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Are Chinese MNEs more Attracted to Knowledge Intensive City Clusters than Developed Market MNEs when Undertaking Greenfield R&D Related FDI?

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1. Introduction

There has been much interest in the international strategic asset seeking (SAS) behaviours of emerging market (E)MNEs, partly driven by theoretical controversies regarding the applicability of mainstream International Business (IB) theory, as well as current international geopolitics (Shi, Williams, Sutherland, & Rong, 2021). Chinese MNEs (CMNEs), at times supported by the state through various 'selective' industrial policies (i.e. 'China Manufacturing 2025'), are considered highly active in acquiring foreign know-how, technologies and brands, with a view to catching-up with developed market MNEs (hereafter DMNEs) (Sutherland, Anderson, & Hu, 2020a). To do so, however, CMNEs must arguably *locate* where the best human resources and knowledge abound. Such locations may facilitate access to capabilities, knowledge networks and supporting infrastructure and resources enabling them to develop the capability to engage in cutting edge innovation (Lorenzen, Mudambi, & Schotter, 2020). Global cities and other city-based knowledge intensive research clusters are likely to be among the most attractive of locations for SAS purposes. The CMNEs Huawei and ZTE stand out as significant cases in point. They rely extensively upon foreign hires in international R&D centres (Schaefer & Liefner, 2017). By 2018, Huawei (116) and ZTE (28) (China's largest MNE investors in greenfield R&D by some way) had established over 144 greenfield SAS related investments, 34 of which were located within the top 100 most innovative research-intensive city clusters in the world (WIPO, 2021).[1] Indeed, most of Huawei's highest cited patents do not originate from China, but rather from the dozens of foreign R&D outposts employing non-Chinese technical experts (Schaefer, 2020), pointing towards the great strategic importance of these offshore R&D hubs.

From a theoretical perspective, the springboard perspective/theory and 'link, leverage and learn' (LLL) models that have become widely accepted within International Business theorising, emphasise the speed of firm-level catch-up as central to EMNEs' internationalisation strategy (Luo & Tung, 2007, 2018; Mathews, 2017).[2] Thus, concepts associated with 'accelerated' and 'springboard' internationalisation, have tended to focus academic research on international strategic-asset-seeking (SAS) related cross-border M&As (Liu & Giroud, 2016; Luo & Tung, 2018; Tan & Mathews, 2014). It is argued M&A deals allow EMNEs to rapidly acquire the strategic resources they lack, often via repeated deals in *developed markets*, facilitating rapid firm-level technological catch-up. It is interesting,

[1] Including: Amsterdam, Brussels, Grenoble, Helsinki, Istanbul, Lausanne, London, Lund, Milan, Moscow. Munich, Paris, Rome, Seoul, Singapore, Stockholm, Sydney, Tokyo, Yokohama, Zürich, Atlanta, GA, London, Stockholm and Tokyo.

[2] The LLL acronym was coined as a direct challenge International Business's mainstream OLI model as a competing theory. Based around the experience of 'Dragon Multinationals' from East Asia, it argued, along the lines of the popular 'springboard- perspective' (Luo and Tung, 2007), that EMNEs were driven by asset augmenting as opposed to asset exploiting internationalisation strategies.

however, that many of the most innovative Chinese MNEs (like Huawei) have engaged in steady long-term greenfield (GF) FDI exposure to specific sub-national regional clusters, organically building and integrating their own international innovation networks using foreign hires.

This raises several questions. Do CMNEs also have a stronger greenfield SAS orientation than DMNEs– as they look to engage in firm-level catch-up? Moreover, if knowledge is 'sticky' and technological clusters and agglomerations are important economic hubs for innovation, do global cities or other research-intensive city-based clusters hold out a stronger attraction for the SAS location choice decisions of CMNEs when compared with DMNEs when undertaking greenfield FDI? In this paper we therefore look to conceptually and empirically explore: (i) the extent to which Chinese GF SAS related FDI may be different to that of DMNEs; (ii) and we do so through the prism of sub-national location choice determinants – specifically the moderating impacts of (a) global cities as well as (b) other research-intensive city clusters on CMNE R&D related FDI projects. We do so by employing logistic regression analysis of the FDI GF choices of close to 100,000 GF projects worldwide (taken from the fDi Markets database), comparing CMNEs with MNEs from OECD nations. Our results show that research intensive city clusters do indeed more strongly attract CMNE greenfield R&D. Interestingly, however, and somewhat contrary to our expectations, global cities negatively moderate the relationship for CMNEs though still act in a positive way for DMNEs, pointing towards some interesting differences in the GF SAS related FDI strategies of the two. We discuss how our findings contribute to the debate on EMNE catch-up theory within IB, including springboard theory. We also consider how the nascent global city literature (Belderbos, Du, & Slangen, 2020; Chakravarty, Goerzen, Musteen, & Ahsan, 2021; Goerzen, Asmussen, & Nielsen, 2013) and a focus on sub-national location decisions help us better understand CMNE SAS strategies.

2. Theory and Hypothesis Development

CMNEs, some argue, do not possess traditional types of 'ownership advantages' that can be meaningfully exploited in developed markets (Cuervo-Cazurra, 2012). This being so, their outward FDI strategies are considered poorly explained by existing theory, prompting calls for new or revised theoretical contributions to explain their FDI strategies (Luo & Tung, 2018). CMNE SAS strategies are thought, in particular, to be driven by the comparatively low levels of strategic assets they possess when compared to their DMNE competitors (Luo and Tung 2007; Rui and Yip 2008), as they look to rapidly catch-up with their DMNE counterparts (Rui and Yip 2008), aided at times by state support (Wang et al., 2012) and a number of additional favourable domestic home market conditions. This includes: access to 'complementary local resources' allowing them to fully exploit their home market (Hennart, 2012); asymmetries in liabilities of foreignness hindering foreign businesses looking to compete in China but not impeding Chinese companies from going out (Petersen & Seifert, 2014); business group affiliation aiding Chinese groups to exploit their home market more effectively (i.e., internal product, labour and finance markets) (Yiu, Lau, & Bruton, 2007); and the imperative to catch-up and learn from foreign rivals (Child and Rodrigues, 2005; Mathews, 2006). State led institutional supports (at various levels, particularly provincial) may therefore encourage their international SAS expansion, via among other things domestic financial markets support (Wang et al., 2012). This includes active industrial policies to promote nascent CMNEs to engage in cross-border SAS (Cui and Jiang 2012; Deng 2009; Luo et al. 2010; Wang et al. 2012).

2.1 Greenfield FDI and SAS orientation: CMNEs versus DMNEs

While the SAS orientation of CMNEs has risen to theoretical prominence among IB scholars (Luo & Tung, 2018; Mathews, 2017; Sutherland, Anderson, & Hu, 2020b), it is of interest to note the role of greenfield establishment mode has generally been downplayed and under-researched in that literature (Schaefer, 2020). This is probably because GF SAS approaches are considered less ‘aggressive’ and more incremental – and therefore less likely to lead to ‘accelerated’ catch-up and ‘leapfrogging’ or ‘spring-boarding’ activities. Moreover, GF FDI tends to be less high profile than larger ‘mega-deal’ M&As, often being less widely covered in worldwide media reporting as it is politically less important. GF datasets, moreover, have been less easily accessed via mainstream academic research institutions, whereas M&A data is commonly available (owing to the importance of finance as an academic discipline in Western business schools). However, the underlying logic and rationale applied to the motivating role of firm-level catch-up, as popularised in the ’springboard’ and ‘LLL’ perspectives (Luo & Tung, 2007; Mathews, 2006), would appear to be equally relevant to the case of greenfield SAS related FDI. If EMNEs are in rush to engage in firm-level catch-up and accelerated internationalisation – as exemplified by ‘aggressive’ acquisitions to developed markets – would they not also look to enthusiastically engage in greenfield R&D related FDI? The example of Huawei highlights the great potential benefits of developing an intensive and highly committed greenfield strategy.

In sum, there has been huge interest in ‘aggressive’ springboard type M&As as a vehicle for EMNEs to catch-up. This has led many scholars to question whether existing theory is adequate to explain EMNEs (Cuervo-Cazurra, 2012; Hernandez & Guillén, 2018). Accompanying this, many believe EMNEs are characterised as having a greater propensity to engage in SAS related M&As (Liu & Giroud, 2016), raising the question of whether the same logic applies to greenfield FDI.

Hypothesis 1: When undertaking greenfield FDI projects Chinese MNEs are more predisposed towards selecting SAS (i.e. R&D and Design, Development and Testing) related projects than developed market MNEs.

2.2 Global Cities and Greenfield SAS related FDI

Following from our first hypothesis, it is potentially interesting to consider the sub-national geographic location factors associated with GF SAS related FDI. As regards M&A deals (i.e. non-greenfield FDI) already discussed, the sub-national level focus has been somewhat lacking in current analysis. This is perhaps understandable, as locational analysis of M&As is often complicated by the fact that target firms (when they are large) often encompass complex MNEs owning multiple subsidiaries across multiple jurisdictions and geographic locations. This makes it challenging to assign a single target location associated with the FDI. Instead, empirical studies considering SAS have tended to focus at a quite broad geographical unit of analysis, namely the country level (Shi, Sutherland, Williams, & Rong, 2021). A paradox of globalization, however, is that rather than leading to a more stable and even spread of economic activity even within countries, economic forces appear to unleash gravitational tendencies. This has led to a polarisation of knowledge and intangible assets in specific locales, even at the sub-national level, leading in turn to the growing importance of cities (Sassen, 1991, 1996). Agglomerations of firms gather and coalesce in specific areas, allowing for positive spill-overs as well as, in particular, the tapping of vital human capital and related networks (Iammarino, Mccann, & Ortega-argilés, 2017). Innovation, therefore, has often been considered as 'a local process….because of its reliance on tacit knowledge, [that] must be embedded in social contexts' (Li & Bathelt, 2018: 968). It is thus the 'stickiness' of certain assets (tangible physical assets, human resources and other intangible assets) that makes certain geographic locations highly attractive to CMNEs. The uneven distribution of this knowledge terrain, moreover, arguably makes it crucial for those emerging market MNEs attempting to catch-up, such as those from China, to locate in the most suitable (for their purposes) knowledge intensive locations.

How do CMNEs hope to benefit from SAS related greenfield FDI? Recent research shows such FDI strategies have looked to: (i) tap into local R&D infrastructure (Schaefer, 2020; Zhang, Di Minin, & Quan, 2017); (ii) engage in 'technological scanning' to 'track' latest technological developments in developed markets, helping plan future investments (Zhang et al., 2017); (iii) establish new technology partnerships/networks and to make use of 'external technological assistance by building or strengthening new or existing local cooperative relationships' (with both well-known large as well as lesser known smaller businesses) (Zhang et al., 2017) and universities and research centres (Liefner, Si, & Schäfer, 2019); (iv) interact with the aforementioned technology leaders; (v) recruit highly trained foreign research personnel and integrate them into the CMNEs organisational structure/fabric – creating deep networks and linkages with key human resources related to R&D (Schaefer, 2020; Schaefer & Liefner, 2017) and; (vi) develop mechanisms for managing foreign R&D personnel, often involving frequent meetings and exchanges (Schaefer, 2020). Indeed, recruitment of highly trained personnel is perhaps unsurprisingly 'among the most important technology-driven motive for setting up overseas R&D units' (Zhang et al., 2017: 189). This is supported by Schaefer et al.'s (2020) detailed case study of Huawei which: 'turned abroad to access state-of-the-art knowledge' because it 'had little left to learn in its home country' (Schaefer, 2020: 1501). Huawei's success, moreover, is now in large part seen as related to 'hiring non-locals who are culturally and professionally embedded in the international industry networks' (Schaefer, 2020: 1501).

Given the above motives, global cities, it might be argued, are likely to be suitable target FDI locations, as they have (a) some of the technological and human capital resources EMNEs require for catching-up, in addition to (b) a number of unique LOF reducing traits the are likely to make undertaking these types of more complex FDI projects more viable. The general beneficial characteristics of global cities are thought to include; higher levels of cosmopolitanism within the general population leading in turn to higher levels of acceptance of foreign firms; and fewer institutional and cultural barriers (Chakravarty et al., 2021). Indeed, extant research on global cities that incorporates coverage of SAS/knowledge seeking types of FDI, confirms the idea that global cities are attractive locations for such knowledge seeking investments (Chakravarty et al., 2021). Goerzen et al. (2013), for example, established that knowledge acquisition and product development activities were associated with global city locations (looking at 8,541 investments in the year 2000) (Goerzen et al., 2013). Chakravarty (2019) considered a longitudinal time-frame (1990-2014) of Japanese foreign subsidiaries in the US and established similar results (Chakravarty, 2019). Belderbos et al.'s (2020) more recent study considers the motivations for global city FDI in around 12,000 wholly owned foreign subsidiaries in the 2008–2012 period, covering over 50 countries (Belderbos et al., 2020). They discovered R&D functions, along with knowledge intensive-services and headquarters functions were all more likely to be located within global cities. Other evidence shows the GF SAS related FDI of CMNEs is typically targeted at 'locations close to world centres of excellence with specific technological advantages' (Zhang et al., 2017: 193). We therefore hypothesise that global cities are likely to be more attractive to CMNEs looking to bridge high levels of contextual distance (i.e. liabilities of foreignness) while at the same time engaging in technological catch-up via SAS.

Hypothesis 2a: Global city locations positively moderate the likelihood of a Chinese MNEs engaging in greenfield SAS related FDI projects (i.e. R&D and Design, Development and Testing) *when compared with* developed market MNEs.

2.3 City Based Research Intensive Clusters and Greenfield SAS related FDI

International Business scholars have started to focus attention on MNE activity in global cities. They have done so in part as global cities are associated with high concentrations of advanced producer services and greater intercity connectivity (Chakravarty et al., 2021). The Globalization and World Cities (GaWC) ranking of global cities, for example, which is commonly employed in empirical studies, looks mainly at city connectivity through four "advanced producer services": accountancy, advertising, banking/finance, and law. These features of global cities, however, may not necessarily be a key attraction for knowledge-seeking CMNEs. Indeed, it is arguably the knowledge-intensity of city-based technology clusters, if EMNE catch-up theory is correct, that should be the strongest stimulus to the choice of city location. High levels of patenting activity and associated innovation ecosystems (including educational institutions), are therefore likely to be the types of research-intensive urban city-based clusters that CMNEs are attracted to. Chinese MNEs like Huawei, for example, appear to prioritize specific locations where the knowledge/personnel they require are found. The location bounded aspect of knowledge, moreover, drives CMNEs to these specific locations. These, for example, may be linked to universities and research centres of excellence. Such locations, owing to reasons outlined in hypothesis one (Schaefer, 2020), arguably provide the best opportunities for firm-level catch-up. Global cities, which although able to lower liabilities of foreignness (i.e. because they are more cosmopolitan and have greater connectivity), do not necessarily hold the specific knowledge assets that CMNEs are most preoccupied in acquiring. Moreover, the additional costs associated with global cities may also make research intensive clusters more attractive to CMNEs looking to affordably catch-up. In short, EMNEs engaging in firm-level catch-up may also choose to focus on city locations where the knowledge they seek is highly concentrated and accessible, but at a reasonable cost (i.e., Frankfurt, Grenoble, Eindhoven, Lund, Lyon, Malmo, Mannheim, Nagoya, Ann Arbor, Austin, Boston, Cambridge, Oxford and so on).

Research-intensive city clusters are key locations for innovation networks and knowledge sourcing worldwide. They should therefore be preferred destinations for CMNEs looking to technologically catch-up by developing their own knowledge-based assets and capabilities. This leads to our second hypothesis, which derives partly from 'springboard theory' and its sub variants, arguing EMNEs undertake accelerated internationalisation as part of their catch-up strategies (Luo & Tung, 2007, 2018), as well as the knowledge network and sub-national FDI literature, emphasising the centrality of localised agglomerations of knowledge intensive activities (Beugelsdijk & Mudambi, 2013; Hutzschenreuter, Matt, & Kleindienst, 2020).

Hypothesis 2b: Research-intensive city clusters positively moderate the likelihood of a Chinese MNE engaging in greenfield SAS related FDI projects (i.e. R&D and Design, Development and Testing) *when compared with* DMNEs.

3. Methods

3.1 Data and sample

The fT FDI greenfield markets database records some 200,000 plus greenfield investments worldwide between 2003 and 2021, drawing on press releases, newspaper reports, information from local and national investment agencies, and information provided by investing firms. It includes information on the investing firm and its parent company, the city and country of investment, the sector of investment and the type of activity for each investment (e.g. R&D, design and testing; logistics, distribution and transportation; education & training; sales, marketing & support; customer contact centre; electricity; construction; manufacturing; extraction; technical support, maintenance & servicing; and recycling; business services; headquarters; ICT & Internet infrastructure). In addition, it provides information about job creation and the capital investment. The database has been used by researchers and international organizations to track greenfield FDI around the globe, including numerous empirical studies (De Beule & Somers, 2017; Yang & Bathelt, 2021). We focus on the period for which we have access to the database, 2003 to 2018. In initial screening we exclude investment projects related to real estate development and business and financial services.

We employ logistic regression analysis to capture the relative likelihood of an MNE undertaking an SAS type FDI project (i.e. 'R&D' or 'Design Development and Testing') vis a vis a non-SAS type FDI activity (i.e. all other FDI types, including: logistics, distribution and transportation; education and training; sales, marketing and support; customer contact centre; electricity; construction; manufacturing; extraction; technical support, maintenance and servicing; and recycling; headquarters; ICT and Internet infrastructure). By incorporating a CMNE dummy variable we can test whether CMNEs have a stronger orientation toward greenfield SAS type FDI projects when compared to DMNE counterparts (H1). Including dummy explanatory variables for global cities (H2a) and research-intensive city clusters (H2b) allows us to consider the differential impacts on the SAS FDI choice by including interaction terms involving the China dummy (and additional sub-sample analysis as robustness checks, which confirm our results).

3.*2 Dependent Variable*

As noted, our binary dependent variable assumed a value of one if the FDI project was classified as either an 'R&D' or 'Design Development and Testing' (DDT) type of project, zero otherwise. Our approach follows some earlier studies using the same data source (Castellani & Lavoratori, 2020; Guimón, Chaminade, Maggi, & Salazar-Elena, 2018). Castellani & Lavoratori (2020) argue R&D is viewed as competence-creating, while DDT is about competence exploitation. However, DDT is also frequently used to capture strategic asset related activity (De Beule & Somers, 2017) and both R&D and DDT have been considered as an appropriate proxy for innovation activity (Castellani & Lavoratori, 2020).[3]

3.3 Independent variables

We use a dummy variable to capture whether the city is a 'global city' based on the GaWC research network (Department of Geography at the University of Loughborough). This definition focuses considerably upon the supply of advanced producer services and city connectivity (as opposed to city innovation *per se*). Three types of cities are distinguished in the GaWC approach, including alpha cities, which are considered as major economic centres that are linked to major economic regions and states globally and beta-level cities, which are vital in integrating their region or state into the global economy. Gamma-cities are smaller and typically not considered as global cities (Belderbos, Du, & Slangen, 2020). We also use the alpha and beta definitional approach. The GaWC lists are consistently updated and available for several years between 2000–2018 (Chakravarty et al., 2021), which covers the period of interest for this study.

Recent attention has been drawn to technological clusters and their attraction for MNE knowledge seeking subsidiaries (Lorenzen, Mudambi, & Schotter, 2020), including accessing valuable location bound knowledge unique to specific areas (Bathelt, Malmberg, & Maskell, 2004; Lorenzen & Mudambi, 2013). Over the last few decades, the internationalization of R&D activity has been reflected in the increased penetration of MNEs into technological cluster cities (Awate, Larsen, & Mudambi, 2015). Thus, our HITECH_CLUS_CITY dummy equals 1 if a firm chooses a specific high-tech cluster city as defined by the World Intellectual Property Organization's (WIPO) Global Innovation Index (GII) list of 100 major technological clusters (WIP0, 2020). The GII was designed to incorporate the innovation ecosystem, measuring innovation activity in terms of both WIPO patents and educational attainment. Specifically, the clusters are ranked according to fractional counting based on

[3] In addition, for robustness checks, we also decomposed the dummy based on whether it was only R&D and (separately) DDT activity.

both the number of patents issued by inventors as well as the scientific articles published by authors in the city. WIPO's GII ranking is a quite widely used proxy for high-tech clusters, as it includes education, infrastructure and knowledge creation within the index (Kerr & Robert-Nicoud, 2020; Rehman, Hysa, & Mao, 2020; Yu, 2021). It is also somewhat similar to previous studies that have ranked high-tech clusters at the country-level (Kerr & Robert-Nicoud, 2020) and (Rehman, Hysa, & Mao 2020).

Finally, a dummy variable captures whether the FDI project is Chinese in origin (Chinese FDI project = 1; 0 otherwise). Developed market comparator DMNEs in our study correspond to the OECD, including: Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Dem. People's Rep., Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and the United States.

3.4 Control variables

We controlled for a number of factors that may influence R&D greenfield investments. We employed a dummy variable to control for capital city, as proximity to a country's political centre may influence R&D investment (Kim, Pantzalis, & Chul Park, 2012). FDI scale, measured as the number of employees in subsidiaries in the host country, was included as a scale control (Hu, Natarajan, & Delios, 2021). Institutional quality in the host country affects the attractiveness of foreign investors when undertaking FDI (Nielsen, Asmussen, & Weatherall, 2017; Yang, 2018). The risk and additional costs in a poor institutional environment may affect different investors in doing business (Nielsen et al., 2017; Yang, 2018). We controlled for the destination country's institutional quality by the first principal component of the six WGI measures (Marano, Tashman, & Kostova, 2017) of: Voice and Accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and absence of corruption. We controlled for capital investment, which may affect the R&D investment decision (Lai, Lin, & Lin, 2015). International experience, in terms of host city-specific experience may affect the FDI strategy, which is measured as the firm cumulated investments in the destination cities from 2003 until 2018. In addition, we also controlled for project type (using a dummy variable to capture whether the investment was an initial or expansionary investment project) and the economic effects (GDP), following other studies (Castellani & Lavoratori, 2020). As a larger domestic market provides more opportunities, the natural logarithm of GDP was used to control for the size of the local market (Banalieva, Cuervo-Cazurra, & Sarathy, 2018; Hutzschenreuter & Harhoff, 2020).

TABLE 1 ABOUT HERE.

As one of the specific areas of our study is the effect of city-level factors on R&D investment, we omitted observations with no specific locations recorded. This left 97,163 FDI project observations involving 41,112 foreign subsidiaries (as some FDI projects are expansionary and not initial) undertaken by 29,956 parent MNEs in the 2003 to 2018 period.

3.5 Model

As noted, we employ binary logistic models with robust standard errors clustered by year and industry to test our hypothesis. Logistic models have been widely used for estimating the probability of foreign investor choice (Belderbos et al., 2020). The model applies the maximum likelihood method (Fischer, 1973). We model:

$$Probability\left(R\&D_{it}/DDT_{it}=1;\ Others_{it}=0\right) = f\left(EXP_{it}, LNEMPL_{it}, CAP\_CITY_{it}\ LNCAP_{it}, EXPAN_{it}, IQ_{it}, LNGDP_{it}, HITECH\_CLU\_CITY_{it}, GLO\_CITY_{it}, CHINA_{it}, CHINA_{it}*GLO_{CITY_{it}}, CHINA_{it}*HITECH\_CLU\_CITY_{it}, YEAR_{it}, INDUSTRY_{it}\right)$$

Where i denotes the parent firms and t represent the investment year. According to our assumptions, an investor's potential to make an R&D investment is influenced by the country of origin of the company i. In addition, we investigate interaction variables, including that on the research intensive and global city binary variables.

4. Results

Table 2 presents the correlation matrix and descriptive statistics. Some variables are likely to have large correlations when we include interaction terms, so we adopt mean-centring. The Variance Inflation Factor (VIF) for our models were less than the standard cut-off level of 10, indicating no issues with multicollinearity (Cohen, Cohen, West, & Aiken, 2013; Hair Jr & WC, 1998). Furthermore, for logit models, interpreting variables using regression coefficients alone is insufficient. Following Bowen & Wiersema (2004), we included the log odds ratio. The likelihood ratio and pseudo-R2 values in Models B-E are all greater than those in the base model based on the model fit statistics. In addition, the log pseudolikelihood and Akaike information criterion (AIC) values decrease and are less than those in Model A, suggesting that the model has become more complex despite having more explanatory power (Wulff, 2015).

TABLES 2, 3A 3B ABOUT HERE.

The results of the logistic estimates for hypotheses 1 and 2a and 2b are presented in Table 3a (reporting coefficients). Model A shows that most of our control variables are significant and have the expected sign. Interestingly, the capital city dummy variable coefficient is significant and negative at a 1% significance level, suggesting capital cities are actually less attractive to R&D investors in model A. The positive results for the variables international host city experience (β=0.106, p<0.01; ORs=1.112, p<0.01) and institutional quality (β=0.466, p<0.01; ORs=1.594, p<0.01) indicate that investors were attracted to GF R&D FDI by prior experience and advanced institutional environments. In terms of market size, LNGDP in the host country is negative (β=-0.49, p<0.01; ORs=0.613, p<0.01), which implies that MNEs do not invest in R&D in order to access markets (market-seeking purpose).

For H1, the CMNE (CN) dummy variable is significant and greater than one in Table 3b, suggesting CMNEs are more likely to choose a SAS related greenfield FDI project than DMNEs. This is supported by average marginal effects estimates in Table 4. We also include an interaction term between 'global city' and the China dummy variable, which is significant but negative in model E (β=-0.409, p<0.01 in Table 3a). The log odds ratio for the interaction term CN_GLOBAL (OR=0.664, p<0.01) in Table 3b is smaller than 1, which implies that the probability of undertaking FDI in greenfield R&D by Chinese investors is lower if their destination is a global city. Importantly, the average marginal effects for model E in Table 4 also show the probability of having an R&D orientation by CMNEs in global cities is -3.42% (p<0.01) lower. Global cities, interestingly, therefore negatively moderate Chinese R&D GF investments FDI choices (see Figure 1).

FIGURES 1 AND 2 ABOUT HERE

Regarding the moderating effect of high-tech research-intensive cluster cities (H2b), the coefficient between CMNEs and technological cluster cities is 0.469 at the 1% significance level in model E (Table 3a). The odds ratio for this model is larger than 1 (ORs=1.598, p<0.01 in Table 3b), which indicates that the probability of CMNEs undertaking GF R&D investment increases in high-tech city clusters in comparison to DMNEs. Furthermore, the average marginal effect for model E in Table 4 shows the probability of choosing the R&D investment is 0.0391 higher (p<0.01), suggesting that if the destination city is located in a high-technological cluster region, the likelihood of the Chinese parent firms undertaking GF R&D investment increased by 3.91% (at the 1% significant level). Thus, hypothesis 2b is supported (see also Figure 2).

5. Discussion

We have suggested late-coming CMNEs scour global markets for intangible knowledge assets, albeit our contribution considers sub-national city level location factors, highlighting how the economic geography of CMNEs differs to their DMNE counterparts. Our findings show that CMNEs have: (i) been more active than MNEs from the developed OECD countries in in choosing to undertake GF SAS vis a vis other types of FDI project; (ii) that research intensive knowledge clusters found at the sub-national city level more strongly affect the SAS location choice for CMNEs than DMNEs and; (iii) contrary to expectations, global cities less strongly attract CMNE R&D GF FDI. We firstly discuss general implications for the EMNE 'catch-up' literature and, secondly, consider implications for the sub-national location choice (city) literature.

5.1 Greenfield knowledge seeking SAS related FDI: DMNEs versus EMNEs

A fundamental question raised in the IB literature concerns whether EMNEs are different to DMNEs – and thus whether new theories are required to explain EMNE activity. In this regard, the increased propensity towards SAS has been strongly highlighted within EMNE theorising (Hernandez & Guillén, 2018; Kumar, Singh, Purkayastha, Popli, & Gaur, 2020; Liu & Giroud, 2016; Luo & Tung, 2018). The IB literature on SAS and firm-level catch-up, however, has focused primarily on the importance of international SAS *via M&As, not GF FDI* (Schaefer, 2020; Schaefer & Liefner, 2017). This, we contest, is in part a legacy of the influence of several high-profile contributions to the EMNE debate, embodied most vividly by the 'springboard theory'. Luo and Tung's (2018) theory emphasises catch-up speed and thus acquisitions as the preferred establishment mode for SAS.[4] As they candidly acknowledge: 'most research has looked at SMNEs (springboard MNEs) through the lens of M&As, while little attention has been paid to other important investment modes' (Luo & Tung, 2018: 147). As a result, studies have statistically compared the relative EMNE/DMNE SAS orientation undertaken using international M&As (Jindra, Hassan, & Cantner, 2016; Sutherland, Anderson, & Hertenstein, 2017; Sutherland et al., 2020b). To date, however, the comparative proclivity to seek strategic assets via *greenfield FDI* has been overlooked, despite this arguably being a vital conceptual aspect of the EMNE/DMNE distinction (i.e. whether EMNEs internationalise to 'augment' rather than 'exploit' ownership advantages (Ramamurti, 2012).

[4] The word 'acquisition/s' is mentioned 31 times, 'speed' 5 times, 'accelerate/d' 6 times, 'rapid' 7 times and 'fast' or 'faster' 5 times in their elucidation of 'springboard theory' (Luo & Tung, 2018). By contrast, 'greenfield', is mentioned only once in the penultimate page in the 'future research and suggested agenda' section (Luo & Tung, 2018: 147).

In fact, greenfield related SAS FDI has now become a far more important path taken via CMNEs during ‘catch-up’. Indeed, since 2016, owing to a changing geopolitical environment and evolving Chinese policy (to restrict capital flight and reckless unrelated deal making, i.e. by the likes of HNA, Wanda, Fosun and Anbang Groups, among others buying a sprawling portfolio of unrelated foreign businesses (Shi, Sutherland, et al., 2021), greenfield SAS strategies appear more realistic for CMNEs (i.e., many big M&A deals come under greater international as well as domestic scrutiny, via CFIUS in the US, for example). Interestingly, our results show that CMNEs do indeed have a stronger preference towards greenfield SAS related projects when compared to their DMNE counterparts. Indeed, in terms of the shares of number and value of greenfield SAS related FDI, CMNEs have experienced a notable upsurge, at a time when such investments have been growing globally (according to our data set). The idea that accelerated internationalisation is embodied by ‘aggressive’ acquisitions, as characterized by Luo and Tung’s (2018) ‘springboard theory’, in reality tells only part of the story about CMNE catch-up strategies. This is epitomised by one of the most successful Chinese latecomers, Huawei. It has relied overwhelmingly on greenfield SAS FDI approaches. And while the ‘springboard’ type literature has emphasised the explosive/aggressive/rapid nature of this FDI activity, calling for a reconsideration of traditional IB models like the Internationalisation Process Model (IPM), a rebalancing towards a greater emphasis on greenfield FDI may potentially lead to a more realistic evaluation of EMNE internationalisation trajectories. This may include more gradualist, incremental and pragmatic expansion paths. This is because greenfield expansion of R&D facilities generally involves a more gradual and progressive deepening of levels of commitment over time when compared with M&As (Schaefer, 2020). In this regard, ideas associated with more traditional IB approaches, embodied by the IPM and its updated version (Johanson & Vahlne, 2009), may potentially also be relevant to greenfield SAS activities (Hertenstein, Sutherland, & Anderson, 2015).

5.2 Global Cities and knowledge intensive city clusters as Hubs for CMNE Catch-Up

Digging further into the question of the unique attributes and characteristics of EMNEs, our findings show certain sub-national geographical considerations more strongly shape CMNEs’ greenfield SAS strategies when compared with other OECD based DMNEs. On reflection, should this be surprising? As the knowledge, expertise and associated technological resources CMNEs need to become innovators at the world technological frontier reside in quite specific geographic locations (Schaefer, 2020), it is perhaps not so surprising. IB scholars have focused a lot of their attention on MNE activity in ‘global cities’. One important characteristic of global cities, however, is the associated intercity connectivity and presence of business service providers (Chakravarty et al., 2021). The GaWC ranking of global cities, for example, looks mainly at their connectivity through the advanced producer services (of accountancy, advertising, banking/finance, and law). Knowledge-seeking CMNEs, however, may not necessarily be so interested in and therefore attracted to the enhanced service provision or superior connectivity aspects of global cities when undertaking SAS. Indeed, according to our results, CMNEs are more likely to establish knowledge-intensive R&D outputs not in global cities but rather in knowledge intensive cities. The WIPO's Global Innovation Index city ranking, which is based around patents and innovation ecosystems (including education), identifies the types of research-intensive urban city-based clusters around the world that CMNEs are more strongly attracted to. This includes cities like: Ankara, Ann Arbor, Austin, Basel, Boston (MA), Cincinnati, Cleveland, Dallas, Eindhoven, Frankfurt am Main, Grenoble, Heidelberg, Kobe, Kyoto, Lausanne, Los Angeles, Lund, Lyon, Malmo, Mannheim, Nagoya, Osaka, Ottawa, Oxford, Phoenix, Raleigh, San Diego, Tehran, Yokohama. These cities are all on the WIPO list (i.e. high-tech centres) but are not 'global cities (per GaWC listings). The types of CMNEs that are most heavily invested in these cities include, Haier Group (Dallas, Eindhoven, Kyoto, Lyon and Osaka), Huawei (Eindhoven, Grenoble, Lausanne, Lund, Lyon, Ottawa and Yokohama) and Wuxi Pharmatech (Boston and San Diego, i.e., biotech clusters).

Looking at these WIPO only listed (i.e. non-global) cities may provide further insights into what these locations offer CMNEs and why they are thus more strongly attracted to them. The most popular location by some way for CMNEs' GF SAS was Frankfurt (72 R&D/DDT projects, US $181 million). Frankfurt, which sits within the broader Frankfurt Rhein Main region, hosts one of the largest Chinese business communities in Europe. It has an excellent international airport as well as a unique digital connection to China owing to a world leading internet node platform. No European region, moreover, has more direct flights to China. It also has a unique mix of service providers, investment banks, chambers of commerce and local authorities with China expertise, which act as possible substitutes for those prevalent in global cities.[5] In addition, it is home to many successful businesses and at the heart of Germany's manufacturing sector, which has itself received extensive inward FDI from China. It is situated, for example, in the heart of Europe's automotive cluster, attracting a number of Chinese auto makers. Chery Automobile has its R&D centre in a Frankfurt suburb with Geely opening its own development centre 'virtually next door'. Others include Fuyao Glass, Jiangsu Best Baby Car Seat, Pateo and Joyson (Automotive News Europe, 2019). Frankfurt has attracted a wide range of R&D centres, tapping German industry's wide range of manufacturing expertise, including: photovoltaics and new energy (at least 11 R&D centres) medical equipment manufacturing (Fulang Medical, Shanghai Das Reb); deep hole drilling technology (Shanghai Hochent): chemicals (Hubei Xingfa Chemicals Group); cloud computing and software (Tencent and Alibaba); precision parts (Kaizhong); temperature/pressure transmitters (Sense Instruments) and printed circuit boards (Sunshine Group),

[5] In addition to numerous Chinese networks and centres, including the historical Association of Chinese Enterprises, there are also four Chinese language schools.

to name but a few. Indeed, the diversity of R&D activities undertaken in the Frankfurt region marks it out as an exceptionally attractive SAS location for CMNEs.[6]

Frankfurt appears to provide many of the benefits of the 'global city', including a unique blend of expertise, knowledge as well and other locational advantages, one of which is lower operating costs. Our results suggesting that global cities are generally less attractive for SAS related GF FDI for CMNEs may potentially be explained by higher costs of operation (why pay a premium for a location when you do not need access to the advanced producer services on offer?). Some of the benefits of a global-city (such as international airports and advanced producer service firms), as noted, are increasingly found in other non-global city locations and broader metropolitan areas (i.e. more peripheral regions), like Frankfurt. So, while global cities potentially offer good opportunities for knowledge seeking, they are also relatively expensive locations. It is possible, furthermore, that CMNEs competing for key research and technical talent in non-global cities may be better poised to successfully hire high-quality employees in any given knowledge intensive cluster over a global city. The relative volume of talent to hiring companies (or open positions) in non-global city knowledge clusters may be higher than in global cities. Other potential disadvantages for R&D SAS FDI in global cities that have been noted include greater competition and even 'negative knowledge spill-overs' (i.e. knowledge leakages) (Chakravarty et al., 2021). Such locations, it is noted, are sometimes associated with increased costs from "agglomeration diseconomies" (Chakravarty et al., 2021: 10). While it is hard to know to what extent this may apply to CMNEs, which are generally still in their catch-up stages, additional research might explore this possibility.

Based on the SAS strategic orientation of CMNE GF FDI, our results suggest locating in knowledge clusters may be a more preferable approach chosen by CMNEs for driving successful knowledge creation and transfer. The location bounded aspect of knowledge, we contend, may explain why global cities, although able to lower liabilities of foreignness (i.e. because they are more cosmopolitan and have greater connectivity), do not exert a stronger positive influence of the CMNE R&D FDI choice. CMNEs, in short, are most interested in knowledge assets, rather than connectivity or producer services. In this regard, it is important to be kept in mind that achieving 'reverse knowledge flows' from overseas learning laboratories is arguably a key motive for EMNE SAS related FDI projects (Awate, Larsen, & Mudambi, 2015). EMNEs generally expect their foreign subsidiaries to possess a higher level of expertise than their headquarters so that they can learn from them. This can be best achieved in specific research-intensive locations. The relatively stronger pull of the research-intensive clusters,

[6] Other popular destinations are more specialised. Eindhoven in the Netherlands, for example, has attracted three investments from Huawei to tap local research excellence as well as two from Haier and Hisense, possibly because competitor Philips its global R&D headquarters there.

therefore, likely owes to the fact that CMNEs are primarily engaged in technological catch-up and their overwhelming objective is to identify relevant expertise, networks and learning opportunities from suitable overseas locations from which they then can attempt to learn and develop leading edge innovation capabilities (Schaefer, 2020).

6. Conclusion

EMNE related research analysing SAS has focused strongly on M&As at the national level. It is assumed that it is primarily via M&As that an adequate volume of high-quality strategic assets can be acquired to facilitate 'accelerated' catch-up (Kumar et al., 2020; Luo & Tung, 2018). One negative consequence of focusing overwhelmingly on M&As, however, has been the marginalisation of greenfield FDI. In addition, sub-national geographic factors and their impacts on the decision making of CMNEs has been overlooked. The types of knowledge, capabilities and resources that EMNEs require to facilitate catch-up via SAS are, however, located in a relatively small number of *specific* locations within countries – usually cities. Understanding the sub-national economic geography of EMNE' FDI strategies may therefore reveal more about the firm-level catch-up strategies that EMNEs are engaging in and how, if at all, they may be different from developed market MNEs.

Chinese MNEs are undoubtedly becoming more active in GF SAS related FDI. Their knowledge seeking strategies, in this regard, appear consistent with the general notion of firm-level catch-up as an underlying driver of their internationalisation strategies. Specific knowledge intensive regions, based around city clusters, cities that are often not part of the global city network, have become important investment nodes in the firm-level catch-up approaches of CMNEs. Global city studies have not incorporated specific decomposition of EMNE related SAS type FDI, neither have they undertaken comparative analysis of the impact of city locations between EMNEs and DMNEs. This, we have argued, is a potentially fruitful line of inquiry in better understanding whether EMNEs are indeed different to DMNEs and whether new theory may be required to explain their activities (Hernandez & Guillén, 2018).

6.1 Policy Implications

Policy implications can be considered at different levels (city/country) and from different sides (i.e. developed versus emerging markets). At the national level of democratic developed market economies, the rise of CMNEs via aggressive acquisitions has raised considerable concerns. Fearful of losing their technological supremacy to an autocratic China, playing by an entirely different rulebook of selective interventionist industrial policy, the US has created its 'foreign entities' list. The

Committee for Foreign Investment in the US has become highly active in blocking M&As. In the European Union, as in the US, sentiment among policy-makers has recently started to swing strongly against Chinese M&As as well. KUKA's acquisition by Midea Group in 2016 marked a watershed, sparking a national debate within Germany (and beyond) leading to a significant change in mindset, led by Angela Merkel, of European Union leaders towards China. Greater reciprocity from China (i.e., market access, fewer institutional and regulatory blocks on foreign MNEs) has become a key issue, as has a strategic response from Europe. To date, however, this policy debate has focused mainly on M&As, not greenfield SAS related FDI from CMNEs. Given the evident evolution in the strategies now used by CMNEs (towards greenfield approaches like those by Huawei), national policy leaders may have to consider the potential threats this poses. Within the semiconductor sector, for example, Chinese firms have been highly active in recruiting Western talent, and the loss of key personnel to greenfield FDI projects is likely to become a greater concern for policy-makers going forward. At the city level, by contrast, the growth of Chinese FDI to greenfield projects may hold out windfall opportunities to those developed market cities that have research clusters and educational establishments that are attractive to Chinese MNEs. Such cities could potentially benefit from the current trend of rising SAS related greenfield FDI by using investment promotion agencies to attract greenfield FDI from China (Anderson & Sutherland, 2015).

From the Chinese perspective, the evolution of CMNE asset seeking towards greenfield activities makes sense. MNEs like Huawei have shown that these strategies can be tremendously effective. They avoid the political fall-out associated with high profile M&As. They also circumvent the added restrictions such deals are increasingly facing. In addition, greenfield approaches do not face the same types of integration challenges, which for large international M&As require high levels of absorptive capacity and the capability to deal with large cultural differences (sometimes exacerbated by state ownership of the acquirer). The policy challenge for China will be to support its MNEs in making such deals in a way that does not raise too much suspicion or attract attention. As Barbieri et al. (2021) put it : 'Like it or not, the second largest economy in the world does make use of selective industrial policies, in particular by choosing specific strategic sectors to be targeted by policy initiatives' (Barbieri, Di Tommaso, Tassinari, & Marozzi, 2021: 266). If the link between these policies and greenfield FDI and associated employment of key scientific personnel becomes too apparent, no doubt additional restrictions will be introduced. From a Chinese policy perspective, this may become a more serious challenge.

6.2 Future Research

We still do not know much about how EMNEs are able to exploit GF R&D related FDI. What are the outcomes of such investments? How do CMNEs transfer knowledge from greenfield subsidiaries in foreign markets? In general, moreover, we need to know more about the specific industry clusters CMNEs may be active in and the relationship between home and host city clusters. We have suggested that global cities may have potential disadvantages for R&D SAS FDI, including higher costs of operation, greater competition and negative knowledge spill-overs (Chakravarty et al., 2021). Is this correct? Detailed case work on specific industries and CMNEs might be able to provide insights into these questions to confirm our initial findings.

Table 1: Description of variables and data source.

Variables	Full name	Measurement	Data source
DDT	Design, development and testing	1=DDT investments; 0=other investments;	fDi markets
RD	R&D investment	1=R&D investments; 0=other investments;	
BOTH	DDT and R&D investment	1=DDT and R&D investments; 0=other investments	
CHINA	Chinese parent firm	1=if the parent firm is from China; 0=if the parent firm is from DMNE	fDi markets; OECD.org
GLO_CITY	Global city	1=if the host city belongs to the global city; 0=other cities	GaWC's world City
HTECH_CLU_CITY	Research intensive high tech-cluster city	1=top ranked technological cluster at city-level; 0=other cities	global innovation index
LNCAP	Capital investment	Logarithm of capital investment (Centred)	fDi markets
LNEMPL	Numbers of employees	Logarithm of numbers of employees (Centred)	fDi markets

EXP	Firm's prior experience	Parent company's prior experience in the host city (Centred)	fDi markets
EXPAN	Firm's expansion	1=project type is expansion; 0=others	fDi markets
CAP_CITY	Capital city	1=if the host city is the national capital city; 0=other cites	
IQ	Institutional quality	Destination country's Institutional quality	World Governance Indicator (Six) (World Bank)
LNGDP	Gross domestic product per capita	Logarithm of gross domestic product (GDP) per capital	The World Bank (IBRD.IDA)
INDUSTRY	Industry	Dummy variables	fDi Markets
YEAR	Year	Dummy variables	fDi Markets

Table 2. Descriptive statistics and pairwise correlations.

Variable	Obs	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
DDT/RD	97163	0.104	0.305	1										
EXP	97163	0.008	2.238	0.095***	1									
LNEMPL	97163	0.001	1.359	0.090***	0.144***	1								
CAP_CITY	97163	0.236	0.425	-0.008***	-0.017***	-0.156***	1							
LNCAP	97163	0.017	1.388	0.033***	0.146***	0.737***	-0.130***	1						
EXPAN	97163	0.221	0.415	-0.002	0.248***	0.138***	-0.147***	0.143***	1					
IQ	97163	-0.005	0.852	-0.011***	-0.033***	-0.292***	0.071***	-0.186***	0.073***	1				
LNGDP	97163	-0.005	0.881	-0.055***	0.019***	-0.290***	0.098***	-0.159***	0.076***	0.826***	1			
HTECH_CLU_CITY	97163	0.307	0.461	0.014***	-0.004	-0.127***	0.303***	-0.111***	-0.164***	0.093***	0.101***	1		
GLO_CITY	97163	0.427	0.495	0.038***	0.014***	-0.151***	0.548***	-0.144***	-0.204***	-0.048***	-0.028***	0.603***	1	
CHINA	97163	0.032	0.175	0.013***	-0.029***	-0.021***	0.003	-0.020***	-0.046***	0.036***	0.043***	-0.008***	-0.014***	1

*Standard errors are in parentheses *** p<.01, ** p<.05, * p<.1*

Table 3a: logistic regression for greenfield R&D investments (Coefficients).

DDT/RD	Model A	Model B	Model C	Model D	Model E
EXP	.106***	.108***	.108***	.108***	.108***
	(.004)	(.004)	(.004)	(.004)	(.004)
LNEMPL	.373***	.372***	.372***	.372***	.372***
	(.014)	(.014)	(.014)	(.014)	(.014)
CAP_CITY	-.286***	-.289***	-.288***	-.29***	-.29***
	(.031)	(.031)	(.031)	(.031)	(.031)
LNCAP	-.116***	-.115***	-.115***	-.115***	-.116***
	(.013)	(.013)	(.013)	(.013)	(.013)
EXPAN	-.197***	-.187***	-.186***	-.188***	-.187***
	(.031)	(.031)	(.031)	(.031)	(.031)
IQ	.466***	.462***	.463***	.461***	.461***
	(.027)	(.027)	(.027)	(.027)	(.027)
LNGDP	-.49***	-.488***	-.488***	-.488***	-.488***
	(.025)	(.025)	(.025)	(.025)	(.025)
HTECH_CLU_CITY	-.172***	-.17***	-.171***	-.179***	-.188***
	(.029)	(.029)	(.029)	(.03)	(.03)
GLO_CITY	.211***	.213***	.22***	.214***	.23***
	(.031)	(.031)	(.032)	(.031)	(.032)
CHINA (H1)		.423***	.495***	.35***	.446***
		(.06)	(.078)	(.072)	(.079)
CN_GLOBAL (H2a)			-.179		-.409***
			(.121)		(.145)
CN_TECHCUL (H2b)				.24*	.469***
				(.129)	(.154)
_cons	-2.751***	-2.749***	-2.752***	-2.747***	-2.751***
	(.108)	(.108)	(.108)	(.108)	(.108)
Observations	97163	97163	97163	97163	97163
Industry	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES
Wald chi2	5646.17***	5660.76***	5661.83***	5666.93***	5673.95***
Log pseudolikelihood	-28073.193	-28050.059	-28048.944	-28048.284	-28044.083
AIC	56264.39	56220.12	56219.89	56218.57	56212.17

Pseudo R2	.132	.133	.133	.133	.133
Mean VIF	1.69	1.68	1.69	1.68	1.71

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 3b. logistic regression for greenfield R&D investments, Log Odds Ratios.

DDT/RD	**Model A**	**Model B**	**Model C**	**Model D**	**Model E**
EXP	1.112***	1.114***	1.114***	1.114***	1.114***
	(.005)	(.005)	(.005)	(.005)	(.005)
LNEMPL	1.452***	1.45***	1.45***	1.45***	1.451***
	(.02)	(.02)	(.02)	(.02)	(.02)
CAP_CITY	.751***	.749***	.749***	.748***	.748***
	(.023)	(.023)	(.023)	(.023)	(.023)
LNCAP	.891***	.891***	.891***	.891***	.891***
	(.011)	(.011)	(.011)	(.011)	(.011)
EXPAN	.822***	.829***	.83***	.829***	.829***
	(.026)	(.026)	(.026)	(.026)	(.026)
IQ	1.594***	1.588***	1.589***	1.586***	1.586***
	(.044)	(.043)	(.043)	(.043)	(.043)
LNGDP	.613***	.614***	.614***	.614***	.614***
	(.015)	(.015)	(.015)	(.015)	(.015)
HTECH_CLU_CITY	.842***	.844***	.843***	.837***	.828***
	(.025)	(.025)	(.025)	(.025)	(.025)
GLO_CITY	1.235***	1.238***	1.247***	1.239***	1.259***
	(.039)	(.039)	(.04)	(.039)	(.04)
CHINA (H1)		1.527***	1.641***	1.419***	1.562***
		(.092)	(.128)	(.103)	(.124)
CN_GLOBAL (H2a)			.836		.664***
			(.101)		(.096)
CN_TECHCUL (H2b)				1.271*	1.598***
				(.164)	(.246)

_cons	.188***	.189***	.188***	.189***	.189***
	(.012)	(.012)	(.012)	(.012)	(.012)
Observations	97163	97163	97163	97163	97163
Industry	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES
Wald chi2	5646.17***	5660.76***	5661.83***	5666.93***	5673.95***
Log pseudolikelihood	-28073.193	-28050.059	-28048.944	-28048.284	-28044.083
AIC	56264.39	56220.12	56219.89	56218.57	56212.17
Pseudo R2	.132	.133	.133	.133	.133
Mean VIF	1.69	1.68	1.69	1.68	1.71

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Table 4. Average marginal effects.

Term	Hypothesis	Models	RD/DDT
CHINA	H1	Model B	3.35%*** (0.000)
CN_GLOBAL	H2a	Model E	-3.42%*** (0.005)
CN_TECHCUL	H2b	Model E	3.91%*** (0.002)

Robust standard errors are in parentheses

*** $p<.01$, ** $p<.05$, * $p<.1$

Figure 1. Interaction between Chinese dummy and global cities for SAS FDI.

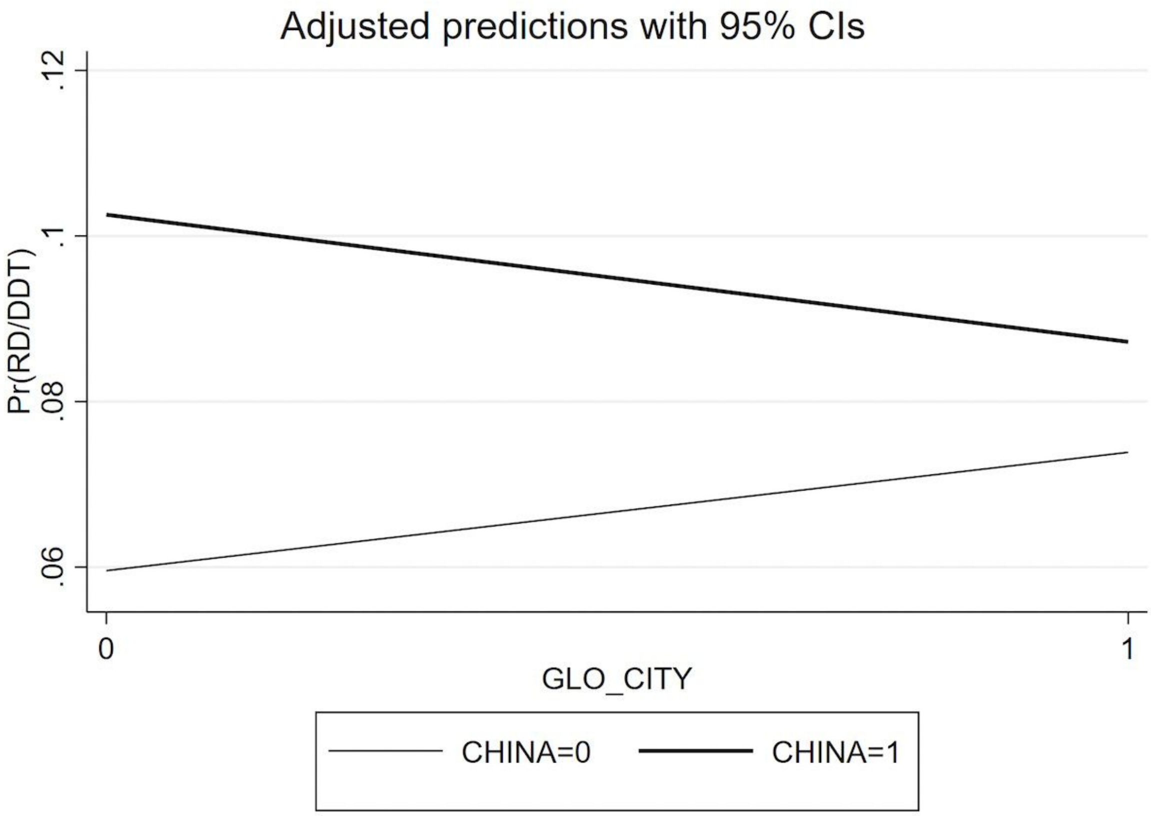
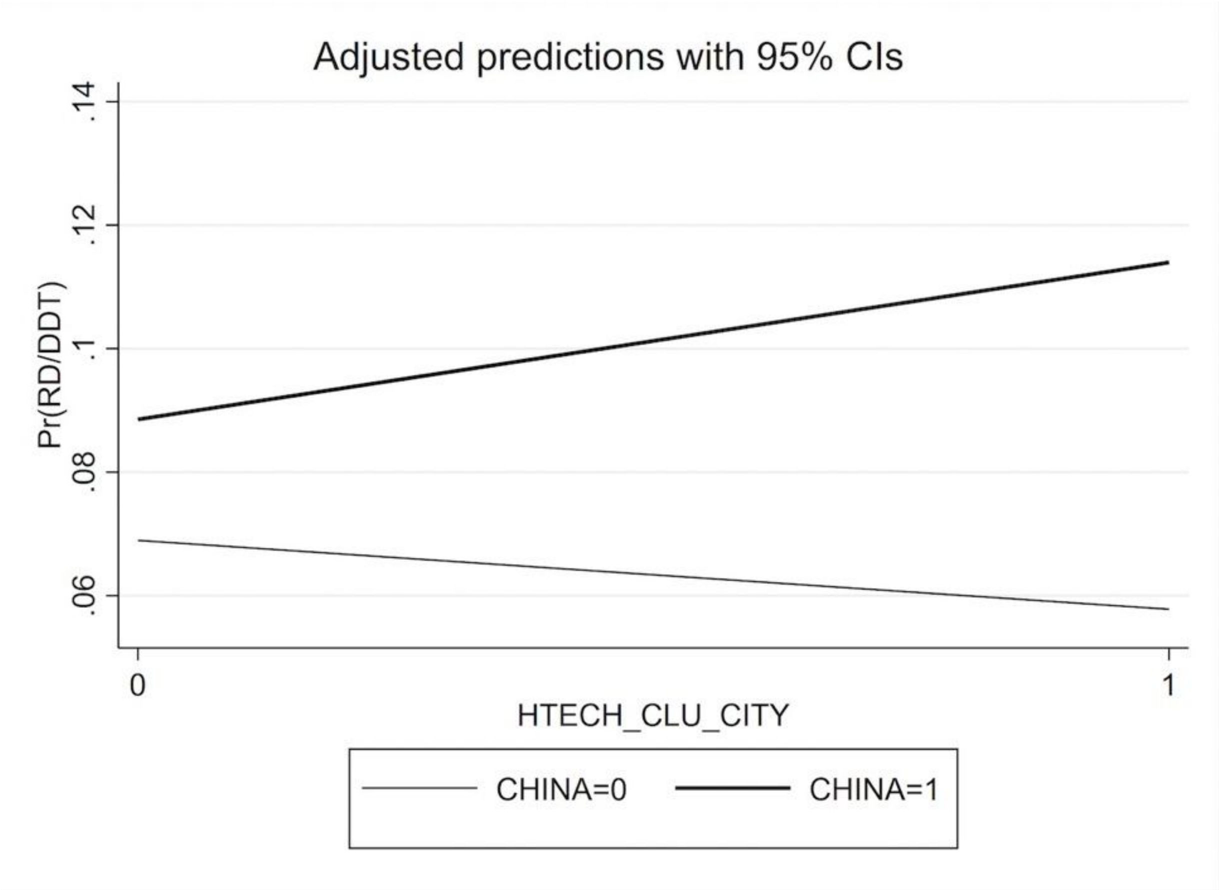


Figure 2. Interaction between Chinese dummy and research-intensive high tech cluster cities for SAS FDI.



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