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Note

"Literature survey on R&D Internationalization of Multinational Enterprises and Trend of U.S. Affiliates"

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In this Research Note, we will first describe the theoretical background for motives and determinants of overseas R&D-intensive Foreign Direct Investment (FDI) and then introduce the trend and characteristics of R&D-intensive FDI undertaken by US Multinational Enterprises (MNEs).

1. Introduction

Technological advance is the key to productivity improvement and to achieve sustainable development, which leads to higher economic growth and standards of living. R&D is one of the main sources for innovation (see Akcay, 2011, for a recent survey of this literature), and for this reason, many countries have recently experienced a sharp increase in R&D expenditures.

MNEs and FDI have long been recognized as one of the main conduits of cross-border knowledge and technology transfer. Such transfers may occur through a variety of channels: the mobility of employees from MNE's affiliate to local company (Glass and Saggi, 2002; Gorg and Greenaway, 2004; Meyer, 2004; Dasgupta, 2012), exposures of local firms to adapt the superior technology through imitating or reverse engineering (Wang and Blomstrom, 1991; Saggi, 2002; Meyer, 2004), backward and forward linkages from MNEs to local suppliers and customers

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(Lall, 1996; Aitken and Harrison, 1999; Giroud, 2003). MNEs may also increase productivity of local firms as their entrance to local markets increase competition, thereby forcing local firms to increase efficiency (Gorg and Strobl, 2001; Gorg and Greenway, 2004).

MNEs play a key role in developing new technological innovations. They account for about half of the world's total R&D expenditure (UNCTAD, 2005). While R&D activities of MNEs are still largely confined to their home countries in close proximity to their headquarters, the available evidence shows that R&D-intensive FDI has grown significantly in recent years. OECD (2011) reports that foreign subsidiaries contribute around one-third of total business expenditure for R&D in most European countries, approximately 15 percent in the United States, and 5 percent in Japan, reaching over 60 percent in some small economies like Slovakia and Ireland.

The internationalization of R&D by MNEs can be particularly valuable for developing countries. Empirical evidence reveals that R&D activities undertaken by MNEs generate substantial spillover effects for the host country. It will open up new opportunities for countries behind the technological frontier to access modern technologies, increase gross R&D activities, enhance quality of human resources, upgrade technological capabilities, and therefore act as a stimulant to further technological development. As MNEs internationalize their R&D activities, competition among countries to attract R&D activities of MNEs through promotion polices has intensified. Attracting research-intensive FDIs therefore became of particular importance for developing countries as they can be a valuable vehicle for local technological upgrading.

2. Literature Review

MNEs' decision makings on location of R&D activities are influenced by two antagonistic forces. Centripetal forces will lead MNEs centralize R&D in their home country and in contrast, centrifugal forces will pull corporate R&D activities to foreign locations (Hirschey and Caves, 1981).

Several forces that lead firms to centralize R&D in their home countries have been identified in literatures. First, in line with internalization theory, it is argued that MNEs may follow a centralized R&D strategy to minimize the risk of technology dissipation abroad (Rugman, 1981). Technology is a key firm specific asset that creates competitive advantage for MNEs to outperform their rivals. Decentralization of R&D which involves more widespread communication and coordination among the increased number of personnel and organizational units may loosen the control over core technologies of the firm and increase the danger of technology diffusion. External knowledge dissemination, as an example, can be eased by geographical proximity to rival firms (Belderbos et al. 2008). The danger can be amplified in countries with weak level of intellectual property rights protection. Second, economies of scale and scope in R&D are an important reason for centralization of R&D activities (Hewitt, 1980; Hirschey and Caves, 1981). Firm size and research productivity has an enduring relationship. In the absence of fully functioning markets for innovation, larger firms may be able to spread the fixed costs in the form of research equipment and personnel over a large sales base. Therefore, small decentralized labs may not be as cost effective relative to the large centralized labs. Economies of scope may arise because the knowledge gained in R&D could be applied to different products within the firm (Henderson and Cockburn, 1996; Arora et al. 2011). Third, centralization of R&D activities can be explained by MNEs desire to minimize the cost of additional coordination and transferring of knowledge base. The high level of communication including the exchange of information through face-to-face contact is essential to effective R&D efforts, as the creation and transfer of tacit knowledge is at stake. When R&D activities are globally dispersed, however, geographic and cultural dispersion make effective communication between units more difficult (De Meyer, 1991). Fourth, when MNEs perform innovative activity, they also rely on external home knowledge sources such as customers, suppliers, and non-firm organizations such as universities and research institutions. Narula (2002) points out that firms are strongly embedded in and they are dependent on these linkages and these linkages make up their home country innovation system which contribute to the development and diffusion of new technologies. Although the process of becoming embedded in its home location's innovation system is time consuming and costly, maintaining it is not. On the other hand in a foreign location, developing and maintaining such linkages with external networks of local economic actors in host country would incur considerable costs to the firms. This creates an 'inertia' whereby MNEs prefer to innovate at home and are reluctant to internationalize innovative activities abroad.

Above mentioned forces for centralization of R&D are increasingly counterbalanced by various centrifugal forces that encourage the evolution toward the geographical decentralization of R&D activities. A study by Kuemmerle (1999) classified R&D activities into two subsets of centrifugal forces, those engaged in home base exploiting (HBE), and home base augmenting (HBA) activities[1]. HBE activities are undertaken to support manufacturing facilities in host countries and to tailor production process to customize products for local demand and or to meet local conditions and regulations, or in some cases, to create peripheral products. In such activities, MNEs use their existing stock of knowledge developed in home country and support the local production and sales activities. This strategic behavior has alternatively been referred to as asset-exploiting activities (Dunning and Narula, 1995) or competence-exploiting activities (Cantwell and Mudambi, 2005). In contrast, HBA activities aims to tap into new knowledge and expertise from the local scientific community, the local pool of scientists, and to create new knowledge base that can be utilized in the international operations of the MNEs. These activities have been labelled as strategic asset-seeking activities (Dunning and Narula, 1995) or competence-creating activities (Cantwell and Mudambi, 2005).

Many studies, often based on surveys, found that the product adaptation was the major motive for dispersing R&D activities abroad. Kuemmerle (1999b), using results from a survey of FDI in R&D by 32 pharmaceutical and electronics companies domiciled in five different home

1) This dichotomy represents two extremes, and is an oversimplification of reality. There are a variety of intermediate types, as shown by Le Bas and Sierra (2002).

countries, shows that 68% of the laboratories in the sample followed a HBE strategy while only 32% followed HBA strategy. Roberts (2001), using the results on a survey of 209 MNEs from Western Europe, North America and Japan, finds that adaptation of products to local requirements is the first reason for R&D internationalization. Edler et al. (2002), based on a survey of the senior officers of the world most technology-intensive companies from Western Europe, North America and Japan, also found that the most important driving force for R&D internationalization is the adaptation of products to local requirements. Iwasa and Odagiri (2004) analyzed 137 Japanese MNEs in1998 and find that more than three quarters of the samples enter the category of support-oriented R&D, whose purpose is to adapt the superior technology at home for local conditions.

Three factors which mainly relate to the adaptation motive for R&D in foreign affiliates have been examined in the literature. First, in many cases, international production through FDI precedes R&D internationalization. As R&D activities often follow where production activities are taking place, production in foreign affiliates are found to be one of the most important determinant of overseas R&D (Lall, 1980; Hirschery and Caves, 1981; Pearce, 1989). Kenny and Florida (1994) found that Japanese MNEs tend to cluster R&D in close proximity to foreign production facilities. Using survey of Finnish firm, Ketokivi and Ali-Yrkkö (2009) find that the need for colocation of production and R&D activities is likely to be positively associated with complexity of product and or production process. However, as pointed out by Dunning and Narula (1995) the internationalization of R&D may not always evolve as a result of the internationalization of production. For example, R&D units may be set up as listening posts for technology gathering and to transfer technologies from centers of technological excellence to support R&D activities in the home countries (Gassman and Gaso, 2004). Ambos (2005) finds that technology sourcing R&D tends to be more independent of production, while adaptive R&D (market-seeking) tend to have strong links with production activities. For example, R&D laboratories of British and Swedish MNEs are found to exist in isolation and separated from the firm's production network (Pearce, 1989; Hakanson and Nobel, 1993). Second, empirical literature consistently points at the pivotal role played by market size and faster growing markets in fostering foreign affiliates' R&D activities (Pearce and Singh, 1992; Ekholm and Midelfart, 2004; Blonigen, 2005; Jensen, 2006; Dachs and Pyka, 2010). When overseas R&D facilities act as support laboratories, a large local market with potentially large demand create more incentives for MNEs to engage in adaptive R&D activities to increase their sales prospects and consequently larger revenues, which in turn allow them to recover costs association with R&D activities. Third, the availability of highly skilled human resources appears as an important location factor for adaptive as well as innovative R&D investments abroad (Kumar, 2001; Jones and Teegen, 2003). A shortage of qualified personnel for R&D activities in the home country, along with the skyrocketing labor costs, motivate MNEs to locate R&D activities abroad. The expanding pool of talent is a contributing factor for Asia to successfully attract innovation activities of MNEs (Ernst, 2006). Lewin et al. (2009) also finds that access to qualified highly skilled technical and scientific talent is one of the important factor to explain the relocation of product development from the United States to other countries, most notably Asian countries.

Although HBE activities still prevail in numbers, a number of studies finds the growing importance of HBA motive of R&D activities undertaken by foreign affiliates of MNEs in the recent years. The main motive of HBA R&D activities is to augment its knowledge base by tapping into local fields of expertise, and to generate new technology that can be used in the other operation of the MNEs (Cantwell, 1995; Dunning, 1998; Frost, 2001; Le Bas and Sierra, 2002; Zedwitz and Gassmann, 2002; Ambos, 2005). Increasing global competition drive MNE to undertake increasingly knowledge-driven R&D activities to seek and develop knowledge advantages wherever and whenever they can. Increased complexity of products that necessitates MNEs to increase the knowledge requirements drive them abroad to acquire new knowledge (Narula and Zanfei, 2005).

For foreign affiliates to assume more creative tasks of competence creation, they need to be sufficiently embedded within the local milieu of knowledge networks of host country such as reputable universities and research institutions as well as other firms. Andersson et al. (2001) finds a positive association of the embeddedness of subsidiaries in the local business network with their competence development.

There is a strong tendency for competence-creating R&D activities to be located in countries with a strong knowledge base. Accordingly, those activities are attracted to a regional center of technological excellence for their primary field of activity (Cantwell, 1991). Firms located in proximity to other innovative entities are more likely to benefit from knowledge spillovers that enhance their competitiveness (Jaffe et al., 1993; Jaffe and Trajtenberg, 1996; Maurseth and Verspagen, 2002). Agglomeration effects is particularly valuable for competence-creating R&D units.

Knowledge spillover can be generated from different sources. First, agglomeration economies may arise as the result of the colocation of similar firms in the same industry. As put forward by Marshall (1890), Arrow(1962), and Romer (1986), knowledge is mostly industry specific. Spatial concentration of firms in the same sector facilities knowledge spillover within a particular industry. These intra-industry spillovers are known as specialization externalities. Second, originally suggested by Jacobs (1969), agglomeration economies may stem from colocation of firms from diverse industries. They are known as diversity externalities. These externalities emphasize that the diversity in industry base gives rise to new ideas which facilitate the process of competency creation. Third, science-technology spillover may also stem from the presence of munificent scientific and educational infrastructure (Cantwell et al., 2001; Cantwell and Piscitello, 2002, 2005). Knowledge spillovers are highly localized within the clusters of R&D laboratories as spatial proximity facilitate the transmission and the acquisition of tacit and complex knowledge, with knowledge spillovers decreasing with distance. Therefore, R&D activities will be concentrated to take advantages of these externalities (Cantwell and Piscitello, 2005; Giarratana et al., 2005).

3. Trends and patterns of the internationalization of R&D by U.S. MNEs

This section surveys the trends and patterns of overseas R&D activities by U.S. MNEs using data from Bureau of Economic Analysis (BEA).

On the aggregate level, Table 1 points to growing R&D expenditures of foreign affiliates of US MNEs in absolute numbers. The dollar value of overseas R&D activities of US MNEs increased from US$ 7 billion in 1989 to around US$ 11 billion in 1993 and continued to grow at an accelerated rate to over US$ 20 billion in 2000. Although overseas R&D expenditures declined slightly in 2001 in response to the slowdown of the U.S. economy and associated slowdown of business activities by many R&D performing firms, it was quickly followed by a recovery period. The period between 2002 and 2008 was characterized by a steady increase of overseas R&D expenditure of the U.S. firms. The dollar value of overseas R&D activities of US MNEs over the same time period increased from US$ 21 billion to US$ 41.7 billion. Increases in overseas R&D expenditures were again interrupted by the global financial crisis with the sharp downturn in the U.S. and global economy beginning in late 2008. The annual growth rate of overseas R&D expenditures in 2009 was negative for the first time since 2001. Overseas R&D expenditure saw a recovery in 2010 and attained higher than 2008 levels in 2011. In 2013, it reached US$ 48.8 billion.

Between 1990 and 2003, the expansion of overseas R&D expenditure has exceeded the pace of U.S. total business R&D expenditure. Overseas R&D expenditure grew on average by 8.9%, compared with a 7.2% average expansion of total business R&D expenditure. The faster rate of growth of overseas R&D expenditure indicates that R&D activities has become more globalized in scope. Reflecting the trend towards the internationalization of R&D, the proportion of overseas R&D in total business R&D expenditure has gradually increased over time. The share that fluctuated between 10.1% and 12.5% in 1990's has shifted upward to between 10.6% and 16.6% during more recent years.

The amount of R&D performed at foreign affiliates of US firms increased by US$ 41.7 billion over the period of this study. Yet total spending on R&D by these firms inside the U.S. increased by US$ 292.8 billion over the same time span. R&D spending in the U.S. still accounts for about 87 % of total global R&D spending by US MNEs. This pattern suggests that while overseas R&D expenditure has

Table 1: Total and overseas R&D expenditure of US MNEs during 1988–2013

	All Sectors			Manufacturing			Manufacturing Share	
Year	Total	Foreign Affiliates		Total	Foreign Affiliates		Total	Foreign Affiliates
	$million	$million	% of Total	$million	$million	% of Total	%	%
1989	73,501	7,048	9.6	63,199				
1990	81,602	10,187	12.5	65,251	8,468	13.0	80.0	83.1
1991	90,580	9,396	10.4	67,639	8,092	12.0	74.7	86.1
1992	94,388	11,084	11.7	71,025	9,345	13.2	75.2	84.3
1993	94,591	10,951	11.6	69,901	9,019	12.9	73.9	82.4
1994	97,131	11,877	12.2	73,375	10,053	13.7	75.5	84.6
1995	108,652	12,582	11.6	81,236	10,791	13.3	74.8	85.8
1996	121,015	14,039	11.6	91,845	12,205	13.3	75.9	86.9
1997	133,611	14,593	10.9	101,202	12,505	12.4	75.7	85.7
1998	145,016	14,664	10.1	102,211	12,819	12.5	70.5	87.4
1999	161,594	18,144	11.2	101,283	16,388	16.2	62.7	90.3
2000	182,844	20,457	11.2	113,173	18,455	16.3	61.9	90.2
2001	185,118	19,702	10.6	112,733	17,383	15.4	60.9	88.2
2002	177,467	21,063	11.9	101,344	18,736	18.5	57.1	89.0
2003	183,305	22,793	12.4	108,079	19,819	18.3	59.0	87.0
2004	188,035	25,840	13.7	131,887	22,400	17.0	70.1	86.7
2005	204,250	27,653	13.5	142,555	23,508	16.5	69.8	85.0
2006	223,365	29,583	13.2	155,230	24,172	15.6	69.5	81.7
2007	242,682	34,446	14.2	169,307	27,825	16.4	69.8	80.8
2008	290,680	41,699	14.3	203,755	31,553	15.5	70.1	75.7
2009	282,393	39,205	13.9	195,144	27,141	13.9	69.1	69.2
2010	278,977	39,887	14.3	196,711	27,481	14.0	70.5	68.9
2011	294,093	44,684	15.2	201,361	30,332	15.1	68.5	67.9
2012	271,629	44,983	16.6	184,356	30,497	16.5	67.9	67.8
2013	366,266	48,750	13.3	249,622	31,741	12.7	68.2	65.1

Source: Computer files of U.S. Direct Investment Abroad, Bureau of Economic Analysis, US Department of Commerce

Table 2: Sectoral Distribution of R&D Expenditure, 1999–2013

[% of All Industries]	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mining	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.1	0.3	0.7	0.7
Manufacturing	90.3	90.2	88.2	89.0	87.0	86.7	85.0	81.7	80.8	75.7	69.2	68.9	67.9	67.8	65.1
Food	2.0	1.4	1.6	1.6	1.8	2.4	1.3	1.4	1.5	1.4	1.3	1.3	1.4	1.2	1.0
Chemicals	23.9	22.5	22.9	24.4	24.3	21.8	23.8	21.8	25.2	21.2	22.3	20.9	20.8	20.3	19.5
Pharmaceuticals and medicines	19.7	19.0	19.1	20.1	20.3	18.5	20.5	18.4	21.8	18.1	19.0	17.8	17.2	15.9	14.7
Primary and fabricated metals	0.8	0.9	0.8	0.9	1.0	0.6	1.1	1.1	1.0	0.9	0.6	0.7	0.8	0.6	0.7
Machinery	4.1	3.8	3.8	3.0	3.4	3.0	3.4	3.8	3.7	3.5	3.5	3.6	4.9	4.9	4.9
Computers and electronic productsq20.8	26.6	28.9	23.6	21.0	19.6	17.4	16.7	14.2	18.2	15.6	14.8	12.3	15.7	15.3	
Computers and peripheral equipment	2.0	1.7	1.9	1.8	1.8	1.8	0.8	0.5	0.6	2.9	2.5	2.1	2.0	1.9	2.2
Communications equipment	13.2	18.8	20.6	14.9	13.1	10.7	7.1	6.8	5.1	4.7	..	..	2.2	2.0	2.3
Audio and video equipment	0.8	..	..	0.3	0.3	..	..	..	..	..	..	..	0.7	0.7	0.6
Semiconductors and other electronic components	3.5	4.2	4.1	5.0	4.2	4.9	7.0	6.8	5.6	7.5	6.6	7.0	5.5	9.0	8.1
Navigational, measuring, and other instruments	2	1.5	1.9	1.6	1.7	2.0	2.0	2.0	2.0	..	2.2	2.2	1.9	2.2	2.1

Magnetic and optical media	0.0	..	..	0.0	0.0	..	..	..	..	0.0	..	..	..	..	0.0
Electrical equipment, appliances, and component	1.2	1.5	1.7	2.0	2.2	2.1	2.3	2.2	1.4	1.2	1.4	1.8	1.6	1.5	1.2
Transportation equipment	31.2	28.2	23.8	28.3	28.3	30.7	29.0	28.7	28.1	24.1	20.0	19.5	18.8	17.1	16.0
Wholesale trade	2.8	2.7	3.8	2.9	3.0	3.1	3.4	3.8	4.0	5.0	5.3	4.8	5.8	5.6	8.6
Finance and insurance	0.0	0.0	0.1	0.0	0.0	0.0	0.0	..	0.0	0.0	0.0	..	..	..	
Professional, scientific, and technical services	5.7	4.5	5.4	4.8	5.9	7.7	8.6	10.5	10.0	14.4	20.6	19.3	18.4	17.9	17.6
Computer systems design and related services 1.7	1.7	2.0	2.1	2.3	2.8	4.4	4.4	2.9	4.7	5.8	5.1	4.3	4.7	4.9	
Management, scientific, and technical consulting	..	0.1	0.1	0.1	0.1	..	0.1	..	..	0.9	1.1	0.8	0.9	0.9	0.9
Other	2.9	2.3	2.9	2.0	3.3	4.3	3.9	..	6.2	8.3	13.5	13.1	..	12.1	..
Other industries	0.2	0.4	..	0.4	0.4	0.3	0.5	0.3	0.4	0.3	..	0.3	..	..	..

Source: Computer files of U.S. Direct Investment Abroad, Bureau of Economic Analysis, US Department of Commerce

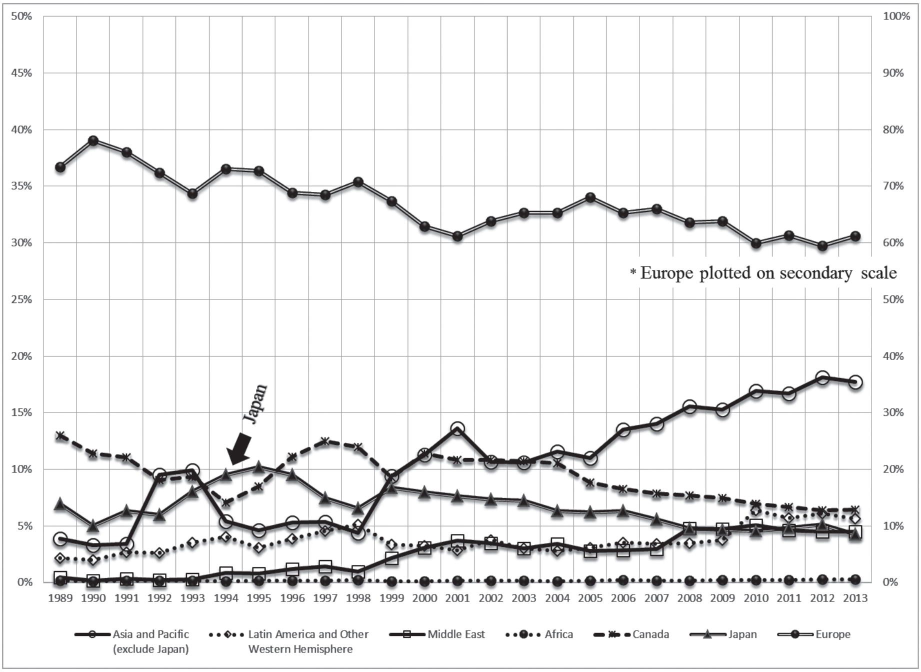
increased, the U.S. firms still perform the vast majority of R&D activities in the U.S.

The manufacturing share in total R&D expenditure appears to have slightly declining trend. Table 1 indicates that the manufacturing share between 1990 and 1998 was on average 75%. The manufacturing share slipped to average of 60% between 1999 and 2003, and climbed back to 69% range between 2004 and 2013. In comparison, the manufacturing share in overseas R&D expenditure increased from 83.1% in 1990 to its peak of 90.3% in 1999 but declined to 65% in 2013. Despite falling share of both total and overseas R&D expenditure over recent years, the manufacturing maintains to be an important engine of technological progress.

As Table 2 shows, the contraction of the manufacturing sector mirrored the expansion of the share of service sector. In particular, the share of professional, scientific, and technical services increased from less than 5.7% in 1999 to over 17.6% in 2013 and that of wholesale trade increased from 2.8% to 8.6%. In contrast, there has been a noteworthy decline in the R&D expenditure share in transport equipment. Despite this subsector accounting for almost one third of R&D expenditure at 31.2% in 1999, experienced continual decline to 16.0% in 2013. Within the manufacturing sector, in 2013, R&D investment by US MNEs is largely in three subsectors: chemicals (19.5%), transportation equipment (16.0%), and computers and electronics (15.4%).

Figure 1 shows the distribution of the US R&D investment across regions and countries. Although European share has slightly declined over time, overall, overseas R&D activities of affiliates remain highly concentrated in Europe. The share peaked in 1990 at 78.1% declined to 61.2% in 2013. In contrast, consistent expansion of R&D activities can be easily observed in the same time period for the Asia and Pacific region, excluding Japan. Their share represented only 3.9% in 1989 but increased to 17.7% in 2013. Additionally, relative importance of Japan as well as Canada as destination has been declining during the recent years, while the Middle East has been steadily increasing their share from 0.5% in 1989 to 4.5% in 2013. The share of Latin America during the period fluctuates between 2.2% and 5.6%.

Figure 1: Distribution of US R&D Activities 1989–2013

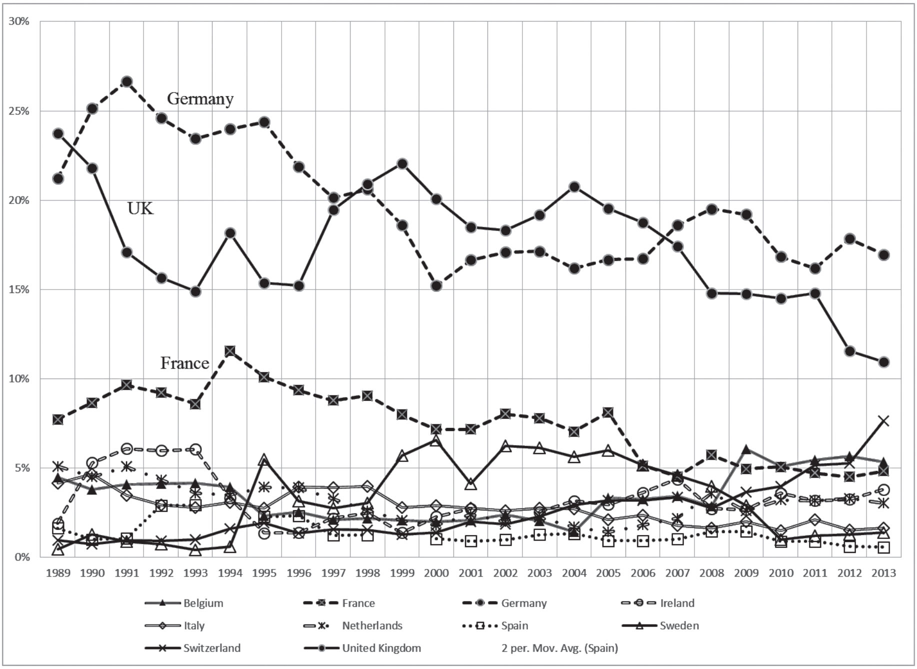


Source: Computer files of U.S. Direct Investment Abroad, Bureau of Economic Analysis, US Department of Commerce

The decline in US R&D expenditure in Europe mainly concerns Germany, the UK, and France (Figure 2). The share of Germany once stood at 26.7% in in 1991 declined to 17.0% in 2013, whereas the share of UK declined from 23.7% in 1989 to 11.0% in 2013. France also experienced similar decline in its share to a lesser extent. Equally interesting development depicted is the rise of small and medium sized EU member states as host countries. Switzerland, for example, has surpassed Sweden and France since 2009 and 2011, respectively. Switzerland was the 3rd largest host country in Europe, accounting for 7.7% in 2013, following Germany and the UK. A similar growth of R&D expenditure of US affiliates can also be seen in Belgium.

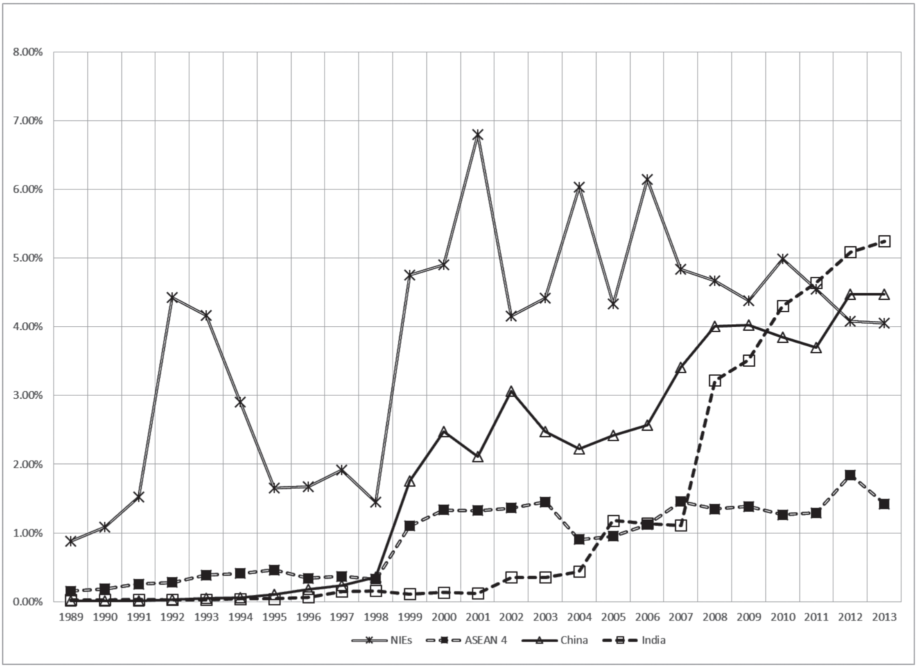
As Figure 3 indicate, within Asia, China and India have emerged as a new attractive location for US MNEs. Although China has always been attractive to production-based FDI, foreign companies including those from the U.S. investing in China engaged only limited levels of R&D activity. However, the trend has changed since the end of the 1990s.

Figure 2: Distribution of US R&D Activities in Europe 1989–2013



Source: Computer files of U.S. Direct Investment Abroad, Bureau of Economic Analysis, US Department of Commerce

Figure 3: Distribution of US R&D Activities in Asia 1989–2013



Source: Computer files of U.S. Direct Investment Abroad, Bureau of Economic Analysis, US Department of Commerce

China's share increased from practically nothing in the early 1990s to 4.5% in 2013. India is another significant newcomer host country for the US affiliates. India which lagged behind China as destination of R&D FDI from the U.S., experienced the sharp rise in the volume since 2007 surpassing China for the first time in 2010 at 4.3%. Their share continued to increase to 5.3% in 2013.

The share of R&D expenditures accounted for by affiliates in the Asian NIEs (South Korea, Taiwan, Hong Kong, and Singapore) appears to be more volatile which mostly reflect the volatility in Singapore. Although Singapore has been successful in attracting the US affiliates' R&D FDI, Korea became the largest recipient among the Asian NIEs in more recent years. The share among the ASEAN countries of Malaysia, Thailand, Philippines, and Indonesia is still relatively small and is largely dominated by Malaysia.

Overall, U.S. R&D investments abroad have generally shifted from the larger European countries, Canada, and Japan, toward several of the smaller European countries as well as Asia, in particular, China and India.

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