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Locational Determinants of Overseas R&D Investments by Chinese Firms

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Abstract

In this paper, we study the location distribution and determinants for Chinese firms' overseas Research and Development (R&D) activities, based on a dataset of 1,500 Chinese firms that established overseas R&D subsidiaries during the years 2010-2014. Integrating Dunning's eclectic paradigm and Uppsala Model, we construct a two-dimensional model, which consists of the determinants from host countries and from the interactions between the host countries and the home country, China. We use a multiple-regression method to analyze the determinants and rationale of the location choice of Chinese firms' overseas R&D activities. By identifying the determinants of the location of the Chinese firms, we aim to reveal whether and where the location strategy of Chinese firms' R&D globalization differs from those of the firms in the U.S., Europe and Japan; and to provide a reference for Chinese firms in their strategy-making on R&D globalization.

Keywords

"Going Global" strategy; host country; location; overseas Research and Development (R&D); overseas R&D subsidiaries

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1. Introduction

The internationalization of R&D activities, which was first noticed in the 1970s (U.S. Tariff Commission, 1973) and captured by Ronstadt (1978) in academia, has drawn increasing attention from scholars, executives and policy-makers. Although R&D is the least-internationalized of multinational enterprises' (MNEs') activities (Patel and Pavitt, 1991), since the 1970s and 1980s, the overseas R&D activities of MNEs in developed countries have expanded substantially: the functions of the overseas R&D subsidiaries have been increased, evolving from local technical support units to becoming significant components in the global R&D system (Patel and Pavitt, 1991; Le Bas and Sierra, 2002). Chinese companies are late-comers in establishing overseas R&D subsidiaries (Sun *et al*., 2007). However, against the backdrop of the "Going Global" (Zou Chu Qu) national strategy, the establishment of overseas R&D subsidiaries of Chinese MNEs has surged in recent years. In the past five years (2010-2014), 1,500 Chinese firms established overseas R&D subsidiaries in 88 countries. Chinese firms' overseas R&D activities are developing in a historical and global context different from that of the MNEs in developed countries, with different motives and mechanisms. Therefore, an analysis of the Chinese firms' overseas R&D subsidiaries' development trends and the determinants of its establishment can not only enrich the literature on the incentives and locational choices for MNEs overseas R&D subsidiaries, but can also provide references for Chinese firms' strategy-making on R&D globalization.

Existing research have explored the incentives of MNEs' R&D internationalization in developed countries (Ronstadt, 1978; Fisher and Behrman, 1979; Lall, 1979; Rugman, 1981; Fors and Zejan, 1996; Kuemmerle, 1996; Zedtwitz and Gassmann, 2002), the organization of internationalized R&D activities (Ronstadt, 1978; Pearce,1989; Serapio, Dalton and Yoshida, 2000), and the choice of location for foreign R&D subsidiaries (Lall, 1979; Hewitt, 1980; Hirschey and Caves, 1981; Pearce, 1989; Barlett and Ghoshal, 1989; Kumar, 1996; Patel and Vega, 1999; Zejan, 1990).

Choosing a location for overseas R&D subsidiaries is difficult, as it is a global choice (Zedtwitz and Gassmann, 2002). Scholars argue that location advantages attract a company investing in R&D subsidiaries, whether it be for research or development (Dunning, 1997). Meanwhile, overseas research project management is highly risky due to challenges brought by physical distance, remote coordination, and Not-invented-here (NIH) syndrome (Zedtwitz and Gassmann, 2002). In this current age of rapid change, the dynamism of location-choice determinants evolves: as some scholars have pointed out, locational disadvantages also effect MNEs' establishment of R&D. Other factors, such as geographical distance and factor endowment differences, are also examined in their relation with location choice of the overseas R&D (Chen and Xu, 2009). The study on location choice of overseas R&D is important, because it is crucial to the outcome of the investment. Since the 1990s, the determinants of MNEs overseas R&D location choice have drawn a lot of attention from scholars. This body of literature applied Dunning's eclectic paradigm in the context of developed countries, including Sweden (Zejan, 1990; Hakanson, 1992; Fors, 1996; Le Bas and Sierra, 2002; Patel and Vega, 1999), the U.S. (Kumar, 1996; Hedge *et al*., 2008), Japan (Odagiri and Yasuda, 1996; Ito and Wakasugi, 2007), and multiple developed countries (Kuemmerle, 1999; Zedtwitz and Gassmann, 2002), and identified the major determinants for MNEs' overseas R&D location choice in the scenario of developed countries through empirical study. The existing literature has left several research avenues open for current research: first, previous studies have mostly focused on MNEs which established overseas R&D subsidiaries in developed countries; meanwhile, attention paid to MNEs form the developing countries or going to the developing countries to operate R&D units is far from sufficient. There is little literature about MNEs setting up overseas R&D in emerging economies, such as India and Singapore. Only two scholars have discussed overseas R&D location choices of Chinese firms (Wang, 2013; Chen *et al*., 2016); these papers followed the same empirical pattern of the previous studies on western MNEs. Choosing overseas R&D locations for MNEs in the context of both developed and developing countries' needs to be further explored, in order to capture the new global R&D landscape. Second, previous studies are no exception for empirical application of Dunning's eclectic paradigm. While Dunning's Locational Advantages Theory explains well how the host countries' advantages attract MNEs, the static analysis missed how the interaction between the host country and the home country would affect the internationalization process. A further development on theory in this regard may open the "black box" of the internationalization process and reveal the determinants within the processes that are involved in the choice of location. Today, it seems that there is a reversed trend of globalization, but we believe that this new trend will not be a permanent phenomenon. So, the topic in this paper still has the value for researchers and policy makers in the world.

In this study, we establish a theoretical framework, based on Dunning (1977)'s eclectic paradigm. We also consider the interaction between the host countries and China, psychological distance and international trade, which moderate the effect of host country's advantage, based on the Uppsala model and Dunning (1998)'s theory on investment development path. By employing the Uppsala model, we spot where national culture makes a difference in the location choice for R&D internalization. Our research questions are: What are the characteristics and trends of Chinese MNEs' overseas R&D subsidiaries' geographical distribution? How does it differ from the overseas R&D of MNEs from the U.S., Japan and European countries? What characteristics of a country, as pointed out as host country advantages, attract Chinese MNEs' establishment of overseas R&D subsidiaries? How does the geographical and national culture distance moderate the effects of these characteristics on Chinese MNEs' location choice of their overseas R&D subsidiaries? A dataset of 1,500 Chinese firms that established overseas R&D subsidiaries during past 5 years (2010-2014) is employed to outline the development trend of Chinese firms' overseas R&D distribution, and to draw findings on determinants of Chinese firms' overseas R&D investment location choice from our two-dimension dynamic model.

2. Development of Chinese MNEs' Overseas R&D Subsidiaries: Trends and Distribution Characteristics

Based on statistics from 1,500 Chinese firms that had established foreign R&D subsidiaries over the past five years (2010-2014) in 88 countries across the world[1], the trends of the overseas R&D development of Chinese firms are identified as the following in contrast to that of the MNEs in the U.S., Europe and Japan.

[1] Source of statistics: "Going Global Strategy" platform, Chinese Ministry of Commerce, China.

Firstly, Chinese firms' overseas R&D subsidiaries have surged in quantity (see Fig. 1). Their parent firms are widely but unevenly distributed in China. Among the 1,500 firms, 78 are owned by the State Asset Supervision and Administration Commission (SASAC) of the central government. The provinces with the largest number of firms "Going Global" to establish R&D units are: Guangdong Province (334 firms), Jiangsu Province (192 firms), Zhejiang Province (178 firms), Beijing (140 firms), Shandong (133 firms), Shanghai (99 firms) and Liaoning (98 firms). Some firms in the central and west regions have also started to establish overseas R&D subsidiaries, but the quantity is small: Shanxi Province (8 firms), Inner Mongolia (8 firms), Xinjiang (8 firms), Gansu (3 firms) and Qinghai (2 firms).

Secondly, Chinese firms' overseas R&D subsidiaries have been widely distributed in both developed and developing countries, including 9 of the least-developed countries (LDCs) (see Table 1).

Thirdly, the majority of the firms are from the manufacturing (756), electronics (390), and Internet (66) industries, which is in accordance with China's traditional industry pattern as well as China's new industry development trajectory shaped by Chinese government's economic transition strategy.

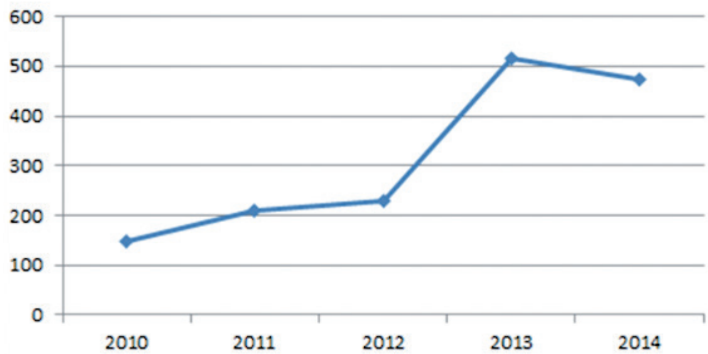

Fig. 1 Number of Chinese multi-national corporations (MNCs)' subsidiaries
Source: Chinese Ministry of Commerce, China

Table 1 Chinese MNCs' overseas R&D subsidiaries in LDCs

Least developed countries	Number of Chinese MNCs overseas R&D subsidiary	Continent
Afghanistan	1	Asia
Ethiopia	3	Africa
Laos	6	Asia
Mali	3	Africa
Myanmar	2	Asia
South Sudan	1	Africa
Nepal	1	Asia
Tanzania	2	Africa
Uganda	1	Africa

Source: Chinese Ministry of Commerce, China

3. Determinants of Chinese Firms' Overseas R&D Investment Location Choice

3.1. A framework and methodology of analysis

The existing literature on the determinants of the MNEs' overseas R&D location choice are all based on Dunning (1977, 1998)'s eclectic paradigm (Zejan, 1990; Hakanson, 1992; Fors, 1996; Le Bas and Sierra, 2002; Patel and Vega, 1999; Odagiri and Yasuda, 1996; Ito and Wakasugi, 2007; Kuemmerle, 1999; Zedtwitz and Gassmann, 2002). While Dunning's Locational Advantages Theory reveals how the host countries' advantages attract MNEs in its internationalization, the static framework cannot explain how the interaction between the host country and the home country would affect the internationalization process.

In order to open the black box of the internationalization process and reveal the determinants within the process, we construct a theoretical framework which integrates Dunning (1977, 1998)'s eclectic paradigm and Uppsala Model (Johanson and Vahlne, 1977) to analyze the location determinants for Chinese MNEs' overseas R&D subsidiaries (see Fig. 2). Dunning (1977, 1998)'s eclectic paradigm is employed to explore if the advantages and disadvantages of the host countries' correlates with Chinese MNEs' location choice; the Uppsala Model is utilized to spot where national culture fits in the dynamism (Earley and Gibson, 2002; Oyserman and Kemmelmeier., 2002) and how it is intertwined with internationalization process as a mediator. The location advantages of host countries, as pointed out by Dunning as market, Science and Technology (S&T) resources, communication infrastructure and policy regime, are analyzed in their effect on Chinese MNEs' establishment of overseas R&D subsidiaries in the host country. Geert Hofstede (1991)'s national culture dimension index is used to administrate the construct of "Psychological Distance" in Uppsala Model.

Fig. 2 Theoretical framework on location determinants of Chinese MNEs' overseas R&D subsidiaries

3.2. Indicators and variables

3.2.1. Host country advantages

According to Dunning's eclectic paradigm, the location advantages of the host countries are market potential, labor cost, trade barrier and government policy. We use the following variables to measure host country advantages.

Market size and potential: The initial and primary incentives for R&D internationalization are to support sales and production activities in the host country by adapting products according to the local market need (Kumar 1999). We use market size index (MARKET) as a proxy variable to measure the host country's market size and potential. The data source is the Global Competitiveness Report of World Economic Forum (WEF).

Science and technological resource level: Another important incentive for R&D internationalization comes from enterprises' intent to use the host country's scientific and technological resources and infrastructure to internalize R&D outcomes (Kumar, 1996). We use the residents and patent number ratio RESPAT as a proxy variable to measure the scientific and technological resources and infrastructure of the host country. This data comes from the World Bank (WB).

Communication facilities: Sufficient communication facilities are a key condition for enterprises' engaging in R&D activities (Kumar, 1996; Chen and Xu, 2009). We use broadband penetration rate (INTENET) as a proxy variable to measure the level of the communication facilities of the host country. The data is from the International Telecommunication Union (ITU).

Institutional environment: The stability and fairness of the institutional environment of the host country is another important influence factor for enterprises' overseas R&D location selection. We use the intellectual property protection index (IPP), which is closely related to R&D activities, as a proxy variable to measure the institutional environment of the host country. The data source is the WEF.

3.2.2. Interaction between the host country and the home country

According to the Uppsala model, the internationalization of an enterprise is a gradual process; the "psychological distance", a sum of factors that hinder market information flows, can affect foreign direct investment mode (Johanson and Vahlne, 1977). Based on the "psychological distance" concept and Hofstader (1991)'s "national cultural dimensions", we explore the influence factors which hinder market information flow during the internationalization of R&D, a new stage of enterprises' internationalization. We examine the moderating effect of the geographical and psychological distance on Chinese firms' overseas R&D location choice. The data source for the moderating variables bilateral geographical distance (DIS) and culture distance (CULTURE DIS) is CEP II database and Hofstede Centre. The cultural distance is calculated according to Kogut and Singh (1998)'s formula:

$$CD_j = \sum_{i=1}^{3} \left\{ \left(I_{ij} - I_{iu} \right)^2 / V_i \right\} / 3 \tag{1}$$

I_{ij} denotes No. i cultural dimensional index of county j; V_i denotes the variance of No. i cultural dimension, u denotes host country, CD_j is the cultural distance between country j and the host country. With this formula, the cultural distance between the host countries and China is calculated as in Table 2.

Table 2 Cultural distance between host countries and China

Country	Culture Distance	Country	Culture Distance
Australia	108.795	Nepal	6.282
Austria	111.688	The Netherlands	87.975
Brazil	38.519	New Zealand	106.860
Britain	101.720	Norway	77.151
Bulgaria	48.517	Pakistan	33.707
Canada	83.684	Poland	86.045
Chile	51.556	Portugal	76.632
Czech	58.657	Romania	57.177
Denmark	100.586	Russia	71.535
Ecuador	22.851	Serbia	58.789
Finland	72.663	Singapore	7.811
France	88.631	Slovakia	27.923
Germany	81.218	South Africa	49.988
Hungary	111.908	Korea	51.419
India	13.487	Spain	69.428
Indonesia	5.481	Srilanka	6.789
Iran	26.353	Sweden	74.166
Ireland	77.397	Switzerland	77.333
Israel	121.773	Thailand	21.123
Italy	90.955	Turkey	52.767
Japan	77.915	Arab Emirates	39.478
Kenya	7.853	U.S.A	103.265
Malaysia	6.890	Vietnam	1.451
Mexico	42.247	Zambia	15.228
Mozambique	3.692		

3.2.3. Control variables

Compared to the natural resources of host countries, the economic, technological, and institutional conditions, as pointed out in Dunning's eclectic theory, are more important determinants in R&D globalization; and are therefore the focus of our study. We use the conditions of natural resources of the host countries as control variables, measured by the proxy variable of ecological footprint. The data is from Global Footprint Network.

3.3. Hypotheses

In their study on the Japanese MNEs, Odagiri and Yasuda (1996) pointed out that companies' overseas R&D is mostly to support the sales and production in the host country, which is defined by Cordell (1973) as a "support laboratory". These incentives for establishing overseas R&D subsidiaries are called "demand side incentives" by Odagiri and Yasuda (1996). Many scholars have empirically proven that the host country's market scale and the overseas R&D location choice have a positive correlation (Lall, 1979; Mansfield *et al.*, 1979; Hirschey and Caves, 1981; Zejan, 1990; Belderbos, 1995; Odagiri and Yasuda, 1996; Kumar, 2001; Chen and Xu, 2009). We explore, for Chinese firms, which are in the largest export countries and in the largest domestic market, whether the market size of the host countries has an impact on their overseas R&D location choice. We assume that the host country's market size matters for Chinese multinationals' R&D locations.

H1: Under the same set of other conditions, the bigger the market size and potential of the host country, the more likely for Chinese firms to choose the host country for their overseas R&D subsidiaries.

In parallel with demand-side incentives, Odagiri and Yasuda (1996) categorize science and technology resources and R&D human resources as supply-side incentives. In the previous studies, the technology resources are interpreted as the host country's "attraction" (Hakanson, 1992); the level of communication facilities is also regarded as an important aspect of the "attraction" of the host country, because "one of the most difficult problems in managing transnational R&D projects is the exchange of data and information of overseas R&D activities can hardly be synchronized with data information exchange of local R&D activities in quality and speed" (Ito and Wakasugi, 2007). In contrast with the time when Western enterprises peaked in overseas R&D expansion, in the current era when the Chinese firms' R&D are "Going Global", the level of science and technology resources in host countries have experienced significant changes; the Internet has changed the communication facilities and conditions fundamentally. As many Chinese companies hunt for technology from the world, we assume, in the new S&T and ICT (Information and Communication Technology) era, the "attrition" of science and technology and communication conditions' influence on Chinese firms' overseas R&D location choice.

H2: Under the same set of other conditions, the more scientific and technological resources that the host countries' have, the more that Chinese firms are inclined to choose the host country for their overseas R&D subsidiaries.

H3: Under the same set of other conditions, the better that host countries' communication facilities and conditions are, the more that Chinese firms are inclined to choose the host country for their overseas R&D subsidiaries.

Previous studies have pointed out that "the uncertainty around the overseas R&D output" affects the choice of location, and thus, the overseas R&D subsidiaries show a tendency for assembling around the home country (Patel and Vega, 1999). The transparency and stability of the host country's policies affects companies' overseas investment location choice. R&D investment, as a special form of overseas investment, is closely related to the host country's intellectual property protection policy. Ito and Wakasugi (2007) pointed out that if the legal system of intellectual property rights protection is the same around the world, then the intellectual property protection system would have no effect on of enterprises' overseas R&D location choice. But, in fact, the intellectual property protection differs in every country, especially between developed and developing countries. We explore whether the location choice of Chinese enterprises overseas R&D activity is influenced by the host countries' institutional environment, especially the system of intellectual property protection.

H4: Under the same set of other conditions, the more stable and transparent the host countries' government policies are, the stronger IPP system is, the Chinese firms are more inclined to choose the host country for their overseas R&D subsidiaries.

Zedtwitz and Gassmann (2002) pointed out that the main risks of overseas R&D activities are brought by the geographical distance between the companies' headquarters and overseas R&D subsidiaries. The geographical distance affects communication, increases the cost of transfer; and the coordination and control challenges hinder cooperation. The geographical distance brings mental pressure to the project manager by the need for frequent business travel. Because of the unwillingness for the senior research staff to travel abroad, overseas R&D activities depend more on the distance coordination, which makes trust-building difficult in the team. Apart from the geographical distance, the "psychological distance" proposed in the Uppsala model, the sum of factors that hinder the flow of information, also affects the internationalization process. We explore in the current era when the modern transportation and communication facilities have enabled the interaction between countries much easier, whether the geographical distance and "psychological distance" affect the overseas R&D location choice.

H5: The bilateral geographical distance between host countries and China has a moderating effect on the relationship between host countries factors and Chinese firms' overseas R&D location choice tendency.

H6: The psychological distance between host countries and China has a moderating effect on the relationship between host countries factors and Chinese firms' overseas R&D location choice tendency.

4. Estimations and inferences

With the number of Chinese firms' overseas R&D subsidiaries in a certain host country as dependent variable, and the six variables elaborated in section 3.2 as independent variables, a multiple linear regression model is as follows:

$$Y_i=\alpha_0+\alpha_1 Z_i+\mu_i \tag{2}$$

The regression model (2) is a linear regression formula with the control variable Z;

$$Y_I=\alpha_0+\alpha_1 Z_i+\beta_1 X_{1i}+\beta_2 X_{2i}+\beta_3 X_{3i}+\beta_4 X_{41}+\mu_i \tag{3}$$

Based on (1) and (2), the regression model (3) adds independent variables X_{ki} (k=1,2,3,4);

$$Y_{\mathrm{i}}=\alpha_0+\alpha_1 Z_i+\beta_1 X_{1i}+\beta_2 X_{2i}+\beta_3 X_{3i}+\beta_4 X_{4i}+\gamma_{j0} M_j+\gamma_{j1} M_j X_{1i}+\gamma_{j2} M_j X_{2i}+\gamma_{j3} M_j X_{3i}+\gamma_{j4} M_j X_{41}+\mu_i \tag{4}$$

Based on (2) and (3), the regression model (4) adds moderating variables M_j.

Y_i denotes the number of Chinese firms' overseas R&D subsidiaries in country i. Z_i denotes the value of the control variable in country i. X_{ki} is No. k affecting factors in country i. μ_i denotes random error.

First, we processed the data and tested the collinearity of independent variables (see Tables 3, 4 and 5). The multicollinearity of independent variables is within acceptable scope (VIF<5).

Table 3 Descriptive data summary (1)

Variable	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
R&D SUB	1	351	17.76	50.821	2582.730	6.14855	40.4983
ECO RESCOURCE	-9.83	7.91	-1.0104	3.45077	11.908	5.17168	30.88577
MARKET	1.21E10	1.62E13	1.1519E12	2.44061E12	5.957E24	4.01981	15.71483
RESPAT	.424	282108.000	18035.476	5.800769E4	3.365E9	0.01030	-1.30482
INTERNET	.07482	40.26027	18.80310	12.97222	168.279	0.15258	-1.49698
IPP	2.65	6.25	4.3204	1.14950	1.321	0.94474	1.88938
DIS	957.40	19059.00	7736.9265	3542.15057	1.255E7	-0.06718	-1.17107
CUL DIS	1.45089	121.77327	57.45627	35.39390	1252.729	0.81136	1.51839

Table 4 Descriptive data summary (2): standardized data

Zscore Variable	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Zscore R&D SUB NUMBER	49	-.32969	6.55728	0	1	1
Zscore ECO RESCOURCE	49	-2.55583	2.58505	0	1	1
Zscore MARKET	49	-.46702	6.15199	0	1	1
Zscore RESPAT	49	-.31091	4.55237	0	1	1
Zscore INTERNET	49	-1.44372	1.65409	0	1	1
Zscore IPP	49	-1.45316	1.67864	0	1	1
Zscore DIS	49	-1.91396	3.19638	0	1	1
Zscore CUL DIS	49	-1.58235	1.81718	0	1	1

Table 5 Descriptive data summary (3)

Zscore Variable	Collinearity Statistics
	VIF
Zscore ECO RESCOURCE	1.197
ZscoreMARKET	3.356
Zscore RESPAT	3.367
Zscore INTERNET	3.971
Zscore IPP	2.124
Zscore DIS	1.420
Zscore CUL DIS	2.796

Table 6 Determinants of Chinese Firms' Overseas R&D Investment Location Choice

Model and Test Method	Model 1(OLS)	Model 2(OLS)	Model 3(2SLS)	Model 4(OLS)
(Constant)	1.04E-16	-7.02E-17	0.056**	-0.107**
Zscore ECO RESCOURCE	-0.169	-0.044	0.003	0.016
core MARKET		0.939***	0.042	0.314**
Zscore RESPAT		0.014	0.899***	0.073
Zscore INTERNET		-0.033	-0.001	0.074
Zscore IPP		0.031	0.070*	0.033
Zscore DIS			0.073*	
X11			0.109*	
X12			0.385***	
X13			-0.017	
X14			-0.022	
X21				0.499***
X22				0.030
X23				-0.020
X24				-0.05555
R2	0.028	0.914	0.978	0.963
Adjusted R2	0.008	0.904	/	0.953
F value/Wald	1.377	91.052	2198.68	98.952
Sig.	0.246	0.000	0.000	0.000
Hausman	2.79 (0.095)	1.69 (0.193)	6.48 (0.011)	0.76 (0.348)

Note: ***, **, and * represent significant levels of 0.01,0.05, and 0.10, respectively.

Then, we introduce independent and moderating variables into the model in successive steps. We use Ordinary Least Squares (OLS) regression, and conduct Hausman test (using Stata 12.0). The result shows that in Models 1,2,4, the P value of Hausman test>0.05, therefore, there is no endogeneity. In Model 3, P=0.011<0.05, therefore, the possibility of endogeneity exists. To resolve this problem, we use Two-Stage least squares (2SLS) regression. The regression result is shown in Table 6.

The estimation results show that the control variable, ecological resources (ECO RESCOURCE), has no positive effect on Chinese firms' overseas R&D location choice tendency. This is in accordance with our assumption, and the market potential, labor costs, trade barriers and government policy of the host countries should be our focus when examining the determinants of overseas R&D investment location choice.

According to the estimation results, similar with enterprises in Europe, the United States and Japan, Chinese firms are "attracted" by the scientific and technological resources in the host countries.

This finding is in accordance with the general motivation of enterprises' overseas R&D investment, "Knowledge Expansion", and Chinese firms long-held goal and effort on catching up with the advanced technology level of the developed world. The former study pointed out geographical distance hinders overseas R&D activities, increases the human and financial costs of using a host country's technology resources (Zedtwitz and Gassmann, 2002). Our estimation results once again prove this point, showing that the bilateral distance between the host countries and China affects Chinese firms' overseas R&D location decisions. In the 1970s and 1980s, when MNEs in developed countries quickly expanded their overseas R&D activities, the primary incentives were to support production and sales in the local market. The estimation results prove that this incentive is the same for Chinese firms, *i.e.*, the market of the host country is the primary incentive for Chinese firms to invest in overseas R&D. Under the moderating effect of culture distance, the host country's market size and Chinese firms' location choice tendencies have a significant positive correlation. H1, H2, H5, and H6 are supported.

The results also show that the level of communication facilities has no significant effect on Chinese firms' overseas R&D location preferences. While communication facilities have gone through revolutionary development, the quality and speed of communication may no longer be a major obstacle to overseas R&D activities: H3 is not supported.

In contrast to Kummar (1996)'s finding that "the intellectual property protection strength has a positive effect on the MNEs overseas R&D location choice when the host country is a developed country", our study finds that Chinese firms' overseas R&D investment choice tendency has no significant correlations with the intellectual property protection strength in the host country, being a developed country or not: H4 is not supported by the estimation. This finding thus opens more questions for the future research: if there are risks in Chinese firms' overseas R&D investment; how can Chinese firms better protect their R&D investment interests and handle uncertainties around the overseas R&D outcomes?

5. Conclusions

Integrating Dunning's eclectic paradigm and Uppsala Model, we construct a two-dimensional model, which consists of the determinants from host countries and from the interactions between the host countries and the home country, China. We use a multiple-regression method to analyze the determinants and rationale of the location choice of Chinese firms' overseas R&D activities.

We find that market size and the science and technology resources of the host country have a significant positive effect on the Chinese firms' tendency to choose an overseas R&D location. This is consistent with other findings from that in developed countries.

We also find that the determinants identified by former studies, such as the level of communication facilities, do not have a significant effect on Chinese firms overseas R&D investment decisions.

From our study, strategy recommendations for Chinese firms can be drawn as this: firstly, in the tide of globalization of science and technology, overseas R&D is an important vehicle for building internal capacity within Chinese firms. Secondly, during the R&D internationalization process, Chinese firms' activities and development show similarities with that of Western companies. However, Chinese firms also face challenges and opportunities different from that of Western companies during their peak overseas R&D expansion time. Chinese firms should learn from Western experience while designing R&D "Going Global" maps of their own.

The innovative contribution of our study can be seen from two sides: on the theory side, it integrates Dunning's eclectic paradigm, his theory on investment development circle, the Uppsala Model, and Geert Hofstede's national culture model into a new theoretical framework, which explains the determinants of MNEs' overseas R&D location Choice in a dynamic way. This framework brings in the national culture factor as a mediator through the Uppsala Model. The Uppsala Model is utilized to identify where and how national culture takes effect. By this design, the framework responds to the scholars' argument "instead of addressing whether or not national culture makes a difference, it is more useful to address the issue of how and when it makes a difference" (Leung *et al*., 2005; Earley and Gibson, 2002; Oyserman *et al*., 2002).

On the empirical study side, while the overseas R&D of MNEs from developed countries, such as the U.S., Japan and the European countries has drawn a lot of attention (Kumar, 1996; Odagiri and Yasuda, 1996; Kumar, 2001; Le Bas and Sierra, 2002; Shimizutani and Todo, 2008), the research on the firms from developing countries is lacking. This study captures China as a new hot-spot in the R&D globalization landscape, and contributes to the literature on emerging economies' overseas R&D activities. Our study opens a series of questions for future research: for example, we find that that Chinese firms' overseas R&D investment choice tendencies have no significant correlations with the intellectual property protection strength in the host country. This may reflect a fact that Chinese R&D investment in other countries is still in incremental innovation and lacks of technological breakthrough. The purpose of Chinese multinational R&D mainly falls in market driven innovation for local market or service the innovation in home market.

We suggest, apart from location choice, whether the intellectual property protection strength in the host country affects Chinese firms' overseas R&D investment strategy in other way can be explored; how Chinese firms better protect their R&D investment interests and handle uncertainties around the overseas R&D outcomes also can be considered for late study.

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