysis, which allows us to contextualize the internationalization process of EMNEs across different "places" (geographic units) and "spaces" (the characteristics that generates heterogeneity across places) in a given time (Beugelsdijk, McCann, & Mudambi, 2010; Iammarino & McCann, 2013).

More specifically, to answer our research question "what is the relationship between the way EMNEs shape their portfolio of cross-border investments and their innovation performance?", we integrate theory from the innovation and IB literatures and we postulate that EMNEs differ in their ability to increase their innovation performance because they internationalize in different ways. Motivated by research about the strategic choices underlying internationalization (e.g., Benito, 2015), we apply and expand the geographic relational approach by postulating that the effectiveness of EMNEs' internationalization in enhancing innovation performance depends not only on *where* but also on *how* they internationalize, with the latter being the dimensions of entry mode, which Deng et al. (2020) suggest to include in their framework as future research avenue.

In particular, our paper examines how innovation performance is influenced by six distinct factors that characterize the way in which EMNEs' internationalize their portfolio of subsidiaries. The first one, which reflects *how* EMNEs internationalize, is: 1) the *entry mode* (greenfield investment vs. acquisition of firms). The second and third factors, which reflect the geography of

where EMNEs internationalize, are 2) *geographic breadth* (how widely firms spread their portfolio of subsidiaries across countries) and 3) *geographic depth* (the extent to which EMNEs locate multiple subsidiaries within each country). The other three factors, which concern the political, social, and economic dimensions of *where* EMNEs invest are: 4) *institutional* and 5) *cultural distance* between a firm's home country and the countries it enters and 6) the *economic state* of the host countries chosen by EMNEs (*developed* or *emerging* economies).

Capturing distinct dimensions of internationalization is theoretically valuable because EMNEs may differ significantly in how and where they set-up their portfolio of investments. Our overarching reasoning is that such variations in internationalization strategy may in turn influence organizational learning, collaboration, the absorption of external knowledge and access to key innovation-related resources. Equally, they may also influence the challenges that EMNEs face, including coordination costs and knowledge leakage (Kafouros et al., 2012). As a result, the way in which firms internationalize may lead to different innovation outcomes.

Because innovation performance is a multi-dimensional construct, in addressing our research question, we examine the effects of internationalization on both the *scale of innovation* (i.e. number of patents) that reflects an EMNE's innovation output, and the *quality of innovation* (i.e. the forward citations received for the EMNE's patents) that reflects how impactful or valuable innovation is (Trajtenberg, 1990). We choose to empirically test our hypotheses using a sample of EMNEs from the largest emerging country, i.e. China. Indeed, firms from emerging countries, particularly from China, invest heavily in internationalization to improve their position in the global battle for technological leadership (Wang, Hong, Kafouros, & Wright, 2012). However, we have limited knowledge of under what circumstances internationalization helps EMNEs to overcome certain challenges and improve their innovation performance.

Our analysis yields an asymmetric pattern of results that challenge current thinking on the relationship between internationalization portfolio and innovation performance. More specifically,

results show that EMNEs having a portfolio of investments with a predominance of M&As as entry mode, emerging economies as host countries, a low average institutional distance and a high average cultural distance report a better innovation performance in terms of both quality and quantity. Geographic breadth and depth exhibit a weak impact, having a slightly positive and slightly negative effect on innovation quality, respectively. Finally, our additional evidence shows that investments in advanced countries are beneficial when undertaken through M&As and when they are diversified across different economies.

Our findings contribute to the innovation and IB literatures by clarifying how different internationalization strategies influence innovation performance and by specifying the different mechanisms through which certain internationalization dimensions *differentially* influence innovation performance. In doing so, our study shifts the focus of the conversation in the literature from the 'degree of internationalization' to *how* and *where* EMNEs should internationalize, by adopting a novel geographic relational approach and by employing a portfolio-level analysis that captures different internationalization paths. Enhancing understanding of this phenomenon improves theorizing about the drivers of EMNEs' innovativeness in the global economy and may help optimize firms' internationalization strategy in developing their innovation priorities.

2. THEORETICAL BACKGROUND

2.1 Internationalization strategies in EMNEs

According to international business theory (Buckley and Casson 1976), the traditional case of firm internationalization is where a firm 'internalizes' technological assets across national boundaries. This enables the firm to exploit its assets in multiple countries (the 'traditional route' to internationalization). Although this view is applicable to MNEs in developed countries, internationalization differs for several EMNEs. The lack of a robust national innovation system means that EMNEs have to seek technology and knowledge overseas. One potential strategy for

EMNEs (the "capital route" of internationalization) is to first gain access to privileged sources of capital in their home market. Examples include capital provided by government to state owned enterprises (SOEs) in China, conglomerate funding from an 'internal bank' offered to Indian business groups, and family capital supporting family-owned firms across Asia. Second, this capital, which is available at below equilibrium interest rates, enables EMNE to source foreign knowledge, technology and skills. This process may lead to greater innovative capacity that can be deployed in the EMNE's home market, given that many EMNEs are primarily concerned with their home market (Buckley et al., 2007).

A third potential internationalization strategy for EMNEs is to internalize key sections of the domestic and/or global labour market ('innovative' route to internationalization). First, the firm internalizes part of the market in skilled labour, directing innovative individuals and groups in its management systems (e.g. by quasi-internalisation of University Departments assisted by the State; Lynch & Jin, 2015). Skills are acquired at home or abroad and "learning" takes place by building global teams within the firm. This learning capacity is then combined with that sourced from abroad, leading to increased innovative capacity that can be utilized in home, foreign or global markets (Buckley, Elia & Kafouros, 2014).

The overarching premise of our analysis is that the extent to which such internationalization strategies enable EMNEs to enhance their innovation performance depends on key dimensions of internationalization strategy. By adopting a relational geographic approach (Deng, Delios and Peng, 2020), we claim that each EMNE can design its international strategy by shaping the portfolio of subsidiaries according to different strategic choices regarding specific internationalization factors. In the following sections, we first consider the mechanisms through which the internationalization of the portfolio of subsidiaries can foster innovation performance. We then discuss the *how* and *where* dimensions underlying an international portfolio of subsidiaries, and develop hypotheses that

explain the impact of each internationalization factor on organizational learning and other aspects that, in turn, influence EMNEs' innovation performance.

2.2 EMNEs' portfolio of subsidiaries and innovation performance

Building on theoretical knowledge from the fields of international business and innovation, we propose that an international portfolio of subsidiaries can affect innovation performance through the following three mechanisms.

First, a key premise in the innovation literature is that external knowledge serves as the seed for future innovations, helps the firm identify opportunities and offers new technological paths and solutions (Griliches, 1992). Firms that operate in multiple countries can identify new ideas and exploit diverse knowledge reservoirs from different locations (Kafouros et al., 2012) and cultural perspectives (Hitt et al., 1997), thus enhancing organizational learning. A globally dispersed portfolio of subsidiaries enables firms not only to improve the process of knowledge accumulation, but also to transfer knowledge across subsidiaries and combine it within one organization (Kogut & Zander, 1993; Phene & Almeida, 2008). Internationalization can therefore help firms to transform location bound knowledge into knowledge that can be transferred internationally through their portfolio of subsidiaries, providing a significant advantage in innovation (Kafouros et al., 2018). This mechanism is often leveraged by establishing subsidiaries in technological clusters in host countries. For instance, the Chinese carmaker JAC Anhui Jianghuai was able to benefit from knowledge spillovers by establishing a subsidiary in Turin, the Italian automotive hub (Piperopoulos et al., 2018).

Second, countries differ in innovation systems and specialization. An international portfolio of subsidiaries can improve innovation performance by enabling firms to access and hire a broader group of scientists who possess different skills and who specialize in potentially complementary technological fields (Kafouros et al., 2018). By being able to tap into alternative streams of

innovation, firms with a globally dispersed portfolio of subsidiaries can exploit selective advantages from multiple nations (Hitt et al., 1997). This diversity is important because the increasing complexity of new products requires the integration of skills from markedly different scientific domains. Hence, a broader variety of division of labour enhances efficiency in innovation and helps the development of innovative goods and services (Beaudry & Schiffauerova, 2009). For example, Galanz, the world's largest microwave manufacturer, gained access to complementary R&D resources and human talent by establishing an R&D unit in Washington (Deng, 2007; Piperopoulos et al., 2018).

Third, the innovation literature has also established how important collaboration is for innovation performance, showing that collaboration with universities (Kafouros, Wang, Piperopoulos and Zhang, 2015) and other organizations (e.g. through alliances and open innovation) is particularly beneficial (Laursen & Salter, 2006; Mindruta, 2013). An international portfolio of subsidiaries helps firms to identify new collaborative opportunities that assist in the acquisition of complementary assets and inputs (Kogut & Zander, 1993; Mindruta, 2013). It may also enable firms to reduce the technological risk associated with innovation and share the cost of certain innovation projects with their partners. For instance, Huawei was able to learn in telecommunication technologies through collaboration with NEC, 3COM, Siemens, and Nortel and through cross-granting patents with Apple (Fan, 2011).

In summary, the above mechanisms show how an international portfolio of subsidiaries can become a strategic tool to gain organizational and experiential learning and access complementary assets (Guillen and Garcia Canal, 2009; Piperopoulos et al., 2018), which help EMNEs imitate certain processes and reverse engineer technologies (Malik & Kotabe, 2009), incorporate technological skills, knowledge and managerial best practises (Banerjee et al., 2015) and absorb technology from collaborators (Srinivasan, Haunschild, & Grewal,, 2007), thus fostering innovation.

Nevertheless, an international portfolio of subsidiaries also presents certain challenges. First, it may increase the risk of knowledge leakage to competitors (Alcacer & Chung, 2007), particularly when firms collaborate with foreign organizations. Similarly, integrating knowledge from multiple countries is challenging and time consuming, and it may disrupt existing technological development (Kafouros et al., 2018). Furthermore, the coordination of a global portfolio of subsidiaries increases costs and may impact the efficiency and the speed at which innovation is conducted. Finally, distance between subsidiaries can affect the frequency and quality of communication and increase the risk of misunderstandings (Fisch, 2003), which can again be detrimental to innovation. In the following paragraph we claim that the extent to which the positive or negative effects prevail largely depends on the way EMNEs shape their portfolio of subsidiaries, i.e. on the *how* and *where* dimensions of internationalization.

3. HYPOTHESES DEVELOPMENT

Many prior studies have adopted a strategic-decision framing perspective to investigate the internationalization of emerging market firms (Deng et al., 2020). As such, few studies have paid attention to multifaceted contextual influences that are responsible for the heterogeneity of the EMNEs internationalization paths (Beugelsdijk et al., 2010; Iammarino & McCann, 2013). The contextualization of the outward foreign investments is particularly relevant when studying EMNEs, and even more when the home country is China.

EMNEs' share some idiosyncratic characteristics that make them different from developed country MNEs. For instance, they rely on strong roots in their home-country institutions and a weak legitimacy arising from their liability of "emergingness" (Deng et al., 2020; Scalera, Mukherjee & Piscitello, 2020). These aspects are likely to affect the relational dimension of EMNEs' internationalization process and, hence, the extent to which their portfolio of subsidiaries can fully accomplish certain strategic goals including that related to innovation. For instance, in the

electronics industry, some firms such as Huawei face difficulties to gain legitimacy due to their strong connection to the Chinese government and to the commercial and technological dispute between China and United States. This is decreasing Huawei's opportunity to cooperate with and learn from advanced MNEs such as Google. At the same time, the recent Road and Belt initiative has raised several concerns (known as the "Red Scare") since this project is perceived as an attempt by the Chinese Government to expand its influence beyond Asia (and to European countries in particular), thus slowing down the collaboration, interaction and learning opportunities for Chinese EMNEs (Child & Marinova, 2014; Clegg, Geppert, & Hollinshead, 2018; Deng, 2013; Luo, Xue, & Han, 2010).

For this reason, several scholars have called for novel approaches to study EMNEs and to offer a more comprehensive view of their internationalization (e.g. Buckley, Doh, & Benischke, 2017; Delios, 2017; Poulis & Poulis, 2018). Answering this call, Deng et al. (2020) propose a geographic relational approach, which captures the multifaceted contextual influences of EMNEs' internationalization and the heterogeneity of their international paths across places (i.e. geographic units) and spaces (i.e. the characteristics that differentiate the places). This approach focuses on the way EMNEs adapt to the new environments and accommodate the differences between the home and host countries through a multiple interacting and recurring process that occurs over time and that shapes the way EMNEs build their portfolio of subsidiaries. This approach emphasizes the interplay of EMNEs with the territorial units and with the socio-cultural, political and economic contexts where such internationalization arises (Mutch, 2016; Verbeke & Kano, 2015). The increase of the scope of the internationalization exposes EMNEs to different cultures, institutions and economic environments, which contribute to EMNEs' experience and capabilities (Deng et al., 2020).

In this paper, we adopt the geographic relational perspective to investigate how EMNEs' portfolio of subsidiaries affects their ability to innovate. Building on prior work that suggests that

the motives for cross-border investment depends not only on the location choice but also on the way in which firms organize their internationalization (i.e. Benito, 2015), we extend this approach by proposing that the innovation performance of EMNEs depends not only on *where* but also on *how* firms internationalize. While the former refers to the contextual dimensions identified by the geographic relational perspective, the latter accounts for the preferred entry mode of EMNEs' internationalization. Understanding how different entry modes matter in shaping the internationalization of EMNEs represents one of the future research avenues suggested by Deng et al., (2020).

Our analysis considers six key internationalization factors shaping the portfolio of subsidiaries of EMNEs: 1) the *entry mode*, 2) the *geographic breadth*, 3) the *geographic depth*, 4) the *institutional distance* and 5) the *cultural distance* between a firm's home country and the countries it enters, and 6) the *economic state* of the counties EMNEs enter (*developed* or *emerging* economies). The first factor captures *how* EMNEs internationalize, the second and the third ones refer to the geography of *where* firms internationalize, while the latter three factors capture the institutional, socio-cultural, and economic dimensions of *where* firms internationalize, in line with the geographic relational approach. Figure 1 summarizes the different routes to internationalization, the six different factors of internationalization and the main benefits and risks of internationalization that in turn affect innovation performance.

- Insert Figure 1 about here -

The next sections discuss the benefits and challenges of each internationalization factor, leading to the development of hypotheses concerning their effect on EMNEs' innovation performance.

3.1 Strategic entry mode and innovation performance

The entry mode (greenfield or acquisitions) through which subsidiaries have been established in the host country, which reflects *how* firms internationalize, can have a profound

effect on EMNEs' innovation by changing the way firms learn and absorb knowledge and technology. Greenfield investments are typically driven by exploitation strategies aimed at enhancing operational efficiency (Meyer et al., 2009) and economies of scale while preserving the EMNE's culture. However, greenfield investments reinforce path-dependencies because they rely on the transfer of core knowledge and technology from the home country (Blomkvist, Kappen & Zander, 2014). Given that EMNEs only rarely possess strong technological capabilities, we expect that greenfield investments are less likely to foster the competitive advantages underlying innovation performance. Greenfield investments are also subject to a stronger liability of foreignness (Zaheer, 1995). This increases the difficulty of establishing ties and collaborative agreements with local firms and slows down a firm's embeddedness in the host country (Zaheer & Mosakowski, 1997). In addition, greenfield investments are viewed as an incremental and time-consuming approach (Chatterjee, 1990; Teece, 1982), thus making a smaller contribution to developing and expanding a firm's technological portfolio (Blomkvist et al., 2010 and 2014).

Conversely, the acquisition of foreign firms is driven by the search for new knowledge and technologies. It enables quick access to the resources of the target firm, including its technological capabilities, scientists, network and customers. It therefore reduces the need to build these from scratch as it is the case in greenfield investment (Blomkvist et al., 2014). Acquisition can therefore help the firm to broaden significantly its asset portfolio that has been shown to have a positive effect on R&D (Bertrand & Zuniga; 2006) and knowledge development (Mudambi & Navarra, 2004). Hence, although acquisitions involve an integration phase that may give birth to frictions, they give access to new technologies, increase the possibility to create synergies and complementarities, and enable firms to pursue diversification strategies that are beneficial for innovation (Buckley et al., 2014; Valentini, 2012).

Therefore, both the "innovative" and the "capital" route to internationalization are expected to work better with acquisition than with greenfield investments as the former helps EMNEs to

trigger their internal markets in skilled labour and utilize their capital cost advantage to access foreign technology and innovative skills. Using a geographic relational logic, M&As is conceived as a strategy to create linkages among corporate networks, which takes place through a sequential organization of interactions during the internationalization process, i.e. by building a portfolio of subsidiaries based on the acquisitions of multiple firms (Hansen et al., 2016; Deng et al., 2020). This multi-level corporate network leads to extensive information and knowledge sharing between the EMNE, the acquired firms and local communities, which is likely to result in valuable learning opportunities that are expected to foster EMNEs' innovativeness. M&As can also help reduce the liability of origin if the Chinese company is able to preserve the local employees and key customers and suppliers. In summary, we expect acquisitions to be more advantageous in improving EMNEs' innovation performance than greenfield investments. Hence:

> **H1:** Chinese EMNEs' portfolios of subsidiaries that have a higher proportion of M&As than greenfield investments are positively associated with innovation performance.

3.2 Geographic breadth and depth

The internationalization of EMNEs can vary significantly in terms of breadth and depth (Kafouros et al., 2018), which refer to the geographic dimension of *where* firms internationalize. In terms of geographic breadth, an EMNE may choose to spread its subsidiaries in a few countries or across several countries. In terms of depth, EMNEs can choose to locate only one subsidiary in each country or locate multiple subsidiaries in a given nation. We argue that these two internationalization factors have different consequences for EMNEs' innovation performance.

Although breadth is likely to raise coordination costs, it enables firms to access a larger number of locations where new knowledge and technologies can be exploited. As cross-border knowledge cannot always be easily redeployed and utilized by the focal firm (Pérez-Nordtvedt, Mukherjee and Kedia, 2015), and by Chinese EMNEs in particular due to their average weaker

comparative ownership advantages with respect to other emerging firms (Scalera, Mukherjee & Piscitello, 2020), geographic breadth can help mitigate this problem by exposing firms to a higher volume of differentiated knowledge reservoirs (Kafouros et al., 2018). A higher level of breadth may also enable EMNEs to benefit from the diversity of innovation, exploit knowledge spillovers from multiple markets, and increase understanding of idiosyncrasies in each host country (Rosenkopf & Almeida 2003; Lahiri, 2010; Kafouros et al., 2012).

Additionally, as innovation is the result of a recombination process (Narula, 2014), breadth enables firms to capture and combine several ideas and projects from different locations (Cantwell & Mudambi, 2005; Lahiri, 2010). It can also help the firm to increase its innovation performance by providing access to distinctive technological and scientific domains that each country specializes in (Tallman & Phene, 2007; Phene & Almeida, 2008). Additionally, breadth leads to higher operational flexibility and enables EMNEs to deal with market fluctuations and uncertainty (Tang & Tikoo, 1999). The benefits associated with breadth also apply to the case of collaborative agreements. Breadth offers firms a greater set of opportunities in technological collaboration with other organizations, enhancing once again innovation performance.

By contrast, we expect depth to have different effects on innovation performance. We recognize that locating multiple subsidiaries in each country increases the EMNE's embeddedness in a given market and its innovation networks (Mudambi, Narula & Santangelo, 2018). Nevertheless, depth may increase competition among subsidiaries and research labs, reduce their willingness to transfer knowledge to and receive knowledge from fellow subsidiaries and, ultimately, have a less positive effect on the innovation performance of EMNEs (Kafouros et al., 2018). Geographic depth also implies that many investments in the EMNE's portfolio will have a similar market focus. As such investments overlap, their advantages decline because they serve similar purposes (Vassolo et al., 2004). In such cases, subsidiaries located in the same host country

become partially redundant due to their similar focus and, once again, have a less positive effect on EMNEs' innovation performance.

This view is consistent with the tenet in the IB literature that competitive advantages arise when each subsidiary has the potential to provide assets and inputs that the rest of the multinational firm and its subsidiaries do not possess (Kogut and Zander, 1993; Kafouros et al., 2018). These advantages are expected to weaken when subsidiaries operate in the same host country and can therefore access the same set of inputs. Hence, while the positive effects arising from depth are likely to become less pronounced as the company becomes fully embedded in the host country, the negative effects are expected to persist for a longer period as they are associated with the presence of multiple subsidiaries in the same country.

Therefore, also in this case we expect both the "innovative" and the "capital" route to internationalization to work better with geographic breadth than with geographic depth, as the former helps EMNEs to take advantage of multiple and different sources for the internalization of the markets in skilled labour and for the utilization of capital cost advantages. Taking a geographic relational approach, an increasing scope of the geography of internationalization implies that EMNEs are forced to change their routines and learning paths to quickly adapt to the new multiple environments (Maitland & Sammartino, 2015; Mutch, 2016), and such changes open up new innovation opportunities (Mavroudi, Kesidou and Pandza, 2020). The same process is likely to be weaker when EMNEs shape their portfolio of subsidiaries by leveraging geographic depth, as the number of countries to which EMNEs are exposed is more concentrated and less diversified, thus resulting in less challenges and lower need to revise the existing knowledge and capabilities.

Overall, internationalization is likely to be more effective in enhancing innovation performance when EMNEs configure their portfolio of subsidiaries more broadly and less so when they do more deeply. Hence:

H2: Chinese EMNEs' portfolios of subsidiaries that have a higher geographic breadth are more positively associated with innovation performance than Chinese EMNEs' portfolios of subsidiaries that have a higher geographic depth.

3.3 Institutional and Cultural Distance

Cultural and institutional distance between the home and the host countries - which can help us differentiate the "*where*" dimension of firms' internationalization - lead to certain challenges. Institutional distance represents an impediment to the transfer of intra-organizational practices, technologies and knowledge (Kostova & Zaheer, 1999), whereas cultural distance gives birth to misunderstandings and communication problems (Sirmon & Lane, 2004; Shenkar, 2012). Cultural and institutional distance increase transactions costs in the ex-ante investment phase as well as coordination and integration costs in the post-investment phase (Barkema & Vermuelen, 1997; Sirmon & Lane, 2004; Pant, 2012). However, while institutional distance between two countries implies that there are differences in the development of their institutions, cultural distance implies that there are differences in the values and norms of the countries involved in the firm's international expansion. We therefore expect that they have different implications for innovation performance.

From the point of view of institutional distance, Chinese (formal) institutions are less developed (especially in terms of IPR protection) and they are not particularly market-oriented. In addition, Chinese EMNEs suffer from liability of "emergingness" not only because of their less developed institutional context, but also due geopolitical factors, less well-known brand names, and ex-ante biases against practices, products and services associated with emerging countries. Chinese EMNEs suffer from even stronger institutional disadvantages in comparison with firms from other emerging countries such as India, due to the strong interference of the Chinese government in the economy and the excessively manufacturing-oriented factor endowments (Scalera, Mukherjee & Piscitello, 2020). All these characteristics are likely to increase both the complexity of Chinese

EMNEs when investing in countries with well-developed and market-oriented institutions and the discrimination by competitors, consumers and even governments (Pant, 2012; De Beule et al., 2014).

Therefore, Chinese EMNEs have to comply fully with the institutional environment of the host countries in order to gain the legitimacy that is required to play in the very competitive and market-based global arena. This task requires efforts and investments that do not help its innovation performance. Such negative effects might be strengthened by the fact that high institutional distance in the case of Chinese EMNEs means that subsidiaries will have fewer opportunities to exploit knowledge spillovers due to, on average, stronger IPR regimes. Hence, although one particular subsidiary might benefit from a better institutional environment, we expect a high average level of institutional distance between the home and host countries of EMNE's portfolio of subsidiaries to be not positively associated with the innovation performance of the EMNE.

By contrast, we expect cultural distance between China and the EMNEs' network of subsidiaries to have a positive contribution to EMNEs' innovation performance. Although cultural distance between the home and host countries might influence the capability to effectively interact with the company in host locations (Basuil & Datta, 2015), it might also introduce different ways of thinking and in turn enhance creativity. Cultural distance is a source of diversity that can foster creativity and enhance innovation (Meirovich, 2010; Elia, Messeni Petruzzelli and Piscitello, 2019). Therefore, the negative effects arising from cultural distance in terms of negotiation, coordination and integration costs and in terms of knowledge transfer are likely to be balanced by the novelty and non-redundancy of the ideas arising from cultural diversity (Eisenhardt & Schoonhoven, 1996). Additionally, cultural differences enable firms to break the mental structures and the rigidities underlying decision making processes, and develop new knowledge structures and novel cognitive maps (Stahl & Voigt, 2008; Palich & Gomez-Mejia, 1999) that favor valuable innovative solutions (e.g., Galunic & Rodan, 1998). Therefore, a higher level of cultural distance between the home and

host countries of EMNEs' portfolio of subsidiaries is expected to have a positive effect on performance.

Therefore, while institutional distance is likely to slow-down and weaken the "innovative" and the "capital" route to internationalization, the cultural distance is likely to be more effective at least for the former, by offering the opportunity to give birth to a synergetic and complementary pool of skilled labour to internalize. Using a geographic relational theoretical lens, formal and informal institutions are considered two crucial spatial dimensions of the EMNEs' internationalization, as cross-country differences in institutions and social norms shape the nature of the relational networks of EMNEs' portfolio of subsidiaries (Hotho & Saka-Helmhout, 2017). Considering the institutional and cultural settings in which EMNEs are rooted is crucial to understand how EMNEs adapt to the new environments and accommodate the differences between the home and host countries. In particular, when institutional distance is high, EMNE face strong hurdles in establishing legitimacy in the host country (Hu, Cui, & Aulakh, 2019; Kalasin et al., 2014). This means that several efforts are required to develop strong corporate governance capabilities and auditing mechanisms to manage the differences and to gain credibility (Deng et al., 2020), thus reducing (at least in the short run) the time and resources for other activities such as innovation. Conversely, cultural differences not only can be a source of heterogeneity and creativity, but can be accommodated more easily and quickly through informal strategies, e.g. by connecting to the local community of migrants and to the ethnicity-based social networks of the host country to interpret the cultural differences and create social legitimacy for the EMNE (Karreman et al., 2017; Deng et al., 2020).

In summary, whereas institutional distance may create legitimacy problems for Chinese EMNEs and limit the absorption of foreign knowledge and technology (particularly in countries with stronger IP protection), cultural distance may become a source of diversity, creativity and innovation. Accordingly, we introduce the following hypotheses:

H3: Chinese EMNEs' portfolios of subsidiaries that have a higher cultural distance are more positively associated with innovation performance than Chinese EMNEs' portfolios of subsidiaries that have a higher institutional distance.

3.4 Internationalization in Developed and Emerging Countries

Chinese firms internationalise by investing in both developed and emerging countries. The economic development of the host country is another crucial factor that allows to differentiate the "*where*" dimension of firms' internationalization. Investments in developed countries, especially in the Triad (i.e. North America, Europe and Japan), provide EMNEs with the opportunity to access valuable tangible and intangible resources that often are not available in their home country (Luo & Tung, 2007; Ramamurti, 2012; Rabbiosi, Elia & Bertoni, 2012; Buckley, Elia & Kafouros, 2014; Piperopoulos et al., 2018). EMNEs seek assets in developed countries to complement or compensate their weaker home-country national innovation systems that do not allow the development of certain advantages (Fu, Pietrobelli & Soete, 2011; Pietrobelli & Rabellotti, 2011; Elia & Santangelo, 2017). Although innovation systems in emerging countries have improved in recent years, EMNEs still make use of asset-seeking investments in developed countries to augment the technological capabilities that cannot be developed easily in their home country (Meyer, 2015; Elia & Santangelo, 2017). Empirical evidence shows that developed countries provide EMNEs with organizational knowledge and technologies that foster the innovation performance of subsidiaries (Piperopoulos et al., 2018). Therefore, we expect investments in developed countries to contribute to the innovation performance of Chinese EMNEs.

Conversely, when the host location is an emerging country, the EMNE is likely to operate in an environment that exhibits similar conditions as that in their home country. Such characteristics include a weaker national innovation system that offers limited opportunities to enhance innovation performance (Rabbiosi et al., 2012). South-south investments, such as Chinese FDIs in neighboring

Asian economies and in African countries, can rely on a better appreciation and comprehension of the local culture and conditions by EMNEs (Stevens & Newenham-Kahindi, 2017). In such situations, EMNEs adopt small-scale and less innovative technologies to address the needs of other emerging countries. As a result, such location choices typically involve the transfer of knowledge from the home to the host country (rather than vice-versa). Therefore, we expect that investments in emerging countries are less beneficial for the innovation performance of Chinese EMNEs.

Hence, both the "innovative" and the "capital" route to internationalization are of course expected to be fully effective when undertaken in advanced rather than in other emerging countries, as the latter exhibit similar conditions to those that explain why Chinese EMNEs' undertake these alternative routes to internationalization. Adopting a geographic relational perspective, we expect EMNEs and their managers to exploit their portfolio of subsidiaries to develop economic relationships with the local business networks in order to establish partnerships, share business ideas and compensate for their inadequate experience (Kemeny et al, 2016; Shi et al., 2014). Given the limited managerial know-how and technological knowledge of EMNEs, it is likely that this process will be more effective when accessing the proprietary technology in developed (rather than in emerging) countries, since developed economies offer frontier scientific knowledge and technology that can serve as a source of newer products and market developments (Fu et al., 2018; Deng et al., 2020). Therefore, although developed countries are both more institutionally and culturally distant (meaning that they can be both negative and positive for EMNEs' innovation activity according to the arguments explained in the previous paragraph), when we isolate the effect of economic development we expect that EMNEs with a portfolio of subsidiaries mainly composed of developed countries to be more likely to improve their innovation performance. Hence:

H4: Chinese EMNEs' portfolios of subsidiaries that have a higher proportion of developed countries than emerging countries are positively associated with innovation performance.

4 METHODS

4.1 Data

Our empirical analysis focuses on China, a country that is an exemplar of the phenomenon of internationalizing EMNEs. China is the first investor among the emerging economies and the third one in the world ranking in terms of investment outflows (UNCTAD, 2016). China is also becoming a global leader in innovation. It has one of the largest R&D expenditures in the world (being equal to US$ 163 billions) and it is also leading in the world intellectual property output (Eurostat, 2015; WIPO, 2012). As discussed earlier, Chinese EMNEs typically internationalize as a strategy to foster their innovation and competitiveness. For instance, companies such as Huwaei and ZTE reached the second and third positions in patent applications in 2014 after sourcing technology in foreign markets (Fan, 2011; Piperopoulos et al., 2018).

Using the Orbis database (Bureau van Dijk), we identified 273 Chinese manufacturing EMNEs having at least one foreign subsidiary in the year 2013[1] and collected information about their ownership structure and their subsidiaries. We complemented these data with balance sheet information from Orbis, Lexis Nexis and CSMAR. To identify the entry mode of each subsidiary, we matched our data with the following databases that provide information on foreign direct investment: a) Zephyr and SDC Platinum that provide data on M&As (1982-2013) and b) fDi Markets that provides data on greenfield investments (2003-2013). After combining these databases, we achieved a sample of 173 Chinese EMNEs, which represents our final sample. For each EMNE, we were able to build the portfolio of foreign subsidiaries, whose total number is equal

[1] We used 2013 as reference year because the data come from a research project developed from collaboration between Politecnico di Milano and the University of Leeds involving five people. The aim of the project was to build a comprehensive database on Chinese MNEs to be employed in studying more in depth the strategic characteristics and the performance effects of Chinese EMNEs internationalization. The project started in 2014 and required about 2 years (i.e. up to the beginning of 2016) to obtain a final reliable database, since it was necessary to access several different data sources and to match the information, which was a very time-consuming process. Given the large-scale of the project, the database is being employed for different studies, one of which (Alon, Elia and Li, 2020) has been recently published on the Journal of International Management.

to 617 distributed among the 173 firms[2]. Table 1a shows the distribution of the Chinese EMNEs and subsidiaries across different portfolio sizes (measured in terms of number of subsidiaries composing the portfolio, ranging from a minimum of 1 to a maximum of 39), while Table 1b shows the distribution of the foreign subsidiaries across 5 different geographic areas. The large majority of Chinese EMNEs (51.45%) has a portfolio composed of one subsidiary, while the remaining firms have a portfolio composed of two (15.61% of the sample), three (7.51% of the sample) or more subsidiaries, most of which are distributed in Asia (56.9% of subsidiaries) and in Europe (21.9% of subsidiaries).

- Insert Table 1 about here -

4.2 Dependent variables

Following Phene & Almeida (2008), we employ patent data to track the innovation performance of Chinese EMNEs. More specifically, we captured two different dimensions of Chinese EMNEs' innovation performance, i.e. the scale, reflecting the quantity of innovation, and the quality, reflecting its importance. To measure *Innovation Scale*, we employ the total number of patents granted to Chinese EMNEs by USPTO up to 2013, by searching for patents assigned either to the parent company or to one of its subsidiaries. We relied on USPTO since it is considered the most reliable patent office being able to capture the dynamics of innovation, given the strength of intellectual property protection laws in the US (Phene & Almeida, 2008). In our sample, the majority of Chinese EMNEs (130) exhibits an innovation scale equal to zero, while the remaining

[2] We have performed several Chi-Square tests to assess whether our reduced sample of 173 firms and 617 subsidiaries is representative of the entire original sample of 273 firms with 1207 subsidiaries. The sample turns out to be representative as regards the portfolio size categories (represented for our sample in table 1a), geographic distribution of the subsidiaries (represented for our sample in table 1b), breadth and depth categories (represented for our sample in table 2), and age and industries (in terms of high- vs. low-tech firms) of the Chinese EMNEs. The tables with the representativeness tests are available upon request.

firms display a number of patents equal to 1 (13 firms), 2 (5 firms), 3 (4 firms) and 4 (4 firms); the number of firms with 5 or more patents is equal to 17.

To measure *Innovation Quality*, we employed the citations of each patent. Given that each patent builds on previous inventions, a patent cited by a large number of inventors is considered to be more impactful than a patent cited by fewer inventors (Lahiri, 2010). Scholars consider different times lags to count citations, ranging from one to six years after being granted (Phene & Almeida, 2008; Lahiri, 2010). Given that we completed our data collection in the year 2016, and given that our data refer to Chinese EMNEs in the year 2013, we were able to count the cumulated number of citations received by each patent in the next 2 years after being granted. The majority of the Chinese EMNEs (146) display a number of citations equal to zero after two years, while the other firms exhibit 1 (8 observations), 2 (5 observations), 3 (3 observations) or 4 (3 observations) citations; the number of firms having patents with more than 4 citations is 8.

4.3 Independent variables

M&As Investments: We operationalized this measure using the percentage of M&As over total investments for each Chinese MNEs (source: fDi Markets, Zephyr and SDC Platinum). In our sample, 57 EMNEs (32.76% of observations) have a portfolio of subsidiaries established only through acquisitions. On the opposite side, 66 EMNEs, corresponding to 37.93% of observations, have a portfolio of subsidiaries composed of only greenfield investments. The remaining companies exhibit a portfolio of subsidiaries composed of both greenfield and acquisition investments.

Geographic Breadth and Geographic Depth: Geographic breadth captures how widely EMNEs spread their subsidiaries across countries. Building on prior studies regarding the breadth (scope) of foreign activities (Allen & Pantzalis, 1996; Tang & Tikoo, 1999), we operationalize this measure using the number of countries in which the subsidiaries of each Chinese EMNE are located (source: Orbis). Geographic depth captures the number of subsidiaries in each country for each EMNE; also in this case, we follow prior studies in the field (e.g. Kafouros et al., 2018) and calculate a record of

the number of subsidiaries in each host country that each Chinese EMNEs operates in (source: Orbis). To build the portfolio measure, for each Chinese EMNE we considered the highest number (arising from the host country with the highest level of subsidiaries) in order to capture the maximum level of depth.

Table 2 shows the geographic breadth and depth of Chinese EMNEs. As regards the former, most of firms (i.e. 104 companies representing 60.12% of the sample) have invested only in one country, while the remaining ones have invested in 2 (32 firms), 3 (15 firms) or 4 (9 firms) different countries; only 13 firms have subsidiaries in more the 4 countries. As regards the depth, the majority of the firms (114) display a maximum of only one investment per country, while 30 firms have more than 2 investments in at least one country, and 12 firms at least 3 investments. The remaining firms have a maximum number of investments ranging from 4 to 25.

- Insert table 2 about here -

Institutional distance and cultural distance: To account for the institutional and cultural distance at portfolio level of analysis, we rely on the methodology based on the average values adopted by Lavie and Miller (2008) to capture the alliance portfolio internationalization. More specifically, to measure institutional distance, we adopted a two-step methodology. First, for every EMNE, we computed the individual distances between China and the host country of each subsidiary, by employing the Kogut and Singh (1988) index[3] applied to the 10 items provided by the Heritage Foundation (http://www.heritage.org/index/about)[4]. Then, given that we employ a portfolio level analysis, for each EMNE we computed the mean value of the institutional distances resulting from

[3] The Kogut and Singh (1988) index is computed as follow for each pair of home-host country: $Institutional\ Distance_j = \sum_{l=1}^{10} \frac{(I_{l,j} - I_{l,s})^2 / V_l}{10}$, where *s* is China, *j* the country where the subsidiary is located, $I_{l,j}$ is the score for the l_{th} institutional item, and V_l is the variance of the l_{th} institutional item.

[4] The items considered to compute the institutional distance index for each pair of host-home country are: Property rights, Freedom from corruption, Fiscal freedom, Government spending, Business freedom, Labour freedom, Monetary freedom, Trade freedom, Investment freedom, Financial freedom

the first step. As a result, we obtained (for each observation) a single value accounting for the average institutional distance of the portfolio of subsidiaries of each EMNE.

To operationalize cultural distance, we adopted the same methodology, by using, in the first step, the Kogut and Singh (1988) index applied to the 5 items provided by Dow (2000)[5] to capture the difference between the cultures of EMNE's home country (i.e. China) and each subsidiary's host country. In the second step, we computed the mean value of the cultural distances of the first step and we obtained, for each observation, the average cultural distance of the portfolio of subsidiaries of each EMNE.

Developed Host Countries: We estimate the percentage of investments undertaken in advanced countries (based on the classification provided by the World Bank[6]) over total investments for each Chinese MNEs. The number of firms with only investments in developed countries amounts to around 30% of the sample. By contrast, 39% of the firms of the sample have invested only in emerging countries, while the remaining observations exhibit a portfolio with a mixed composition.

4.4 Control Variables

A number of control variables account for factors that, according to the literature, may influence innovation performance[7]. The first firm-level variable that needs to be controlled for when studying innovation is R&D activity, which also represents the innovation input. There are plenty of papers providing theoretical and empirical evidence that R&D represent the *conditio sine qua non* of firms' innovation (e.g. Shefer and Frenkel, 2005). However, to capture the real

[5] The items considered to compute the cultural distance index for each pair of host-home country are: Language distance, Religious distance, Industrial development distance, Educational distance, Political distance. (https://sites.google.com/site/ddowresearch/home/scales).

[6] We considered as advanced countries those one classified as "High Income" by the World Bank; see: https://datahelpdesk.worldbank.org/knowledgebase/articles/378834-how-does-the-world-bank-classify-countries

[7] The continuous explicative and control variables have been standardized in order to smooth the different scales of the proxies.

commitment of firms towards R&D, we opted for a relative rather than for an absolute value. More specifically, following Piga and Atzeni (2007), we employ the variable *EMNE R&D intensity*, operationalized as the investment of each EMNE in R&D in relation to their total assets in 2013 (sources: Orbis, Lexisnexis and CSMAR). This variable accounts for the percentage of assets that a firm invests in R&D, capturing the extent to which a firm is R&D-intensive.

Among the firm-level variables, several studies (e.g. Cohen and Klepper, 1992 and 1996) suggest that innovation performance depends on firm size. Large firms have resources to support innovation and a wider output that helps spreading the costs of R&D. However, they might be less creative and less able to identify new opportunities. Hence, we control for *EMNEs Size*, which is operationalized as the number of employees of each Chinese EMNEs in 2013 (sources: Orbis, Lexisnexis and CSMAR).

A third firm-level control variable that is typically employed in the innovation literature is the age of the EMNE, which reflects its experience and which has been associated with two contrasting effects. On the one hand, it contributes to the accumulation of knowledge, organizational competences, absorptive capacity and decrease of the marginal costs associated with the development of new products (Balasubramanian & Lee, 2008). On the other hand, long experience arising from age can imply path-dependence, lock-in effects, organizational inertia and learning myopia (Albertoni, Elia and Piscitello, 2019), which are likely to hinder innovation. Therefore, we control for *EMNEs Age*, which is estimated as the difference between the base year (2013) and the year of foundation of each EMNEs (sources: Orbis, Lexisnexis and CSMAR).

A final firm-level variable we employ is *EMNEs Government Ownership*, a dummy taking value of 1 for EMNEs that include the Chinese Government among the shareholders (source: Orbis). EMNEs owned by national governments are more likely to rely on a larger amount of resources to support their innovation and financial performance (Buckley, Elia and Kafouros, 2010), although several authors suggest that expanding abroad is more challenging for state-owned

enterprises than for private companies. The interference of politicians in business decisions affects the international competitiveness of SOEs by prompting them to make suboptimal strategic choices that are driven by political and non-strategic motives, giving birth to political concerns and discrimination (Cuervo-Cazurra, 2012, 2018; Kalasin, Cuervo-Cazurra and Ramamurti, 2019; Mukherjee, Makarius and Stevens, 2018; Wang, Kafouros, Hong and Ganotakis, 2020).

Innovation also depends on the industries to which firms belong. Sectors that are more technology intensive are likely to require constant innovation and to recur extensively to patenting to protect inventions. Therefore, following Shefer and Frenkel (2005), we also employ a variable controlling for the technology intensity of EMNEs' industries, i.e. *High-Tech Industry*, a dummy taking value of 1 if the Chinese EMNE operate an industry classified as High-Tech or Medium High-Tech by Eurostat-OECD (2007)[8] and 0 if it belongs to a traditional industry.

5. RESULTS

Given that both dependent variables (*Innovation Scale* and *Innovation Quality)* are count measures, integer and non-negative, the negative binomial approach is the most suitable[9] (Hausman, Hall & Griliches, 1984). Table 3 reports the correlation matrix and descriptive statistics. None of the variables displays correlation that might raise multicollinearity problems. Table 4 reports the results of the negative binomial regressions for *Innovation Scale* and *Innovation Quality*. To understand the importance of the results in terms of impact, we provide information on the size effect of each variable by reporting the Incident Rate Ratios (IRRs)[10] associated with the

[8] The high-tech and medium high-tech industries identified by Eurostat-OECD (2007) classification include: Aerospace, Computers, Office Machinery, Electronics-communications, Pharmaceuticals, Scientific instruments, Motor vehicles, Electrical machinery, Chemicals, Other transport equipment, Non-electrical machinery.

[9] We use the Negative Binomial model instead of the Poisson model since the latter assumes an equal value between standard deviation and mean, a condition that is violated by both our dependent variables.

[10] The Incidence Rate Ratio (IRR) provides a measure of the frequency with which an event occurs in a population over a period of time (number of events divided by the person-time at risk).

coefficients for each dependent variable.

- Insert Tables 3 and 4 about here -

Our analysis shows that *M&As Investments* have a positive and significant impact on both innovation scale and quality ($p<0.01$ and $p<0.05$, respectively), thus confirming Hypothesis 1. As regards the size of the effect, the IRRs show that the rate of patents and citations within firms having a portfolio with M&As investments is 2.75 and 2.14 times, respectively, the rate of patents and citations within firms having a portfolio without M&As investments.

Regarding the effects of *Geographic Breadth* and *Geographic Depth*, the coefficients are statistically significant only for *Innovation Quality* ($p<0.10$ in both cases), with a positive and negative sign, respectively. These results partially confirm Hypothesis 2. The IRRs show that the rate of citations within firms having a portfolio spread across several countries is 1.99 times the rate of citations within firms having a portfolio concentrated in one single country, while the rate of patents and citations within firms having a deep portfolio is 0.06 times the rate of patents and citations within firms having a portfolio with one subsidiary per country.

Institutional Distance exhibits a negative and significant effect on both dependent variables ($p<0.01$), while the coefficients of *Cultural Distance* turn out to be positive and significant for both dependent variables ($p<0.01$ and $p<0.10$, respectively). The IRRs show that the rate of patents and citations within firms having a portfolio with a high institutional distance is 0.30 and 0.37 times, respectively, the rate of patents and citations within firms having a portfolio with a low institutional distance. Conversely, the rate of patents and citations within firms having a portfolio with a high cultural distance is 2.90 and 2.07 times, respectively, the rate of patents and citations within firms having a portfolio with a low cultural distance. These results therefore confirm Hypothesis 3.

Finally, the variable *Developed Host Countries* is negatively and significantly associated with both dependent variables ($p<0.01$), providing evidence that contradict the prediction of Hypothesis 4. The IRRs show that the rate of patents and citations within firms having a portfolio of

investments in developed countries is 0.41 and 0.44 times, respectively, the rate of patents and citations within firms having a portfolio of investments in emerging countries.

Regarding the control variables, *EMNEs' R&D* displays a positive effect on both *Innovation Scale* ($p<0.05$) and *Innovation Quality* ($p<0.10$), thus confirming the importance of internal R&D to support innovation. The variable *Intensity EMNEs' Size* also exhibits a positive and significant effect on both *Innovation Scale* and *Innovation Quality* ($p<0.01$ for both), suggesting that large firms benefit from resources and economies of scale to foster their innovation performance. Additionally, it turns out that firms that are (partially or totally) owned by Chinese Government perform slightly better ($p<0.10$ for *Innovation Scale* and $p<0.05$ for *Innovation Quality*), possibly due to access to financial resources and to potential political networks (Buckley, Elia and Kafouros, 2010). Finally, the variable *High-Tech Industry* displays a negative and significant coefficient on both *Innovation Scale* ($p<0.01$) and *Innovation Quality* ($p<0.01$). This result seems to suggest that EMNEs encounter more challenges in high-tech industries. This can be due to the high level of tacit and complex knowledge that is embedded in such sectors. By contrast, information in low-tech industries is more readily available from market intermediaries and documents such as company reports and financial statements (Kim, Gaur & Mukherjee, 2020).

Robustness checks and additional evidence

We also performed some additional analyses to check the robustness of our results. First, in order to better disentangle the reasons why hypothesis 4 exhibits an opposite sign respect to our expectations, we interacted this term with other explanatory variables to understand whether the variable *Developed Host Countries* can assume the expected effect when combined with other characteristics of the portfolio of subsidiaries. The results of this analysis, which are displayed in tables 5a and 5b, provide some interesting insights. Indeed, columns 1a and 1b show that the interaction between the variables *M&As Investments* and *Developed Host Countries* is positive and significant ($p<0.05$) for both innovation scale and quality, meaning that developed countries can

contribute to boost the innovation performance of Chinese EMNEs mainly when they adopt M&As as entry mode, and that M&As are more effective when they occur in developed rather than in developing countries. Columns 2a and 2b show that the interaction between the variables *Geographic Breadth* and *Developed Host Countries* is also positive and significant for both dependent variables ($p<0.05$), meaning that investments in developed economies can benefit Chinese EMNEs' innovation performance mainly when they are diversified across countries rather than concentrated in one or few locations.

Second, we introduced the square terms of our explicative variables as internationalization can have a U-shape or an inverted-U shape effect on performance (e.g. Gomes and Ramaswamy, 1999; Contractor, Kumar and Kundu, 2007). Our results (which are available upon request) exhibit a U-shape effect of cultural distance for both innovation scale and quality, thus revealing that the most innovative Chinese EMNEs are those one with a portfolio of subsidiaries that is either far or close to its home culture. The results also show a U-shape effect of depth on innovation quality, suggesting that innovation quality is higher at either a very low or a very high number of subsidiaries.

Finally, we introduced the variable *Portfolio Size* (i.e. total number of subsidiaries for each firm) as additional regressor, being one of the typical control variables employed when using the portfolio as unit of analysis (e.g. Lavie and Miller, 2008). This variable has not been employed in the main regression due to its high correlation with the breadth (84%) and depth (73%) variables, which results in Variance Inflection Factors higher than the conventional threshold of 10. However, Lindner et al. (2020) suggest that multicollinearity does not introduce a real bias, meaning that it does not violate assumptions necessary for regression models to work, and that in the presence of a high correlations between variables, it can paradoxically become more problematic to omit. Therefore, we run the regression after introducing the portfolio size as additional control. The results, which are available upon request, are in line with those presented in table 4.

6. DISCUSSION AND CONCLUSION

6.1 Theoretical Contributions

Although several studies acknowledge that internationalization can be potentially advantageous for firms' innovation, it remains less well understood why some EMNEs can enhance their innovativeness from internationalization, while others cannot. The starting point of our study is that certain idiosyncratic features of emerging countries may lead to different internationalization paths that in turn, differentially affect the innovation performance of EMNEs. To answer our research question, i.e. "what is the relationship between the way EMNEs shape their portfolio of cross-border investments and their innovation performance?", we provide evidence that EMNEs improve their innovation performance when their portfolio of subsidiaries (1) is built through M&As (rather than greenfield investments), (2) is distributed across multiple countries (rather than located in few locations), (3) is distant from home in terms of culture (but not in terms of institutions), and (4) is located in emerging (rather than in developed) countries (although M&As provide better results in developed countries). The use of a portfolio-level analysis allows us to disentangle an asymmetric pattern of internationalization leading to a higher innovation performance. This approach suggests that firms have to find the right balance between cultural, institutional and economic distance, where the former should be relatively higher while the second and third dimensions should be lower (although economic distance can be higher when combined with M&As). Accordingly, our analysis provides a more forensic understanding of the factors that shape the innovativeness of EMNEs, by contributing to two different streams of literature.

The first one is at the intersection between international business and innovation. Indeed, prior research has considered how firms benefit from international expansion in terms of innovation (Kafouros et al., 2008; Piperopoulos et al., 2018), but the reasons why some firms actually enhance their innovativeness when they internationalize and some others do not are not so clear. Building on

and extending the geographic relational approach (Deng et al., 2020), we show that the effectiveness of internationalization in enhancing innovation performance depends on *where* and (above all) on *how* firms internationalize, i.e. on the configuration of their portfolio of subsidiaries (rather than merely on the degree of internationalization).

The application of the extended geographic relational approach to the Chinese context and the results of our analysis allow us to add a second important and multifaceted contribution to another stream of literature, i.e. the EMNEs studies. First, we show that not all EMNEs increase their innovation performance because of their different internationalization trajectories. Overall, our conceptual model shifts the focus of the literature from the degree to which EMNEs internationalize to *how* and *where* they should internationalize in order to become more innovative and catch-up technologically. The theoretical value of this approach is that it allows us to focus on the differential internationalization strategies of EMNEs across different "places" (geographic units) and "spaces" (the characteristics that generate heterogeneity across places), by adopting a portfolio-level of analysis that is rather innovative within the EMNEs literature.

Second, our study goes beyond EMNEs' work that either focused on the degree of internationalization (Kafouros et al., 2008) or distinguished between developed and emerging countries (Piperopoulos et al., 2018) by adopting a finer perspective that explicitly considers the effects of six distinct and crucial factors that characterize EMNE's internationalization. Distinguishing between the different ways in which they internationalize is theoretically and practically important because, as our analysis shows, these dimensions influence innovation performance *differentially*, in both magnitude and directionality. Our overarching reasoning suggests that these six internationalization factors influence the benefits (e.g. organizational learning, collaboration and access to resources) and challenges (e.g. coordination costs and knowledge leakage) that firms face, as well as the effectiveness of the innovation and capital route to internationalization, which in turn influence the overall innovation performance of the EMNE.

Third, our analysis offers a new insight on the specific role of the entry mode for EMNEs' innovation performance, by showing that acquisitions enhance both innovation scale and quality, whereas the opposite is true for greenfield investments. This finding supports the theoretical prediction that the capital-market route to internationalization by acquiring foreign firms is an effective strategy when EMNEs aim to enhance their innovation performance (Buckley et al., 2014). Fourth, we demonstrate that there are significant differences between geographic breadth and depth for the innovation of Chinese EMNEs. The results show that the effect of breadth is positive but not significant for innovation scale and only slightly significant for innovation quality, reflecting that the dispersion of activities raises coordination problems that, as suggested also by Vasudeva & Anand (2011), can reduce the effectiveness of the synergies and complementarities arising from the cross-country diversity of knowledge. For depth, we find a negative effect only on innovation quality (not scale), suggesting that increases in investments in one country do not result in innovation quality improvements.

Fifth, our analysis also complements research that considers how institutional and cultural distance influences the internationalization of EMNEs by demonstrating how these two aspects affect the innovation performance of these firms. We hypothesize and empirically verify that there is an asymmetric pattern of results for institutional and cultural distance. Institutional distance has a negative and significant effect on both innovation scale and quality, suggesting that there are strong institutional barriers to the creation and development of intra-organisational markets in innovation resources across countries. However, cultural distance is advantageous for both innovation scale and quality (although the effect on the latter is weaker), supporting the view that cultural diversity in internal markets is beneficial for creativity.

Finally, our empirical analysis shows that locating subsidiaries in advanced countries is negatively associated with both the innovation scale and quality of Chinese EMNEs. This finding differs from our theoretical prediction but is in line with some recent empirical evidence showing

that investments in advanced countries are not necessarily beneficial for EMNEs (see, for instance, Amendolagine et al., 2018). Indeed, what matters is not how much the target country is advanced, but rather the extent to which the Chinese EMNEs are able to capture the complex knowledge and technology embedded in developed countries and mobilize it at their own advantage (Amendolagine et al., 2018). Our additional evidence shows that this happens when the Chinese EMNEs enter the advanced country through M&As and when they are able to diversify their investments across different developed economies rather than concentrating them in one or few locations. This result is consistent with Alon, Elia & Li (2020), who provide evidence that Chinese firms entering rule-based countries tend to select M&As (rather than greenfield) as establishment mode since these locations - which typically correspond to developed countries - offer more transparent information and stable conditions, thus enabling EMNEs to maximize their gains from the takeovers. Our additional analyses provide also some evidence of the U-shape relationship between international expansion and performance proposed by Contractor, Kumar and Kundu (2007) for Indian firms, by showing that, in the case of Chinese EMNEs' innovation performance, this seems to hold for the dimensions of cultural distance and geographic depth.

6.2 Managerial Implications

First, our analysis on the different dimensions of innovation performance (scale and quality) shows that certain aspects of internationalization strategy as well as the characteristics of the EMNEs subsidiaries portfolio do not have univocal impact on innovation. This may help the managers of EMNEs to understand the "expansion paradox" – that is, why some EMNEs with global ambitions have little success (Lynch & Jin 2015). Managers of Chinese EMNEs should first consider which dimension (scale or quality) their innovation strategy should prioritize (or find the right trade-off between innovation scale and quality), and then consider how to implement their internationalization strategy. From the point of view of entry mode, they should be aware that, on

average, acquisitions are likely to be more advantageous for innovation performance compared with greenfield investments, especially in advanced countries.

With respect to geographic breadth and depth, it turns out that the former might be more beneficial than the latter for the innovation quality of Chinese EMNEs, especially when targeting advanced countries. Therefore, managers may want to consider more carefully those projects that are aimed at making multiple investments in existing markets. In a similar vein, they should be aware that it is advantageous for Chinese EMNEs to make location choices that exhibit a lower level of institutional distance but a higher level of cultural distance. Given that countries with high institutional distance often exhibit a high cultural distance, manager should try to minimize the dispersion of time and resources that firm face to adapt to local institutions, e.g. by adopting isomorphic strategies (i.e. imitating the organizational forms of other Chinese companies located in the same area) in order to achieve a quicker regulative, normative and cognitive legitimacy (Salomon and Wu, 2012), thus reducing the negative effects of institutional distance.

Finally, there is an ongoing debate as to which location choice (emerging or developed countries) is more beneficial for EMNEs. Managers of Chinese EMNEs that aim at investing in advance countries should be aware that, to gain benefits in terms of innovation, they should pay attention to *how* they enter, by opting for M&As rather than for greenfield investments in order to be able to take advantage of the knowledge, technology and resources that are embedded in the target firm. Additionally, they should opt for a diversification strategy by investing in more than one developed country rather than concentrating all subsidiaries in one single advanced location.

6.3 Limitations and Future Research

First, although the size and the internationalization strategies of China make it an appropriate country for our analysis, we should recognize that our empirical findings are China-specific. Consequently, we do not know how the results of our analysis might differ for other

emerging countries due to differences in idiosyncratic characteristics. Future studies may examine how certain characteristics vary from country to country and how in turn such effects influence our hypothesized effects. They can also consider how EMNEs from different emerging countries differ in their motives, capabilities and strategies and in turn how such variations might affect which internationalization strategy is more beneficial for innovation. It would be interesting also to explore some industry-specific and firm-specific contingencies that might moderate the relationship between the portfolio of subsidiaries and internationalization, and to disentangle more in depth both the *how* (e.g. by including also the cooperative and the market entry modes) and the *where* (e.g. by considering the geography at subnational level) dimensions of internationalization. Future studies can also use panel-data in order to better understand the dynamics of the relationship between the internationalization process and the innovation performance. Additionally, other patent offices (in addition to the USPTO) might be taken into account as source of further innovation outputs. Finally, future studies should try to study the effect of the portfolio of subsidiaries on different types of innovation, e.g. by distinguishing between core and non-core technologies, product and process innovation etc. Despite these limitations, we believe that our paper provides a useful contribution to understand why some Chinese EMNEs have boosted their innovation performance while some other did not after internationalization.

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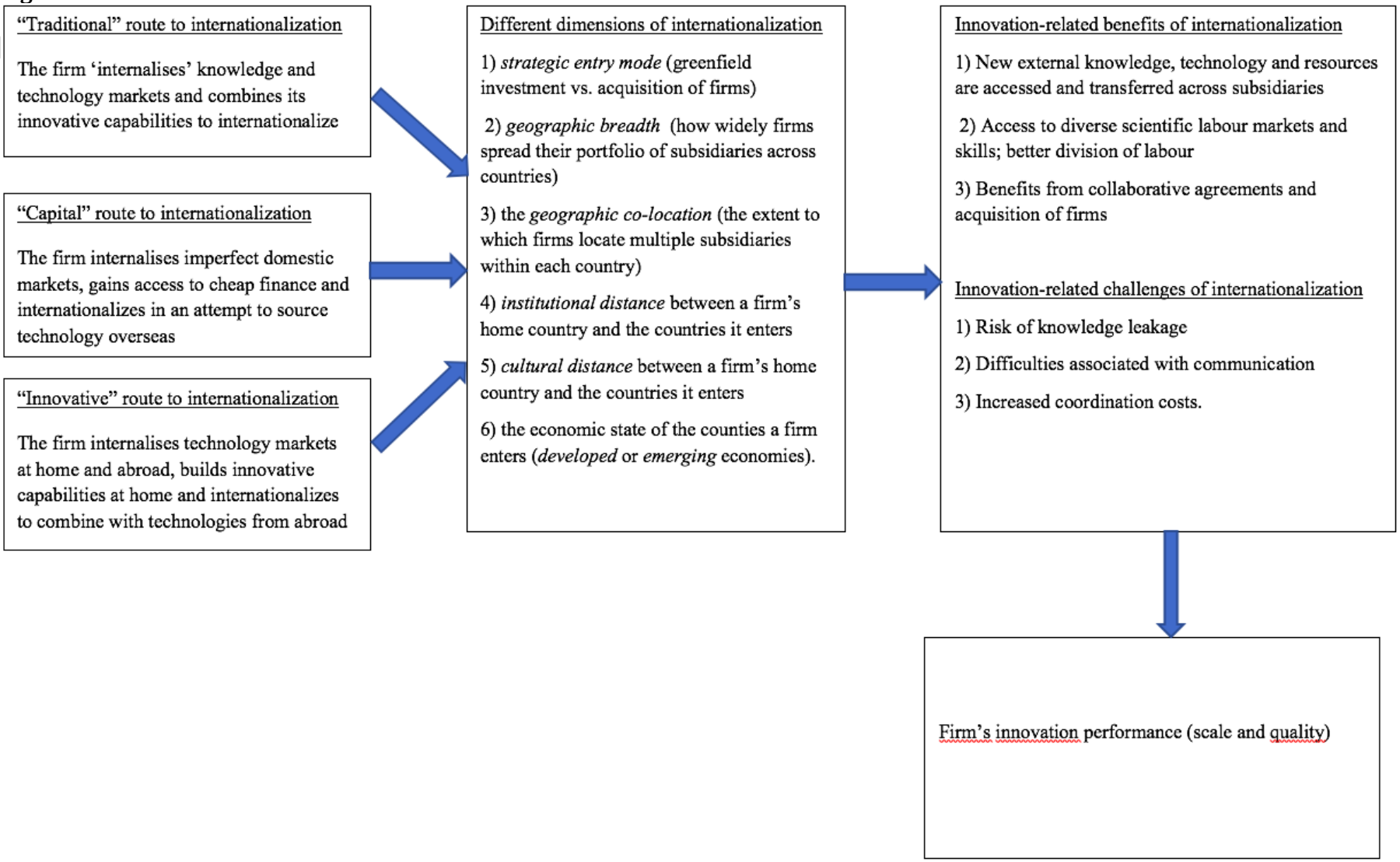
FIGURES AND TABLES

Figure 1: Internationalization and Innovation



TABLES

Table 1a: Distribution of the Chinese EMNEs and subsidiaries across different portfolio sizes

Size of the portfolio (in terms of No. of subsidiaries) (a)	Number of Chinese EMNEs for each portfolio size (b)	% of Chinese EMNEs for each portfolio size (c)	Total subsidiaries for each portfolio size (a*b)
1	89	51.45	89
2	27	15.61	54
3	13	7.51	39
4	10	5.78	40
5	7	4.05	35
6	7	4.05	42
7	2	1.16	14
8	3	1.73	24
9	3	1.73	27
10	2	1.16	20
13	1	0.58	13
14	1	0.58	14
15	1	0.58	15
19	1	0.58	19
21	1	0.58	21
22	1	0.58	22
26	1	0.58	26
29	1	0.58	29
35	1	0.58	35
39	1	0.58	39
Totals	**173**	**100**	**617**

Table 1b: Distribution of Chinese EMNEs' foreign subsidiaries across geographic areas

Geographic Areas	No. of countries	No. Of subsidiaries	%
Africa	9	17	2.8%
Asia	23	351	56.9%
Europe (including Russian Federation)	20	135	21.9%
North America (Including Mexico)	3	83	13.5%
Oceania	4	14	2.3%
South America	4	17	2.8%
Totals	**63**	**617**	**100.0%**

Table 2: Geographic Breadth and Depth of the portfolio of subsidiaries of Chinese EMNEs

Breadth (No. of countries)	**Frequency Breadth**	**% Breadth**	**Depth (Max number of subsidiaries in a country)**	**Frequency Depth**	**% Depth**
1	104	60.12	1	114	65.9
2	32	18.5	2	30	17.34
3	15	8.67	3	12	6.94
4	9	5.2	4	3	1.73
5	3	1.73	5	4	2.31
6	2	1.16	6	3	1.73
7	1	0.58	7	2	1.16
8	2	1.16	10	1	0.58
9	1	0.58	13	1	0.58
11	1	0.58	16	1	0.58
17	1	0.58	18	1	0.58
21	1	0.58	25	1	0.58
26	1	0.58			
Totals	**173**	**100**	**Totals**	**173**	**100**

Table 3: Matrix of correlations and descriptive statistics of the dependent, explicative and control variables

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1)	Innovation Scale	1.000												
2)	Innovation Quality	0.987	1.000											
3)	M&As Investments	0.070	0.064	1.000										
4)	Geographic Breadth	0.530	0.465	-0.032	1.000									
5)	Geographic Depth	0.021	-0.006	-0.084	0.281	1.000								
6)	Institutional Distance	-0.154	-0.157	0.112	-0.207	0.060	1.000							
7)	Cultural Distance	0.060	0.046	0.070	0.034	-0.017	0.254	1.000						
8)	Developed Host Countries	-0.020	-0.039	0.067	0.133	0.062	0.093	0.218	1.000					
9)	EMNEs R&D Intensity	0.163	0.120	-0.019	0.349	0.045	0.068	0.041	0.066	1.000				
10)	EMNEs Size	0.473	0.432	0.047	0.395	0.054	-0.213	0.023	0.042	-0.035	1.000			
11)	EMNEs Age	0.010	0.002	0.082	-0.002	0.178	-0.152	-0.002	-0.060	-0.124	0.070	1.000		
12)	EMNEs Government Ownership	0.152	0.156	0.183	0.158	-0.055	0.026	0.004	0.099	0.023	0.257	0.047	1.000	
13)	High-Tech Industry	-0.056	-0.055	-0.064	-0.030	0.039	-0.035	0.106	0.144	-0.083	-0.010	-0.032	-0.020	1.000
	Observations	173	173	173	173	173	173	173	173	173	173	173	173	173
	Mean	7.272	5.751	0.473	2.214	2.058	4.442	10.348	0.472	0.019	0.026	15.220	0.474	0.104
	Std. Dev.	40.832	35.154	0.437	3.045	2.891	0.955	2.153	0.424	0.026	1.027	12.969	0.501	0.306
	Min	0.000	0.000	0.000	1.000	1.000	0.973	2.852	0.000	0.000	-0.496	1.000	0.000	0.000
	Max	446.000	364.000	1.000	26.000	25.000	5.977	14.008	1.000	0.248	8.194	110.000	1.000	1.000

Table 4: Results of the negative binomial analyses

Explanatory variables	**Innovation Scale**		**Innovation Quality**	
	Coefficient	*IRR*	*Coefficient*	*IRR*
M&As Investments	1.014***	2.756***	0.762**	2.143**
	(3.89)	(3.89)	(2.29)	(2.29)
Geographic Breadth	-0.004	0.996	0.689*	1.992*
	(-0.02)	(-0.02)	(1.65)	(1.65)
Geographic Depth	0.210	1.234	-2.680*	0.069*
	(0.86)	(0.86)	(-1.71)	(-1.71)
Institutional distance	-1.203***	0.300***	-0.989***	0.372***
	(-4.48)	(-4.48)	(-3.22)	(-3.22)
Cultural distance	1.066***	2.903***	0.729*	2.072*
	(3.12)	(3.12)	(1.82)	(1.82)
Developed Host Countries	-0.893***	0.410***	-0.814***	0.443***
	(-3.22)	(-3.22)	(-2.72)	(-2.72)
EMNEs R&D Intensity	1.222**	3.395**	1.373*	3.948*
	(2.16)	(2.16)	(1.80)	(1.80)
EMNEs Size	0.467***	1.596***	0.474***	1.607***
	(4.13)	(4.13)	(3.80)	(3.80)
EMNEs Age	0.340	1.406	1.109	3.031
	(0.61)	(0.61)	(1.14)	(1.14)
EMNEs Government Ownership	0.812*	2.252*	1.247**	3.480**
	(1.68)	(1.68)	(2.12)	(2.12)
High-Tech Industry	-0.566	0.568	-2.408**	0.090**
	(-0.76)	(-0.76)	(-2.17)	(-2.17)
Constant	-0.640*		-1.760***	
	(-1.66)		(-3.39)	
Observations	173		173	
Chi-square	108.415***		85.899***	
Log pseudo-likelihood	215.292		-148.385	

* p<0.10, ** p<0.05, *** p<0.01. Z-statistics between brackets

Table 5a: Results of the negative binomial analyses with interactions for *Developed Host Country* (Dependent variables: *Innovation Scale*)

Explanatory variables	**Column 1a**	**Column 2a**	**Column 3a**	**Column 4a**	**Column 5a**
M&As Investments	1.249***	0.997***	1.057***	0.981***	1.084***
	(4.66)	(3.84)	(3.90)	(3.06)	(3.81)
Geographic Breadth	-0.091	-0.422*	0.026	0.003	-0.026
	(-0.53)	(-1.89)	(0.16)	(0.02)	(-0.16)
Geographic Depth	0.263	0.191	0.209	0.201	0.217
	(1.16)	(0.81)	(0.89)	(0.78)	(0.90)
Institutional distance	-1.477***	-1.288***	-1.258***	-1.192***	-1.203***
	(-4.72)	(-4.69)	(-4.44)	(-4.37)	(-4.35)
Cultural distance	0.957***	1.149***	1.120***	1.057***	1.016***
	(3.06)	(3.29)	(3.10)	(3.00)	(3.35)
Developed Host Country	-1.031***	-0.362	-0.944***	-0.886***	-0.900***
	(-3.39)	(-1.25)	(-3.55)	(-3.06)	(-3.21)
EMNEs R&D Intensity	1.441***	1.249**	1.191**	1.247**	1.200**
	(2.65)	(2.45)	(2.05)	(2.03)	(2.25)
EMNEs Size	0.517***	0.540***	0.430***	0.467***	0.482***
	(4.65)	(4.92)	(4.15)	(4.26)	(4.25)
EMNEs Age	0.208	0.367	0.404	0.367	0.303
	(0.46)	(0.75)	(0.63)	(0.59)	(0.56)
EMNEs Government Ownership	0.713	0.636	0.814*	0.798	0.796*
	(1.46)	(1.36)	(1.67)	(1.61)	(1.65)
High-Tech Industry	-0.684	-0.696	-0.851	-0.511	-0.515
	(-0.92)	(-0.94)	(-0.96)	(-0.64)	(-0.69)
*Developed Host Country*M&As Investments*	0.591**				
	(2.10)				
*Developed Host Country*Geographic Breadth*		1.757**			
		(2.36)			
*Developed Host Country*Geographic Depth*			-0.267		
			(-0.91)		
*Developed Host Country*Institutional distance*				0.039	
				(0.15)	
*Developed Host Country*Cultural distance*					-0.110
					(-0.53)
Constant	-0.832*	-0.670*	-0.615	-0.641*	-0.625
	(-1.95)	(-1.76)	(-1.56)	(-1.68)	(-1.63)
Observations	173	173	173	173	173
Chi-square	99.506***	184.317***	111.179***	116.159***	104.896***
Log pseudo-likelihood	-213.550	-214.463	-215.150	-215.280	-215.199

* p<0.10, ** p<0.05, *** p<0.01. Z-statistics between brackets

Table 5b: Results of the negative binomial analyses with interactions for *Developed Host Country* (Dependent variables: *Innovation Quality*)

Explanatory variables	Column 1b	Column 2b	Column 3b	Column 4b	Column 5b
M&As Investments	1.024***	0.727**	0.793**	0.360	0.777**
	(2.61)	(2.17)	(2.32)	(1.17)	(2.38)
Geographic Breadth	0.497	-0.174	1.672	0.874**	0.675
	(1.07)	(-0.46)	(1.59)	(2.07)	(1.57)
Geographic Depth	-2.363	-2.212*	-5.311*	-3.034**	-2.651
	(-1.45)	(-1.76)	(-1.71)	(-1.98)	(-1.64)
Institutional distance	-1.364***	-1.108***	-1.031***	-0.800**	-0.988***
	(-4.01)	(-3.46)	(-3.40)	(-2.50)	(-3.22)
Cultural distance	0.584	0.789*	0.817**	0.671*	0.708*
	(1.49)	(1.94)	(2.03)	(1.77)	(1.94)
Developed Host Country	-0.954**	-0.067	-1.860**	-0.816***	-0.814***
	(-2.54)	(-0.15)	(-2.00)	(-2.87)	(-2.72)
EMNEs R&D Intensity	1.696**	1.551**	1.366*	1.498*	1.375*
	(2.09)	(1.99)	(1.84)	(1.94)	(1.84)
EMNEs Size	0.543***	0.579***	0.515***	0.528***	0.475***
	(4.08)	(4.51)	(3.68)	(4.30)	(3.85)
EMNEs Age	0.794	1.132	0.811	1.331	1.095
	(0.78)	(1.31)	(0.64)	(1.38)	(1.09)
EMNEs Government Ownership	1.250**	0.972	1.393**	1.070*	1.250**
	(2.09)	(1.62)	(2.33)	(1.90)	(2.11)
High-Tech Industry	-2.227*	-2.609**	-2.257**	-1.204	-2.423**
	(-1.71)	(-2.40)	(-1.97)	(-1.17)	(-2.21)
*Developed Host Country*M&As Investments*	0.753**				
	(2.06)				
*Developed Host Country*Geographic Breadth*		2.503**			
		(2.30)			
*Developed Host Country*Geographic Depth*			-2.854		
			(-1.22)		
*Developed Host Country*Institutional distance*				0.440	
				(1.55)	
*Developed Host Country*Cultural distance*					-0.027
					(-0.11)
Constant	-2.088***	-1.714***	-2.579***	-1.931***	-1.751***
	(-3.35)	(-3.42)	(-2.91)	(-3.76)	(-3.37)
Observations	173.000	173.000	173.000	173.000	173.000
Chi-square	81.555***	136.450***	83.680***	85.391***	89.076***
Log pseudo-likelihood	-147.107	-147.756	-147.806	-147.639	-148.382

* p<0.10, ** p<0.05, *** p<0.01. Z-statistics between brackets