

Technology-Driven FDI by Emerging Multinationals in Europe

Project Report

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Executive Summary

In the last decade, foreign direct investment (FDI) from developing countries has grown dramatically: in 2013, the outflows of FDI from developing and transition economies reached a record level of 39% of the world total at US\$460 billion [1]. This shift in the origin of FDI has occurred in parallel with a rise in the proportion of technology-driven FDI (TFDI), both from developed and developing countries. TFDI refers to those investments made abroad with the specific objective of acquiring technological capabilities.

This report summarizes the results of three years of research (2011–2014) with the purpose of understanding the dynamics and consequences of FDI and TFDI by emerging multinationals (EMNEs) in Europe, particularly investments from Brazil, India and China (BIC) in the automotive, clean technology and information and communications technology (ICT) sectors. The results presented in this report are based on a unique database built in the project (EMENDATA), which contains all the investment deals by emerging market multinationals from low- and middle-income countries in the EU-27 between 2003 and 2011. The analysis of the database has been complemented with in-depth interviews in firms with TFDI in Europe, as well as interviews with policy makers. The main findings presented in the report are summarized as follows:

On the characteristics of the investments

1. China and India are the most important investors from emerging economies in Europe. Approximately 29% of all inward investments from emerging countries into Europe come from India and around 21% from China. They are closely followed by Russia.
2. The UK receives most FDI from emerging countries, followed by Germany and at some distance by France and Spain. With regard to target sectors, services are at the top of the list (particularly financial services), while the pharmaceutical and metal sectors are the top manufacturing sectors receiving FDI in Europe.
3. High-income countries attract more TFDI, while low and middle-income countries mainly attract investments in relation to market- or resource-seeking motivations.
4. With regard to TFDI from emerging market MNEs (EMNEs), distribution within Europe reflects existing technological hubs – agglomeration plays a role in the choice of the location of investment by EMNEs, e.g. investments in the automotive sector go to Germany, renewable energies (wind) to Denmark and ICT investments are widely spread.
5. Most investment in Europe by emerging multinationals takes the form of green field investments, rather than mergers and acquisitions (M&A). Green

field investments represent 80% of Chinese deals and more than 50% of those for Brazil and India.

6. With regard to acquisitions, Chinese and Indian MNEs prefer less control of an acquired company if their objective is acquiring technological competences rather than a customer base or an established brand name. Indian firms go as far as maintaining the acquired firm as a separate entity to preserve the brand value and penetrate European markets.

On the determinants of the investments

7. Firms with high levels of intangible assets, including research and development (R&D), high profitability and open innovation models, are more likely to conduct TFDI.

On the impact of the investments

8. There is high diversity in the impact of the TFDI from Chinese and Indian firms in Europe and no generalized predatory behaviour. On the contrary, in several cases the investment has a positive impact on the European subsidiaries.
9. The positive impact in terms of increasing technological capabilities, augmenting the patent portfolio and its quality, or developing local innovation networks in Europe may take several years to realize. A medium- to long-term strategy to maintain operations in Europe is needed.

On the influence of regulations and other institutions on the investments

10. The widely accepted prescription in the EU regarding inflows of FDI is that regardless of their sources and modes of entry, they are to be welcomed. However there are emergent expectations which call for restrictions of FDI and TFDI in cases in which security, environmental and social objectives are compromised.
11. The firms interviewed stated that they encountered no hindrances at the level of EU investment regulations when making an investment. However, other labour market regulations and migration restrictions are often mentioned as cornerstones for the sound functioning of the investments in the short and long term.
12. A number of future challenges are identified, including concerns regarding: i) investor–state dispute settlement and the representation of investor and public policy interests; ii) investors with strong links to governments, such as sovereign wealth funds (SWFs) and state-owned enterprises (SOEs), which might possibly pursue political rather than commercial interests; iii) investments in industries and technologies deemed strategic for national security.

1. Introduction

Globalization poses challenges to the world economy and this is particularly true for the globalization of economic activities. In only the last decade, foreign direct investment (FDI) from the so-called developing countries has grown dramatically: in 2013, the **outflows of FDI from developing and transition economies** reached a record level of 39% of the world total, a huge advance considering that the percentage was barely 0.36 in 1970, 6.12 in 1980 and 5.0 in 1990 [1]. This shift in the origin of FDI has occurred in parallel with a **rise** in the proportion of **technology driven FDI**³ (TFDI), both from developed and developing countries [2], with important consequences for any multilateral negotiations over FDI.

Both trends – **the rise in developing countries as sources of FDI to the rest of the world, as well as the increasing importance of TFDI** – have fundamental consequences for the world political economy. Hitherto, most of the discussions on FDI and TFDI from emerging economies have been based on limited empirical evidence from a restricted number of countries and sectors [3], rather than on the systematic analysis of all FDI and TFDI. This has been partly due to the fact that there was no database covering all investments by emerging multinationals around the world and that TFDI from emerging MNEs was a very new phenomenon and there was not even a clear or widely accepted definition.

In this report, we summarize the results of a three-year research project aimed at **understanding the dynamics and the consequences of technology-driven FDI by emerging multinationals in Europe** – with a focus on MNEs from Brazil, India and China (BIC) – and discuss the **implications** of these FDIs for the negotiation of bi- and multilateral investment agreements.⁴

The results presented in this report are based on solid data collection and analysis. Throughout the project we have constructed a database, named the Emerging Multinationals' Events and Networks DATABASE (EMENDATA), which contains all the investment deals by emerging market multinationals from low- and middle-income countries in the EU-27 between 2004 and 2011. Although we provide a general overview of all investments by emerging multinationals in Europe,

³ TFDI refers to those investments made abroad with the specific objective of acquiring technological capabilities. TFDI can take the form of green field investments, joint ventures and mergers and acquisitions.

⁴ A complete list of all publications emerging from the project can be found at the end of this report.

this report focuses mainly on three countries: **Brazil, India and China**. The analysis of the database has been complemented with in-depth interviews in firms that have undertaken TFDI in Europe, as well as interviews with policy makers.⁵

This report provides insights into the following issues:

1. The main **characteristics of technology-driven FDI** and the differences between MNEs from advanced economies (AMNEs) and those from emerging economies (EMNEs) (Section 3), addressing the following questions: *Are EMNE investments different from those of AMNEs?*
2. The **determinants of FDI and TFDI** in Europe by Chinese and Indian multinationals (Section 4): *What explains the differences in the patterns of investments in Europe by Chinese and Indian MNEs?*
3. The **impact of FDI and TFDI** by emerging multinationals in Europe on technological capabilities, innovativeness and knowledge flows (Chapter 5): *What is the impact of TFDI by EMNEs in Europe on the European firms in terms of the technological capabilities and innovativeness? Do we observe systematic loss of technological capabilities or rather an improvement in the local innovation performance and technological capabilities?*
4. The influence of **institutional frameworks governing inflows of TFDI** in Europe (Chapter 6): *To what extent do existing rules and regulations, such as international investment agreements and other institutions, influence the type of investments by EMNEs and their impact?*
5. The **policy implications** (Chapter 7): *What have we learned from the project that can inform policy makers in designing policies governing trade and innovation in Europe?*

⁵ The project has used a variety of quantitative and qualitative methods. The quantitative analysis started quite early in the project and thus constitutes the cornerstone of this report. Data collected through cases and interviews came much later in the project and at the time of writing this report, they are still being coded and analysed and will gradually be incorporated in further updates.

How to read this report

This report is written especially targeting a non-academic audience. It is based on rigorous scholarly work but to make it more readable, we have minimized the theoretical references; most of the literature review as well as the methodological descriptions can be found in the Annexes. Our primary focus is on the main empirical findings of the project and their implications.

If you have little time...

Read the *executive summary*.

Read the *main findings*, always highlighted in italics and right aligned at the beginning of each section.

If you wish to read more...

At the end of the report we have included a bibliography as well as a complete list of publications from the project (Annex 4).

Updates

This report will be updated as new analyses are performed. Check the latest version of the report at <http://globinn.circle.lu.se/category/reports/>

2. What is technology-driven FDI (TFDI)?

Due to the multifaceted nature of technology acquisition, **it is not easy to give a precise definition of what technology-driven foreign direct investment (TFDI) actually is.** Investments in some activities are undoubtedly technology-related or technology enhancing (most notably investments in R&D), but in principle any activity could foster advances in technological learning to the benefit of the investing firm. Any type of FDI – including resource-, market- or efficiency-seeking FDI – may generate technology transfer from the subsidiary to the parent firm, which makes TFDI difficult to identify a priori based on the main motivation for investing [4]. Therefore, a working definition of TFDI should include any foreign direct investment aimed at accessing advanced knowledge and capabilities, mainly available in developed countries, with the ultimate goal of improving the technological and innovative capabilities of the investing firms [5–8]. The definition of TFDI adopted in this project is presented below in Box 2.1.

Box 2.1

Definition of technology-driven FDI (TFDI)

TFDI are foreign direct investments undertaken predominantly with the aim of:

- A. **accessing** and/or **learning to master** technologies not previously within the grasp of the multinational;
- B. **generating** new knowledge.

An example of what is **considered** a TFDI in this report is opening an R&D subsidiary abroad, acquiring a technology-intensive company abroad and opening a subsidiary for manufacturing with the aim of learning to master a particular technology to which the firm did not previously have access. An example of what would **not be considered** a TFDI is opening a subsidiary for sales or marketing or opening a subsidiary purely for manufacturing. TFDI includes green field and brownfield investments, mergers and acquisitions (M&A) and joint ventures. How this definition is operationalized in the empirical analysis differs depending on the data source. A more detailed description on how it is used in different parts of the analysis can be found in Annex 1.

3. FDI and TFDI from emerging multinationals in Europe

The Emerging Multinationals' Events and Networks DATAbase (EMENDATA)⁶ provides an overview of all FDI from emerging multinationals (EMNEs) that occurred between 2003 and 2011 with an indication of both the origin and destination of the investments, the type of investments (green field, M&A) and their nature (e.g. production, R&D or sales). In this report, we focus on the investments by emerging multinationals in Europe, starting with a general overview of the investments (section 3.1.) and followed by a more detailed analysis of the investments by Brazil, China and India in Europe.

3.1. Overview

Main finding: China and India are the most important investors in Europe in relation to all foreign direct investments from emerging economies in Europe.

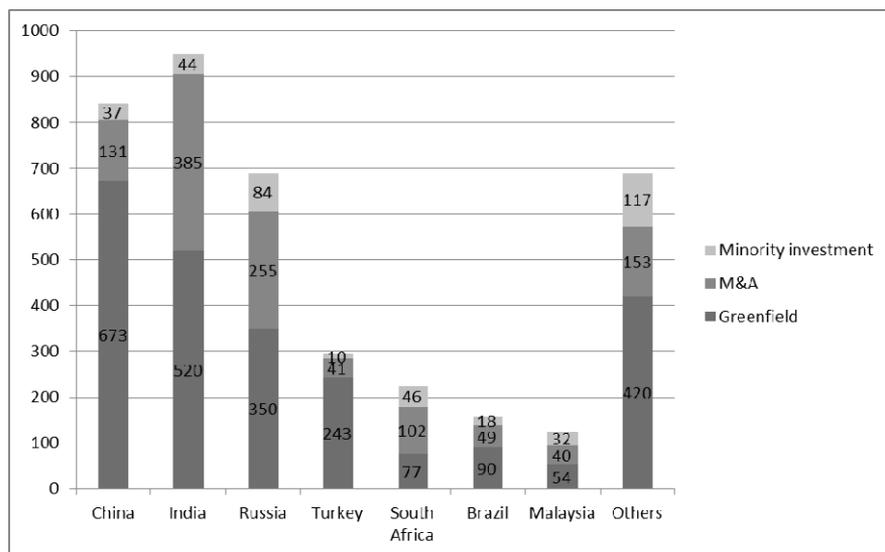
As shown in Figures 3.1 and 3.2, China and India are the top two source countries of FDI from emerging countries to Europe. They are closely followed by Russia, while the other emerging countries show a lower number of deals in the period 2003–2011.

The top target EU countries and sectors are shown in Figures 3.3 and 3.4. As regards countries, the UK is the most important recipient of FDI from emerging countries, followed by Germany and at some distance by France and Spain. While the number of green field FDIs going to UK and Germany are quite similar, the UK shows more than twice as many M&A as Germany

In terms of target sectors, services are the most important (especially financial services), while the pharmaceutical and metal sectors are the top manufacturing sectors for FDI to Europe (Figure 3.4).

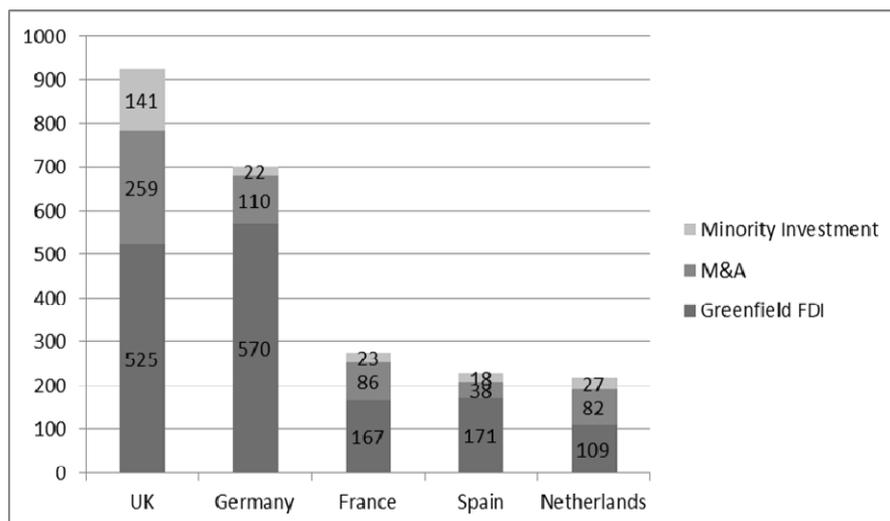
⁶ A detailed description of this database is included in Annex 1 to this report.

Figure 3.1
Emerging countries' FDI in Europe by entry mode (2003–2001) (Number of deals)



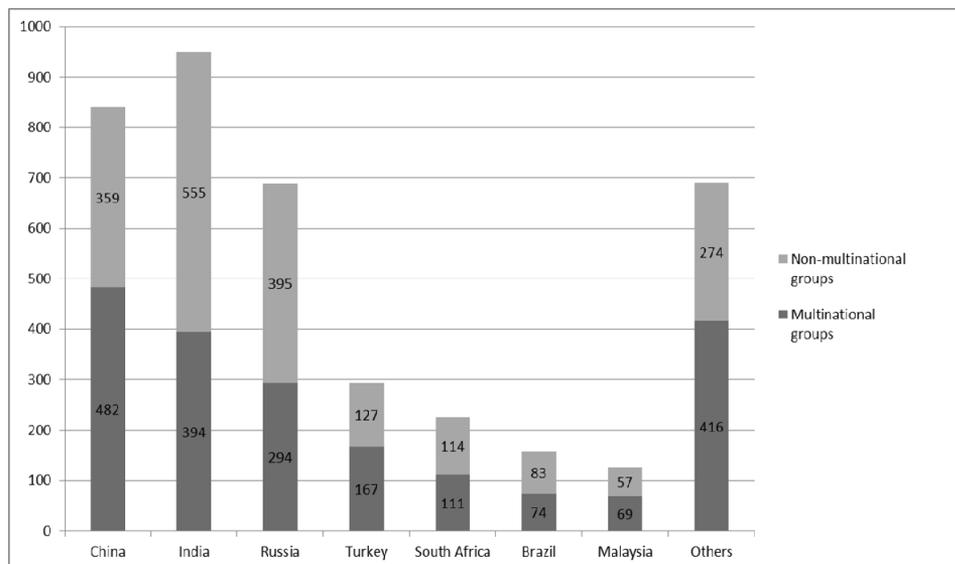
Source: EMENDATA (based on Table A3.1, Annex 2)

Figure 3.2
Emerging countries' FDI in Europe (2003–2001) (Number of deals groups)



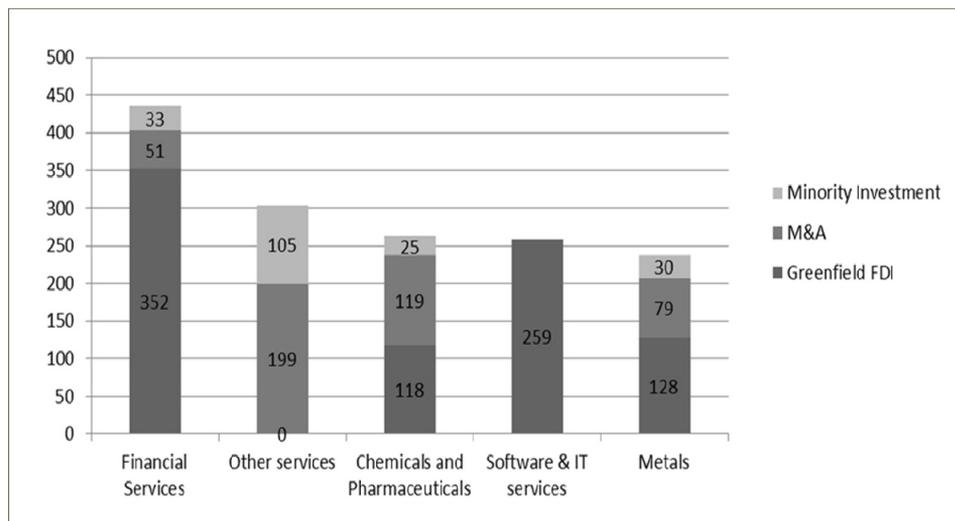
Source: EMENDATA (based on Table A3.1, Annex 2)

Figure 3.3
Top target countries of emerging countries' FDI in Europe (2003–2011) (Number of deals)



Source: EMENDATA (based on Table A3.3, Annex 2)

Figure 3.4
Top target sectors of emerging countries' FDI in Europe (2003–2011) (Number of deals)



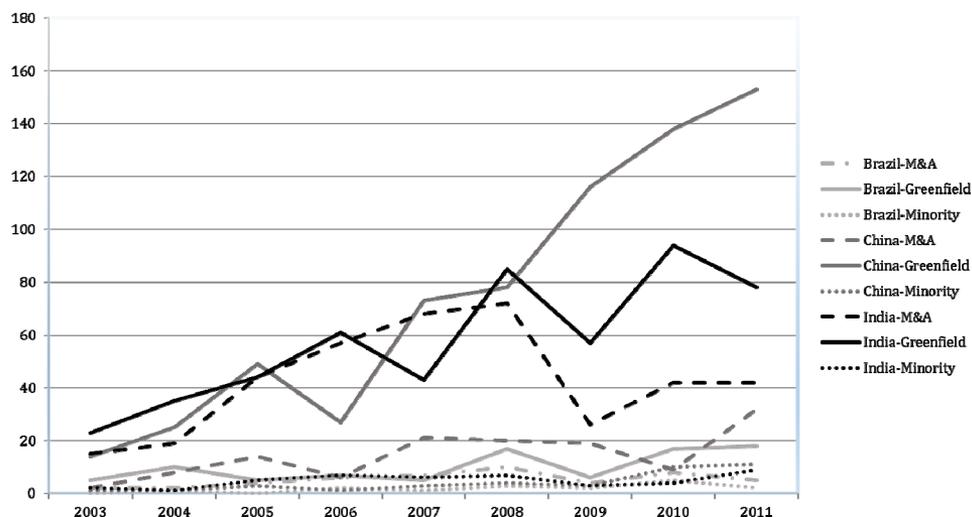
Source: EMENDATA (based on Table A3.4, Annex 2)

3.2. A deeper look at Brazilian, Chinese and Indian (BIC) investments in the EU-27

Main finding: Green field investments are by far the most common mode of entry.

In the period 2003–2011, a total of 1,947 investments were undertaken by BIC multinationals in Europe. Of these, 8% were undertaken by Brazilian multinationals, 43% by Chinese companies and 49% by Indian investors. For the three countries under investigation, green field investments were by far the most favourite mode of entry, representing 80% of Chinese deals and more than 50% of those for Brazil and India. When considering the trends (Figure 3.5), Chinese green field investments steadily increased throughout the period, while Indian investments increased until 2006, following which they exhibited some ups and downs. M&A register a less clear trend: Indian M&A increased until 2008, at which point they reached the level of green field investments in absolute value, then registered a sharp drop, while Chinese M&A increased at a slower pace. Brazilian investments remained rather stable, with some increases in 2008 and then again from 2010.

Figure 3.5
BIC FDI to Europe (2003–2011)

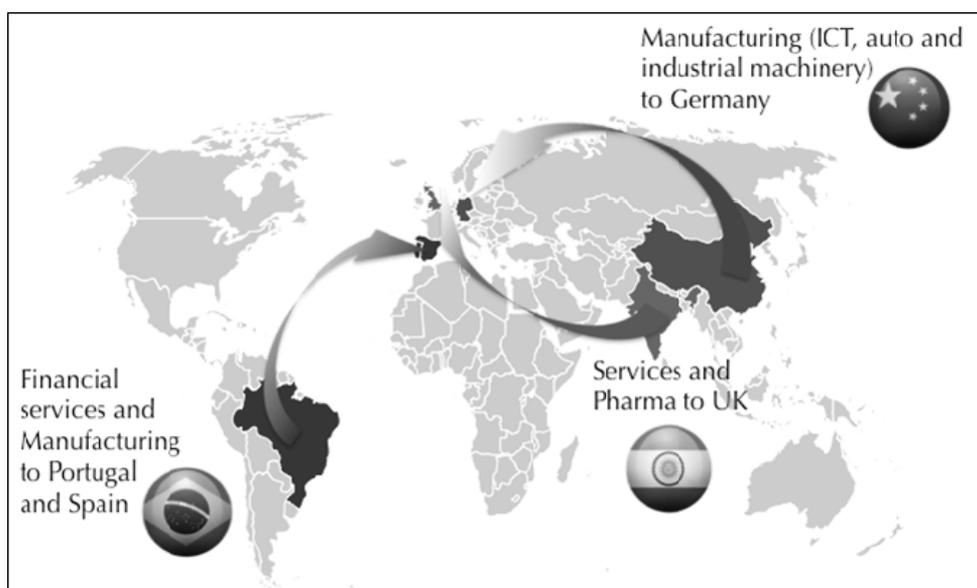


Source: EMENDATA

Main finding: There are significant differences in the country of destination of the investments by BIC MNEs.

When we look at the destinations of BIC investments, those directed to the EU represent 19%, 31% and 33% of the worldwide total respectively.⁷ There are major differences in the top destination countries: Indian firms mostly target the UK, whereas Chinese firms mainly go to Germany. In both cases, the top destination country is the recipient of more than one third of the total deals. In the case of Brazil, the main destination countries are Portugal (41 deals) and Spain (24), followed by the UK and France.

Figure 3.6
Main country and sectoral destinations of BIC MNE investments in the EU-27.



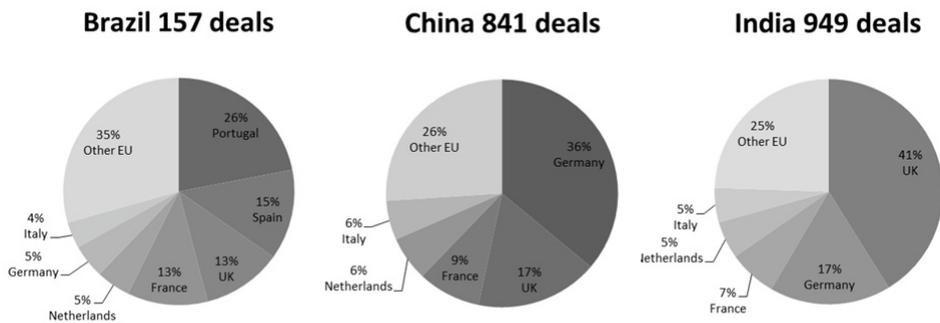
Source: EMENDATA, own elaboration (based on Tables A3.6 and A3.7, Annex 2)

⁷ This means that of all outward FDI from Brazil to the world, only 19% goes to EU-27, while the same percentages are 31 and 33 for China and India respectively. This means that the EU is relatively more important as an investment destination for Indian and Chinese companies than for Brazilian companies.

Main finding: The three investing countries show significantly different patterns in terms of the targeted sectors.

BIC FDI in Europe are also very concentrated in terms of target sectors. Around half of the deals are concentrated in just four sectors, which are significantly different in the three investing countries. Chinese firms invest mainly in manufacturing sectors: electronics, industrial machinery, communication and the automotive industry. Indian MNEs invest more in service industries and in the pharmaceutical sector. Brazilian MNEs invest in financial services and in manufacturing services as diverse as food, metals and textiles.

Figure 3.7
Percentage of BIC FDI in the EU-27 by sector (2003–2011)



Note: Totals also include minority investments.

Source: EMENDATA (based on Table A3.7, Annex 2)

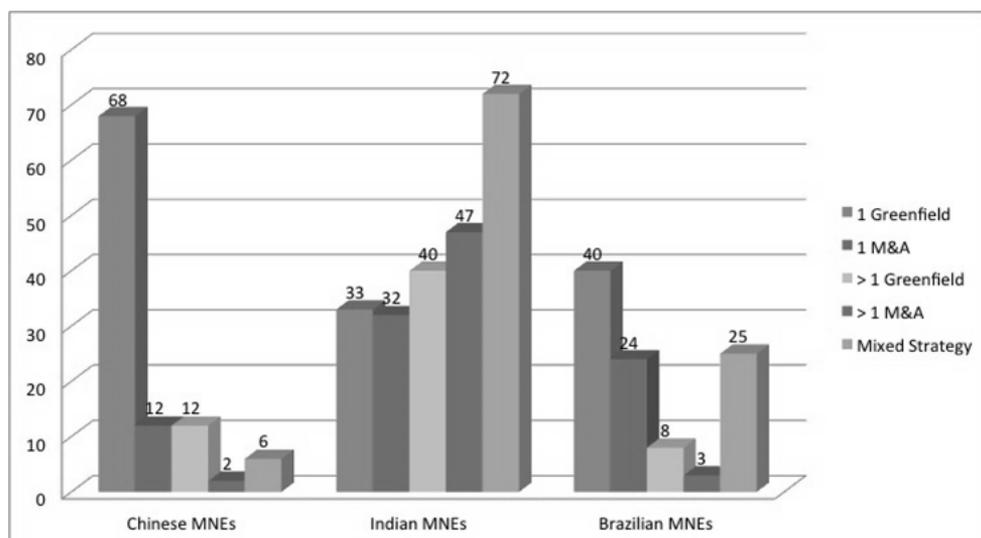
Main finding: Most of the firms have only one investment in Europe.

Turning the focus to the number of deals undertaken by each MNE, the large majority undertook only a single deal (respectively 80%, 65% and 64% of Chinese, Indian and Brazilian investing companies), as shown in Figure 3.8. This is important as repetitive investments are associated with better performance. Firms learn from previous mistakes and subsequent investments tend to have a more positive impact on the performance of the subsidiary [9].

Finally, looking at the top investors in the EU-27, we can see from Figure 3.9 that more Indian groups carried out at least ten deals than Chinese MNEs. Furthermore, investment strategies based on multiple modes of entry are more concentrated within capital- and knowledge-intensive manufacturing sectors, such as the automotive industry (SAIC, Tata Group, Mahindra Group), chemicals (China

National Chemical) and the energy sector (Reliance, Suzlon Energy). In the service industry (e.g. finance, communications, software) and in the electronics industry, the top investors mainly rely on the green field mode of entry (Huawei, ZTE, ICBC, State Bank of India, ICICI Bank).

Figure 3.8
Percentage of investments of Chinese, Indian and Brazilian MNEs in the EU-27 by entry mode (2003–2011)

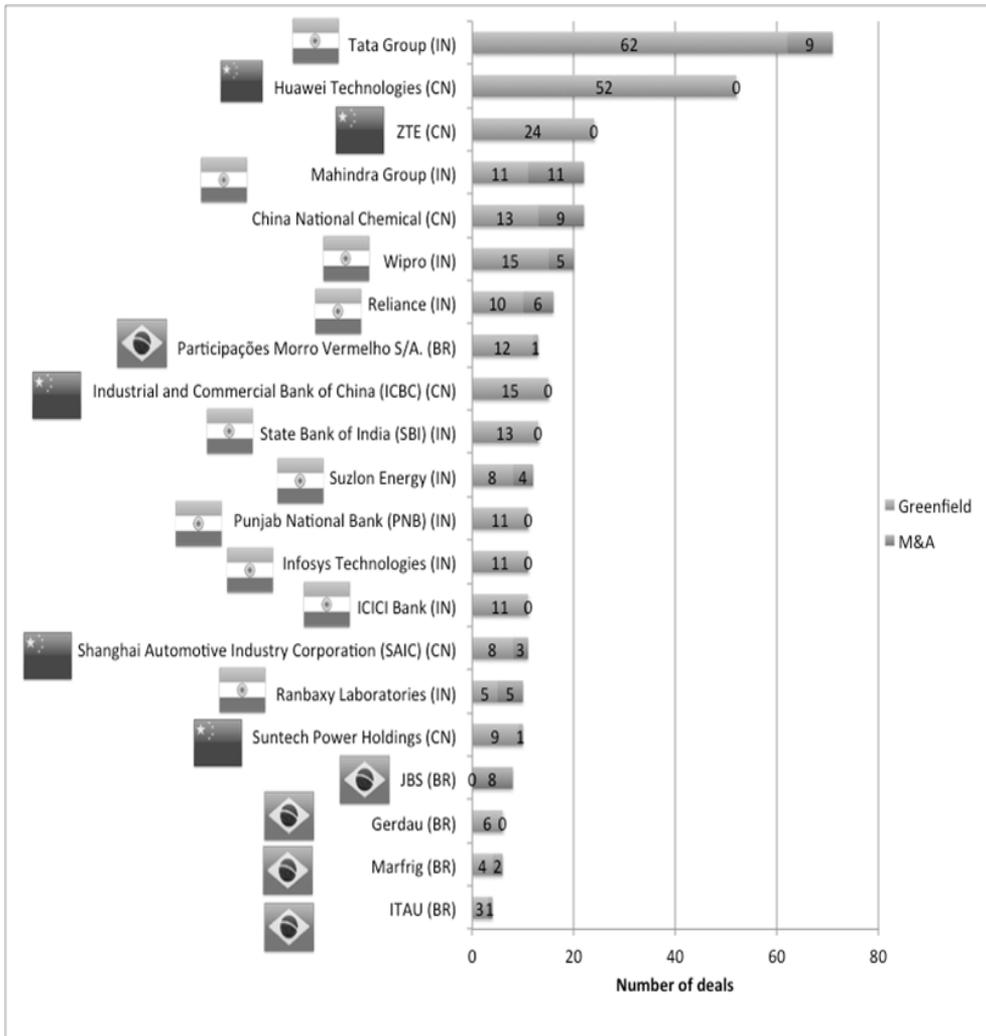


Note: Percentages calculated for 495 Chinese investments, 432 Indian investments and 87 Brazilian investments.

Source: EMENDATA (based on Table A3.8, Annex 2)

In sum, Europe is an important destination for investment from Chinese and Indian firms. About one third of all outward investments from China and India go to Europe. On the other hand and from the perspective of the recipient, India and China are the most important investors from emerging economies in Europe. Approximately 29% of all inward investment from emerging countries into Europe comes from India and around 21% from China. The investments are not widely spread across economic sectors or countries but are rather concentrated. Chinese investors focus mainly on ICT, as well as on automotives and machinery in Germany and to a lesser extent the UK, while Indian investors focus on services (financial, IT) and on pharmaceuticals in the UK. Brazil is far below China and India in terms of the number of investments and predominantly targets other manufacturing sectors (the main investor in Europe, Havaianas, produces shoes).

Figure 3.9
Main BIC MNEs in the EU-27 (2003–2011) (Number of deals)



Source: EMENDATA (based on Table A3.9, Annex 2)

4. Determinants of investments by Chinese and Indian multinationals in Europe

4.1. Relationship between mode of entry and motivation

EMNEs investing in more advanced economies generally face technological and commercial competitive disadvantages and often lack reputation and legitimacy [10–12]. The choice of mode of entry has major implications for resource commitments, performance and risk, particularly in acquisitions [13, 14]. **Full acquisition** of the target company provides access to embedded knowledge and competences and minimizes transaction costs through **full control over the foreign activities** [15]. However, **partial acquisition** may be preferable, particularly when the main motive for investment is the acquisition of knowledge and competences which are more advanced than those in the acquirer company. In this case, the acquired company remains relatively independent of the acquirer company.

Main finding: In acquisitions, Chinese and Indian MNEs prefer less control if their objective is the acquisition of technological competences.

We investigate the relationship of EMNEs' ownership choices in M&A undertaken in Europe with the motivation of acquiring technology [16]. The analysis is focused on Chinese and Indian acquisitions in Europe between 2003 and 2011. The empirical analysis shows that Chinese and Indian MNEs prefer less control if the objective of the acquisition is technological competences rather than a customer base or an established brand name. It also shows that firm-level and industry-level characteristics have different impacts on the ownership decision, depending on the reason for the acquisition. Using content analysis of the information provided in public announcements and company reports, we find that when acquiring companies in Europe with the aim of accessing technical competences, EMNEs prefer a low level of commitment because of the prospective partner's dissimilar knowledge and highly specific resources. The Indian cases (Box 3.1) confirm the generic findings and provide some insights into the underlying reasons.

Main finding: When the investment relates to TFDI through acquisitions, Indian MNEs tend to maintain the acquired firm as a separate entity to preserve the brand value and penetrate European markets...

The interviews with the Indian MNEs suggest that a key motivation for TFDI in Europe by Indian firms is to access technological capabilities. TFDI within Europe varies spatially by sector. In the case of the *automotive sector*, the investment by AUTO1 was to secure emission control capabilities in Dortmund, considered the “Silicon Valley of combustion engineering”. Similarly, in *clean technologies*, CLEANT1 made its first investment in Denmark, considered to be a centre for expertise in wind energy. Investments in the *ICT sector* are more widespread, including Austria, Finland, France and Germany, reflecting that ICT refers to a broader basket of technologies than, say, combustion engineering.

In the case of India, accessing technological capabilities has been motivated by the need to address markets and has taken two forms. First, it used technology as a means of addressing markets in Europe and in the rest of the world which required a more advanced technology or skills not available in India at that time. Second, it used European technology to meet the demands of the Indian context. For example, in one of the acquisitions in the ICT industry, the acquirer used the speech recognition technology of its French acquisition and customized that technology to recognize music and accents in different Indian languages.

Acquisition has been the preferred TFDI mode. In two cases the TFDI took the form of a green field investment. In one of them, the green field investment followed a failed acquisition attempt, whereas in the other the green field R&D centre was established alongside a local manufacturing acquisition. The new subsidiaries are generally maintained as a separate European entity as the brands of Indian firms are not strong amongst customers in terms of delivering technology products. In one of the automotive and one of the clean technology cases, maintaining the German identity enabled the acquirer not only to generate new technologies but also to acquire new customers.

Main finding: ...while Chinese TFDIs tend to be strategic investments with a long-term orientation aiming at substantial development of both production and innovation.

The interviews with the Chinese firms reveal that TFDIs tend to be strategic investments with a long-term orientation aiming at substantial development of both production and innovation by collaborating with European subsidiaries. Innovation is strongly emphasized in the strategic guidance from headquarters (HQ) to subsidiaries, but – as previously outlined – the degree of control over the acquired firm varies according to the level of the investor’s competences from a comparative perspective. When the acquiring Chinese firm has no relevant technological competences at all, full autonomy is given to the subsidiary in undertaking R&D; this was the case in one

automotive MNE (AUTO2). However, when the HQ has complementary technology competences, the strategic guidance to the subsidiary is more technologically detailed and R&D is more a collaboration between the HQ and subsidiaries rather than a one-man-show on the part of the subsidiary; this is the case for two MNEs in clean technology. In both cases, the subsidiaries in Europe tend to maintain a high degree of independence, particularly with regard to technological strategy. Box 3.1 provides an overview of the main motivations for Chinese companies to invest in Europe according to the cases in the study.

Box 3.1.

Overview of motivations for TFDI in Europe from a selection of Chinese firms

The Chinese case firms' TFDI is mainly driven by the following motivations:

1. **Accessing technology and knowledge** by acquiring companies with relevant technological competence, hiring local talent, particularly with long experience in the industry, acquiring IPR, licenses, and production and technology platforms. All the four cases interviewed reported this as one of their motivations. Technology buy-out works well only when the acquirer company's absorptive capability is sufficiently strong.
2. **Generating new technology and knowledge** by collaborating with the acquired or newly established European subsidiaries. Both CLEAN2 and CLEAN3 aimed to generate new technology through TFDI.
3. **Expanding international and domestic business** by acquiring a production division including infrastructure and personnel in both manufacturing and R&D that the Chinese company did not previously have. For example, the acquisition of a European company by AUTO2 led to a considerable leap in both production and innovation capacity and added one more new product in the Chinese company's product line.
4. **Gaining legitimacy** in the international market by acquiring a European brand. The European brand and the overseas R&D establishment are used as a symbolic strategy to increase market influence and brand recognition when promoting products in both domestic and international markets.

4.2. Relationship between mode of entry and firm-level characteristics

In the previous section, we have seen that the choice of entry mode (green field or M&A) is related to the motivation but also the specific characteristics of the firm. In this section, we go deeper into how firm-level characteristics influence the mode of entry, destination, motivation and number of deals⁸ in all investments by Chinese and Indian MNEs investing in the EU-27 in the period 2003–2011 [17]. In terms of firm-level characteristics, we consider: a) size measured as total revenues; b) (negative) leverage as the ratio of shareholders' assets to total assets; c) performance measured with return on assets (*ROA*); d) capital intensity as the ratio of total capital assets to the number of employees; e) innovation propensity as the share of intangible assets to total assets and the ratio of the number of patents to total revenues; f) profitability as the total amount of profits (losses) from revenues.⁹ The methodology used for the analysis – decision trees – is described in Annex 1 on methodology.

Main finding: Firm characteristics have a differentiated impact on the mode of entry, destination and motivation for Chinese and Indian investments in Europe.

Firm size matters for the choice of the mode of entry and, as might be expected, for the decision to undertake numerous deals in more than one country. Large MNEs are more likely to undertake green field investments because their size could make it easier to cover the high fixed entry costs implied by this strategy [18]. Moreover, undertaking more than one investment leads to even greater and more complicated entry costs and indeed being of a large size is helpful for companies engaging in multiple markets [19].

Capital intensity (in terms of capital/labour ratio) is also related to decisions regarding mode of entry and the number of deals. On the one hand, MNEs choosing M&A as a mode of entry have a high capital/labour ratio. Indeed, larger capitalization might be related to a higher financial capability, potentially crucial for undertaking cross-border M&A deals. Furthermore, given the availability of low-cost labour in

8 Mode of entry: green field vs. M&A; Destination: EU core vs. EU periphery, where the core includes the EU-15 countries and the periphery the EU-12 countries (i.e. those that gained access to the EU after 2004); Motivation: TFDI (technology-driven FDI) vs. other FDI, where TFDIs are either green field FDIs focused on “R&D”, “Design, Development & Testing”, “Education & Training”, or acquisitions of target companies with intangible asset values larger than zero; Number of deals/countries: one deal vs. multiple deals across more than one country (within the EU-27).

9 Furthermore, we control for the industry-sector dimension, which can be crucial in setting up outward FDI strategies.

their countries of origin, more labour-intensive Chinese and Indian companies are likely to enjoy a more favourable position in international markets [20]; thus, they may enter these markets through a more costly strategy such as green field FDI and moreover have less need of partnerships with host country companies. On the other hand, investing in more than one country is associated with more labour-intensive companies. Large Chinese and Indian investors entering more than one national market might be relying on one of their major country-specific advantages: the availability of low-cost labour [21].

Main finding: Firms with high levels of intangible assets, including R&D, high profitability and open innovation models, are more likely to conduct TFDI.

Innovation propensity is associated with the mode of entry, destination and motivation for Chinese and Indian deals in the EU-27. Companies opting for M&A as a mode of entry generally have high intangible assets. Moreover, MNEs investing in the EU core nations also have high intangible assets, as do those choosing to carry out technological FDI. Therefore, asset-seeking investments are more likely to be undertaken by MNEs relying on technology-based competitive advantages, given their larger absorptive capacity [22] and M&A as a mode of entry is more likely to be chosen by companies with asset-seeking motives [23–25]. Finally, the asset-seeking motive itself might be driving MNEs towards the more skill-abundant [26] and knowledge-oriented [27] EU area (i.e. the “core”). Having linkages with foreign and local universities, as well as drawing on external sources for technological inputs, are significantly and positively associated with TFDI in general (not exclusively in Europe) [28].

Leverage also matters in the choice of destination. MNEs investing in the EU periphery have large shares of self-owned capital assets. This might be due to the need for greater financial stability in companies investing in more volatile and “risky” markets such as those in the EU periphery [29].

Profitability is relevant in relation to the destination and the number of deals. On the one hand, investing in the EU core is more likely to be associated with companies with high profits. This might be due to the need for high profitability in order to challenge larger and more competitive markets such as those of the EU core [30, 31]. On the other hand, high profits are also related to MNEs with high probabilities of investing in more than one country: high profitability can be crucial in dealing with multiple markets [32].

Better performance is a feature of Chinese and Indian MNEs with relatively higher probabilities of entering European markets through green field investments and those of the technological type. Better performing companies may be opting for green field-type investments.

State-owned equity: focusing only on Chinese companies, we find that companies with a high proportion of **state-owned equity** and a large board of supervisors are more likely to pursue **green field** investments [33]. Ownership

concentration and board size have no significant effect on foreign market entry mode choice.

To conclude, this empirical analysis sheds new light on the strategies deployed by Chinese and Indian MNEs in the EU-27 markets by looking at different aspects influencing their actions: mode of entry, geographical destination, motivation and replication of investments. In particular, it links the EMNEs choices of modes of entry to key firm-level characteristics, such as size, capital intensity, innovation propensity, leverage capacity, profitability and efficiency, as well as ownership structure, board mechanism and management incentives. Our data confirm that a high level of intangible assets and high profitability (high ROA) are related to TFDI in Europe. However, despite the importance of firm-level characteristics in the decision to locate production or innovation activities abroad, the type and direction of the investment is strongly influenced by the institutional environment in both the host and the home country.

4.3. Host country characteristics

Main finding: High-income countries tend to attract more TFDI, whereas low- and middle-income countries tend to draw market- or resource-seeking FDI.

Using Chinese green field investments in the EU-27 from 2003 to 2011 (EMENDATA), as well as investments all over the world (MOFCOM data), we find that Chinese manufacturing firms are most attracted to invest in **high-income countries** because of the possibility of benefiting from strategic assets located in these countries, both tangible (e.g. technology, communication and transport infrastructure) and intangible (human capital, knowledge base) [3, 34]. Investments targeted at **middle- and low-income countries** seem to be based on different motivations, namely a purely market-seeking or resource-seeking rationale. In this respect, our results are consistent with most of the main findings of the extant literature on host country determinants of FDI in general and on Chinese FDI specifically.

It is worth noting that the **level of R&D spending on gross domestic product (GDP)** positively and significantly affects Chinese FDI in manufacturing and services in OECD countries, that is, more technologically advanced countries are targeted with the aim of exploiting higher value-added activities and resources. These findings are particularly relevant as they highlight the importance of the strategic asset-seeking motivation of Chinese investment in developed countries, put forward in a number of qualitative studies but not confirmed by previous econometric analyses.

In addition, we find an overall positive impact of **higher education levels**, which holds for all the groups of countries in our sample. In terms of sector-level

disaggregation, the availability of skilled human capital is positively associated with Chinese investments in the manufacturing sectors.

Main finding: Regions matter – agglomeration plays a role in the choice of location of investments by EMNEs.

When studying the foreign location choices by affiliates of Chinese automotive firms worldwide, our findings show that Chinese automotive FDI tends to be located in regions or areas with a massive presence of firms from the same industry [35]. Individual firms are attracted to areas hosting numerous other producers from the same sector because of the positive impact on productivity through knowledge spill-overs and through strategic resources that can be accessed locally, such as specialized suppliers or technical research centres. The existence of such spill-overs provides incentives for locating in countries regardless of their overall institutional or industrial characteristics, or their level of technological development, in order to benefit primarily from the regional clustering of firms in the same industry.

Main finding: Host country factors are evaluated differently by state-owned versus private enterprises.

Introducing the distinction between state-owned and private companies in the empirical analysis, we further contribute to shedding some light on the host country determinants attracting Chinese investors. Our results, based on the analysis of worldwide FDI by Chinese companies, show that the pattern of Chinese FDI differs according to corporate ownership [34]. Private firms are attracted by large markets and host-country strategic assets and are averse to economic and political risks when choosing investment locations abroad. In contrast, state-owned enterprises (SOEs) are clearly more resource-seeking than private firms, which are instead more asset-seeking, especially when investing in OECD countries. The resource-seeking motive confirms that SOEs venture abroad, often without being constrained by the distance from home or by political instability in the host countries, to secure access to valuable resources for their home country development; thus, their foreign expansion may not merely follow corporate strategies, but rather broader national strategic priorities.

4.4. Home country characteristics and location strategies for FDI and TFDI

Main finding: Using data on Chinese firms investing in Germany, we find that the strictness of government regulation and the degree of business freedom strongly influence the mode of entry of the investment...

We analyse the impact of home country regional institutional factors on firms' foreign market entry mode decisions based on institutional theory [36]. We use the investment data for 578 Chinese firms in Germany between 2000 and 2012. These sample firms originate from 28 provinces in China and cover 16 sectors. We use several dimensions of institutions, namely regulative, normative and cognitive aspects, at the regional level of the home country [37].

We find that home country regional government regulation, regional freedom of business practice, firms' political connections and imitation have significant effects on firms' foreign market entry mode decisions. Specifically, for regulative institutions, the stricter the home regional government regulation the more likely it is that Chinese firms will pursue green field investments compared to joint ventures when investing in Germany. For normative institutions, home regional freedom of business practice has the same effect as home regional government regulation, which indicates that firms in regions with greater freedom of business practice usually have mature operational experience and a greater capability to invest abroad using their own resources.

An interesting result is that firms with more political connections prefer joint ventures to M&A because the former need less input in terms of resources and present less risk. For cognitive institutions, other firms' experiences in foreign market entry mode choice have greater impact on green field investment than on joint ventures, which indicates that firms are more cautious when pursuing entry modes presenting greater risk and are more likely to learn from other firms.

Main finding: ...however, the same factors seem to have a lower impact on TFDI.

Regarding technology-driven FDI, our findings suggest that for Chinese firms, political, regulatory and governmental factors do not have a strong impact on decisions concerning where to establish international R&D sites [36]. However, as an increasing number of Chinese firms have begun developing indigenous intellectual property (IP), foreign companies and states are now attacking Chinese firms abroad over their earlier IP rights infringements at home. As a result, Chinese firms are barred entry to foreign markets based on technologies that they have used domestically. Local R&D centres could overcome these difficulties by developing local technology, which build new technological competencies for Chinese firms abroad in the process [38].

5. Impact of FDI and TFDI of EMNEs in Europe on technological capabilities, knowledge flows and local networks

As the vast literature on direct and indirect spill-overs from MNEs to indigenous firms has demonstrated, MNEs are in general reluctant to engage in interactive learning with indigenous firms due to their low absorptive capacity, the lack of differentiation between firms and the goods that they supply and the fear of losing knowledge [39-43] (although see also [44]10). However, a new trend is emerging. MNEs from developing countries are investing in developed countries to acquire technological capabilities. In this case, it is the host country that has advanced technological capabilities that are of interest to the MNE. Through reverse technology transfer (RTT), or the mobility of employees, these technological capabilities can be diffused in the home country [45]. A possible consequence of this phenomenon is an increase in the barriers to the establishment of TFDI from developing countries in developed countries.

As an increasing number of firms from emerging countries invest in Europe, worries abound over the impact of such investment on local economies. Some fear that Chinese, Indian or Brazilian companies will simply take over local companies, exploit their technology and leave without creating lasting benefits for employment or economic growth in Europe. But are these concerns justified, or should FDI from emerging economies be seen in a more positive light?

The findings of our project with regard to the impact of TFDI on the technological capabilities of the European subsidiaries, the extent to which knowledge flows between subsidiaries and HQ and the impact on the innovativeness of the firm are discussed next. Most of the findings in the following subsections (5.1–5.3) are based on the interviews with the HQ and subsidiaries of Chinese and Indian

¹⁰ A relatively recent survey by Schmitz (2006) illustrates that the interaction between MNEs and indigenous firms can lead to upgrading for the indigenous firms. Schmitz points out that upgrading and innovation can lead to product and process improvements but seldom to functional improvements.

multinationals in Europe. The cases are summarized in section 9 at the end of this report. The section on innovativeness in 5.3 is based on patent data.¹¹

5.1. Impact on the technological capabilities of subsidiaries and HQ

Main finding: There is high diversity in the impact of the TFDI of Chinese and Indian firms in Europe and no generalized predatory behaviour. In contrast, we find cases in which the investment has a positive impact on the European subsidiaries.

During the interviews, the firms were asked to indicate the level of technological capabilities of their HQ and the subsidiary before and after the investment. The experience of knowledge gains from TFDI varied according to sector and country. The interviews provided important insights into the impact of TFDI on the technological capabilities of subsidiaries in Europe.

Insights from the Indian cases

AUTO1 clearly attained world leading innovation capabilities thanks to its subsidiary. Similarly, CLEAN1 also gained advanced innovation capabilities in wind turbine design. In both cases, the gain in technical capabilities came as there were barely any existing capabilities in India. But the experience of the ICT sector was different. Although the ICT sector and its firms catered to demanding global customers and had greater international presence than their counterparts in the other two sectors, their growth and prominence was on the basis of labour-intensive services provided through technologies accepted as industry standards. Their ability to absorb new technology was typically limited to enhancing their business services (typically technology customization) rather than using it as a building block for pursuing new products or furthering technology development.

In ICT1, the use of an HQ sales force that was unable to appreciate how to license IP without falling into the trap of time and material billing common in the services undermined the subsidiary. The IP business declined and it was only R&D services which benefited. Furthermore, upon seeing the ICT1-affiliated sales staff, customers began to expect the same rates that ICT1 charged for operations from India rather

¹¹ Annex 1 on methodology contains a summary of the methods used in each analysis.

than the rates they were paying for R&D services from the subsidiary. Similarly, ICT3's acquisition of the speech-processing engine of its subsidiary boosted the services business but there was little investment in technology. Consequently, no new patents were filed after acquisition and the relationships that the subsidiary had with a local university and an industry partner also died. The experience of the German subsidiary of ICT2, which was active in standards setting in mobile wireless communication, was no different. But the Finnish subsidiary had a different experience for one reason: it brought in hardware capabilities that had been non-existent and this allowed them to obtain projects on a joint basis. However, this acquisition was about the skills and knowledge of a customer and patents did not come with the acquisition, nor have any been filed since.

Insights from the Chinese cases

In the automotive cases, a positive influence on technological competences was reported in the AUTO2 acquisition, whereas no influence has yet been observed for the green field investment by AUTO3. In the former case, following acquisition, the European subsidiary was to build up a large R&D centre as its global innovation centre in the Netherlands and it had opened a new factory in Slovakia. An increased number of R&D personnel and a higher level of technological capability since the acquisition were also reported.

In the clean technology cases, CLEAN2's European subsidiary experienced a growth in the number of R&D personnel as well as new product development projects. The number of R&D personnel had grown sevenfold following acquisition. The technological capability level was the same as before, but the subsidiary greatly improved its production capacity. The green field investment of CLEAN3 was also reported to have resulted in a continually increasing number of R&D personnel and innovation projects, including both regular and radical ones, as well as the invention of new technologies. Two mechanisms are found to explain these improvements:

- On the one hand, the Chinese companies' strategic ambition of developing self-owned advanced technology has promoted innovation in the European subsidiaries. Three out of four European subsidiaries¹² reported that the Chinese owners' great ambition regarding innovation was one of the most important driving forces of innovation in their companies. CLEAN2 shows that the Chinese company has pushed the acquired European company to move from a technology follower to a technology leader. CLEAN3 reported that the aim of the Chinese company is to produce "Western quality and

¹² One European subsidiary did not agree to be interviewed but its Chinese HQ did.

Chinese-priced products” to exploit the huge Chinese market, as well as to penetrate Europe, the US and the international market, which has to a great extent promoted innovation in the European subsidiary.

- On the other hand, the specific market needs of the Chinese market provide new challenges to R&D in the European subsidiaries and stimulate innovation. Acquisition by Chinese companies opens up the Chinese market to the acquired European companies and the green field investment in R&D by Chinese companies also provides an opportunity for locally hired R&D personnel to develop new technology and new products to meet the specific needs in the Chinese market, for example the wind-resistant windmill blade designed to withstand typhoons developed by CLEANT3.

In general, the Chinese TFDIs have had a positive influence on the technological capabilities and production capacity of Chinese HQ, except in the case of AUTO3 which has seen no obvious progress. The AUTO2 firms quickly increased their technological capabilities, production capacity and IP ownership through a technology buy-out and have since gradually enhanced their technological capabilities by strategically pushing the acquired European subsidiary to be more innovative. CLEANT2 and CLEANT3 built up their technological competences through the acquisition of firms with technology or by establishing R&D centres in the industrial cluster and hiring experienced technological experts from other companies in the cluster. Besides their improved technological capabilities, the Chinese companies also accumulated experience in international acquisition and international management, helping them to gain confidence and competence for further development in the international market.

5.2. Knowledge flows between subsidiaries and HQ

Main finding: Knowledge flows vary on the basis of the function performed by the subsidiary as well as the stage of development of the technology.

Insights from the Indian cases

The Indian cases suggest that knowledge flows between the subsidiaries and India vary on the basis of function. In the case of AUTO1 and CLEANT1, there is a flow of operational and design knowledge from the R&D capabilities in Europe to the manufacturing that takes place in India. The same is the case for ICT3, with its software development capabilities being used to operationalize and design services around the scientific knowledge from France. In ICT2, the complementary

(hardware/software) capabilities between the Finnish subsidiary and India led to bi-directional knowledge flows.

Overall, however, there are limitations to the flows of scientific and technical knowledge from European TFDI, especially in the ICT sector, mostly because of skills constraints. On the one hand, Indian ICT service firms employ large numbers of engineers as the business is labour-intensive. Yet, as service provision demands catering to the diverse demands of different customers, technology-specific expertise tends to be limited among the engineers. A further disincentive to deepen technical knowledge is that the career progression for Indian engineers in ICT service firms tends to be tied to managerial rather than technical roles. Making matters worse is the relatively high level of job mobility. Ironically, ICT1's subsidiary chose not to be acquired by a large US firm because it feared that its technical capabilities would be eradicated. Unfortunately, its hopes of retaining its technical capabilities through its ties to India were dashed as it did not find the range and quality of skills for its IP business.

Indian managers are considered good as they routinely have to deal with an uncertain business environment characterized by unreliable infrastructure and scarcity. Moreover, India's ICT service industry grew by developing project management skills. The managerial strengths of Indian firms means that there is regular financial and business reporting to HQ by the subsidiaries, although the subsidiaries retain freedom with respect to technologies and product development. Similarly, the Indian firms have been innovative with business models. The employees of both the subsidiaries of ICT3 had feared the loss of jobs after acquisition, but that never happened. Despite a preconceived notion that they would not learn anything from India, they learned how to enter new markets – especially in Asia – and how to develop innovative business models.

Insights from the Chinese cases

In one of the acquisition cases (AUTO2), there was little collaboration for innovation at the time of the study as the collaboration between Chinese HQ and the European subsidiary related mainly to production; the development of new products had only recently started and had not made substantial progress. The European subsidiary was thus given high autonomy in terms of technology development. In contrast, the green field investment of CLEAN3 led to intensive collaboration between the Chinese HQ and European subsidiary for R&D from the very beginning, mainly based on staff mobility between China and Europe. Clear ownership and a sense of belonging, more common in the case of green field investment than in acquisition, have helped to guide all the efforts of both Chinese HQ and the European subsidiary in the same direction and have created more synergy for innovation.

A well-functioning global connection between China HQ and European subsidiaries is highly related to *mutual trust* between the two parties. This was

frequently and repeatedly mentioned by the interviewees in almost all the cases. Such trust is based on previous collaboration and shared vision regarding innovation. Previous collaboration among individuals from both the Chinese and European sides, particularly top management and key engineers, has a very positive impact on late collaboration.

Among the automobile cases, the acquisition of AUTO2 resulted in significant R&D collaboration with European suppliers and universities and much less collaboration with Chinese HQ. This was because the acquired European company produced a specific product and there was no counterpart in Chinese HQ with which to collaborate. The interaction between HQ and the subsidiary was mainly through staff mobility for training and recruiting, with no R&D collaboration reported. The acquired European subsidiary was given great autonomy when developing innovation and was satisfied with this state of affairs. At the time of writing this report, the green field case of AUTO3 had not made much progress and no clear information on global-local connections was available.

Both clean technology cases showed significant R&D collaboration with European suppliers and universities; such connections were mainly in the old networks that the company or the employees had before the TFDI from the Chinese company. Table 5.1 presents an overview of the findings in relation to the case companies.

We also analyse the behaviour of EMNEs in Europe. Box 5.1 summarizes the results of the study, showing that **FDI from EMNEs can be “predatory”, but equally it can have positive effects on the local economy, stimulating mutual knowledge exchange and local innovation.** This casts doubts on alarmist calls for caution concerning investors from these countries.

Table 5.1
Overview of the cases: motivations and knowledge flows

	Mode of access	Motivations	Knowledge flows between HQ and subsidiaries
<u>INDIA</u>			
AUTO1	Green field	Indian regulation, need to serve global customers	People movement between the HQ and subsidiary has deliberately been kept limited
ICT1	Acquisition	Develop its R&D services offerings	Mobility in both directions
ICT2	Acquisitions	Access technologies, key customers	Mobility of managers and engineers for short durations between ICT2 and the subsidiary
ICT3	Acquisition	Access new markets and new technologies	Unstructured mobility in knowledge flows between the subsidiary and HQ
CLEANT1	Green field	Learn and build technological capabilities and generate IP	Little mobility between the subsidiaries and the parent, except at the CEO level
<u>CHINA</u>			
AUTO2	Acquisition	Expand the business, enable rapid growth for initial public offering (IPO)	Short- and medium-length training programme for managers and engineers; job rotation between HQ and subsidiary; “unfriendly” investment environment; difficulty of understanding and grasping the technology acquired
AUTO3	Green field	R&D	Group of Chinese managers and engineers sent to Germany to start up R&D centre; R&D centre used as an antenna to collect technological information and to recruit talent rather than doing R&D
CLEANT2	Acquisition	Increase technological capability	Mutual trust and understanding between HQ and subsidiary
CLEANT3	Green field	Expand market share	Intensive collaboration for innovation between Chinese HQ and Danish R&D centre, facilitated by frequent personnel mobility not only for co-development but also for technological training

Source: Own elaboration based on cases

Box 5.1

Source: Giuliani et al. (2013)

Looking at examples from Italy and Germany, we find that there is “predatory” behaviour on the part of “rising power” firms in some cases, but we also identify another type of FDI from these companies that creates mutual benefits for investors and for the economies in which they invest [46]. Moreover, MNEs from emerging economies investing abroad are more likely to engage in local innovation networks and create win-win situations in terms of mutual learning than AMNEs. We find that MNE subsidiaries can be divided into three main types, with significant differences between subsidiaries of advanced economy and emerging economy MNEs, as follows:

- “**Passive subsidiaries**” of AMNEs are mainly interested in accessing local markets. Decision-making tends to be centralized in the MNE’s HQ and subsidiaries exhibit little engagement in innovation activities. Within the sample studied, this category includes significantly more subsidiaries of AMNEs than subsidiaries of EMNEs.
- “**Predatory subsidiaries**” come close to the negative picture of emerging economy investment. Significantly more subsidiaries of EMNEs than AMNEs fall into this category. Put simply, the EMNEs in this case are seeking to acquire advanced technology by taking over companies in advanced economies, transferring knowledge to their HQ without contributing much to innovation in the local economy. Local employees in the subsidiary constitute an important source of knowledge and learning takes place through personnel exchanges or joint product development projects between the subsidiary and HQ. While this seems to confirm some of the worries about rising power investment in Europe, there is another type of FDI from emerging economies that has so far been overlooked in the debate.
- “**Dual subsidiaries**” are similarly interested in acquiring advanced technology and they are significantly more common among EMNEs than AMNEs. However, they differ from predatory subsidiaries because they actively engage in local innovation activities and cooperate in these with local firms and universities. These local networks allow mutual learning: on the one hand, local employees, supplier firms and universities are sources of knowledge for the MNE HQ; on the other hand, these local actors learn from new perspectives and experiences in emerging economy markets brought in by the investors. Hence, such cooperation is perceived as a win-win situation for the MNE and for local actors, rather than as an exploitation of local knowledge by the foreign investor in a “take or leave it” manner.

5.3. Impact on innovativeness

Main finding: Cross-border collaboration between BIC businesses and EU-27 inventors is still limited....

In this project, we asked a number of questions relating, for example, to the extent to which the companies have established technological collaborations with European companies and profit from them. We also asked about the impact of M&A by BIC firms on the innovativeness of the EU firms acquired. These research questions were investigated using data on the European Patent Office (EPO) patenting activity of BIC firms in Europe, complemented with information on the M&A deals included in EMENDATA related to the acquired firm's patent portfolio [47]. These data have been analysed using econometric techniques as well as descriptive statistics.¹³

International collaborations involving co-inventions (hereinafter “cross-border inventions”) are a valuable channel through which knowledge is transferred from developed to developing countries [48], not least because they are often characterized by intensive knowledge sharing over a long period of time [49] and by face-to-face interactions between inventors with different levels of technological competence, which in turn facilitates international knowledge spill-overs [50, 51]. We find that cross-border collaboration between BIC and EU-27 inventors (carried out by BIC firms) is still a limited phenomenon but is growing over time, mainly driven by China (Figure 6.1).

With regard to the type of BIC firms involved in the sample, we find that BIC MNEs own the large majority of the patents in the sample; however, when we turn to the cross border patents, we find that BIC domestic firms (without registered subsidiaries) own 41 of the 113 cross-border patents (36% of the total).

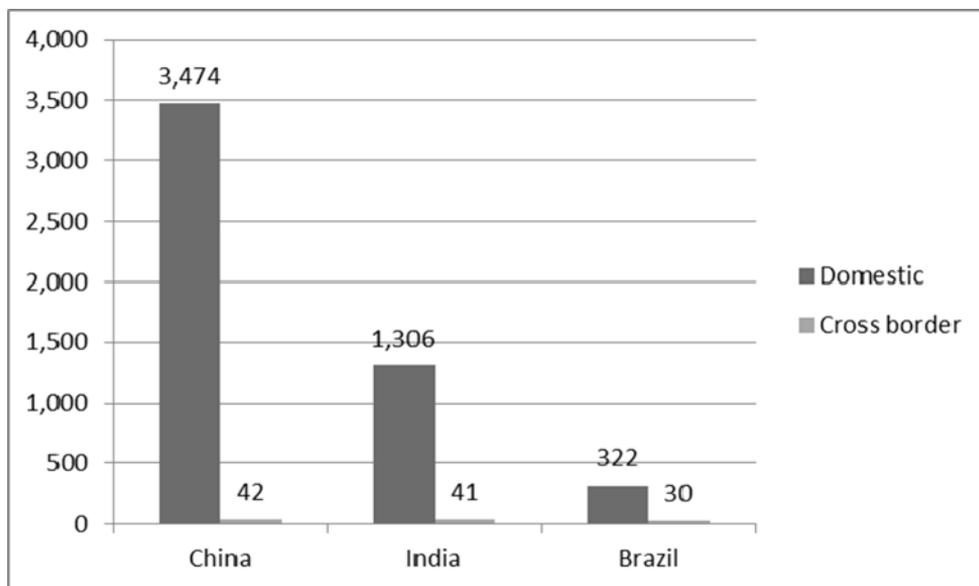
Main finding:...but it yields better results in terms of higher value and more general patents

Whether cross-border collaborations bring about better innovations is investigated by comparing the value and characteristics of cross-border and domestic patents. The results suggest that cross-border inventions are more rewarding than domestic ones as they produce higher value patents (i.e. a higher proportion of forward citations), as well as more general patents, which means that the innovations produced by international collaborations are likely to influence the subsequent development of other inventions across a variety of technological fields. At the same time, cross-border inventions have a lower market scope compared to domestic patents (i.e.

¹³ A summary of the methodology used for this analysis is included in Annex 1.

applications for protection are made in fewer countries), which suggests that such international collaborations are not a strategy used by BIC companies to enter potentially new markets, but rather are employed to improve the future impact of their innovative activities.

Figure 6.1
Cross-border collaborations in patents



Source: Giuliani et al. (2014) (based on Table A6.1, Annex 2)

We also find a significant difference between BIC MNEs' and domestic firms' capacity to benefit from international collaborations [47]. BIC MNEs' international collaborations are not only of higher value (i.e. more forward citations), but they are also both more general and more original compared to those produced by BIC MNEs' domestic collaborations. The results for BIC domestic firms are also interesting: domestic firms' cross-country collaborations also generate more valuable (i.e. more cited) patents compared to domestic collaborations, but these patents are neither more general nor more original. In contrast, domestic collaborations foster the production of patents with a greater market scope, which means that inventions produced by domestic firms through domestic inventive efforts aim to secure IP rights into numerous countries.

Main finding: In acquisitions, most of the European firms that had patenting activity before the deal ceased their patent activity following acquisition by an EMNE.

Whether BIC firms accrue their level of technological competences by acquiring European innovative firms is analysed by examining the patent portfolio of target firms included in EMENDATA. Of the 534 deals examined (we exclude deals involving the acquisition of business units and divisions and deals increasing an existing stake), we find that in 23% of the cases (123 deals) the target company had filed at least one patent application with the EPO before the deal. The rather limited number of target companies involved in patent activities is also due to their sector of activity, traditionally not relying on the use of patents as a mean of appropriation. In fact, the analysis of the NACE codes available for 274 target companies shows that approximately 41% of them are involved in services (banks, insurance, hotels, etc.). It is also interesting to note that the size of the patent portfolio of the target firms is rather skewed as they own 3.7 patents on average, with a maximum of 204. This means that, on average, the innovative capacity of target firms (measured using patents) tends to be relatively small, with only six cases of acquired firms holding more than 100 patents.

Changes in the acquired firm's patenting activity can shed some light on the consequences of M&A on the European company. We therefore focus on a five-year window before and after the deal.

Table 6.1
Patenting activity of acquired firms

		Post-deal patents	
		YES	NO
Pre-deal patents	YES	26 (5%)	97 (17%)
	NO	9 (2%)	402 (76%)

Source: Giuliani et al. (2014)

Table 6.1 shows that almost 80% of the acquired firms held no patents before the deal; however, nine of them (2%) displayed some innovative activity after the acquisition. In contrast, 97 firms ceased patenting activity following acquisition by a BIC country. The use of the ORBIS database should mitigate the problem of further patenting activity using a different name after the acquisition. However, it does not rule out the possibility that all the patents developed by the European subsidiary are assigned to the BIC HQ. Finally, 74 out of the 97 deals took place before 2010, allowing enough time to pass to observe some innovative activity.

The analysis conducted on 866 patents related to the 26 deals in Table 6.3 applied in a five-year window before and after each deal shows no statistical difference

in the average patent value (measured as forward citations and number of citations) and patent characteristics (measured as originality and generality). Furthermore, the comparison of the nationality of the inventive teams shows no increase in the degree of internationalization of inventions and no increase in the involvement of BIC inventors.

6. Impact of TFDI from EMNEs on institutions governing investments in Europe

Foreign investors are generally very sensitive about the political atmosphere and any kind of formal or informal rules in the host country of their investments that might potentially have an impact on their profitability. This section focuses on the institutions governing FDI inflows into Europe [52, 53], including formal legal institutions as well as normative expectations and collective perceptions. Whereas the influence of institutions on companies and their investment decisions has been well documented elsewhere, this section rather focuses on the evolution and changes in these institutions in response to the growing inflows of TFDI from emerging economies.

In Europe, the national, EU-level and international institutions governing FDI flows were built at a time when FDI flows were still asymmetrical in that FDI largely flowed from industrialized to emerging economies. Against this background, it is not surprising that these institutions were designed to award investors the highest level of protection vis-à-vis host country governments' policy objectives. With the rise of FDI flowing in the opposite direction, the EU and its member states are suddenly finding themselves in the position of host countries.

However, not all forms of FDI inflows are greeted with the same enthusiasm. In most EU member states there have been controversies about the influence and interests of investors from China and Russia, sovereign wealth funds (SWFs) from emerging economies, and FDI in strategic industries. Policymakers in Europe can thus be expected to have an interest in changing the aforementioned institutions which grant such strong protections to foreign investors and which allow relatively little policy space for the host country governments. Therefore, this section seeks to address how the institutional framework governing foreign investment inflows at the EU and member state level evolved from the early 2000s to the early 2010s. Subsequently, it seeks to explain what factors affected such evolution, or the lack thereof.

With the Treaty of Lisbon, investment policy has become an exclusive EU competence. Therefore, we start by examining the EU-level changes in institutions governing inflows of FDI (6.1) [53]. However, national institutions and policies still play an important role. Therefore, subsequently we look at changes in FDI-related institutions in Germany (6.2.) [52] as an example of changes at the member state

level. The case of Germany is interesting because not only is it the member state that has completed the highest number of bilateral investment treaties, it is also considered one of the most liberal and open of the member states. This makes it the least likely case for institutional changes in reaction to FDI inflows. If changes towards a more restrictive regime have been introduced in Germany, we can plausibly formulate the expectation that this is even more likely in the other, less liberal, member states.

6.1. Institutional framework governing inflows of (T)FDI to the EU

Main finding: The dominant perception belief about the effects of inflows of FDI and TFDI in the EU is that such flows, regardless of the sources and modes of entry, are beneficial...

The European integration project is deeply rooted in the liberal economic approach, which emphasizes the benefits resulting from open and integrated markets, not only for goods and services but also for capital. The core theories and concepts that are largely accepted and lie in the background of policy debates concerning inflows of FDI into the EU are based on the liberal economic understanding that FDI, regardless of its form or source, has a positive impact. Based on this understanding, it is also believed by many in the European Parliament, Council and Commission that any attempts to regulate FDI flows, even for legitimate policy reasons, would have detrimental economic effects by sending the wrong signal to financial markets. Although some actors might be in favour of the regulation of FDI flows in certain cases, there is a widespread perception that this would not be possible as it would be penalized directly by international investors.

Main finding: ...while emerging perceptions regarding inflows of FDI and TFDI at the forefront of policy debates are concerned with the detrimental effects of such FDI in relation to security, environmental and social objectives.

With the entry of the European Parliament into the arena of investment policy as a result of the Treat of Lisbon, this aforementioned worldview has slowly found itself confronted by new perceptions. An increasing number of members of the European Parliament are starting to see investment policy issues in the context of environmental, social and security policy objectives. In consequence, the regulation and limitation of FDI flows is sometimes considered necessary for the pursuit of other policy objectives, such as the protection of the environment or national security.

Among the *left and green parties* in the European Parliament, it is often emphasized that FDI inflows ought to be restricted when environmental policy or social policy objectives might be compromised. It is often alleged by these

parliamentarians that foreign investors are trying to erode or circumvent social and environmental standards. However, in principle, the norm that investment inflows ought to be welcomed prevails. Among *conservative parliamentarians*, the expectation is that investment inflows ought to be restricted whenever these investments are politically motivated rather than based on a company's strategic considerations. Individual conservative members of parliament who principally consider themselves to be rather business-friendly commonly argue that investments ought to be restricted whenever national security is at stake, as for instance in the case of investment in strategic industries. At this end of the political spectrum, parliamentarians also tend to be more willing to discriminate among different home countries of FDI. Investments from SWFs from the Gulf States or Russia and investments by Chinese investors are deemed to require closer scrutiny than investments from other sources. Among the conservative and traditionally more business-friendly parliamentarians, the protection of technologies can also be found to be a concern.

Main finding: Formally, the EU still is the most open and liberal regime. Most of the changes introduced have only dealt with circumstances under which investments could be restricted and no review mechanism for incoming FDI has been introduced.

In terms of formal regulations, the EU has the most liberal and open investment regime in the world. Its founding treaties establish the free movement of capital within the EU, a prerogative that is not only extended to European investors, but also to investors from third countries, albeit with some exemptions for public security. This is unparalleled elsewhere in the world.

Nonetheless, the formal regulatory framework has always included and still does include exemptions from the free movement principle, which can temporarily be invoked by the member states whenever legitimate public interests are at stake. From the mid-2000s, new secondary legislation was introduced specifying these exemptions, thereby limiting the degree to which individual member states are able to use these exemptions arbitrarily – meaning that they cannot be interpreted as protectionist – and increasing legal certainty for investors. Similarly, the European Court of Justice also intervened on several occasions, clarifying the criteria under which FDI can be restricted. These criteria generally include that the restricting measures need to be in the general interest, limited in time, specific about the assets or management decisions concerned and subject to an effective legal review by domestic courts.

Main finding: The single, most important formal change introduced during the observed period was the Lisbon Treaty, which may preclude more profound changes in the future.

The greatest formal change during the observed period was introduced by the Lisbon Treaty. However, the Treaty had no direct impact on the EU's openness vis-à-vis foreign investors. Instead it rearranged how the EU's investment policy is made. It granted the Commission exclusive competences in investment policy and the European Parliament became a co-legislator in investment policy.

Given the inclusion of these new venues of decision making and the entry of new actors and interests, one should, a priori, expect more substantial policy changes. Therefore, it is particularly interesting to note the formal changes that did not take place. The first non-change can be observed in the context of the negotiation of the Commission regulation on the transition from national bilateral investment treaties (BITs) to an EU-wide policy, which was meant to pave the way for transition from a national to a European policy regime. During the negotiations between the Commission, Council and Parliament, the latter's Green rapporteur sought to introduce limitations on investment flows where these could be expected to have a negative impact on environmental and social standards. In the end, however, these proposals were rejected and the more liberal proposal of the Commission prevailed.

Second, Commissioners Barnier and Tajani made public statements calling for the introduction of a committee that would review foreign investments and potentially block investments that might threaten European security. These calls never made it into the formal legislative process, but indicate a push towards a more restrictive regime. However, these calls were never put down in formal Commission proposals.

Finally, an important non-change can also be observed in the case of the negotiations with China on a common investment treaty, opened at the end of the observed period. The negotiation mandate, which was co-legislated with the European Parliament, neither included a departure from the investor–state dispute settlement system, which was heavily criticized by some members of the European parliament as being overly investor friendly, nor did it include a positive list of sectors to be liberalized. Instead a negative list was agreed, including sectors to be exempt from liberalization.

6.2. Institutional framework governing inflows of TFDI at the member state level: the case of Germany

Main finding: In Germany, the liberal economic approach continues to underlie policy debates regarding inflows of FDI and dominant perceptions at the forefront of the policy debate focus on the benefits of incoming FDI.

Similarly to what was observed at the EU level, in the case of Germany, the frameworks which underlie the policy debates regarding FDI shaping the policy

solutions preferred by decision makers have been based on the liberal economic approach. Concurrently, dominant perceptions concerning the effects of inflows of FDI in Germany at the forefront of the policy debate have focused on the benefits of incoming FDI. Openness to incoming FDI in any form (green field investments, M&A and acquisitions of minority stakes), independent of its origin (from advanced or emerging economies), has been seen as fundamental to German competitiveness by the decision makers in charge of FDI policy in the Federal Ministry of Economic Affairs under various administrations, those from different political parties and other stakeholders, such as industry associations.

Main finding: In the 2000s, emerging perceptions of the effects of inflows of FDI were that German military, technological and strategic assets could be exposed through M&A from emerging economies...

From the mid-2000s, important views concerning the nature and effects of inflows of FDI for the German economy emerged, contesting the dominant perceptions regarding the benefits of unrestricted openness to capital flows. An emerging view was that German military, technological and strategic assets were exposed to foreign investors. The German government became concerned that existing export control regulations did not provide enough protection to German defence and national security assets and could not prevent the transfer of sensitive technologies overseas. As there were no formal mechanisms to block acquisitions of defence companies by foreign investors, national security issues became highly significant in relation to FDI, at this stage mostly from other advanced economies. Issues relating to national security, technology and FDI from emerging economies converged around the role of SWFs in creating strategic risks for host countries, which came to prominence in the late 2000s. Political parties across the spectrum, the government, think tanks, the media and the public became increasingly concerned with the potential political, economic, technological and security risks posed by investment by SWFs from emerging economies. SWFs were seen as extensions of foreign governments, lacking in transparency and able to influence policy in host countries by controlling leading firms and strategic sectors, such as ICT, energy and media. These sectors were vulnerable to takeover by SWFs from emerging economies, particularly the Gulf States, Russia and China.

Beyond the debate about the role SWFs from emerging economies, the perceptions of the nature and effects of inflows of FDI from emerging economies in Germany more generally have also undergone an important transformation. From the mid-2000s, the media and the public became more concerned with inflows of FDI from emerging economies to access technologies and IP rights, even when no national security issues were involved, as well as the perceived risk of “selling out” German firms. Some takeovers by EMNEs were perceived as involving technology “asset stripping”. Such deals were seen as consisting of the acquisition of competitive or struggling companies with the aim of accessing their technological assets, such as

patents, designs and skills, and transferring them to the country of origin of the acquiring company whilst de-investing in the host country. Over time, such beliefs subsided and the continued concern in parts of the media of the risk of “selling the family silver” failed to find resonance among the political parties. Simultaneously, the government believed that inflows of FDI from emerging economies, particularly technology-orientated, still represented a small share of overall FDI inflows; however, as these are growing substantially, they still need to be better understood.

Main finding: ...however, there was also an increasing awareness that the potential positive impact of the investments could take some time and that a medium- to long-term strategy to maintain the operations in Germany would be needed.

Different stakeholders, such as the government, unions and business associations, perceived FDI from emerging economies as making a positive contribution to the German economy and providing a lifeline to companies that are struggling. They also believed that there was a transformation in the nature of TFDI from emerging economies in Germany over time as investors came to realize that they needed a medium- to long-term strategy involving the maintenance of their operations and technological efforts in Germany to attain the technological objectives of their investment.

Main finding: The widely accepted view regarding incoming FDI in Germany was that the policy framework should provide an open environment, clarity and stability for foreign investors.

The dominant expectations regarding inflows of FDI in Germany were consistent with the liberal economic approach and its focus on the gains to be made from openness. What was considered most appropriate by key stakeholders was that the investment policy framework should provide an open environment, clarity and stability for foreign investors. This was considered a precondition to guarantee similar treatment of German investors by third countries based on reciprocity. Thus, it was seen as acceptable to tolerate a small number of transactions that might destroy value as a trade-off for having a welcoming environment for the majority share of FDI which was seen as contributing to value creation.

Main finding: Emergent collective expectations regarding incoming FDI involved growing calls for more protection from transactions which threatened German national security interests.

However, emerging norms – new collective expectations subject to debate – originated in the second half of the 2000s that constrained and modified the widely accepted expectations regarding inflows of FDI into Germany. These were encapsulated in the growing calls for more protection from transactions which

threatened German national security interests and the assertion that sensitive technologies should not be taken out of Germany via foreign investment. The proposed prescription on how to deal with these demands was the introduction of mandatory rules constraining investment that posed a threat to German public security.

Main finding: Shifts in the regulatory framework in Germany in the period considered included the consolidation of incentive mechanisms to attract FDI, but also the introduction of regulations constraining inflows of FDI on the grounds of security and public order objectives.

On the one hand, incentive mechanisms were introduced from the mid-2000s actively to attract inflows of FDI. This was done primarily through the establishment of an investment promotion agency (GTAI) and the expansion of its activities over time, as well as the implementation of various mechanisms to facilitate the operations of foreign MNEs following investment. The most important mechanisms included the provision of tax subsidies to all foreign investors investing in Germany and low-interest loans for foreign investors undertaking R&D.

On the other hand, also from the mid-2000s, various regulations were introduced that indicated a shift in the prevailing open institutional framework for FDI inflows in Germany, adding another layer of constraints to those already imposed by voluntary commitments. In 2004, the Foreign Trade and Payments Act and the Foreign Trade and Payments Regulation were amended and introduced controls on the movement of capital into Germany on the grounds of security. The amendment stipulated that the acquisition of more than 25% of the voting rights of a German company developing and/or producing defence equipment would be subject to review. In 2005, the Foreign Trade and Payments Act was amended to extend the review procedures to the acquisition of stakes in specialized engine and gear manufacturers. In 2009, the Thirteenth Amendment to the Foreign Trade and Payments Act and the Foreign Trade and Payments Regulation was introduced. Through this amendment, the scope of coverage for the screening of FDI inflows was substantially broadened beyond the defence sector. According to the new law, review procedures could be applied for investments involving a 25% or greater equity ownership that would pose a threat to public policy or public security. The formulation of public security was kept intentionally ambiguous, leaving considerable scope for the interpretation of the laws according to the prevailing perceptions regarding the benefits and threats associated with specific FDI events.

7. Policy recommendations

Over the last decade, FDI from developing and emerging economies has risen remarkably and alongside this shift there has been a simultaneous change in the nature of FDI – with a notable growth of flows that are aimed at the acquisition and development of technologies. As a result of these trends, developing/emerging economies have become a key source of FDI/TFDI in advanced economies; the latter have taken up a new role as receivers of such FDI/TFDI flows from the former. This has led to the emergence of novel policy issues associated with these new roles of advanced economies, among them the EU and its member states, as the hosts of FDI/TFDI and emerging economies as the home countries.

7.1. EU and member states as hosts of incoming FDI/TFDI from emerging economies

In terms of the *domestic regulations of member states* or *internal regulations of the EU as host countries*, the key investment policy challenge is how to maximize the benefits of inbound TFDI flows, while minimizing the eventual negative effects. Although isolated cases of technology “asset stripping” following the acquisition of European firms by MNEs from emerging economies occasionally occurs, **TFDI can equally have positive effects on the local economy, stimulating mutual knowledge exchange and local innovation.** In such cases, subsidiaries of EMNEs investing in Europe learn from the local context and contribute to it as much as they benefit from it.

Policymakers could benefit from a better understanding of the behaviours of EMNEs in Europe to encourage such win-win situations, minimize predatory investment and foster quality investment. An important policy recommendation is that local, regional and national governments should seek to embed the subsidiaries of EMNEs from in host country networks and foster R&D efforts leading to valuable knowledge spill-overs to the benefit of local firms. As the World Trade Organization’s agreements have made it unviable to apply performance requirements to subsidiaries of MNEs, the creation of R&D incentives and networking opportunities involving foreign investors and the host actors should be stimulated and encouraged. This would reduce predatory behaviour and open up opportunities for advanced host country managers and entrepreneurs to learn from new investors, which could be exploited to bridge the cultural and market distance with emerging economies.

Furthermore, there is still room to improve the already welcoming environment for foreign investors in the EU and its member states. There is a need to improve the codification and visibility of the wide set of investment-related policies – ranging from competition, trade and IP rights to the environmental and labour market policies of member states – and country-specific variations at the EU level to provide a predictable and transparent environment for the entry and operation of foreign investors. More flexibility in labour rules as well as supportive migration policies – granting work permits to facilitate the short-term mobility of personnel between HQ and the subsidiaries – were often mentioned by the firms interviewed as cornerstones for the sound functioning of the investments in the short and long term. However, there is a risk that more permissive regulations could provide room for abusive practices.

With respect to investment policies at the *international level from the perspective of host countries*, this rise in FDI/TFDI flows from emerging economies into Europe and other advanced economies decreases the asymmetry in FDI flows. These flows are no longer unidirectional, from advanced to emerging and developing economies. For policy makers in Europe dealing with international investment agreements, this means that they are no longer able to focus one-sidedly on the interests of investors and outbound FDI. In negotiating international investment agreements, they are required to balance the interests of investors with other policy objectives emerging from various policy domains, including security, environmental, labour, competition/anti-trust and industrial policy.

Balancing the legitimate interests of investors seeking to protect their investments, as well as other public policy objectives, will require addressing a number of challenges. These include: i) concerns about investor–state dispute settlement and the representation of investor and public policy interests; ii) investors with strong links to governments, such as SWFs and SOEs, which might possibly pursue political rather than commercial interests; iii) investments in industries and technologies deemed strategic for national security.

These challenges can be addressed by expanding the scope of coverage of bilateral investment treaties, free trade agreements with investment provisions, economic partnership agreements and regional agreements to deal with the public policy issues of host countries, increase policy space and emphasize investors' obligations. The introduction of provisions intended to guarantee public policy objectives is recommended, including clauses stipulating exceptions and reservations related to national security and environmental and labour protection. Another important objective should be to rebalance the focus of investment-related treaties from protecting the interests of investors to giving greater emphasis to their obligations. Provisions to ensure more transparency of SWFs and SOEs may range from requirements to adhere to international standards, for instance, by complying to the Santiago Principles, to demands for more disclosure regarding investment objectives and the ownership structure of investing companies, as well as the inclusion of clauses requiring compliance with host countries' investment regulations.

7.2. Emerging economies as home countries of outward FDI

Regarding the *domestic policies of emerging economies as home countries of outward FDI*, one key policy issue is how to foster outflows of FDI and TFDI as channels for technological accumulation. TFDI represents an important opportunity for BIC firms to accumulate technological capabilities, access frontier knowledge and – not least – appropriate the IP rights of collaborative inventions involving partners in advanced economies. In particular, if emerging countries want to build technological capabilities to catch up with advanced countries, cross-border patenting activity represents an efficient means of doing and this could be promoted by tax reductions or other fiscal incentives for companies involved in international co-patenting. Moreover, emerging economies should elaborate policies that encourage domestic firms' participation in global R&D networks by funding and facilitating technical visits abroad, conference attendance and sponsorship for internships for foreign engineers and researchers in domestic enterprises.

One of the main issues related to investment policies at the *international level of emerging economies acting as home countries* is the further liberalization of advanced economies in relation to incoming investment and keeping protectionist tendencies in check. One possible avenue to address this would be a shift from a restrictive approach to international investment agreements focusing on the protection of investors, to a liberal perspective which emphasizes the promotion of both inflows and outflows of FDI beyond investor protection. This could be accomplished by negotiating liberalization commitments and introducing pre-establishment clauses in international investment agreements (IIAs). In addition, adopting clauses stipulating the announcement of new investment-related regulations by host countries could make investment conditions more predictable for foreign investors.

8. Managerial recommendations

Encouraged by the welcoming policies of EU countries and easy access to finance, EMNEs are increasingly making use of TFDI in Europe as a vehicle to pursue their goal of becoming global players. The **motivation** for TFDI is to acquire innovation/technology capabilities in new areas and to establish a stronger market presence in Europe. Having studied several TFDI investments by Chinese and Indian multinationals in Europe, we make the following recommendations for such firms:

- As they come from very different political, social and economic systems, the **culture of the EMNE and the subsidiary typically differ**. For instance, employees in the subsidiary may be highly productive but tend to stick to office times and vacation plans, whereas employees in the EMNEs may be comfortable managing uncertainties and flexible with their work schedules. **Enough time must therefore be spent after the TFDI for cross-cultural training on both sides to build trust and set realizable goals.**
- Although the movement of employees between a subsidiary and HQ helps in knowledge diffusion and team building, employees from subsidiaries do not tend to like long-term stays at the parent company, whereas employees from EMNEs are more amenable to this. Moreover, the **higher turnover of employees in emerging countries** increases the risk that employees that have been trained in the subsidiary in Europe will leave the firm after they return to their home country, **hindering learning and competence accumulation in the HQ and creating fatigue in the subsidiary due to the need to start again in transferring knowledge to a new employee.**
- The **structure and degree of autonomy** of the acquired subsidiary **plays a key role in influencing the success of the TFDI**. When a subsidiary is given full autonomy, including over business and finance functions, and the parent restricts its role to representation on the board of the subsidiary, the more likely it is that the TFDI will achieve the desired goal. **Autonomy helps retain the highly experienced technical pool in the subsidiary**, which is critical for development of the IP or maintaining domain skills. This helps avoid the typical path of the cost-based optimization of operations by the EMNE based on the employee costs in the host country.
- Maintaining the **independent identity** of the subsidiary in Europe helps EMNEs command a premium for the IP developed in the subsidiary and favours them in addressing European customers. **EMNEs are not perceived as sufficiently strong to deliver a high-technology product**; rather, they are viewed by many global customers as a low-cost option.

- The **technical competence of the subsidiary and the EMNE rarely match**; indeed, this is one reason that drives TFDI. The **difference** in the technical capabilities between an experienced European team and a junior Indian or Chinese team **is difficult to bridge**. The EMNE should invest in senior technical person to provide an interface between the subsidiary and the parent teams. Keeping the core IP at the subsidiary and undertaking customization or complementary work at the EMNE tends to work well.
- Having **access to the global customer base of the parent company (EMNE)**, while **relying on the dedicated sales team of the subsidiary** helps to win more deals. This is because the core competence of the sales team of the parent company does not lie in selling IP-driven products/solutions.
- The **ecosystem plays an important role in technology-driven product/IP development**. When an EMNE **does not support ties with the existing ecosystem of its subsidiary**, the subsidiary is **unable to build a future roadmap of its product**. Hence, following the TFDI, the EMNE must support and encourage the subsidiary to maintain its linkages with research laboratories and academia. These are the source of new technology experimentation and new hires for R&D activity, besides offering a means of brand building.
- **Policies** with respect to labour, IP sharing and R&D incentives vary among the countries in the EU. **Certain policies are tacit, for example the repatriation of IP from a German firm is possible only when it is 100% acquired**. As **labour laws in most countries, except the UK, do not support easy downsizing/resizing of teams**, the EMNE must plan in advance how to sustain or rejuvenate skills in the event of changes in the business development roadmap.

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Annex 1. Methodology

The project has been very rich in data collection and analysis, using a variety of quantitative and qualitative methods. The quantitative analysis started quite early in the project and thus constitutes the cornerstone of this report. Data collected through cases and interviews came much later in the project and at the time of writing this report (December 2014), are still being coded and analysed.

Research design

Selection of countries

The focus of the project was on Brazil, China and India from the start for two main reasons. First, when the project started, there was no database on MNEs from emerging economies located in the EU. Ad hoc studies and our previous research suggested that Chinese, Indian and Brazilian MNEs had a very strong presence in the EU in the ICT, automotive and petroleum and mining industries. Some of the largest Indian and Chinese ICT firms, such as Infosys, TCS and ZTE, have subsidiaries in the EU. In the automotive industry, Chinese firms have acquired parts of Swedish automotive firms (Volvo and Saab) and Indian firms have acquired UK automotive firms (Land Rover and Jaguar). The largest Brazilian MNEs in petroleum and mining have subsidiaries or joint ventures in Europe. Second, focusing on China, India and Brazil ensured the integration of the new data with the data collected within the framework of past projects in which some of the partners in this application had been involved.

Once the database had been constructed (EMENDATA), we discovered that Brazil had no technology-driven FDI in any of the three industries that we had selected in the project, except for one ICT company. This is why most of the analysis contained in the report is based on data for China and India only.

Selection of industries

For this project, we started with a focus on three industries: petroleum and mining, automotive and ICT. The automotive industry was the leading manufacturing sector in the 20th century and is one in which emerging economies attempt to prove themselves before entering other less technologically stable sectors. The ICT industry is particularly interesting for two reasons. First, it is a relatively new sector that has become global in scope only in the past 25 years. Second, it is also a sector which is increasingly dependent on software for its versatility. Software itself has no materiality and its marginal cost of production is near zero. Petroleum is a critical resource the distribution of which is determined by geophysical features. What is especially interesting is to interrogate how an industry involved in the production, supply and

innovation related to this natural resource has developed even in areas in which petroleum is not abundant.

However, once EMENDATA was constructed, it was clear that there were almost no technology-driven investments in petroleum and mining in the EU-27 from any of the three selected countries. This sector was therefore substituted by clean technology, more specifically by wind energy, a field in which we could identify several technology-driven investments in Europe by MNEs from India and China.

Selection of firm cases

Of particular interest in this project was the development of case studies of MNEs from developing countries located in Europe. Using EMENDATA, we identified Chinese and Indian firms with technology-driven investments in the EU-27 in the three sectors considered. We chose a purposive sample procedure and shortlisted three to four firms in every country/industry based on multiple criteria: the companies needed to have at least one green field investment and one acquisition (so we could compare modes of entry), not be among the largest (which have been studied extensively) and be operating in a similar subsector (to allow comparison between countries). Interviews were conducted in the headquarters of the MNE (in the EU or in the emerging economy), as well as in the subsidiaries in Europe. This allowed us to grasp the nature of the innovative activities conducted by the R&D laboratories in Europe and the spill-overs in the host region, as well as contrasting the information gathered in the headquarters.¹⁴

Data building and collection

EMENDATA¹⁵

The main data sources for bilateral FDI with worldwide coverage are: fDiMarkets, providing information on green field investments (i.e. new wholly-owned subsidiaries) from 2003; Zephyr (by Bureau van Dijk); Thomson Reuters SDC Platinum, providing data on M&A and other minority investments. These data sources are used extensively in the literature to investigate the international activities of both emerging and advanced multinationals, but so far they have been used separately. The data from these sources are not directly comparable as the databases differ in the way they are built: fDi Markets is an event-based or deal-based database, reporting each investment deal through which a wholly-owned subsidiary is established on a certain date by an investing firm, whereas Bureau van Dijk's Zephyr

¹⁴ Our experience shows that some R&D departments are more commercial offices than innovation laboratories, with limited knowledge spill-overs in the region. The cases and the survey will allow us to gain a better understanding of the extent, scope and possible consequences of the location of real knowledge-intensive activities.

¹⁵ Description of the EMENDATA taken from Amighni et al. (2014).

and Thomson Reuters' SDC Platinum are firm-level databases reporting the ownership relationships between any parent firm and its affiliates and subsidiaries.

EMENDATA is a major accomplishment in terms of harmonization and makes these three data sources comparable. EMENDATA includes all cross-border green field investments, M&A and minority investments (corresponding to a share lower than 50%) from MNEs in emerging countries between 2003 and 2011. It should be noted that using 2003 as the first year for the database does not constitute a major limitation for the purpose of researching the outward expansion of emerging multinational firms because the international expansion of EMNEs only boomed in the early 2000s. EMENDATA provides information at the level of the individual deal, the investing company and the global ultimate owner (GUO). The main deal-level information includes: (i) entry mode; (ii) sector of specialization of the investing company and of the subsidiaries; (iii) activities undertaken by the subsidiaries; (iv) location of the subsidiaries; (v) number of jobs created.

An innovative feature of EMENDATA is that all the deals included are linked to firm-level (both investor and target companies) as well as group-level identifiers, which allows grouping and analysis of all the deals undertaken by the same GUO. Such a coding procedure allows the linking of the three original data sources (fDi Markets, Zephyr and SDC Platinum) with further firm-level information, such as the ownership structure, the location of domestic and foreign subsidiaries, the sector of economic activity, the consolidated and unconsolidated balance indicators, some firm size variables, the names and types of shareholders and the patenting activity. All these additional variables have been sourced from the database Orbis, published by Bureau van Dijk. We have also included for all the EMNES included in EMENDATA their patent applications to the EPO and USPTO. Other sources of information that can be linked to the information in EMENDATA include the FT Emerging 500, the Fortune Global 500 and the EU Industrial R&D Investment Scoreboard.

EMENDATA also allows analysis of the interplay between different dimensions; namely, at the level of the deal, investing firm, group, sector, home and host country. Specifically, at the deal level, it allows investigation of the distribution of investments across sectors, business activities and countries, distinguishing by deal type, company and group. Moreover, it enables mapping of the foreign expansion strategies of firms and groups in a more comprehensive way compared to what was previously possible with non-comparable data on different types of foreign activities; at the country and regional levels it allows examination of the location choices disaggregated by sector and deal type.

In this research project, we focus on the deals undertaken by Brazilian, Chinese and Indian investors in the EU-27 countries.

Firm-based interviews

To ensure the comparability of the cases [54], a research protocol was designed at the beginning of the project. Each interview was recorded, transcribed and coded using NVIVO. The same questionnaire was used for China and India and a slightly

modified questionnaire was used for headquarters and subsidiaries. The questionnaire was divided into four sections: i) the identification of TFDI investments in Europe; ii) the characteristics of the most important technology-related investment in Europe, including the motivation for the selection of mode of entry, such as the impact on the technological capabilities of the firm; iii) the relationships between the headquarters and the subsidiary, particularly intentional and unintentional knowledge flows; iv) the role of the ecosystem, including the networks at local and national levels. In almost all the interviews at least two researchers were present. Two European researchers went to India and two to China to conduct the interviews in the headquarters with the local partners. One Indian researcher also came to Europe to conduct the interviews with the subsidiaries of the Indian companies, together with a European researcher. In total, 24 in-depth interviews were conducted, seven in Chinese MNEs and 17 in Indian MNEs.

Interviews with policy makers

Interviews with high-level policy makers concerning TFDI, institutional frameworks and international investment agreements were conducted in the EU and in Germany. Similarly to the interviews with firms, a research protocol was designed and each interview was recorded, transcribed and coded. The interview guide covered four types of issues: i) perceptions and ii) expectations about FDI/TFDI into Europe and Germany, particularly from emerging economies, iii) regulations and international agreements governing such inflows and iv) the main events and processes that had triggered changes in perceptions, expectations and regulations/agreements. We interviewed representatives of various stakeholders at the EU and member state (i.e. Germany) levels. At the EU level, we conducted interviews with members of the European Commission (6), members of the European Parliament (4) and a European trade union member (1). In Germany, we conducted interviews with representatives of the German Federal Ministry of Economics and Energy (3), members of the German parliament (2), the federal investment agency (2), business associations and trade unions (2) and representatives from academia, think tanks, law firms and consultancies, and other stakeholders (10). In addition, we interviewed representatives of international organizations and another member state government (3) to address relevant issues at the international level.

Methods of data analysis

Content analysis was used to investigate the relationship between mode of entry and motivation (section 4.1.). The primary source for public announcements and deal information is LexisNexis, which provides access to billions of searchable documents and records from more than 45,000 legal, news and business sources. We integrated this information with the annual reports and official websites of both acquirer and target firms. Based on the main FDI motives suggested by Dunning's [39] eclectic paradigm and using an iterative process (feedback loops), we identified market and strategic asset-seeking investments, which are the typical types of FDI from emerging to advanced economies [55, 56]. We also identified the motive of global legitimacy

seeking, which is quite a relevant motive for EMNEs investing in Europe and in advanced countries more generally [57]. We developed explicit definitions, examples and coding rules for each deductive category to determine unequivocally under what circumstances an announcement can be coded to a certain category [58]. The qualitative analysis consisted of reading, analysing and methodologically assigning a unique category to each announcement. Following the defined coding rules, two trained researchers carefully read each document to identify the main motive for the investment and hand code it. The reliability of the codification process was tested by measuring the level of agreement between coders and showed 87% correspondence [59].

Regression trees: Regression trees are a methodology commonly used in botany and in medical decision making [60]. Regression trees are developed by a recursive procedure, which allows the division of a set of n statistical units into groups that are homogeneous with respect to the output variable. With respect to other methodologies, they have several advantages. First, they can make fast and easily understandable predictions about which variables are important in classifying the sample units with respect to a certain outcome. Second, they can be extremely useful when the variables affecting the output interact in complicated and nonlinear ways. In such cases, defining a simple global model over the entire sample can be difficult and non-parametric smoothers like regression trees can be helpful in trying to fit the model within smaller parts of the sample. Regression trees were used in the analysis of firm characteristics (section 4.2.). In each exercise, we applied the revenues; b) (negative) leverage as the ratio of shareholders' assets to total assets; c) performance measured with return on assets (ROA); d) capital intensity as the ratio of total capital assets to the number of employees; e) innovation propensity as the share of intangible assets to total assets and the ratio of the number of patents to total revenues; f) profitability as the total amount of profits (losses) out of revenues, controlling for sectors. regression trees to categorize investors making a 1-0 decision about each different aspect of their international strategies. In other words, we tested if and how certain firm-level dimensions, found to be relevant in the existing literature, matter for each of the different aspects identified. The firm-level characteristics are: a) size measured as total

Annex 2. Background Tables

Table A3.1
Emerging countries' FDI in Europe (2003–2011)

Country	Multinational groups	Total deals	Green field	M&A	Minority investment
China	482	841	673	131	37
India	394	949	520	385	44
Russia	294	689	350	255	84
Turkey	167	294	243	41	10
South Africa	111	225	77	102	46
Brazil	74	157	90	49	18
Malaysia	69	126	54	40	32
Others	416	690	420	153	117
Total	2,007	3,971	2,427	1,156	388

Note: Data for China, India and Brazil were elaborated within the project, following a complex procedure of harmonization of data sources. This harmonization merged together M&A and minority data from two different data sources (BvD Zephyr and Thomson Reuters SDC Platinum) and took into account misspellings and mistakes in country of origin and destination. For the other countries, the data reflect the breakdown of totals in the original data sources (FDiMarkets for green field and BvD Zephyr for M&A and minority investment). Source: EMENDATA

Table A3.3
Top target countries of emerging countries' FDI in Europe (2003–2011)

Target countries	Total deals	Green field FDI	M&A	Minority investment
UK	925	525	259	141
Germany	702	570	110	22
France	276	167	86	23
Spain	227	171	38	18
Netherlands	218	109	82	27

Source: EMENDATA

Table A3.4

Top target sectors of emerging countries' FDI in Europe (2003–2011)

Target sector	Total deals	Green field		Minority investment
		FDI	M&A	
Financial services	436	352	51	33
Other services	304	0	199	105
Chemicals and pharmaceuticals	262	118	119	25
Software & IT services	259	259	0	0
Metals	237	128	79	30

Source: EMENDATA

Table A3.6

Chinese, Indian and Brazilian FDI in the EU-27, by target country (2003–2011)

Target country	Chinese FDI			Indian FDI			Brazilian FDI		
	Total	Green field	M&A	Total	Green field	M&A	Total	Green field	M&A
Germany	304 (36)	268 (40)	32 (24)	163 (17)	96 (18)	63 (17)	9 (6)	6 (7)	2 (4)
United Kingdom	144 (17)	108 (16)	28 (21)	391 (41)	225 (43)	146 (38)	21 (13)	16 (18)	5 (10)
France	74 (9)	50 (7)	20 (15)	65 (7)	30 (6)	30 (8)	21 (13)	13 (14)	8 (16)
Netherlands	53 (6)	32 (5)	17 (14)	51 (5)	30 (6)	21 (5)	9 (6)	4 (4)	5 (10)
Italy	47 (6)	33 (5)	11 (8)	47 (5)	14 (3)	29 (7)	7 (4)	2 (2)	5 (10)
Other EU countries	219 (26)	182 (27)	23 (18)	232 (25)	125 (24)	96 (25)	90 (57)	49 (54)	24 (49)
EU Total	841 (100)	673 (100)	131 (100)	949 (100)	520 (100)	385 (100)	157 (100)	90 (100)	49 (100)
World Total	2715	2092	623	2849	2559	290	830	557	225

Note: Includes Spain and Portugal. % in brackets. Totals also include minority investments.

Source: EMENDATA

Table A3.7

Chinese, Indian and Brazilian FDI in the EU-27, by sector and typology (2003–2011)

Chinese FDI	Green field	M&A	Minority Investment	Total
Electronics	114	9	5	128 (15)
Machinery & engines	79	30	5	114 (14)
Communications	97	0	0	97 (12)
Automotive	49	13	0	62 (7)
Other sectors	334	79	27	440 (52)
EU TOTAL	673	131	37	841 (100)
Indian FDI				
Software & IT	134	58	5	197 (22)
Business services	79	36	3	118 (12)
Biotechnology & pharmaceuticals	41	48	6	95 (10)
Financial services	73	5	1	79 (8)
Other sectors	193	238	29	460 (48)
EU TOTAL	520	385	44	949 (100)
Brazilian FDI				
Food & tobacco	11	13	0	24 (15)
Financial services	11	3	5	19 (12)
Metals	10	4	2	16 (10)
Textiles	14	2	0	16 (10)
Other sectors	44	27	11	82 (52)
EU TOTAL	90	49	18	157 (100)

Source: EMENDATA

Table A3.8

Investments of Chinese, Indian and Brazilian MNEs in the EU-27 (2003–2011)

NO. OF INVESTMENTS	CHINESE MNES	INDIAN MNES	BRAZILIAN MNES
1 GREEN FIELD	336 (68)	144 (33)	35 (40)
1 M&A	58 (12)	139 (32)	21 (24)
> 1 GREEN FIELD	60 (12)	40 (9)	7 (8)
> 1 M&A	11 (2)	37 (9)	3 (3)
MIXED STRATEGY	30 (6)	72 (17)	21 (25)
TOTAL	495 (100)	432 (100)	87 (100)

Note: % in brackets

Source: EMENDATA

Table A3.9

Main Chinese, Indian and Brazilian MNEs in the EU-27 – No. of deals (2003–2011)

Chinese MNEs	Green field	M&A	Total
Huawei Technologies	52	0	52
ZTE	24	0	24
China National Chemical	13	9	22
Industrial and Commercial Bank of China (ICBC)	15	0	15
Shanghai Automotive Industry Corporation (SAIC)	8	3	11
Suntech Power Holdings	9	1	10
Indian MNEs			
Tata Group	62	9	71
Mahindra Group	11	11	22
Wipro	15	5	20
Reliance	10	6	16
State Bank of India (SBI)	13	0	13
Suzlon Energy	8	4	12
ICICI Bank	11	0	11
Infosys Technologies	11	0	11
Punjab National Bank (PNB)	11	0	11
Ranbaxy Laboratories	5	5	10
Brazilian MNEs			
Participações Morro Vermelho S/A.	12	1	15
JBS	0	8	8
Gerdau	6	0	7
ITAU	3	1	6
Marfrig	4	2	6

Source: EMENDATA

Table A6.1

Cross-border collaborations in patents

	Brazil	China	India	Total	
Domestic	322	3,474	1,306	5,102	98%
Cross border	30	42	41	113	2%
Total	352	3,516	1,347	5,215	
	7%	67%	26%		

Source: Giuliani, Martinelli and Rabellotti (Forthcoming)

Annex 3. Overview of cases

Automotive sector

AUTO1 is more than half a century old and is a leading manufacturer of commercial vehicles in India. For the first 40 years, AUTO1 predominantly built vehicles based on technology from a European partner with small incremental innovations. From the 1990s, AUTO1 built its capabilities to redesign its vehicle platform for the Indian market by undertaking frugal innovation. This was a first step in focusing on the “second hemisphere” (i.e. parts of Asia, Africa and South America) with similar market requirements to India. As part of this focus, AUTO1 made multiple TFDIs in Europe, because “they had know-how in India, but the know-why exists in Europe”.

The case study focused on a green field investment in Germany in the area of emissions control. German policy is protective of the local workforce, which hindered transfer of knowledge/IP and the attainment of price reduction. Despite the restrictions in Germany, it is considered to be among the best destinations (along with Austria, Sweden and the UK) for the automotive industry. The motivation for this investment was the emerging regulation of emission control in India, its associated high-cost impact on commercial vehicles (3,000 to 4,000 euros per vehicle) and the need to serve global customers in accordance with the stringent Euro VI standards.

When a planned acquisition did not go through, AUTO1 hired two key employees from the target company and set up its own subsidiary in Dortmund, considered the “Silicon Valley of combustion engineering”. The subsidiary is run as an independent German company with R&D in Germany and with manufacturing plants in Germany and in India. With an R&D team 150 strong, the subsidiary contributes to new technologies and job creation in Dortmund; indeed, the city mayor visited the subsidiary to acknowledge its role in rejuvenating the old steel town. The German subsidiary is a global leader in the area of emission control and its patented technology has helped it to win customers in Europe, Japan and China.

The movement of personnel between the HQ and subsidiary has deliberately been limited, with a focus on first achieving a position of prominence. The subsidiary collaborates with local universities, laboratories and the local Fraunhofer Institute.

AUTO2 is a state-owned industrial corporate established in 2010 with a complete portfolio of vehicle manufacturing, component manufacturing, vehicle service and trade and vehicle R&D, as well as other business, such as education and finance. Its main products are passenger vehicles, buses and jeeps. The target market of AUTO2

is mainly China and other emerging and developing countries, as well as Eastern European countries. AUTO2 produces vehicles and components in 11 countries. It has had joint ventures with world leading automobile producers in Germany, the US and Korea since the 1980s, as well as with Russia and South Africa later on. It has a components factory in the Netherlands and many assembly factories in Iran, Kenya, Pakistan, Myanmar, Malaysia and Indonesia. AUTO2 has one domestic R&D centre and three R&D centres in the Netherlands and Italy for component and new energy vehicle design.

One of the TFDIs of AUTO2 investigated in this study was the acquisition of a Dutch roof system producer. The Dutch company was sold to AUTO2 by the then owner for financial reasons. After the acquisition, AUTO2 expanded its business to manufacturing a vehicle roof system that it had not previously been able to produce. Another important reason for the acquisition was to grow considerably in a short period of time to undertake an IPO. After the acquisition, the Dutch subsidiary experienced fast growth in both innovation and production. The CEO of the Dutch subsidiary attributes the fast growth to the strategic guidance from HQ, which strongly prioritizes innovation and aims to be a technology leader rather than a follower. The European CEO of the subsidiary is designated as the board member for the whole AUTO2 group, which is rare in state-owned companies in China. Following its acquisition by AUTO2, the Dutch subsidiary is now building a new R&D centre in the Netherlands and has opened a new factory in Slovakia.

The other TFDI of AUTO2 investigated was a technology buy-out in Sweden. AUTO2 initially tried to buy a bankrupt Swedish automobile company in its entirety. The target company was once a technology leader in Europe. However, due to the strict Swedish labour law and the strength of the Swedish union, which greatly increased the cost of acquisition, AUTO2 decided only to acquire three vehicle manufacturing platforms, including infrastructure, technology and IP rights. This is the only case that reported an “unfriendly” investment environment in our interviews. Even though the company hired a technological team from the Swedish company to help it install the manufacturing platforms in China, it still had some difficulty understanding and grasping the technology acquired owing to the sizable gap in technological capability between AUTO2 and the acquired European company.

AUTO3 is a state-owned company which was established in 1996 as a farm tractor manufacturer and made an IPO in 1998. Its main products are business and passenger vehicles, such as buses, trucks, minivans and SUVs. AUTO3 operates with mainly Chinese customers and international customers in emerging and developing countries. Currently, AUTO3 is also developing markets in Russia and Eastern European countries. AUTO3 has 40,000 employees and is the largest new energy vehicle manufacturer in China. It has assembly factories in over 20 countries and exports to over 80 countries. It has two joint ventures for engine production and medium- and heavy-duty truck production with world leading companies in Germany and a sales company in India. Its two HQs are in China and Russia and it

has one domestic R&D centre and three international R&D centres in Japan, Taiwan and Germany. AUTO3 collaborates with companies in the US, UK, Germany, Japan, and Korea for R&D.

The TFDI investigated was a green field R&D centre in Germany. The plan was to develop R&D in battery and electronic control systems, but not much progress had been made in the two years since it was established. A group of Chinese managers and engineers were sent to Germany to start up the R&D centre. The company attributes the slow progress to lack of familiarity with the local environment, particularly with regard to cultural and social aspects. They also mentioned the negative influence of the local media's reporting. Now the German R&D centre is used as an antenna to collect technological information (particularly from Daimler) and to recruit talent rather than engaging in R&D. AUTO3 has adopted a careful trial-and-error approach to TFDI to see what works and how it works. If it succeeds, the company will continue more aggressively.

ICT sector

ICT1 is among the largest exporters of ICT services from India, with thousands of employees, and it has made multiple TFDI investments in Europe to develop its R&D service offerings. In order to enhance its IP portfolio, allowing it to offer comprehensive analogue, digital and radio frequency solutions for connectivity, such as wireless LAN, Bluetooth and USB, ICT1 started looking for acquisitions. This was because analogue skills in particular were non-existent in the company.

The subsidiary became a target as it had wireless LAN IP and strong analogue mixed signal hardware design competencies and it was engaged with major European customers. At the time of acquisition, the subsidiary had 150 employees across Austria, France and Germany and 25 patents (compared to eight in comparable areas with ICT1), with a business mix of IP licensing and R&D services. The team was drawn from across leading universities in Europe, had strong research capabilities and participated in standard bodies.

While the acquisition gave ICT1 immediate access to advanced and world leading innovation, the TFDI did not work as envisaged, especially the IP licensing business. On the one hand, there were issues at the subsidiary. As a result of the departure of a key European customer following acquisition, the engineering business of the subsidiary funding the IP business could no longer support it. Second, as the radio frequency technology of the subsidiary was not mature, a delay in the commercialization of IP by customers affected revenue flows from royalties.

However, the larger problem was the lack of absorptive capacity in ICT1. This was evident in two ways. First, despite mobility in both directions, with three senior employees positioned on a long-term basis at the subsidiary and six to seven people from the subsidiary going to India every year, the difference in the technical

capabilities between the experienced European team and the junior Indian team could not be bridged. Second, the sales team of ICT1, which had acquired a global stature by providing labour-intensive ICT services on a time and material basis, took over sales at the subsidiary. However, pricing and selling IP required different competencies. Furthermore, when European customers saw Indian sales teams, they inevitably tended to demand hourly Indian rates rather than the rates previously charged by the acquired firm for R&D services. As the IP business withered and the subsidiary began to focus more on providing R&D services, the emphasis shifted to cost over technology, undermining the logic of the acquisition. Ironically, the subsidiary had chosen to be acquired by ICT1 instead of a large US firm because it feared that its technical capabilities would be eliminated and also because it was impressed by the managerial capabilities of ICT1. But these capabilities alone could not prevent the slow death of technical capabilities in the subsidiary.

ICT2 is a mid-sized ICT services company with a focus on the telecommunications sector. It undertook two TFDI initiatives in Europe to access technologies it did not previously have and to deepen engagement with key customers. It acquired a subsidiary for wireless connectivity technology in Germany. As ICT2 had competence in mobile software and was capable of advanced innovation, it could have built its capability in wireless connectivity internally, but this would have taken too much time. However, the German operation was shut down as it was not cost effective for R&D services. While ICT2 won some semiconductor customers, based on the knowledge gained from the German team, ICT2 was unable fully to realize the potential of any scientific knowledge held by the subsidiary.

ICT2 made another investment to access mobile communication hardware capabilities in Finland. As ICT2 had no hardware capabilities, it could not have built the capabilities that the acquisition in Finland gave. Although the acquisition gave ICT2 no patents, it was driven more by the firms' competence and existing customer engagement. Unlike the German subsidiary, the Finnish subsidiary survived as it had its own sales team and could win niche business with high profit margins. The acquisition helped win complex mobile phone design projects based on the combined capabilities of the subsidiary and ICT2, the hardware team being in Finland and the software team and programme management in India. Although monitoring from the Indian HQ was minimal, the Finnish project management was not streamlined. Thus, there are monthly meetings to set objectives and lots of financial control.

There was some mobility of managers and engineers for short durations between ICT2 and the subsidiary, but the Finns did not want to spend long periods in India and nor did the Indians find it easy living in northern Finland. Although a few employees were sent on long-term transfers to Finland, the subsidiary felt they were quite invisible and did not bring any advantage. Yet, Finland is considered very supportive of TFDI and welcomed the ICT2 management.

ICT3 is a relatively recent start up, providing value-added telecommunications services. Their products are deployed in 56 countries and its ring-back tone is a big success. Inorganic growth has been part of the core strategy of ICT3 to access new markets and new technologies. The case is focused on two acquisitions in France.

In 2007, ICT3 acquired a firm that was a leader in SyncML-based phone address book back-up products with a fairly large European customer base. The firm had 75 employees and five million euros in revenue. The motivation for this acquisition was the need to address developed markets and to launch a cloud-based open phone book product in emerging markets. The acquired company was structured as a separate line of business with a common global sales team and achieved revenues of 18 million euros with core product development happening in France and the development team split equally between France and India. While the subsidiary had freedom with technology and product development for service offerings, it had to do a lot of reporting on the business and financial front to HQ.

In 2008, ICT3 acquired another company in France with a niche technology in speech recognition. ICT3 needed the capability to do searches in songs/music and to identify accents in local languages. The licensing of a speech recognition engine from an existing supplier was expensive and the supplier had become a competitor of ICT3. The acquired company was 10 years old, with 16 PhDs in a 25 member team, making a loss.

Since acquisition, the language model and application work has been done in India while the core algorithm work happens in France. However, ICT3 was unclear about how to capitalize on the speech processing expertise of the subsidiary beyond telecommunications. As a result, the focus of the subsidiary became solution development and offering services (providing different solutions with one product) to meet the demands of customers and markets in the telecommunications sector. Yet, customers' demands were not used to generate new product ideas for the future. ICT3 also had no patenting strategy. Even though the subsidiary proposed building a patent portfolio, no patents were filed after acquisition. The subsidiary had two important technological partnerships with a university and an industry partner, but those slowly died as there was no incentive to continue investing in technology. These circumstances led to the technical competence of the subsidiary *declining*, from being able to undertake advanced innovation to only intermediate innovation.

Several factors also led to knowledge flows between the subsidiary and HQ being unstructured. Among the reasons for this were the high attrition of technical staff in the HQ, too many layers and titles for staff and career development trajectories for engineers tilted towards managerial roles rather than engineering roles. Finally, there was also a lack of trust among the business/finance staff in the HQ and the leadership at the subsidiary.

However, there was also another aspect to the story. The ICT3 HQ was innovative when it came to business models. The employees of both the subsidiaries had feared that acquisition would lead to the loss of jobs but this never happened. Despite the idea that they would not learn anything from India, they learned how to

enter new markets – especially in Asia – and how to develop innovative business models.

ICT4 is an ICT service provider comprising a merger of two companies in 2012. It is headquartered in China and the US. It provides consulting service and solutions, such as business intelligence, business process management, cloud services, customer relationship management digitization, offshore development centres and product globalization services. It offers outsourcing services, such as application development and maintenance, business process outsourcing, enterprise application services, IT infrastructure management, outsourcing strategy, product engineering services, product localization services and testing services. Its main customers are banking and financial companies, energy and utilities companies, government, education, health care, insurance, life sciences, manufacturing, retail and distribution, technology, telecommunications and mobile communications, travel and transportation companies. ICT4 has over 21,000 employees and is the largest software outsourcing company.

The TFDI investigated was the acquisition of a Spanish company with localization skills and language skills that fit the needs of ICT4's international operation. A service provider such as ICT4 usually follows its clients, which is not considered a TFDI. Such firms go to where the clients are located; thus, ICT4 follows its Chinese clients who have operations in Europe and helps them to localize their operations in Europe. ICT4 is welcomed by the government of Spain because it helps Chinese firms to invest and locate in Spain. ICT4 had the necessary knowledge and skills in its business, but needed to present itself in Europe to cover the difference in time zones and establish a global image. It has its own technology and entered Europe to search for complementary assets in order to exploit its existing technological capabilities.

ICT5 was established in 1998 and launched a Nasdaq IPO in 2010. It provides content delivery network (CDN) services and cloud services. Its main customers are those involved in media and online games, e-commerce, internet and software services, mobile internet, enterprises, financial institutions and government agencies. ICT5 has over 700 employees. It is a fast growing company with an annual growth rate of 38.4% in 2007–2012. It has the largest market share, with far more than its competitors in China. ICT5 has 15,000 servers and switches in over 110 cities across 14 countries. It has eight net nodes in the US and three in Europe. ICT2 has two R&D centres in China and one in the US. It occupies a leading position in R&D in the industry, with 23 patents, 42 patent applications and 14 software copyright registrations.

The investigated TFDI was a green field investment in Ireland, which at the time of the research was so new that we could not investigate its impact. The most important factor in the choice of location was the favourable taxation policy, the second most important was proximity to European customers and the third was being

close to an Irish collaborator which they plan to acquire later. The target Irish company has interesting technology for content capture, which is based on an old generation of platform technology. ICT5 asked the Irish company to make it work on a new generation of platform technology. To show its commitment to the Irish company and also to monitor progress, ICT5 started up a branch in Ireland at the side of the Irish company. The TFDI was a fast decision because the industry itself is fast changing.

ICT6 was established in 1988. It is a leading company in management software, solutions and cloud service provision in China and the Asia Pacific region. Its core businesses are software and solutions for enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM), human resources management (HRM), business intelligence (BI) and office automation (OA). ICT6's customers are domestic clients and foreign clients entering the Chinese market. The firm has 60% of the Top 500 enterprises in China as its clients. It has over 100 subsidiaries and branches in China and abroad, including Hong Kong, Macau, Taiwan, Singapore, Malaysia, Thailand, Vietnam, Japan and Europe. ICT3 has over 13,000 employees of whom 6,500 are R&D staff. ICT6 has six domestic R&D centres.

The TFDI investigated was a joint venture with a French company. ICT6 has the core product technology and second mover advantage. It launches products based on a new generation of technology whilst its competitors continue to use old technology due to the high costs of changing for both the firms and their customers. The investment in Europe was not a TFDI, but rather aimed to make use of the market channel and marketing capabilities. Brand recognition in Europe is a major problem for ICT6 so it decided to use the new name of the joint venture when selling products in Europe.

Clean technology

CLEANT1 is among the world's largest wind turbine suppliers. It started manufacturing wind turbines under license but soon discovered that this was not sustainable in the long term. As the technical capability for wind turbines was non-existent in India, CLEAN1 made a green field investment in Århus, Denmark, in an R&D centre, to learn and build technological capabilities and to generate IP. It also acquired a local blade and gear manufacturing unit, which it integrated with the centre. Denmark was the preferred location because of its well-known advanced expertise in wind energy. Thus, the R&D of the blades, towers and turbines takes place in Århus, while the low-level design and manufacturing is located in India. By integrating the technical knowledge of the green field subsidiary in Århus with the acquired subsidiary, CLEAN1 hoped to offer a spectrum of solutions for the Indian,

European and global markets. However, CLEAN T1 did not succeed in addressing the European market with this strategy as there was little faith that an Indian firm could provide the technical assistance needed.

In early 2008, CLEAN T1 realized that land for wind turbines was limited and that the technology was moving off shore. To obtain this technology, they acquired a firm with 3,000 employees, headquartered in Hamburg and a leader in offshore wind turbines in Germany. To create a European front end, this acquisition has remained an independent firm in the CLEAN T1 group. The initial investment was 65% but under German law they could only access the technology if they had close to 100%, so they converted the acquisition to 100% in 2011.

CLEAN T1's technical capability increased from basic innovation to intermediate innovation after the establishment of the R&D centre in Denmark. The German acquisition gave it advanced innovation capabilities. Any patent filed by the subsidiary remains with it, which is a way to giving customers confidence. Although the managerial capabilities are similar in India and Europe, the teams in India are better at managing scarcity, chaos and difficult infrastructures. There is little mobility between the subsidiaries and the parent, except at the CEO level, but there is mobility between the R&D centre in Denmark and the parent.

CLEAN T2 is a private company established in 1998, with IPOs in 2007 and 2010 in two different stock markets. Its main businesses are wind turbine R&D, design, manufacturing and sales. It also offers services including wind resource assessment, EPC contracting, operations and maintenance, and wind farm investment. CLEAN T2's customers are mainly in China, Africa, Europe, America and Australia. It has around 5,000 employees. CLEAN T2 is a fast growing company with over 100% annual growth rate between 2000 and 2007 and a net profit growth rate of 150–200% in 2013. CLEAN T2 has operations in six countries, including a manufacturing factory in Germany where it also acquired an R&D centre. It is the largest wind turbine company in China and has two HQ bases in China and three in the US, Germany and Australia. CLEAN T2 has one R&D centre in China and one in Germany.

The TFDI investigated was the acquisition of a small design company in Germany. The collaboration started from the time when CLEAN T2 bought products from a German company, the owner of which recognized that CLEAN T2 would be the best partner in the future. He left the original German company and joined another, where he started to collaborate with CLEAN T2. Five years later CLEAN T2 established a manufacturing company alongside the German collaborator. The next year CLEAN T2 bought 70% of the German company. After the acquisition, both the Chinese HQ and the German subsidiary increased their technological capability thanks to the complementarity between the manufacturing technology of CLEAN T2 and the design capability of the German subsidiary. Mutual trust and understanding between the owners of CLEAN T2 and of the acquired German company, built up

during the previous collaboration, was considered to have been a crucial factor in the success of the acquisition.

CLEANT3 is a private company established in 2007. It offers technology solutions including wind turbine R&D, manufacturing, sales and maintenance, smart grid, wind farm management, wind power asset management, and energy management systems and services. CLEANT3 has successfully addressed Chinese market and is now expanding its market share in both Europe and North America. CLEANT3 has around 700 employees of whom 20% are international staff and 80% are R&D and technology personnel. CLEANT3 has its HQ, manufacturing centre and one R&D centre in China. It has four international R&D centres in Denmark, the US and Japan.

The TFDI investigated was a green field R&D centre in Denmark, a hotspot in the windmill energy industry with many world-leading wind energy companies clustered there. The R&D centre was established in 2010. The CEO of CLEANT3 was attracted by the technology that Gamesa had at the time. CLEANT3 hired a former manager from Gamesa as the director of its Danish R&D centre. Many of the key staff at this R&D centre previously worked for other leading multinational companies in the industry, such as Vestas, Siemens, Gamesa and Suzlon. Only one year after the establishment of the R&D centre, CLEANT3 developed a new offshore wind turbine prototype in Denmark and rented a large production site there to assemble the new product. Since then, the Danish R&D centre has collaborated closely with the Chinese HQ on both regular R&D and breakthrough innovation. It has applied for 39 patents. One of the most distinctive innovations is the E128, a 3.6 MW two-bladed direct drive wind turbine designed particularly for the South China Sea, where typhoons frequently occur. CLEANT3's Chinese CEO and its Danish R&D centre director have a good personal relationship and they have reached a strong consensus over their years of collaboration to develop new products and services with world-class technology, European quality and at Chinese prices. The intensive collaboration on innovation between the Chinese HQ and the Danish R&D centre is facilitated by frequent personnel mobility, which is not only for co-development but also for technology training.

Annex 4. List of complete publications from the project

Papers published or accepted for publication

- Alvandi, K., Chaminade, C., Lv, P., 2014, “Commonalities and differences between production related FDI (PFDI) and technology-related FDI (TFDI) in developed and emerging economies”, *Innovation and Development*.
- Amighini, A. Cozza, C., Rabellotti, R. & Sanfilippo, M., 2014, “Investigating Chinese outward foreign direct investments: How can firm-level data help?”, *China & World Economy*, 22(6), 44–63.
- Amighini, A. & Franco, C., 2013, “A sector perspective on Chinese FDI: The automotive case”, *China Economic Review*, 27, 148-161.
- Amighini, A. & Gorgoni, S., 2013, “The international reorganization of auto production”, *World Economy*.
- Amighini, A., Rabellotti R. & Sanfilippo, M., 2013, “Do Chinese state-owned and private enterprises differ in their internationalization strategies?”, *China Economic Review*, 27, 312-325.
- Amighini, A., Rabellotti, R. & Sanfilippo, M., 2013, “China’s outward FDI: An industry-level analysis of host-country determinants”, *Frontiers of Economics in China*, 8(3), 903-936.
- Chaminade, C., Castellani, D. & Plechero, M., 2014, *The emergence of China and India as new innovation power houses. Threat or opportunity?* Stockholm: Entreprenörskapforum.
- Chaminade, C. & Plechero, M., 2014, “Do regions make a difference? Exploring the role of different regional innovation systems in global innovation networks in the ICT industry”, *European Planning Studies*.
- Chaminade, C. & Plechero, M., 2013, “The influence of micro-characteristics and the region in different modes of globalization of innovation: A comparative study of the Pune region and the Beijing region”, *Industry and Innovation*, 20(7), 661-682.
- Crescenzi, R., Pietrobelli, C. & Rabellotti, R., 2014, “Innovation drivers, value chains and the geography of multinational corporations in Europe”, *Journal of Economic Geography*, 14(6), 1053-1086.
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- Lv, P., Plechero, M. & Basant, R., 2013, "International competitive strategy choices: Comparing firms in China and India", *Asian Pacific Business Review*.
- Pietrobelli, C., Rabellotti, R. & Sanfilippo, M., 2012, "What drives Chinese multinationals to Italy?" in Crescenzi R. & Percoco M. (Eds.), *Geography, institutions and regional economic performance*, Springer.
- Piscitello, L., Rabellotti, R. & Scalera, V. G., 2014, "Chinese and Indian acquisitions in Europe: The relationship between motivation and entry mode choice", in Risberg, A., King, D. & Meglio, O. (Eds.), *The Routledge companion to merger and acquisition*. London: Routledge (*accepted*).
- Xu, C. & Lv, P., 2013, "The impact of globalisation on innovation and innovation performance", *Management Review*, 25(9), 40-50 (*in Chinese*).

Papers in progress

- Amighini, A., Cozza, C., Giuliani, E., Rabellotti, R. & Scalera, V. G., "Technology-driven FDI: A survey of the literature", CIRCLE Working Paper no. 2013/17, Lund University, submitted to a journal.
- Amighini, A. & Gorgoni, S., "An analysis of high-tech and low-tech global production networks: What role for China and the UK?"
- Amonedolagine, V., Giuliani, E., Martinelli, A. & Rabellotti, R., 2015, "The impact of international collaboration between BIC EMNEs and the EU: A patent data assessment", mimeo.
- Chaminade, C., Cozza, C. & Trippel, M., "Dynamics of TFDI of EMNEs in Europe: A regional perspective", working paper.
- Chaminade, C., Hansen, T. & Parthasarathy, B., "Strategies and impact of TFDI in Europe by Chinese and Indian firms", working paper.
- Chaminade, C. & Parthasarathy, B., "Broken dreams – the negative impact of acquisition of EU firms by Indian companies", working paper.
- Dantas, E. & Meyer, N., "The changes in the institutional frameworks for investment in Europe in a context of increasing technology-oriented foreign direct investment from emerging economies", working paper.
- Dantas, E. & Meyer, N., "Changing institutions governing investment in Germany: The role of rising technology-oriented foreign direct investment from emerging economies", working paper.
- Dantas, E., Meyer, N. & Stehnken, T., 2013, "Growing outflows of technology-driven FDI from emerging economies and the implications for the international investment regime", Fraunhofer ISI Discussion Papers No 38, Fraunhofer ISI, Karlsruhe.

- Giuliani, E., Martinelli, A. & Rabellotti, R., 2014, "Is co-invention expediting technological catch up? A study of collaboration between emerging country firms and EU inventors", CIRCLE Working Paper no. 2014/25, Lund University.
- Liu, J. & Lema, R., "Technology-driven FDI as a learning process for innovation: A case study of Chinese wind power companies", working paper.
- Lv, P., "Ownership, knowledge, network and innovation performance: Evidence from China's ICT Sector".
- Lv, P. & Guo, C., "Home country-based driving forces of FDI location choices: Evidence from Chinese OFDI of listed companies", working paper.
- Lv, P., Guo, C. & Yang, G., "How corporate governance affects foreign market entry mode choices. Evidence from Chinese OFDI of listed companies in main EU countries", working paper.
- Lv, P. & Spigarelli, F., "Going green: Chinese OFDI in the European renewable energy sector".
- Lv, P. & Zhu, S., "The impact of home country regional institutional factors on firms' foreign market entry mode decision", working paper.
- Piscitello, L., Rabellotti, R. & Scalera, V. G., "Chinese and Indian M&As in Europe: The relationship between motive and ownership choice", CIRCLE Working Paper no. 2014/3, Lund University.
- Piscitello, L. & Scalera, V. G., "Acquisitions and greenfield investments by Chinese and Indian firms in Europe: A comparative analysis of knowledge-sourcing strategies".
- Piscitello, L. A. & Scalera V.G., "Chinese and Indian M&As in Europe: An analysis of strategic motivations".
- Piscitello, L. & Scalera V. G., "The internationalisation of R&D by emerging MNEs: What is really new?"
- Scalera, V. G., "Knowledge-intensive acquisitions by firms from emerging countries in Europe: The role of corporate governance and experience in the ownership choices".