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Technology-Driven FDI: A Survey of the Literature

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ABSTRACT

In the past century we have witnessed worldwide a growing flow of Foreign Direct Investment (FDI), which have attracted the attention of economists, international business and development scholars. In this scenario, two trends have recently gained momentum: the increasing relevance of Technology-driven FDI (TFDI) and the upsurge of Emerging Economies' Multinational Enterprises (EMNEs) investing in advanced countries.

In this paper, we present a survey of the relevant literature on TFDI, with a focus on both AMNEs and EMNEs. After presenting the different phases of TFDI from Advanced Economy Multinational Enterprises (AMNEs), we focus on EMNEs and discuss the usefulness and limitations of the existing theoretical frameworks to interpret this new phenomenon. Next, the paper reviews the literature on EMNEs' sources of competitive advantages and their main motivations for investing abroad. Finally, the paper explores the peculiarities of TFDI from emerging economies.

JEL Code: F23; O32

Keywords: Foreign Direct Investments; Technology Driven Foreign Investments; Emerging Countries

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Technology-Driven FDI: A Survey of the Literature*

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Abstract

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1. Introduction

In the past century we have witnessed worldwide a growing flow of Foreign Direct Investment (FDI), which have attracted the attention of economists, international business and development scholars. In this scenario, two trends have recently gained momentum: the increasing relevance of Technology-driven FDI (TFDI) and the upsurge of Emerging Economies' Multinational Enterprises (EMNEs) investing in advanced countries. While at the beginning of the past century, FDI were mainly oriented at exploiting pre-existing corporate assets and competences abroad, more recently foreign investors have become interested in exploring new ways of acquiring technological assets and creating knowledge and innovation through different forms of FDI, which we call as TFDI.

Since the 1990s, TFDI have characterized the global R&D expansion of many Advanced Economy Multinational Enterprises (AMNEs), which have established new R&D facilities in knowledge-rich countries and regions – a case in point is the setting up of subsidiaries of Multinational Enterprises (MNEs) from Europe in the Silicon Valley. This trend has also come along with the development of new governance structures within corporations, which have shifted from being centrally directed, hierarchical organisations, to networks of dispersed operations where subsidiaries gain autonomy and power. Hence, some subsidiaries have become "centres of excellence" for the creation of new technology and their strategic importance for transferring knowledge to the rest of the corporation – including headquarters – has grown.

Parallel to these changes occurring to AMNEs, outward FDI (ODI) from emerging economies has started to soar – especially since the end of the 1990s. EMNEs have begun to undertake investment in developed economies with the specific purpose of acquiring technology, brands, management and marketing capabilities, which are lacking in their home countries. Thanks to a set of country-specific advantages – among which are easier access to credit and state support – EMNEs have taken over some advanced countries' leading firms, having access to their knowledge resources and skills. On these grounds, TFDI has recently become a topic of growing interest among scholars and policy makers.

This paper reviews the literature on TFDI, with a focus on both AMNEs and EMNEs. The paper is organized as follows. Section 2 discusses the historical trends of TFDI from the perspective of AMNEs (Section 2.1), as well as TFDI location strategies (Section 2.2), and it explains how such an historical trend has come along with major transformations at the intra-corporate level (Section 2.3). Section 3 focuses on EMNEs, tracing an historical perspective of their ODI (Section 3.1) and discussing the usefulness and limitations of the existing theoretical frameworks to interpret this new phenomenon (Section 3.2). Next, the paper reviews the literature on EMNEs' sources of competitive advantages (Section 3.3) and their main motivations for investing abroad (Section 3.4). In Section 3.5, the modalities through which EMNEs invest abroad are discussed, while Section 3.6 explores the peculiarities of TFDI from emerging economies. Finally, in Section 4 we suggest some questions that future research in this area can address.

2. R&D internationalisation

2.1. Historical trends in the internationalisation of R&D

The internationalisation of R&D is not a new phenomenon but it has evolved along the second half of the 20th century, so that three historical phases can be identified (Hedge and Hicks, 2008; Hui and Kiggundu, 2011). The first phase started after the Second World War (WW), with some investment being already present in the interwar period. In that time, R&D internationalisation represented a strategy for firm growth, alternative to other strategies like diversification (Section 2.1.1). In a second phase (Section 2.1.2), beginning at the end of the 1970s and consolidating in the 1980s, R&D internationalisation became a priority for MNEs (Pearce and Singh, 1992) and it grew both in terms of R&D spending and patenting activity (Dunning, 1994; Pavitt and Patel, 1999). From the mid-1990s, a third phase of even more accelerated R&D internationalisation began, with MNEs increasingly oriented towards the global location of their R&D activities (Section 2.1.3).

2.1.1. The first phase: from the 1930s to the 1960s

The initial development of in-house R&D occurred in the large chemical and electricity firms in the US and Germany before the first WW; General Electric, DuPont, AT&T and Kodak all set up R&D labs by the 1910 (Mowery and Rosenberg, 1989; Mowery and Nelson, 1996). But it was especially after the Second WW – in the UK and in most other leading European

countries – that centralised R&D laboratories became a fundamental part of the organisational structure of knowledge-intensive firms (Massini and Miozzo, 2012).

In the interwar and early second post-war period, large firms located in advanced economies were diversifying their technological competences in the normal course of growth (Hounshell and Smith, 1988; Chandler, 1990) and started some projects of R&D internationalisation aimed at a wider exploitation of the basic competence they had already built up at home (Dunning and Lundan, 2009). Cantwell and Piscitello (2000) underline that at this stage the internationalisation of corporate technology was mainly motivated by the existence of a certain degree of dissimilarity between home and foreign markets, rather than by the need to accumulate new competences. Hence in this phase, R&D FDI were mainly aimed at the adaptation of products to local tastes and needs as well as at the adjustment of processes to local resource availabilities and production conditions.

Using evidence from patent applications at the US Patent Office, Cantwell (1995) presents an overview on R&D internationalisation trends over the 20th century. He shows that throughout this century the largest US and European MNEs generated an increasing share of their patents outside their home country. Referring to the period 1930s-1960s, Cantwell identifies three types of national groups of MNEs:

- German and French firms displayed low levels of technological internationalisation, which increased sharply only after the Second WW and then they experienced a further rise in the early 1970s – especially for French firms;
- British, Swiss and Dutch firms experienced a higher rate of internationalisation than the French and German companies in the period 1930s-1960s. In particular, British firms started to increase their foreign technological operations during the interwar period and reached peaks in the late 1960s and then again in the 1980s;
- Swedish and US firms were much more internationalised in technological activities in the interwar period than immediately after Second WW. Swedish firms began this process in the early 1920s and the largest US firms peaked in the early 1930s.

2.1.2 The second phase: 1970s and 1980s

The second phase of R&D internationalisation covers most of the 1970s and 1980s. In these two decades, MNEs internationalised their R&D following other activities already set up abroad (e.g. sales and production). Such a strategy was directed at supporting foreign

subsidiaries with complementary design and development capabilities (Gerybadze and Reger, 1999). The increasing internationalisation was linked to the fact that by around the mid-1970s, the old technology paradigm based on economies of scale ran into difficulties (Freeman and Perez, 1988), as the opportunities for integrating diverse technologies in large scale plants had been gradually exhausted (Cantwell and Piscitello, 2000). Therefore, since the 1980s, due to the increasing complexity of globalised processes, MNEs have increasingly internationalised, not only sales and manufacturing, but also technology generation and innovation (Gammeltoft, 2006). As identified by Kuemmerle (1999), the investment in R&D facilities abroad in this period did not concern only US companies - that had been pioneer investors in R&D in Europe, Japan and the rest of the world (Canada, Australia and a small number of Asian countries) - and European MNEs. He finds that, in the early 1980s, also Japanese R&D FDI became an important reality, going to the US, Europe and to the rest of the world, with a strong increase in the late 1980s and 1990s.

In the 1970s and 1980s, R&D internationalisation was undertaken mainly with the purpose of exploiting firm-specific capabilities in foreign environments (Vernon, 1966; Hakanson, 1990; Dunning, 1998) and high amounts of R&D were carried out abroad primarily to adapt products to local markets (Howells, 1990; Hakanson and Nobel, 1993) – as was the case of the first FDI wave. On conceptual grounds, the approach to the study of R&D internationalisation dates back to Vernon (1966) and his product cycle model. This model was used as a classical explanation of market-seeking production by firms of a particular nationality or ownership. Vernon, as well as other contemporary scholars such as Kindleberger (1969) and Stopford and Wells (1972), referring to US MNEs, "*theorised a quasi-colonial relationship between the parent company and foreign subsidiaries, wherein the latter are in charge of replicating the former activities abroad*" (Zanfei, 2000: 515). Vernon emphasised the costs and difficulties of transferring tacit knowledge and relevant information and capabilities across national borders. Hence, he believed that R&D processes were highly hierarchical, primarily based on one-way transfers of knowledge from MNEs headquarter to their subsidiaries abroad. R&D was considered to be a highly centralised activity with the MNE conceived as "*a polyp with its brain in the home country and tentacles in the host countries*" (Archibugi and Michie, 1995: 131). According to this view, MNEs retained R&D in the home country for a variety of reasons, including the perceived need for proximity between the places of strategic making and the development of core competences. Another main reason is related to the advantages of being embedded in specific industrial clusters and

knowledge environments, which favoured the access to tacit knowledge and the connections to lead users and finally, the concerns about information leakage to competitors abroad (Gammeltoft, 2006).

More recently, scholars have referred to this motivation for R&D internationalisation as "*asset-exploiting*" (Dunning and Narula, 1995) or as "*home base exploiting*" (HBE) (Kuemmerle, 1996, 1997), by that indicating FDI aimed at improving the way in which existing assets are utilised. As it is discussed in the next section, in the 1990s the HBE motivation has been proposed in the literature within a classification aimed at taking into account other new, increasingly important, reasons for undertaking R&D internationalisation.

2.1.3 The third phase: from the 1990s onwards

At the beginning of the 1990s, the hierarchical view of the MNE lost relevance as MNEs started being organized as networks of resources whose governance was much more complex than a simple hierarchy (Ghoshal and Bartlett, 1990), as highlighted in Cantwell (1995: 168): "*the transformation of the MNE, from a mainly multi-domestic structure of separate affiliates each serving their local market, to an integrated internal network structure*". Hence, some empirical studies have shown that MNEs started to establish international networks in order to exploit the potential of different foreign centres of excellence (Cantwell and Piscitello, 1999, 2000), and innovative activities became geographically dispersed across different locations. Therefore, MNEs expanded their innovative activities abroad in order to exploit economies of agglomeration and scope present in the host country or in foreign region, and because they soon realised that pure economies of scale in R&D activities were not enough to guarantee the development of innovative products and processes on an international scale.

During the 2000s, R&D internationalisation continued at an accelerated speed. A study conducted by the OECD (2008) has shown that in OECD countries business R&D under foreign control has more than doubled between 1995 and 2005, rising up from 37 to more than 83 billion US$. Besides, results from an analysis conducted by the European Commission revealed that *"on average, nine out of ten companies outsource 15% of their R&D; two-thirds of it to other companies and one-third to public research organisations"* (European Commission, 2005: 6). This clearly indicates that R&D outsourcing has become an integral complement to in-house R&D as part of companies' innovation strategies. In geographical terms, the years 2000s have testified the sharp increase of the role played by

emerging economies in R&D internationalisation, especially as recipient of foreign R&D (UNCTAD, 2005). The internationalisation of R&D by MNEs from such economies has also started during the 2000s and it will be discussed later in the paper, in Section 3.6.

With regard to motivations, R&D internationalisation in the 1990s started responding to the need to augment MNEs' knowledge base (Howells, 1990; Cantwell, 1991; Florida, 1997; Dunning, 1998). This required the development of links between home and host country R&D units, especially with host country's organisations (both public and private) that could enhance the knowledge base at home (Florida, 1997). This kind of FDI was therefore directed to host countries that could provide access to complementary location-specific advantages and to competences and capabilities, e.g. those embedded in specific knowledge clusters (Tallman et al., 2004), which were not available in the home country.

To define this new wave of FDI, undertaken with the purpose of improving "*existing assets or to acquire (and internalise) or create completely new technological assets through foreign-located R&D*" (Narula and Zanfei, 2004: 326-327) two different classifications have been proposed in the literature:

- Dunning and Narula (1995) with a focus on the strategic view of the MNE suggest the distinction between *strategic asset-seeking* and *asset-exploiting*;
- Kuemmerle (1996,1997), with a focus more on the MNE country of origin, suggests the categorization in *home base augmenting* (HBA) and *home base exploiting* (HBE).

The distinction between HBE and HBA strategies (or between *asset-exploiting* and *strategic asset-seeking*) represents one of the conceptual building blocks in the interpretation of R&D internationalisation. It is nevertheless important to remind that these two strategies are not mutually exclusive, but they can coexist within the same MNE and both represent relevant key motivations for undertaking R&D internationalisation.

Narula and Zanfei (2004) have also contributed to the literature on asset-seeking R&D investment suggesting that, over the past two decades, the main motivations have been:

- the increasing cost and complexity of innovation, derived by the need to enlarge the technical sources and to augment interaction between different and dispersed actors;
- the higher pace of innovative activities in a number of industries, encouraging firm to search for application which are mainly location specific;

- the growing political pressure from the host government on MNEs for accessing to the local resources as key condition to gain access to foreign markets.

During the 2000s, several studies have focused on the determinants of R&D internationalisation; among others there are: Kumar, 2001; Von Zedwitz and Gassmann, 2002; Thursby and Thursby, 2006. On the basis of the existing literature (Granstrand et al., 1992; Hakanson and Nobel, 1993; Florida, 1997; Reddy and Sigurdson, 1997), Gammeltoft (2006) identifies six main motivations for undertaking R&D internationalisation:

- market-driven, motivated by market size and proximity, and employed to support local sales, improve responsiveness in term of both speed and relevance, customise products for specific markets;
- production-driven, aimed to support local manufacturing operations and locate R&D close to manufacturing facilities;
- technology-driven (pull) for technology monitoring (especially competitor analysis) and to access local expertise, knowledge bases and technologies in foreign nations;
- innovation-driven (push) for generating new company-specific assets and oriented to capitalise on local-specific advantages through an international division of labour between R&D labs and to vary the flow of new ideas, products and processes;
- cost-driven, namely to access less expensive R&D resources;
- policy-driven for monitoring of regulations, technical standard and incentives of foreign governments, and aimed to satisfy national regulatory requirements (see also Murtha, 1991).

Empirically, Thursby and Thursby (2006) surveyed US and EU based MNEs on their plans on R&D location, in 2005 and for the three coming years. They find four main drivers for the internationalisation of R&D: output market potential, quality of R&D personnel, university collaboration and intellectual property protection. Using data from a different survey addressed to the EU based MNEs performing global R&D in 2007/2008, Cincera et al. (2010) find that access to public support and differences in high skilled labour cost also play a significant role as drivers of global R&D.

Other studies look more specifically at the different drivers of HBE and HBA strategies. Kuemmerle (1999), Patel and Vega (1999), Le Bas and Sierra (2002) have studied the trade-

off between home and host location advantages as a motivation for MNEs' R&D FDI. Their analyses show that the choice between HBE and HBA strategy varies according to the relative strengths and weaknesses of MNEs as compared to the countries of investment. All these studies find out that "*in a great majority of cases (nearly 70%) the MNEs locate their activities abroad in technological areas where they are strong at home*" (Le Bas and Sierra, 2002: 606). Hence, HBA strategies occur when both the MNEs and local firms own technological advantages, generating opportunities for interactive learning between the MNE and other local actors.

Studies by Miller (1994), Odagiri and Yasuda (1996), Florida (1997), Dalton and Serapio (1999), Castellani and Zanfei (2004) have focused on the nature of technological investment as an intra-firm process, based on firm-level survey data. These works have highlighted that, since the 1990s, HBA strategies are increasingly pursued by a wide population of MNEs, operating in different manufacturing industries and independently from the country of origin.

2.2. The location strategies of TFDI

The MNEs location strategies have received increasing attention in the literature since the 1960s with the aim of investigating why MNEs choose a location rather than another as a base for their R&D activities (Buckley and Casson, 1976; Dunning, 1977). The logic underpinning the location choice for different type of activities such as production, distribution, marketing, and R&D is not identical, and because of their strategic importance and the characteristics of the assets they require, the location strategies of R&D function present some specificity (Florida, 1997).

Traditionally, as seen above, the internationalisation theory has taken the view that R&D is conducted abroad in order to adapt products and services to local requirements (Prahalad and Doz, 1987), accordingly R&D operations are very often accompanied by manufacturing operations for supporting the local adaption of products to local conditions (Doh et al., 2005). Defever (2006) finds a strong relation between the location of production and of R&D, concluding that production and R&D are mutually attractive and that there are strong vertical linkages between these activities, generating cumulative effects as envisaged by the New Economic Geography theory (Krugman and Venables, 1995).

More recently there is evidence that an increasing number of R&D outlays have been located in foreign countries for different reasons and it is evident that the R&D function is more and more independent of production (Cantwell, 1995; Kuemmerle, 1997). MNEs are currently moving their research centres abroad not only to attain proximity to local markets, but also to ensure that they are close to centres of scientific excellence and thus able to take advantage of the local knowledge and to participate in global networks (Alcacer and Chung, 2007; OECD, 2004).

Going back to the distinction introduced in Section 2.1.3, HBE and HBA TFDI are characterised by different location strategies. In the case of HBA, the objective of the subsidiary is to provide new knowledge to the company and, thus, R&D activities are located in geographical areas rich in knowledge where the opportunities for internalising spillovers are highest; this implies strategies of proximity-seeking for co-location with technology leaders (Cantwell, 1995; Colovic, 2011). Thus, HBA investment occurs in locations that have a technological comparative advantage relative to other locations and particularly relative to the home location of MNEs (Dunning and Narula, 1995; Le Bas and Sierra, 2002; Patel and Vega, 1999). Colovic (2011) introduces a classification of location-specific factors driving MNEs R&D location. These factors are described in detail below.

Scientific and technological factors

MNEs investing in technological FDI are attracted by the existence in the host countries of centres of scientific and technological excellence (OECD, 2005; Sachwald, 2007) in which top universities and research centres are located (Alcacer and Chung, 2007; Cooke, 2001; Zucker et al., 1997). Surveys conducted on US and European MNEs show that they choose their locations considering the technological specialization and the international reputation of the host regions (Chung and Alcacer, 2002; OECD, 2005; Pisano, 1990; Thursby and Thursby, 2006).

The national innovation system (NIS) of the host country may also influence MNE location decision of R&D projects (Demirbag and Glaister, 2010). Crescenzi et al. (2012) empirically show that MNE location decision of R&D activities are driven the characteristics of regional innovation systems more than by national drivers. Knowledge infrastructures, creative environments and knowledge linkages contribute to locations' attractiveness (Chung and Alcacer, 2002).

The quality and the abundance of the scientific workforce are two further important factors influencing R&D location. MNEs usually select locations where the level of expertise of the scientific workforce is at least comparable to that of their home countries (Cooke, 2001; Doh et al., 2005; Jones and Teegan, 2003; Taggart, 1991).

Agglomeration and network effects

Contractor et al. define a knowledge cluster as "*a dense network of interlocking companies, suppliers and university and research centres whose proximity and interactions create an industry capability in innovation and responsiveness that is not easily replicable elsewhere*" (Contractor et al., 2011: 18-19). Co-location in knowledge clusters is a motivation confirmed in several studies such as Cantwell and Mudambi (2005) and Patel and Vega (1999). Referring to the location choice of R&D investment, several studies have underlined the important role played by existence of linkages between universities and firms in particular clusters (Alcacer and Chung, 2007; Audretsch and Feldman, 1996; OECD, 2005). Knowledge clusters are often characterized by high quality universities, which supply skilled labour as well as basic research. In general, the presence in a country, a region or a cluster of other research teams could be an incentive to co-locate new foreign R&D facilities, also with the aim of monitoring competitors' moves (Doh et al., 2005). Nevertheless, the proximity with other (competing) firms could also represent a disincentive to locate in that region, since MNEs may consider too high the risk of outward knowledge spillovers, therefore deciding to stay away from such risky location (Liu et al., 2010).

The opportunity to networking with other firms located in the same region is considered an important location factor because it favours the efficient transfer of knowledge and competences (Powell, 1990; Sorenson et al., 2006). Podolny and Page (1998) argue that networks bring several benefits to the member firms: learning, legitimacy, status and reputation. Due to the tacit character of knowledge, geographic proximity ensures that information is efficiently transferred not only through conventional and legitimate channels, but also through interpersonal contacts and the mobility of the workforce (Audretsch and Feldman, 1996; Head et al., 1995; Jacobs and De Man, 1996).

Market and demand factors

The size of the market and its potential growth has received consistent support in empirical research as determinant of the location of MNEs (Basile et al., 2008; Jones and Teegan, 2003; Flores and Aguilera, 2007; Taggart, 1991). These two factors are key drivers in the location of production and of the R&D activities, sometimes accompanying production abroad in order to adapt products and services to local requirements (Prahalad and Doz, 1987).

Infrastructures and the role of public incentives

Empirical analyses show that an adequate level of infrastructures in the host country positively impacts the location of MNE activities (Cheng and Kwan, 2000; Loree and Guidinger, 1995). State financing of R&D and favourable taxation policies also have a positive impact in attracting FDI (Feinberg, 2000). At the regional level, local public policies, governmental incentives and the quality of infrastructures affect the R&D location choices in a particular region (Cooke 1985, 1992; OECD, 2001).

Country risk factors

When entering a foreign market, firms aim to minimize the risks associated with operating in the new environment. Environmental uncertainties are associated to country's political, legal, cultural and economic environments, which may threaten the stability of a business operation (Gatignon and Anderson, 1988).

Political risk is an important dimension of the institutional environment since MNEs establishing activities abroad face new political systems and set of regulations. There are two main types of risks connected to political uncertainty. The first type of political risk, generally declined in recent times, regards the danger of expropriation of foreign owned assets by the host government (Murtha and Lenway, 1994). The second still actual risk is the explicit or implicit repudiation of contractual obligations by the host government (Doh et al., 2009; Lenway and Murtha, 1994).

Cost factors

This category includes all typologies of costs incurred by R&D activities in a given location, i.e. costs of land, buildings, research infrastructures, labour. Low wages may be a factor of attraction of MNE investment also in the case of TFDI (Sachwald, 2007); a relative R&D wage advantage provided by the host location may be a significant determinant of the location choice (Doh et al., 2009; Manning et al., 2008). The role of low wages as a locational

determinant has become evident especially in the studies on foreign R&D investment located in emerging economies (Kang and Lee, 2007; Lewin et al., 2009; Liu et al., 2010; Lou and Tung, 2007; Shimizutani and Todo, 2008). But the increasing importance of emerging countries as a destination of TFDI is associated not only with lower wages costs, but also with the quality of their "low-cost" skilled labour force (Lewin et al., 2009).

The costs of land, of buildings and of the physical infrastructures play an important role as location drivers when the size of the investment is very large (Colovic, 2011; Loree and Guisinger, 1995).

In general, cost factors are increasingly gaining importance as location drivers with respect to other factors such as infrastructures, human capital and high quality universities, favouring the competitiveness of emerging countries as a destination of R&D investment (Contractor et al., 2011).

Distance factors

The concept of distance has been identified as a key explanatory factor in the international business (IB) literature (see Johanson and Vahlne, 1977; Johanson and Wiedersheim-Paul, 1975; Nordstrom and Vahlne, 1994; Vahlne and Wiedersheim-Paul, 1977). The classic distance is the geographic one, and it clearly influences transportation costs. Nevertheless, this dimension also affects intangible goods and services. In particular, geographic distance raises the costs of transferring knowledge and technology (Leamer and Storper, 2001) and there is wide empirical evidence highlighting that knowledge is more effectively shared in geographic proximity (Almeida and Kogut, 1999; Jaffe et al., 1993; Marshall, 1920).

Beckermann (1956) introduces the concept of "psychic distance" to highlight the need for a broader definition of distance in IB research. The concept of psychic distance implies that companies perform best in foreign markets that are similar to their domestic market (Johanson and Wiedersheim-Paul, 1975; Nordstrom and Vahlne, 1994). In the literature, the concept of psychic distance has been measured with different proxies. Hofstede (1983) has introduced an indicator of cultural distance; Evans and Mavondo (2002) have provided a different definition on the basis of the distance between home and foreign markets determined by perceptions of both cultural and business distances.

Psychic distance has also cultural, administrative, political, and economic dimensions that can make foreign markets considerably more or less attractive, as proposed by Ghemawat (2001) with the CAGE (cultural, administrative, geographic and economic) distance framework in which there are incorporated geographic, cultural, economic and administrative dimensions. Cultural distance refers to differences in beliefs, race, social norms and languages, and it determines how individuals interact with one another and with companies and institutions (Hofstede, 1983). Administrative or political distances also include institutional distance, defined as the difference in regulatory, cognitive and normative aspects between home and host countries (Kostova, 1999). In general, this type of distance also refers to tariffs, restrictions on ODI and other administrative policies or regulations (Kostova and Roth, 2002; Kostova and Zaheer, 1999). Economic distance indicates the difference between the economic conditions of host and home countries, and, in particular, the average consumer income is considered as the key economic factor (Armine and Cavusgil, 1986).

2.3. R&D internationalisation from a subsidiary perspective

The diffusion of new technologies and organisational arrangements, and the deep changes in world competition, have transformed international firms' possibilities for searching out, creating and exploiting competitive advantages (Ghoshal and Bartlett, 1990; Gupta and Govindarajan, 1994; Hedlund, 1986). Correspondingly, nowadays managers of MNEs enjoy an unprecedented degree of flexibility in moving production between locations, and, consequently, in transferring know-how and knowledge (Kogut, 2002). As seen above, the IB literature has reflected these changes and has come to be concerned with actively seeking advantages originating in the global spread of the firm rather than just exploiting centrally created technological assets.

With the global spread of innovative activities, the earlier models of MNEs as centrally directed, hierarchical organisations have lost relevance, and much more relevance has been given to the role played by subsidiaries in both exploiting and generating knowledge and innovation. Among the pioneering authors in this sense, Ghoshal and Bartlett (1990) have conceptualised the MNE as a differentiated network of dispersed operations, with a configuration of activities and resources that may not be closely controlled through hierarchical decisions taken by headquarters. Within such a network, each unit is recognised as unique and is provided with a potentially important role in the process of advantage creation and exploitation.

Alongside these changes, a large body of research has emerged that specifically focuses on subsidiaries as the central object of study. Indeed "*the management of multinational subsidiaries has gradually emerged as a distinct field of research*" (Paterson and Brock, 2002: 139). This recognises that subsidiaries may not only grow in size and importance, but also that many of them, drawing on their unique capacities and contextual resources, can develop a stock of distinctive assets on which the rest of the corporation starts to depend (Birkinshaw and Hood, 1998). Furthermore, in developing those unique resources, subsidiaries may engage actively in attracting capacities and resources from the rest of the corporation.

Within this increasingly network-centred model of the MNE, with subsidiaries pursuing significant degrees of independent development in their corporate networks, one thread of analysis has emerged that focuses specifically on the innovative activity and its dispersal across the corporate network - see for instance Cantwell and Iammarino (2003), Cantwell and Janne (1999), Cantwell and Mudambi (2005), Kuemmerle (1999), Kumar (2001), Pearce (1999), Pearce and Papanastassiou (1999), von Zedwitz and Gassman (2002), Zander (1999).

Although becoming widely accepted in the 1990s, the seeds of this new conception of the MNE go back at least to the works of Perlmutter (1969) and Ronstadt (1977), who identified different ways in which MNE could organize their internal resources and decentralize their R&D activities. At the end of the 1990s several empirical works showed how pervasive the internationalisation of MNEs industrial R&D was (Gassman and von Zedtwitz, 1999; Niosi, 1999; Patel and Vega, 1999; Pearce, 1999), also pointing at the differences existing across subsidiaries in terms of their levels of entrepreneurship and innovative activity – with some merely carrying out processes of local product adaptation and others maintaining laboratories conducting blue-sky research (Nobel and Birkinshaw, 1998).

The factors influencing the innovative activity of subsidiaries include such things as the characteristics of their management, the degrees of autonomy they seek and develop, their network importance, and the roles they negotiate within in the MNE. The importance of these has been emphasised in particular by Birkinshaw and Hood (1998). They argue that, increasingly, rather than accepting predetermined roles, subsidiaries are expected to engage actively in developing their own capabilities - see also Manolopoulos et al. (2005).

Accordingly, they suggest that it is increasingly the case that *"the competitive environment only creates the arena in which subsidiaries compete, but it is up to the subsidiary's managers to engage with this environment (internal and external); by acting entrepreneurially, and sometimes unilaterally, to shape it in a way that allows the subsidiary to be a success"* (Birkinshaw et al., 2005: 233).

Much of the analysis in this literature has centred on an important distinction between two kinds of dispersed innovative activity: one associated with exploiting in host country contexts existing MNE assets; the other concerned with using dispersed innovative activities in subsidiaries as a means of creating new knowledge assets for the MNE. This latter case would correspond to instances of FDI where subsidiaries pursue technology-driven strategies. As we have seen in Section 2.1.3 in the language used by Kuemmerle (1999), this distinction between HBE and HBA strategies remained embedded in a model of the MNE as a centrally-driven organisation. However, others have developed terms that are more consistent with the network model of the MNE, in particular: 'asset-exploiting' and 'asset-augmenting' forms of dispersed innovative activity - e.g. Criscuolo et al. (2005), Dunning and Narula, 1995, Narula and Zanfei (2004).

The asset-exploiting/asset-augmenting distinction has been seen as a basis for classifying the strategy of the MNE entity as a whole. Even when the level of analysis explicitly shifts to the level of the subsidiary, as in the study of 'competence-creating' subsidiaries by Cantwell and Mudambi (2005), the focus of interest is on the subsidiary as a creator of competence for the MNE corporate whole.

However, one serious limitation of this literature is that almost all of it has been generated by research that has focused on the dispersal of innovative activity among subsidiaries located in the technologically advanced economies – with innovative activity usually identified exclusively in terms of R&D inputs to innovation or patented outputs from it. A much more modest strand of research has specifically addressed these issues in the context of developing countries, which include studies on the R&D activities of MNE subsidiaries in a few knowledge-rich locations primarily in India, China or Brazil (e.g. Ariffin and Figueiredo, 2006; Boehe, 2007; Hobday and Rush, 2007; Sargent and Matthews, 2006). Also relevant is the scarcity of research on the innovative behaviour of EMNEs' subsidiaries operating in

advanced countries (exceptions include: Galina and Bortoloti, 2004; Giuliani et al., 2012), which is an area of research deserving more consideration in the future.

3. Multinationals from Emerging Countries (EMNEs)

3.1. An historical perspective

ODI by emerging country firms are not a new phenomenon. The literature suggests that there were at least three different waves of ODI from emerging countries prior to the current one, which has started at the beginning of the XXI century (Dunning et al., 1998; UNCTAD, 2005).

During the first wave from the 1960s until the early 1980s, firms expanding abroad, predominantly from Latin America countries such as Argentina, Mexico and Brazil were driven mainly by market- and efficiency-seeking factors; access to natural resources and attempt to escape from bureaucratic restrictions at home were other important motives (Andreff, 2003). Investment was mainly directed towards other developing countries, especially those at shorter geographical, cultural, ethnic and institutional distance (Tolentino, 1993; Barnard, 2008). EMNEs typically entered in new markets with minority stakes or with greenfield investment. Additionally, the most active EMNEs in ODI were often state-owned companies (Rasiah and Gammeltoft, 2009).

During the second wave of ODI from emerging countries in the 1980s, strategic asset-seeking became a common motivation and investment into both developed and developing countries, outside the investor's own region, became more important. This wave was dominated by Asian MNEs, spreading first from the Republic of Korea, Taiwan, Hong Kong, Singapore and thereafter from Malaysia, Thailand, China, India and the Philippines. ODI from Latin America was less prominent during this period. Asian MNEs expanded mostly in fast growing foreign markets but they also invested abroad to access cheap labour in developing countries that were less developed than their home countries (Lall, 1983; UNCTAD 2005).

During the 1990s a third wave of ODI emerged. EMNEs were more frequently privately owned companies. With regard to the mode of entry, the acquisition of majority ownership in outward investment projects became more common, even though greenfield investment

remained the dominant entry mode (Tolentino, 2000). Investment was increasingly oriented towards developed countries with the objective of acquiring technology, brands, and marketing capabilities in advanced economies (Tolentino, 2000; Rasiah and Gammeltoft, 2009). Motivations were similar to those of the second wave, but asset-seeking projects acquired more and more importance (Andreff, 2003) for accessing technology, R&D and marketing capabilities, brands, distribution networks, and managerial and organisational competencies (Barnard, 2008; Cantwell and Barnard, 2008; Dunning and Wymbs, 1999; Kumar, 1998; Rasiah and Gammeltoft, 2009; Rugman and Jonathan, 2008).

The successive waves of ODI from EMNEs inspired a theoretical framework, which was first developed to describe how the Swedish manufacturing companies began their internationalisation process by establishing in other Nordic countries. The Uppsala model explains how firms gradually intensify their activities in foreign markets. It suggests that firms first gain experience from the domestic market before they move to foreign markets; firms start their foreign operations from culturally and/or geographically close countries and move gradually to culturally and geographically more distant countries; firms start their foreign operations by using traditional exports and gradually move to using more intensive and demanding operation modes (sales subsidiaries etc.) both at the company and target country level.

It is only at the beginning of the XXI century that ODI activities by firms from emerging economies started to grow at considerable speed. The significant increase of ODI from emerging economies has opened a lively debate about whether the extant literature on the international activities of firms – dominated by the IB framework based on the observation of MNEs from the so-called triad (i.e. US, EU and Japan) – is fully appropriate to investigate EMNEs or whether it might be necessary to elaborate different theories.

3.2. The analytical framework

Until today, there is not a widely agreed position among scholars about the applicability of extant theories to explain the current increasing presence of EMNEs. Two extreme views can be detected in the literature so far: "*one is that EMNEs are a new species of MNEs that can be understood only with new theory (Mathews, 2002); the other is that existing theory is quite adequate to explain EMNEs (Narula, 2006)*" (Ramamurti, 2012, p. 41). Whether or not a concerted position will ever come out of this debate, it is itself a debated issue. According to

Ramamurti (2008) on the basis of several EMNEs comparative case studies from a number of countries, any kind of generalisation is necessarily going to be misleading as EMNEs are not a homogeneous group, nor in terms of home countries, of industries, of their competitive advantages, of targeted markets, nor of the internationalisation paths followed. "*The evidence [does] not permit sweeping generalizations about EMNEs nor about how they are different from MNEs that came before, because the latter is also a heterogeneous group*" (Ramamurti, 2008: 1).

The real challenge is to discover which aspects of the existing theory are applicable and useful to understand strategies, motivations, advantages and entry modes of EMNEs, which aspects are not and therefore which new aspects need to be introduced in the theory to understand EMNEs behaviours.

Dunning's OLI framework

The most influential approach to study the international activities of MNEs is represented by the '*eclectic paradigm*' introduced by Dunning (1981), according to which the decision of firms to expands their activities abroad via FDI depends on three different advantages:

· *O (Ownership)* advantage, representing the ownership of firms specific resources to be exploited externally;

· *L (Location)* advantage, depending on the characteristics of the host country in terms, for instance, of natural resource endowments;

· *I (Internalisation)* advantage that depends on the opportunity to internalise firm specific advantages rather than to exploit them on the markets through arms' length transactions.

The combination of these three advantages is the so-called *OLI (Ownership-Location-Internalisation)* framework, which with its successive refinements can be considered as the mainstream theory of internationalisation of firms.

In his subsequent works, Dunning (1993) has extended his framework in order to take into account the main changes occurring in the international markets. This is the case of the rise in the alliance capitalism and of the proliferation of firm networks during the 1990s (Dunning, 1995). Thus, under the influence of the knowledge-based theories and the resource-based view (Barney, 1991), the concept of O-advantage has been widened to include the benefits accruing to firms through the interactions and the share of knowledge with other firms. Moreover, with regard to the I-advantage, Dunning has affirmed that alliances and networks

of firms could be considered as a distinctive organisational mode, complementary to the hierarchical mode proper of the internalisation view based on the transaction-cost theories. These last considerations have strengthened the importance of the strategic asset-seeking motivation (Dunning, 1998). In his later works, Dunning (2006) has also recognized the importance of institutions as an essential component in the internationalisation process of firms and has consequently incorporated some institutionally related variables into the three initial components of the eclectic paradigm (Dunning and Lundan, 2008).

Limitations of the OLI framework

Considering the recent internationalisation process of EMNEs, the OLI framework has been criticised because EMNEs are supposed to internationalise for obtaining the ownership advantages they lack (Mathews, 2002) and therefore they contradict one of the principle of the IB theory that to become a MNE a company must possess relevant ownership advantages that can offset its disadvantages in competing abroad (Dunning, 1998). According to this view, the OLI framework is considered to be a static paradigm taking into account only the pre-existing advantages to the FDI decision, leaving unexplained the opportunities for the development and the evolution of firm capabilities throughout time, thanks to the accumulation of experience in the international markets. With regard to this issue, the main criticisms have mainly been drawn on the dynamic capabilities approach (Teece et al., 1997). According to this *asset-exploration* view, firms internationalise in order to get access to the strategic resources they need being motivated by "*...learning objectives that allow these firms to overcome the initial resource hurdles arising due to technological gaps and late mover disadvantages in international markets*" (Aulakh, 2007: 237). These are what Moon and Roehl (2001) call *unconventional* FDI that is strategic investment to develop rather than to exploit the set of resources owned by firms. Thus, internationalisation becomes a strategy aimed at strengthening the firms themselves thanks to the accumulation of resources previously not available.

Mathews (2002) has proposed an alternative framework, entirely based on the observation of a group of dynamic firms originating in the Asia-Pacific region, named "Dragon Multinationals". Mathews' framework has the same name of the original OLI framework, but O stands for *Outward orientation*, L for *Linkage/leverage* and I for *Integration*. Mathews' main point is that in most of the cases EMNEs do not possess overwhelming domestic assets, which can be exploited abroad, as it has been common with developed MNEs and linkages,

such as joint ventures and other forms of collaboration into global value chains, with foreign companies (the incumbents) representing a fast way to access new resources that EMNEs lack internally. Once linked, latecomer firms use their global linkages to *leverage* their resources and particularly their cost advantages, learning about new sources of competitive advantages and how to operate internationally. Differently from the provisions of the OLI framework, the first phase of EMNEs formation is most likely to begin with asset-exploring motives rather than with asset-exploiting ones. Moreover in an early stage, this process is often interlinked with inward FDI activity at home (Li, 2007; Luo and Tung, 2007), which provides local firms with the unique chance to enter into established foreign production networks and to enhance their capabilities.

Ramamurti (2012) has recently put forward a criticism to this growing strand of literature questioning that the search for new strategic resources does not imply that EMNEs are without ownership advantages *ex ante*. In fact, EMNEs do possess ownership advantages that are different from the ones commonly considered in the IB literature such as cutting-edge technologies, global brands or extended commercial networks. Moreover, Dunning himself has more recently introduced an evolving concept of O advantages, taking into account changes occurring in the international markets and recognizing the existence of valuable O advantages in some EMNEs (Dunning et al., 2008). In the next section we present a review of the existing literature documenting different types of ownership advantages attributed to EMNEs.

3.3. EMNEs' competitive advantages

A widely accepted view in the IB literature is that a firm operating abroad faces disadvantages compared to local competitors in those countries, because of its liabilities as a foreigner, and the costs of operating in distant markets and cultures (Hymer, 1976; Zaheer, 1995). Therefore to succeed abroad, adopting a terminology introduced by Rugman (2007), such a firm must have:

- *Country-specific* advantages such as natural resource endowment, availability of cheap factors of production or some cultural factors;
- *Firm-specific* advantages (FSA) that are valuable and inimitable, such as product or process technologies, brands, marketing and commercial skills.

Besides the more extreme positions of those scholars who have argued that EMNEs embark in FDI precisely because they lack ownership advantages, in most of the literature there is a wide consensus about a significant difference between the endowments of competitive advantages of EMNEs and those of AMNEs. AMNEs are most likely to possess advantages based on ownership of key assets, such as technologies, brands and other intellectual properties, while EMNEs rely much more on advantages related to their production capabilities, networks, relationships and organisational structures (UNCTAD, 2006).

Another explanation put forward by Ramamurti (2008) is that the differences in terms of advantages between EMNEs and AMNEs may also be due to the different stages of their evolution. AMNEs have stronger advantages because they had more time to accumulate capabilities and with time EMNEs will likely augment their ownership advantages to become more like AMNEs (Lessard and Lucea, 2009).

In what follows, we present a review of some empirical contributions that have discussed different forms of competitive advantages in EMNEs.

Country-specific advantages

The typical home country advantage in EMNEs is the low cost of factors, as stressed in a report by the Boston Consulting Group (2006) on 100 MNEs from 12 emerging economies. The lower factor costs enjoyed by emerging and developing economies go far beyond labour costs, which are noticeably one of the main competitive advantage for countries with a relative abundance of labour, as already stressed by Lall (1983). Also other factors, such as capital, can be a source of competitive advantage; in fact, as emphasized by the report above, EMNEs often operate in imperfect capital markets at home and therefore can also count on easier and cheaper access to capital and in some cases on low cost access to natural resources (e.g. Brazil and Russia).

In a study on 20 Latin American MNEs, Cuervo-Cazurra (2007) finds that firms with strong location advantages are most likely to keep their production activities at home and establishing marketing subsidiaries abroad. More specifically, with location advantages the author refers to both the possession of a cost advantage in some factors of production (natural resources, labour and capital) and the possession of a "country of origin" advantage, defined as "*...the advantage that their products are perceived as truly coming from the country of*

origin" (Cuervo-Cazurra, 2007: 271). This is the case, for instance, of what Ramamurti (2008) calls 'local optimizer', i.e. a firm that pursues an internationalisation strategy based on making the most of products and production processes that are made for their home markets, especially in other developing countries sharing similar characteristics. Along the same lines, studying Indian MNEs, Kumar (2008) stresses their capabilities in 'frugal engineering', in other words their ability to manufacture low cost version of goods for mass markets as well as their skills in operating in regions that are very heterogeneous in their ethnic, linguistic and cultural characteristics.

Another relevant source of competitive advantage is represented by the characteristics of the home country market and the relative market power of firms at home. As highlighted by the Boston Consulting Group (2006), some of the emerging economies' markets are among the largest and the fastest growing worldwide. This provides domestic firms with the opportunity to build competitive advantages since the beginning as well as to face international competitors in their home markets Andreff (2003) in his analysis on ODIs from transition economies finds that the monopolistic or oligopolistic position of firms at home acts as a 'springboard' to the investment abroad, particularly towards countries at similar stages of development.[1] As discussed by Andreff (2003) with reference to EMNEs from Russia, the reason is the accumulation of financial resources that allow financing new investment projects abroad. Moreover as shown in Barnard (2008), EMNEs have concentrated their Merger and Acquisition (M&A) activities in mature traditional industries, such as cement, steel, chemicals, beverages and processed foods, in which they have accumulated capabilities along time and in which – compared to firms from developed countries – they enjoy competitive advantages such as capital-intensive production, scale economies and assembly-based mass production. In these industries, there is a large concentration of ODI from EMNEs going into developed countries to obtain advanced technologies and build scale through horizontal expansion.

A particular category of home country advantages widely stressed in literature is acquired by formally or informally connecting with domestic institutions (Child and Rodrigues, 2005; Goldstein and Pananond, 2007; Peng, 2002; Peng et al., 2008; Tan and Meyer, 2007). Some authors focus on the role of central Governments in shaping the process of internationalisation

[1] Similar considerations can be found in Li (2007) on China, Klein and Wocke (2007) on South Africa and Pananond (2007) on Thailand.

of domestic firms (Tan and Meyer, 2007; Ramamurti, 2008). In the case of China, the role played by the central Government is obviously stressed in literature. In fact, many Chinese MNEs are state-owned enterprises and have been supported, together with some selected private firms, through several instruments such as preferential loans, selection of international partners for joint ventures to facilitate technology transfer at home and favourable tax regimes (Child and Rodrigues, 2005; Buckley et al., 2007; Athreye and Kapur, 2009). Yiu et al. (2007) empirically assess the rise in international venture activities of a sample of Chinese firms including in their analysis institutional variables such as the linkages with domestic institutions (i.e. central and local governments, financial institutions, trade associations, research centres) as well as the participation in business networks. These variables play a statistically significant role in the internationalisation process. On the basis of their empirical findings, they conclude that the presence of institutional network ties represents, for firms belonging to countries that are at a preliminary development stage, an outstanding ownership advantage to set up their international activities. The support from the central Government and the strong institutional ties are found as significant explanations of the recent rise of Chinese MNEs on the international scene also in other empirical studies (Buckley et al., 2007; Li, 2007; Liu and Tian, 2008). In particular, Wang et al. (2012) find that Chinese ODI are influenced by government support as well as by the characteristics of the industrial sectors of the home country (e.g. degree of competition, foreign presence, level of industrial development).

State support and formal and informal institutional network ties represent a competitive resource for the international activities of domestic companies in a number of other countries, as highlighted by Goldstein and Pananond (2007) for Singapore and Ariff and Lopez (2008) for Malaysia. On the Indian pharmaceutical sector, Athreye and Godley (2009), Chittoor and Ray (2007) and Pradhan (2008) all stressed the relevant role played by the Indian Government in promoting the establishment of many MNEs through investment efforts and regulatory activities. Testing several hypotheses on the determinants of foreign acquisitions by Indian MNEs, Buckley et al. (2012) highlight the important role of home-host country linkages including both trade linkage (proxied by the volume of trade with partner countries) and non-trade linkages (proxied by membership of international forums such as the G20, G15, and the Commonwealth). They find that India's North–South linkages within the G20 and the

Commonwealth are significant in explaining foreign acquisitions by Indian MNEs but South–South linkages are instead insignificant.[2]

On Thailand, Pananond (2007) found that two major MNEs strongly benefited from institutional ties and network relations with domestic and international financial institutions, home and host country governments, foreign technological partners and social relations based on ethnic ties (particularly with China) at least until the financial crisis in 1997. Afterwards, as the two MNEs have moved up in their value chains, there has been a shift towards more transparent and formal relations with institutions and a focus on more advanced firms' specific advantages.

This final case allows drawing two important considerations. First, the importance of some home country advantages may decline as EMNEs evolve acquiring more competitive advantages at the firm level. This implies that if some home country competitive advantages such as the availability of low cost factors may be unsustainable in the long run, they can be substituted by the building up of new advantages. Second, for the exploitation of some home country advantages as having good relations with the local government, firms need also to possess some firm specific advantages. In other words, all firms located in a country are not all equally able to exploit home country advantages (Ramamurti, 2008).

Firm-specific advantages

One FSA shared by many EMNEs is the capacity to develop products suited to the special needs of customers in developing countries: low cost, easy to maintain, multi-purpose (i.e. the famous washing machine by Haier also used to wash vegetables), adaptable to poor quality infrastructures (Ramamurti, 2008). Similarly, EMNEs are also superior to advanced country MNEs in their capacity to adapt technologies and processes to contexts characterized by large pool of low cost labour, scarce capital and limited availability of inputs. These advantages do represent an important basis for internationalising into other low-income countries.

[2] This result contrasts with the pattern exhibited by Indian ODI in the 1960s, when India implemented an import-substituting development strategy that mainly relied on South–South cooperation (Pradhan, 2005; Ramamurti and Singh, 2008) and resource-seeking FDI.

Moreover, latecomer companies from emerging countries have often started their operations with a global perspective since the beginning, catching up fast on technologies and best practice organisational models. Along these lines, Mathews (2006) has pointed out that the same condition of being a latecomer in the international markets may represent an advantage in itself for firms engaging in the internationalisation process. This has to do, for instance, with the opportunity to access advanced technologies and innovations (through imitation) and, thus, to catch-up as fast as possible. This implies that latecomer firms might possess at least some advantages such as the early awareness of the need to plan their activities, having in mind global competitive networks, and to leverage the resources made available through these linkages (Aykut and Goldstein, 2006; OECD, 2007). Ramamurti (2008) argues that the catch-up has been faster in medium technology sectors that are declining in developed countries and growing in developing countries.

Other important FSAs are related to the position of EMNEs in the global and regional networks. More specifically, EMNEs have built up advantages from the adoption of innovative organisational forms as well as in firms' strategies aimed at leveraging resources from the strengths of other companies by means of international connections (Mathews, 2006). For example, the group of the so-called "Dragon Multinationals" analysed by Mathews (2002 and 2006) has been able to internationalise fast and successfully thanks to the adoption of superior organisational forms, proper of companies from more advanced countries. Bonaglia et al. (2007) describe in details some of the organisational innovations adopted by three EMNEs in the white goods sector. They notice that, rather than adopting an organic pattern of development, these firms have focused their efforts on investing in strategic functions such as top-level human resources and R&D. This in order to be able to leverage new competitive advantages on the strategic partnerships they were able to set up with global players either in their home markets and abroad. Similar conclusions come from the study of Duysters et al. (2009) on two among the most successful EMNEs: Haier and Tata. The authors underline that the possession of dynamic capabilities at the entrepreneurship level, innovative management practices and the ability to enter into new markets and sectors via strategic partnerships and acquisitions have allowed both companies to become very large and successful.

Some studies have pointed out that the participation in networks is a crucial means to complement EMNEs existing resources (Chen and Chen, 1998; Elango and Pattnaik, 2007;

Makino et al., 2002). In particular, the experience of the Asian tigers shows that through their participation in networks, firms have improved their capabilities and learnt how to enter into international markets (OECD, 2007). In a study on a sample of almost 800 Indian firms, Elango and Pattnaik (2007) conclude that firms more easily create their capabilities through learning within established networks rather than building them following a sequential process as it was envisaged by the Uppsala model of internationalisation described in 3.1 (Johanson and Valhne, 1977).

The participation in global production networks and in global value chains is indicated as a unique way adopted by some EMNEs to accumulate their own advantages (Chen and Chen, 1998; Hitt et al., 2000; Makino et al., 2002). As explained by Luo and Tung (2007), "*…emerging countries economy enterprises have tremendously benefited from inward FDI at home by cooperating (via original equipment manufacturing (OEM) and joint venture in particular) with global players who have transferred technological and organisational skills, allowing emerging market enterprises to undertake outward internationalisation later in some unconventional way*" (481). Mathews (2002) has reinforced this view, suggesting that emerging country firms are often able to enter into production networks thanks to their organisational advantages, being able to complement the incumbents' strategies by providing specific services and products. On the basis of their capabilities, then, firms are able to leverage the resources needed to begin their active internationalisation process. A significant example of this is that of Asian subcontractors in the IT and the electronics sectors, which "*...have prospered as contract manufacturers, most visibly in the fields of information technology and consumer electronics. In the process, through their own learning and innovation efforts, many of them are becoming original design manufacturers (ODMs) and original brand manufacturers (OBMs), in a pattern of development and internationalisation*" (UNIDO, 2006: 18).

To conclude on EMNEs' ownership advantages, we share Ramamurti's (2012) view that we do need more empirical research into what makes an ownership advantage valuable or special, 'how much' O advantages are needed to offset the liabilities of foreignness and how the country context shapes the O advantage of EMNEs.

3.4. EMNEs' motivations

It is generally recognized that the internationalisation process of firms (especially via FDI) can be affected by a series of domestic push factors such as internal policies, inadequateness of domestic market and taught competition at home and external pull factors such as market attractiveness and access to strategic resources (Dunning, 1993). In this regard, comparing the case of EMNEs to that of incumbents from the triad, Svetlicic argues: "…*driving forces behind internationalisation seem the same, although relative weight of push and pull factors as sequencing of the process is changing*" (2004: 1). A number of studies have investigated the relative relevance of push and pull factors and there is a general agreement that domestic push factors are for different reasons key to explain FDI from developing countries (Aykut and Ratha, 2004; UNCTAD, 2006). In large countries such as China, ODI have been pushed in many ways by the government while in smaller countries the main push factor is represented by the small size of the domestic market. For instance, Lu et al. (2011), using data from a survey on Chinese firms conducted in 2008, find that supportive government policies are important motivators for both strategic asset-seeking and market-seeking ODI. Also Holtbruegge and Kreppel (2012), by conducting case studies on eight MNEs from BRIC countries, highlight the role played in Russia and China by the strong government support in the decision to invest abroad.

The degree and nature of competition at home and abroad do also influence the decision to invest abroad. As firstly elaborated by Hymer (1976) and recently recalled by Athreye and Kapur (2009), firms often decide to venture abroad to increase their competitiveness vis-à-vis domestic rivals, such as in the case of Indian business groups. Moreover, the degree and nature of competition abroad is also a crucial determinant of the decision on where and how to internationalise. For example, in sectors where both developed and developing country MNEs are active, such as chemicals and pharmaceuticals, oil and petroleum, and telecommunications, some EMNEs have decided to acquire or enter into joint ventures with existing firms from industrialized countries to be able to compete with established MNEs (Fortanier and van Tulder, 2009).

Dunning (1993) has introduced a widely utilised typology of motivations drawing ODI, based on four categories:

· *market-seeking* investment aimed at penetrating into third markets;

· *efficiency-seeking* investment pursuing an efficient specialization of firms;

· *resource-seeking* investment aimed at searching for unique resources specific to foreign locations (e.g. natural resources);
· *strategic asset-seeking* investment aimed at augmenting the set of proprietary resources of firms.

The 2006 World Investment Report (UNCTAD, 2006) has identified resource-seeking, market-seeking and efficiency-seeking factors as the main reasons for ODI by EMNEs towards other developing countries. Conversely, strategic asset-seeking motivations are dominant for ODI from developing countries to developed countries. These motivations have been widely analysed in many studies in different countries. On Taiwanese firms, Chen and Chen (1998) and Makino et al. (2002) have highlighted the role played by ODI for establishing linkages with foreign firms and tapping into strategic resources, which are key for their successive strategies of international expansion. In a comparative study on Mexico, Poland and Romania, Hitt et al. (2000) also conclude that firms from emerging countries search for technical capabilities and managerial know-how when signing strategic alliances with firms from developed countries. Similarly on China, several recent studies have emphasized the importance of the strategic asset-seeking motivation together with the market-seeking one (Buckley at al., 2007; Cross and Voss, 2007; Liu and Tian, 2008).

Focusing on Indian MNEs, Pradhan (2008) stresses the evolution of motivations: mainly market-seeking and directed to other developing countries in the pre-liberalization phase, while more recently resource-seeking and increasingly aimed at the acquisition of strategic assets, such as technologies, marketing knowledge and brands in developed countries. This finding is also in line with Pradhan's (2007) who argues that many Indian software companies with ownership advantages have recently moved abroad to acquire further knowledge as well as skills and technology that were not available at home.
Lu et al. (2011) investigate the motivations for ODI by Chinese private firms using survey data. Starting from the premise that no single theory can explain the pattern of ODI by EMNEs, they empirically test hypotheses derived from three different theoretical frameworks, namely the resource-based, the industry-based and the institutional-based views. They find that supportive government policies are important motivators for both strategic asset-seeking and market-seeking ODI. Firms' technology-based competitive advantages and a high R&D intensity motivate strategic asset-seeking ODI, whereas firm's export experience and a high level of domestic industry competition favour market-seeking ODI. Therefore, Lu et al.

(2011) conclude that the traditional FDI theory is still relevant to latecomer Chinese MNEs: technology-based competitive advantages derived from firms' internal resources and capabilities play a significant role in the ODI strategy of Chinese firms. Moreover, the motives for ODI differ among industries according to their R&D intensity: firms in technology-intensive industries are more likely to conduct strategic asset-seeking FDI in order to obtain advanced technology, acquire internationally recognized brands, and attract human capital. The reason behind this motive is that ODI may allow latecomers, that are not initially competitive in the world market, to close the gap with leading companies through acquiring strategic assets and resources. According to the same study, gaining market access and surpassing trade barriers are important motivations for ODI among firms in export-intensive sectors.

To conclude on the strategic asset-seeking motivation, Ramamurti (2012) adds an important consideration saying that EMNEs may go abroad to acquire technologies, skills and brands primarily for exploitation in their home markets and not abroad. This is an important implication that may be interesting to be further investigated empirically.

Taking into account ODI aimed at acquiring natural resources, many studies have underlined the importance of the resource-seeking motivation for EMNEs investing abroad (among others: Makino et al., 2002; Cuervo-Cazurra, 2007; Ariff and Lopez, 2008). As regards China, several studies have econometrically shown that natural resource abundance in the host country is an important motivation for FDI (Buckley et al., 2007; Cheng and Ma, 2010; Cheung and Qian, 2008). Kolstad and Wiig (2010) have confirmed such result only for non-OECD host countries. With a focus on the steel industry, Kumar and Chadha (2009) find that much of the ODI of the main Chinese and Indian MNEs is motivated by the need to secure the supply of raw materials, necessary to produce in the home market. Similarly, Goldstein (2008) documents how much of the FDI activities of some divisions of the Indian conglomerate Tata (such as Tata Chemicals and Tata Power) have been motivated by the access to key natural resources for their productive process.

Finally, with regard to the efficiency-seeking motivation, there are a few empirical analyses on countries such as Malaysia (Ariff and Lopez, 2008), Taiwan (Sim and Pandian, 2007) and Thailand (Pananond, 2007) explaining ODI as motivated by the search for lower production costs due to the increasing cost of factors in the home countries.

3.5. Modalities of EMNEs internationalisation

This section describes how EMNEs entry in foreign markets, considering two different dimensions: the entry mode (greenfield vs. acquisition) and the ownership structure (partial vs. fully owned companies).

The emergence and growth of asset-seeking and competence-creating EMNEs activities are increasingly driving firms to acquire target firms abroad (Chung and Alcacer, 2002; Wesson, 2004). Due to the growing importance of strategic resources as the fundamental rationale for investment, foreign entry by acquisition of local companies has increasingly become the primary fashion by which foreign MNEs access complementary resources, information and knowledge otherwise hard to obtain (Anand and Delios, 1997; Meyer et al., 2009a; Meyer et al., 2009b; Phene et al., 2012). Asian firms, in particular, have established their competitive advantage typically via acquisition of established firms in developed countries (Makino et al., 2002; Mathews, 2002). They are interested in seeking superior resources and skills in advanced host countries that are not available at home (Makino et al., 2002) and their interest for acquisitions has grown thanks to the simultaneous willingness of companies in advanced countries to sell or share their technology, know-how or brands due to their diffused financial difficulties or their restructuring needs (Deng, 2009). The acquired strategic assets via FDI can provide the acquiring firm with reputation and allow it to obtain and control resources, and to gain access to local markets (Chung and Alcacer, 2002). In addition, the acquisitions allow firms to rapidly close their resource gaps, facilitating the development of new skills and competences and providing tools for organisational and technological learning (Dierickx and Cool, 1989; Vermeulen and Barkema, 2001). Past M&A experience also helps in shaping EMNEs expansion strategy: analysing a sample of 808 acquisitions undertaken by firms from Brazil, Russia, India and China in Europe, Japan, Canada and the US between 1999 and 2008, Rabbiosi et al. (2012) find that: "*international acquisition experience positively affects the likelihood of exploitative (related) acquisitions by EMNCs, while home country endowments favour explorative moves*" (207).

This early propensity to use high commitment investment modes, such as M&A, has been stressed as one of the peculiarities of EMNEs (Ramamurti, 2012). According to the mainstream IB theory, for the purpose of seeking strategic resources and capabilities, companies will choose either fully owned or majority owned acquisitions. Indeed, only with a

dominant position can companies fully reflect their economic rationale, strategic ability, and resource commitment during the course of entry and operations (Caves, 1996). These acquisitions seem to be driven by the need of rapid entry into foreign nations, the underlying motive being the access to complementary capabilities embedded in the acquired firms. MNEs that lack the complementary capabilities owned by indigenous firms may, for instance, have to procure reputable brands or distribution networks from local firms (Chen and Hennart, 2002).

Within this context, the degree of ownership and control that foreign MNEs maintain on the local target firm becomes a crucial dimension (Brown et al., 2003; Shrader, 2001). Transaction cost economics is among the theories most widely used to study foreign subsidiary ownership policy (Makino and Neupert, 2000; Yiu and Makino, 2002; Zhao et al., 2004). It argues that the choice between partial and full ownership depends on the net benefits of sharing equity relative to retaining full ownership. Hennart (1991) argues that the investing firms tend to choose joint ownership with a local partner over full ownership when they need continuous access to local firms' resources of, for example, knowledge and know-how, which are subject to high market transaction costs (Makino and Neupert, 2000). Partial acquisitions allow residual ownership by some important existing shareholders or managers (e.g. through stock-options), who can continue to provide much needed resources and know-how to the ongoing concern. In particular, local knowledge is highly embodied in local human resources (Chen et al., 2012), the management practices of which are, by and large, shaped by strong local forces.

As a matter of fact, the targeted knowledge is largely tacit in nature and hence difficult to assess and access. It is challenging to identify and collect promising sources of knowledge, put them into an adequate context, if linguistic, cultural and social barriers cause misinterpretations, mistakes and delays. These obstacles are especially pronounced when foreign firms search for valuable sources of innovation abroad (Al-Laham and Amburgey, 2005). Full or majority ownership entry is generally preferred over joint or minority ownership by parent firms that suffer high external uncertainty due, for instance, to high cultural and institutional distance (Zhao et al., 2004). Country differences are viewed as a barrier to obtaining local knowledge, making it difficult for the MNE to manage its foreign subsidiaries on its own or to enlist the help of a local partner efficiently (Xu and Shenkar, 2002; Hennart and Larimo, 1998).

On a sample of acquisitions in advanced economies undertaken by firms from Brazil, China, India and Russia, Rabbiosi et al. (2012) show that EMNEs are more willing to engage in so-called "related acquisitions", characterized by relatively short technological distance between the acquiring and the target firm, which also suggests an interesting explanation about why EMNEs tend not to establish alliances with the strongest partners in an industry. Related acquisitions give the acquirer more control over the returns from the acquired strategic assets (Athreye and Godley, 2009). The hypothesis that international acquisitions among firms are more likely to occur when they are not too distant from each other in terms of capabilities is not new to the literature (Johanson and Vahlne, 1977; Barkema and Vermeulen, 1998; Luo and Peng, 1999; Thomas et al., 2007). This suggests that, at least on this aspect, EMNEs should not be considered so different from advanced country MNEs. Interestingly, the hypothesis that distance affects firms' decision about international acquisitions has been recently confirmed with reference to European firms entering into alliances with firms in China and India (Belderbos et al., 2011). In this case, the findings suggest that European firms extend their alliance portfolio from developed to emerging economies building on their prior international alliances experience. In particular, they are more likely to enter into international alliances with Chinese and Indian firms if they had prior alliance experience with Japanese firms. This suggests that the distance effects could work also in terms of cultural distance and not just in terms of technological distance.

Taking into account the effect of institutional distance on the entry mode, there is not a unanimous consensus. On the one hand, for a parent company the different institutional environment surrounding its subsidiaries represents an impediment to the transfer of intra-organisational practices (Kostova and Zaheer, 1999) and this encourages full ownership and greater control in order to raise the power of the parent as perceived by its subsidiaries (Xu and Shenkar, 2002). On the other hand, the organisational legitimacy[3] perspective argues that in a very unfamiliar environment, MNEs from more dissimilar institutional environments tend to share ownership with a local partner in exchange for adaptation to the external environment (Zaheer, 1995).

[3] Organisation legitimacy can be defined as the adaptability of an organisation in a specific environment where it operates.

Entry modes can also be evaluated in terms of the impact they generate, both at the parent company and at the subsidiary levels. Kling and Weitzel (2012) find that Chinese cross-border mergers create shareholder value, but no more than domestic expansions. At the level of the host country, Chari et al. (2011) analyse the performance of 214 U.S. firms acquired by EMNEs, examining stock market and accounting-based indicators. Their results suggest that EMNEs tend to acquire U.S. firms with relatively high levels of sales, employment and total assets. Furthermore, they find a "restructuring effect" in the post-acquisition performance of U.S. target firms, with a decline of sales and employment and a rise in profits, "*suggesting more streamlined but efficient operations following restructuring by the emerging-market acquirer*" (Chari et al., 2011: 4).

3.6. TFDI by EMNEs

As reviewed in Sections 3.3 and 3.4, the literature on international expansion of EMNEs has extensively dealt with the issue of whether these firms engage in FDI in order to exploit existing assets or to acquire new technological capabilities. The results so far seem to suggest that firms from emerging economies very often engage in FDI precisely to acquire technology and other strategic competences they lack. Hence, a specific type of strategic asset-seeking ODI by EMNEs – the technology-driven FDI (TFDI) – is coming to the fore as a relevant topic of research. As a matter of fact, there is not an official nor an agreed-upon definition of what should be properly considered as TFDI and so far the literature has included in such category all FDI aimed at accessing advanced knowledge and capabilities, mainly available in developed countries, with the aim of improving the technological and innovative capabilities of the parent firms (Makino et al., 2002; Luo and Tung, 2007; Mathews and Zander, 2007; Rui and Yip, 2008; Deng, 2009; Chen et al., 2012).

The extant literature with a specific focus on TFDI by EMNEs is very recent and still limited. The main issues addressed are the following ones: (1) the reasons why EMNEs engage in such particular types of FDI; (2) the location factors attracting TFDI by EMNEs and whether they are attracted by countries at the highest technological level or instead by countries which are technologically not too far away from investing countries; (3) the characteristics of FDI in R&D; (4) the international organisation of R&D by EMNEs and finally (5) the impact of the internalisation strategy on the R&D intensity of parent firms. In what follows, we give an account of the available contributions in these different areas.

(1) A number of studies have explored the reasons explaining the existence of TFDI by EMNEs aimed at acquiring rather than exploiting technological capabilities. The literature provides three explanations for this:

- EMNEs have traditionally grown as latecomers in technological terms, by relying on mature technologies licensed by the technological leaders from advanced economies. More recently, firms from emerging countries have tried to reduce their reliance on foreign technologies and to develop ‘‘indigenous knowledge’’ (Aubert, 2005, p. 13) and ‘‘indigenous innovation’’ (Fu et al., 2011). In order to be able to develop their own technology, they need to learn how to build knowledge and innovation in-house and therefore they have started acquiring technologically advanced firms in financial distress or establishing their own foreign subsidiaries in advanced economies to benefit from knowledge spillovers and to access to advanced human capital;
- Governments in emerging countries have often encouraged and rewarded indigenous technological efforts, providing favourable policies such as tax incentives and financial assistance to motivate EMNEs to pursue technological development abroad and in their home market (Chaminade and Vang, 2008; Peng, 2010);
- Most EMNEs still lack the capability to coordinate global R&D activities and therefore they prefer to concentrate on technological development at home, also through knowledge acquired via FDI (Luo and Tung, 2007; Wei, 2010).

On the motivations of TFDI, there are also several studies undertaking empirical analyses based on large samples of firms and in general finding that EMNEs invest in developed countries mainly for “knowledge-seeking” purposes (Bertoni et al., 2008; Buckley et al., 2007). This result has also been explored by research based on case studies on well-known companies such as Haier from China and Tata from India, which have invested abroad for acquiring technology (Duysters et al., 2009).

(2) As regards the most favoured locations for TFDI by EMNEs, a recent study by Wang et al. (2012) has challenged the idea that these firms target countries at the highest level of technological development. As EMNEs are more competitive in low-to-medium tech segments compared to developed country MNEs, they are not attracted to countries with the highest level of technological development but they rather prefer to locate in countries specialized in middle-end technologies and medium-tech manufacturers, being not too distant from their own technological capabilities.

(3) With reference to TFDI in R&D or innovation-related activities, there are a few studies available: a study on a very small sample of firms by Chen and Tong (2003) and a survey on leading Chinese firms, some of them having overseas R&D units by von Zedtwitz (2005). More recently, Di Minin et al. (2012) have focused on Chinese R&D investment in Europe through several in-depth case studies, showing that the technological activities undertaken by Chinese overseas R&D units do not follow the typical pattern – initially technology exploitation and then technology exploration – but instead they are aimed at exploration first and exploitation afterwards. Trying to generalize on the results of the extant literature, Kedia et al. (2012) have provided a conceptual framework based on different functional types of knowledge with the aim to propose testable propositions for predicting EMNEs TFDI decisions, based on the type of knowledge sought. Knowledge is categorised into four broad functional areas: Technology, R&D, Consumer and Market Expertise, and Management and Operational Expertise. According to them, the type of knowledge influences the location choice (as in Kumar, 1998; Makino et al., 2002) and the entry mode (as in Martin and Salomon, 2003).

(4) The organisational configurations of international R&D is the focus of Zhou (2011), who studies the organisational management of overseas R&D by Chinese MNEs. The study is based on the framework proposed by von Zedtwitz (2004), who introduces three alternative patterns: ethnocentric centralized R&D, geocentric centralized R&D and polycentric decentralized structure.[4] The results suggest that the organisational structure of R&D by Chinese MNEs depends on their level of internationalisation: the higher the level of internationalisation, the more complex the organisational structure of R&D. Currently, the most diffused organisational structure of R&D by Chinese MNEs takes the form of the so called ethnocentric centralized R&D. This is considered as an elementary stage of overseas R&D structure in which all R&D activities are concentrated in the home country and foreign R&D activities are only aimed at technological scanning. Moreover, the majority of Chinese MNEs undertake overseas R&D activities by cooperating with local firms, through for instance the establishment of joint laboratories. Only a small group of MNEs with solid

[4] In the ethnocentric centralised R&D structure, the peripheral units only have the responsibility for scanning new technological knowledge in the host country. The geocentric R&D organisational model is characterized by a R&D headquarter maintaining strong control on R&D resources, with innovative decision always centralized, but overseas R&D centres also have the responsibilities to transfer technology from the host country and to develop new products for the host markets. Finally, a decentralized federation of R&D sites with no supervising corporate R&D centre characterizes the polycentric decentralized structure.

international experience manage their overseas R&D centres in more complex ways, such as through geocentric centralized or polycentric decentralized structures.

Liu et al. (2010) have explored the driving forces and the organisational configurations of international R&D by Huawei and ZTE, two technology-intensive Chinese MNEs in the telecommunications equipment industry. In particular, they have investigated the international R&D organisational configurations in these two Chinese MNEs, distinguishing between tactical R&D (usually for product adaptation and technical support to foreign markets) and strategic R&D (for technology acquisition). Their results suggest that the establishment of HBA strategic R&D sites is the predominant organisational configuration in these MNEs in developed and also in other developing countries.

(5) Another area of research concerns the impact of the internalisation strategy on the EMNE R&D intensity. Kumar and Aggarwal (2005) have investigated a large panel dataset of Indian enterprises during the 1990s, including both MNEs and local firms, and found that, starting with a relatively low R&D intensity compared to local firms, MNE affiliates increased their R&D spending rapidly, while the R&D intensity of local firms has declined over the same period. Furthermore, in a study on 493 EMNEs from emerging countries over the years from 2000 to 2008, it has been recently found that those EMNEs with foreign subsidiaries in technologically advanced markets exhibit stronger technological capabilities at home (Chen et al., 2012). An important consideration can be drawn from these studies because in both cases the FDI having an impact on the technological intensity of parent firms are not strictly defined as TFDI. This suggests that FDI in general might produce knowledge and technological spillovers from the host to the parent company. This result needs to be taken into account when defining TFDI.

4. Concluding remarks and research questions

The internationalisation of R&D is not a new phenomenon. In this survey, we have shown that MNEs have started projects of R&D internationalisation since the 1930s. Until the 1980s, the main reason was to exploit firm-specific capabilities adapting products and processes to foreign contexts. This is what Dunning and Narula (1995) have defined as “strategic asset-exploiting” R&D internationalisation to contrast with “strategic asset-seeking”, which became

an increasingly common behaviour among MNEs since the 1990s. During the 2000s, the upsurge of FDI from EMNEs into advanced countries has added a new South-North perspective to this phenomenon. In what follows, we suggest a number of issues and related research questions arisen from the present literature survey and that seems of interest for future research.

A first issue is related with the different entry modes adopted for technology-seeking investment. The existing literature shows that besides greenfield investment, EMNEs have rapidly adopted high commitment investment modes such as acquisitions and this has been stressed as one of the main peculiarities of EMNEs. Taking advantage of a new database including different modes of entry, some interesting questions which can be addressed are: Is TFDI entry mode influenced by host and home country-level factors, such as institutional, cultural and economic distance between them, technological distance and technological complementarity? Is the entry mode affected by firm-level characteristics such as the sector of specialization, the past internationalisation strategy, the firm existing network of relations and the innovative profile of the investing EMNE? These are questions tackled in the existing literature for FDI in general. Addressing them in the case of TFDI from EMNEs can contribute to investigate the key characteristics of technology based FDI.

A second issue is the impact of TFDI. The general question that is worth investigating is whether TFDI contribute to enhance or downplay EU firms' R&D and innovation capacity. Asset-seeking TFDI can have very different impact on the host countries: they can be drawn by predatory objectives or they can contribute to the host country's development process through significant innovative efforts.

In relation with the mode of entry, the common perception is that acquisitions do contribute less to host economies than greenfield investment as they do not automatically add to the existing capacity and they are more often associated with predatory goals. On this point it could be worth investigating if different forms of TFDI are more favourable for the host country than others. A question could be: how connected with other firms (in the same region and/or in the same country) are EMNE subsidiaries depending on the different mode of entry?

Other questions also related with the impact of TFDI on the host country investigate EMNE strategies and the characteristics of their subsidiaries. Interesting questions to be addressed

are: Why some EMNE's subsidiaries contribute to local development and innovation capability while others adopt a predatory behavior? Are these differences due to intra-firm (e.g. corporate culture; innovative firm profile) conditions or to the context conditions in the host country (e.g. existence of appropriate local partners for the formation of ties)? Which factors (e.g. management characteristics, degrees of autonomy, characteristics of their relation network, headquarter strategy) do influence the innovative activity of the subsidiary?

A third interesting issue to investigate is the impact of TFDI on the parent firms. Here, the open issue is how and if TFDI have a positive impact on the technological intensity of parent firms? Furthermore, it is possible to analyze if TFDI favour an increase in the globalization of EMNE technological activity for instance through an increase of technological cooperation projects with different type of actors in the host countries which can for instance induce an increase in co-patenting activities. Finally, EMNE's technological activity can also be associated with different characteristics of TFDI (e.g. entry mode; industry proximity, subsidiary 'characteristics) and different characteristics of the host country contexts (e.g. creation of local knowledge networks).

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