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Policies to benefit from the globalization of corporate R&D: An exploratory study for EU countries

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Abstract

This article explores how the globalization of corporate R&D has led to the emergence of new policy strategies across the EU, involving a more proactive role of governments and a closer connection between innovation policies and FDI promotion policies. The first part presents an analytical framework encompassing the main policy objectives and instruments at stake, which aims at facilitating the design and evaluation of policies geared towards the globalization of corporate R&D. Both the policies to attract inward FDI in R&D and those towards R&D offshoring are addressed, as well as the distinct policy implications of alternative entry modes. The second part provides evidence of the evolution of European policies in response to the globalization of corporate R&D, pointing out a set of country-specific examples and suggesting avenues for policy intervention at the EU level. Although the focus is on the EU, this study may inform policy learning in other developed and developing countries alike.

Keywords

R&D;

FDI;

Innovation policy;

Globalization;

European Union

1. Introduction

Since the globalization of corporate R&D is a somehow ambiguous concept, it is important to clarify from the beginning that in this article it will be used to refer to the high and increasing share of R&D activities that multinational corporations (MNCs) are performing through their international network of subsidiaries. Indeed, although this terminology is widely used in the literature (e.g. [Florida, 1997](#), [Gerybadze and Reger,](#)

1999 and Hedge and Hicks, 2008; Reddy, 2000) other authors have shown preference for the term ‘internationalization of R&D’ to refer to the same phenomenon (e.g. Dunning and Lundan, 2009, Edler, 2008 and OECD, 2008) and yet others have come up with the concept of ‘metanational innovation’ to refer to the situation where MNCs put in place a “truly integrated innovation chain (...) that transcends local clusters and national boundaries” (Santos et al., 2004: p.31). Other related concepts are the ‘international collaboration in R&D’ and the ‘international exploitation of national innovations’, but the key difference is that the globalization of corporate R&D implies higher cross-border interdependence, as it involves the generation of innovations from a global platform owned by a single entity, an MNC, rather than the collaboration or transfer of technology between independent entities from different countries (Archibugi and Iammarino, 1999).

The globalization of corporate R&D has major implications both for the MNC and for territories, either as sources or as recipients of foreign direct investments (FDI) in R&D. From the MNC perspective, it is widely acknowledged nowadays that R&D is gradually evolving from a centralized and hierarchical function of corporate supply chains towards one that builds upon a network of geographically dispersed R&D centers (Cantwell and Molero, 2003, Economist Intelligence Unit (EIU), 2007 and Pearce, 1999). This brings along new corporate management challenges and also opens up new windows of opportunity for the subsidiaries of MNCs, which are now more likely to become involved in innovative activities. However, the focus of this paper will not be on corporate strategies, but rather on national policy implications.

From the host country (or inward) perspective, in 2004 the foreign subsidiaries of multinational companies accounted for over 16% of domestic business expenditure in R&D in OECD countries, a significant increase from around 11% in 1994 (OECD, 2007). Since R&D across the world is very concentrated in MNCs, their location decisions have a major impact on the global distribution of R&D activities (Jaruzelski and Dehoff, 2008). This helps explain the growing importance attached to attracting the R&D of MNCs by governments worldwide.

From the home country (or outward) perspective, R&D offshoring by national firms is often perceived as an undesired outcome, since it may come at the expense of less R&D activity at home. But at the same time it also represents an opportunity for national firms to catch-up with the technological frontier. European investments in Silicon Valley during the 1990s and the establishment by Japanese auto companies of R&D facilities in the US since the 1960s are common examples of the latter, while a more recent example concerns multinationals from emerging markets tapping into foreign sources of knowledge through FDI.

Most international investment in R&D is still confined to developed countries, both as host and as home countries, but the importance of emerging countries is rising, especially due to the growing relevance of China and India in global innovation networks (Bruche, 2009 and Kroll and Schiller, 2010). Another important trend concerns the growing importance of international R&D investments aimed at tapping into new knowledge relative to those aimed merely at adapting a product or production process to a different country (Carlsson, 2006).

As MNCs expand their international R&D activity, national innovation systems are becoming more linked to global innovation networks and more dependent on foreign decision makers. At the global level this is expected to result in net benefits by enabling a more efficient allocation of R&D inputs and by reducing fragmentation and duplicities (OECD, 2008). But the international distribution of such net benefits remains uncertain and represents a concern for some peripheral countries, which risk losing control and being marginalized. Altogether, the response to the globalization of corporate R&D has become a more significant issue for the governments of developed and developing countries alike.

This article combines contributions from the international business literature and from the innovation systems framework in order to better address the policy implications of the globalization of corporate R&D. In particular, the main objective is to explore the policy strategies to benefit from the globalization of corporate R&D that have emerged in recent years in the EU. The analysis builds upon a review of official documents published by the European Commission and the member states (white papers, reports from expert groups, promotional documents, websites, etc.); personal interviews with policy-makers and subsidiary managers in Spain and Ireland (21 semi-structured interviews in Spain and Ireland from 2006 to 2008 plus multiple informal conversations); an analysis of OECD statistics on the R&D expenditure of foreign subsidiaries; and a review of a selection of recent publications in this stream of research (focusing on the most policy-relevant results). The following section classifies and discusses the main policy objectives and instruments to benefit from the globalization of corporate R&D. Subsequently, Section 3 analyzes the case of EU countries, building on the hypothesis that the globalization of corporate R&D is leading to the emergence of a new form of discourse and a new portfolio of policies geared towards the attraction of internationally mobile R&D. Finally, Section 4 provides some concluding remarks.

2. The policy framework

The globalization of corporate R&D is a highly heterogeneous process. In particular, it is essential to consider the different motivations and entry modes behind the location of internationally mobile R&D in order to better frame its policy implications.

On the one hand, with regard to the different motivations, the academic literature distinguishes between demand driven (or asset-exploiting) and supply driven (or asset-augmenting) forces behind the globalization of corporate R&D. Demand driven FDI in R&D is closely connected to the internationalization of manufacturing operations and primarily oriented towards the adaptation of products and processes to overseas markets. Supply driven FDI in R&D involves tapping into foreign sources of knowledge and specialized clusters, as well as searching for cost efficiency. FDI in R&D was primarily demand driven in the past, but in recent years supply driven motivations have become increasingly important (Cantwell et al., 2004, Carlsson, 2006, Hedge and Hicks, 2008 and Kumar, 2001). Furthermore, the location factors vary widely across sectors and companies and are highly influenced by the type of R&D activity (Sachwald, 2008). In the case of some specific R&D activities and contexts, such as medical trials in the least developed countries, FDI in R&D may represent a threat to human rights for the host country (Shah, 2007).

On the other hand, with regard to alternative entry modes, the globalization of corporate R&D can be interpreted along the lines of the so-called Uppsala model of internationalization (Johanson and Vahlne, 1977), that is, as a sequential process whereby the manufacturing or customer support subsidiaries already located in the country get progressively engaged in R&D after accumulating the necessary knowledge, and later may increase the quality and scope of their R&D activity. In other words, FDI in R&D normally occurs through the evolution and expansion of existing subsidiaries rather than through purely greenfield investments (Costa and Filippov, 2008, Guimón, 2009, Mudambi and Mudambi, 2005 and Narula and Dunning, in press).

However, a large part of international investment in R&D occurs as a side effect of transnational mergers and acquisitions (Patel, 1997). In this case, both the impact on the national innovation system and the scope of policy intervention are markedly different. Indeed, when inward FDI in R&D occurs through the acquisition of a domestic firm with R&D activities by a foreign firm, the only short-term effect for the host country is a change of ownership, while the potential benefits are to be weighed against the risk that the acquirer ends up reducing the subsidiary's R&D mandate to avoid duplicities with other existing units. Thus, many governments are not interested in receiving FDI in R&D through acquisitions and may even act to protect their 'national champions' from foreign acquirers (Archibugi and Iammarino, 1999 and Cantwell et al., 2004). However, with few exceptions, this kind of protectionist policies is neither desirable nor compliant with international law.

The rest of this section classifies the different policies to benefit from the globalization of corporate R&D into four broad policy objectives and points out a set of specific policy instruments within each of those objectives (Table 1). By classifying and discussing briefly the main policy objectives and instruments at stake, the aim is to provide a useful framework for the design and evaluation of national policies to benefit from the globalization of corporate R&D. While the natural approach might be to maximize inward and minimize outward FDI in R&D, a more comprehensive approach should also consider the potential benefits of outward FDI in R&D. In addition, besides maximizing inward FDI in R&D, another objective should be to ensure that the national innovation system reaps the benefits associated with the presence of foreign MNCs.

Table 1.
A taxonomy of policies to benefit from the globalization of corporate R&D.

<i>Policy objectives</i>	<i>Selected policy instruments</i>
	• Improve universities and S&T infrastructures
Enhance the R&D investment climate	• Develop human capital and attract foreign talent
	• Provide fiscal and financial incentives to business R&D

Policy objectives

Selected policy instruments

	•	
		Promote collaboration both within the national innovation system and across borders
	•	
		Develop lead markets through public procurement
	•	
		Improve the intellectual property rights regime
	•	
		Target R&D in FDI promotion
	•	
Promote inward FDI in R&D		International promotion of national technological capabilities
	•	
		Pre-investment services
	•	
		Aftercare services
	•	
Absorb the benefits from inward FDI in R&D		Stimulate clusters around MNC subsidiaries and foster linkages (supplier upgrading and technology linkage programs)
	•	
		Promote collaboration through incentive schemes
	•	
Absorb the benefits from outward FDI in R&D		Set up overseas technology foresight units
	•	

Policy objectives

Selected policy instruments

Support international expansion of domestic research centers and universities

•

Incentives for temporary transfer of national researchers to foreign research centers of national firms

Table options

2.1. Policies to improve the R&D investment climate

In order to benefit from the globalization of corporate R&D, the main focus should clearly be to improve the quality of the national innovation system. This is a necessary requirement both for attracting inward R&D investment from abroad and for retaining domestic firms' R&D at home. It also enables the national innovation system to develop the absorptive capacity required for efficient learning from foreign sources of knowledge.

It follows that national innovation policies should become more sensitive to the factors that MNCs are looking at when deciding where to locate their international R&D centers and when rating alternative locations. The existing literature suggests that the main location drivers that may be influenced by policies are the following (e.g. Bas and Sierra, 2002; Cantwell and Iammarino, 2001; Dunning and Lundan, 2009; EIU, 2004; Jaruzelski and Dehoff, 2008; Jones and Teegen, 2003; Kuemmerle, 1999; Meyer-Krahmer and Reger 1999; UNCTAD, 2005):

•

The availability of skilled employees: this calls for policies to improve the education system as well as the capacity to attract international talent.

•

The quality of universities, research centers, technology parks and other science and technology infrastructures: this calls for additional public funding for R&D and for a more efficient governance of public research institutes.

•

Fiscal and financial incentives to corporate R&D: Governments aim at increasing the magnitude of incentives relative to other countries and at facilitating their implementation in the different stages of the R&D cycle.

•

The propensity to collaborate of the different agents of the national innovation system: this calls for policies such as offering incentives to research consortia to promote collaboration among firms and with universities.

•

The presence of lead markets in key technology areas: Governments can encourage foreign firms to engage in local R&D through public procurement.

•
A clear and enforceable intellectual property rights regime: this involves regulatory changes as well as the promotion of a culture more sensitive to intellectual property rights.

Other significant location drivers identified in the academic literature are largely exogenous to policies, such as the size of the market (Mansfield et al., 1979) or the upward influence and entrepreneurship of subsidiary managers (Ling et al., 2005).

2.2. Policies to increase inward FDI in R&D

Inward FDI in R&D can bring significant benefits to the host country by raising its technological capacity and enabling it to access foreign markets and to integrate more advantageously into global innovation networks (Cantwell and Piscitello, 2000, Carlsson, 2006 and Santangelo, 2005). Foreign subsidiaries often act as ‘anchor tenants’ in their host region, providing an opportunity for growth and technological upgrading (Agrawal and Cockburn, 2003). Among other impacts, the domestic R&D activity of foreign MNCs enables the transfer of tacit technological knowledge and may allow locally produced components to be incorporated more easily at the design stage of new products. The benefits of FDI in R&D comprise *direct* effects associated with the R&D activity of the subsidiaries, and *indirect* effects related to the impact of foreign subsidiaries on the local environment through different types of formal and informal linkages and spillovers (Audretsch, 2000, Görg and Strobl, 2001 and Narula and Dunning, in press). Based on the perceived benefits, the interest of policy-makers and the competition among countries to attract inward FDI in R&D have grown significantly (Bellak et al., 2010, Mudambi and Mudambi, 2005, OECD, 2008 and UNCTAD, 2005).

The first role of policies aimed at attracting FDI in R&D is to act upon the attraction factors of the territory, as discussed in Section 2.1. But another role of policies is to make those attraction factors more visible to the investment community and to influence the perceptions of decision makers, for example through marketing campaigns, missions, seminars and tailored services to foreign investors in R&D. Creating a specific agency to promote and facilitate inward FDI has now become a standard practice worldwide, after a substantial growth during the 1990s (OECD, 2006). In a survey conducted by UNCTAD (2005) to a sample of 84 national investment promotion agencies (IPA), 55% declared that they actively promote R&D-intensive FDI (79% in developed countries and 46% in developing countries), which demonstrates the importance attached to R&D within FDI promotion policies.

Beyond general advertising of the country as an R&D location, IPAs normally offer customized services to foreign investors in R&D both before and after the actual investment, in order to facilitate the investment process. In the pre-investment phase it has become commonplace among the IPAs of developed countries to provide a short report or fact-sheet explaining the key features of the national innovation system, which may be tailored to specific sectors or technologies and distributed through different channels. IPAs also inform of the different incentives available, and may even be able to

negotiate and offer an incentive package before the actual investment takes place. In addition, IPAs often prepare visits of potential foreign investors to local R&D centers, universities and technology parks, as well as meetings with government officers and potential suppliers or partners.

On the other hand, post-investment or ‘aftercare’ services are aimed at supporting the transition of already existing foreign subsidiaries towards new (or higher quality) R&D activities, and are customized to the specific needs of foreign subsidiaries already present in the country (UNCTAD, 2007). According to Costa and Filippov (2008) IPAs tend to focus their resources on the attraction of FDI through pre-investment services, while very little is invested in aftercare. But aftercare services are deemed to be especially important in the attraction of inward FDI in R&D because, as argued earlier, MNCs normally engage in R&D abroad either sequentially or through the acquisition of an R&D-intensive foreign entity, but rarely through greenfield investments. Aftercare services to attract and embed the R&D of MNEs may include – but are not limited to – the following:

- - Assistance in applying to national R&D programs and other R&D incentives.
- - Assistance in forging technological alliances with universities and local firms.
- - Support in preparing proposals addressed to headquarters.
- - Assistance in recruiting local researchers and processing the necessary visas to bring employees from abroad.

Another critical role for IPAs targeting FDI in R&D is to provide policy advice to the government bodies responsible for formulating and implementing innovation policy based on the needs of R&D investors. IPAs hold a unique insight into the problems investors face and their impressions of the country as an investment location, based on which they should draw attention to different agents of the national innovation system to areas that are important for making a location more attractive to foreign investors. To be effective in their policy advocacy role, IPAs need to develop strong links with other government ministries and agencies, as well as with the local managers of foreign MNCs and business and professional associations.

2.3. Policies to absorb the benefits from inward FDI in R&D

Besides increasing inward FDI in R&D, a related policy objective is to reap the benefits associated with the existing stock of FDI in R&D by developing the *absorptive capacity* of the domestic innovation system and by stimulating linkages (Rama, 2008, Helmut and Nones, 2008 and Chaminade and Vang, 2008).

Absorptive capacity was defined by [Cohen and Levinthal \(1989\)](#) as the ability to acquire, assimilate and exploit knowledge developed elsewhere. Indeed, domestic firms must have a certain level of technological expertise to be able to absorb the potential externalities and spillovers related to the presence of foreign subsidiaries active in R&D. Thus, policies to upgrade reliability and quality in local firms are important. Improving the innovation system's absorptive capacity involves improving the quality of human capital, universities and national technological infrastructures and, in sum, all the different policies aimed at enhancing the R&D investment climate that were described in [Section 2.1](#).

A more proactive policy approach to reaping the benefits from foreign presence in national innovation systems consists in efforts to induce collaboration and linkages between foreign subsidiaries and national actors, with the aim of stimulating spillovers. Those linkages may take the form of collaboration in R&D projects, subcontracting or technological alliances ([Aitken and Harrison, 1999](#) and [Buckley et al., 2002](#)). The decisions of MNCs about local linkages are made by comparing the various options available to the MNC globally through their global network of suppliers and partners, and thus governments should not expect these to happen naturally. In this case, rather than by market failures, policy intervention is justified by 'systemic failures', in particular by the fact that it takes considerable time and costs for outsiders to become familiar with new institutions and local firms, in order to develop linkages with the innovation system ([Narula, 2002](#)).

A typical policy instrument is the design of technology linkage programmes to support the development of supplier networks and technology clusters around MNE subsidiaries. Another policy option is to design subsidies and tax incentives to FDI in R&D in a way that induces 'behavioral additionality' effects, in particular the propensity of MNE subsidiaries to collaborate with domestic actors in their R&D efforts ([OECD, 2006](#)). This kind of policies are closely related to aftercare services as described in [Section 2.2](#), although here the aim is not so much to attract new R&D activities as to influence the way in which those activities are conducted, in order to stimulate the formation of domestic linkages. This also implies that policy-makers should aim at attracting the kind of FDI in R&D projects that provide the greatest opportunity for linkages between foreign firms and other local actors.

2.4. Policies to absorb the benefits from outward FDI in R&D

The rationale for policy intervention in the case of attracting inward FDI in R&D and reaping its potential benefits is clear, but as suggested earlier outward FDI in R&D is a subject of more controversy. The concern is that outward FDI in R&D may have a high opportunity cost for the home country in terms of loss of domestic R&D activity. Therefore, policy-makers may be tempted to prevent national firms from offshoring their R&D activities through protectionist policies, for example by withdrawing public support or discouraging R&D investments abroad in other ways. But it is unfeasible in market conditions to place limits to the international expansion of national firms. The only option, then, is to improve the conditions for domestic R&D investment, with the hope that this will anchor at home the R&D activities of national firms. These kinds of policies to improve the R&D investment climate were addressed in [Section 2.1](#).

Moreover, fears over loss of qualified jobs and innovative capacity should not overshadow the potential benefits of outward FDI in R&D in terms of increasing the competitiveness of national firms (PRO INNO Europe, 2007). Indeed, outward FDI in R&D allows national firms to tap into foreign sources of knowledge, a process which has been characterized as ‘reverse technology transfer’ and includes the acquisition of foreign firms by national firms driven by the aim of acquiring specific knowledge and technology (Griffith et al., 2004 and Narula and Michel, 2010). In addition, when evaluating the potential impact for the home country it is important to consider the different kinds of outward FDI in R&D. For example, asset-exploiting FDI in R&D should not be seen as a threat to the home country, but rather as an opportunity, in the sense that it does not produce a ‘hollowing-out’ of the innovative base of the home country, but rather helps to enhance it (Dunning and Lundan, 2009). Similarly, if the R&D activities developed abroad are complementary (rather than substitutive) of those developed at home, then the hollowing-out concern is lower.

In view of the potential benefits, it would be advisable to develop new policy approaches to benefit from outward FDI in R&D, which have been largely neglected so far by policy-makers (Edler, 2008). Along these lines, Dunning and Lundan (2009) sustain that home country governments have an important role to play by fostering institutions that support the development of the kind of management and organizational skills that enable successful reverse technology transfer from outward FDI.

A first policy dilemma is whether the R&D activity abroad of domestic firms should be eligible for national fiscal and financial incentives to R&D. In some cases, such as Spain, overseas R&D is eligible only to a certain limit.

Following are some additional examples of specific policy instruments to assist domestic firms in their R&D activities abroad and to facilitate reverse technology transfer:

- Setting up overseas technology foresight units, within Embassies or investment promotion agencies.
- Promoting the expansion of domestic research centers and universities to foreign locations where domestic firms are locating their R&D activity.
- Providing incentives to the temporary transfer of national researchers to the foreign research centers of domestic firms.

3. Policies to benefit from the globalization of corporate R&D in the EU

Building on the previous section, the focus here is to explore in further detail how the globalization of corporate R&D is leading in recent years to the development of new policy strategies across the EU. After providing some empirical evidence revealing the increasing relevance of foreign subsidiaries in European innovation systems, the rest of

this section characterizes the evolution of policies in the EU, including a set of country-specific examples and some suggestions for policy intervention at the EU-level.

3.1. The relevance of foreign subsidiaries in European innovation systems

Table 2 shows the share of foreign subsidiaries in total business R&D expenditure in 14 EU countries, ranked from the lowest to the highest value in 2006. The countries in the sample represent 87% of the total population of the EU. For the 13 remaining EU countries, the information is not available from the source used. In all the EU countries in the sample the indicator is higher than in the US and it is also much higher than in Japan, while Canada shows a similar degree of internationalization to the EU average. However, it needs to be stressed that figures for EU countries include intra-EU flows of R&D, whereas in the case of the US intra-State flows are excluded.

Table 2.
R&D expenditure of foreign subsidiaries (% of business expenditure in R&D).

	1994	2006	% Change ^a
Finland ^a	13.9	17.0	22.3
France	14.2	20.8	46.5
Poland ^b	10.3	21.7	110.7
Italy	–	26.6	–
Netherlands ^{bc}	20.4	27.5	34.8
Spain ^{adc}	30.0	35.6	18.7
Germany ^{adc}	13.0	38.3	194.6
United Kingdom	29.1	38.4	32.0
Sweden ^{ad}	19.3	42.3	119.2
Portugal ^{dc}	–	47.4	–
Belgium ^d	–	56.8	–
Hungary ^d	22.6	57.8	155.8
Czech Republic ^b	20.9	58.6	180.4
Slovakia ^{dc}	4.1	64.1	1 463.4
Ireland ^{adc}	66.8	75.9	13.6
<i>EU average</i> ^f	23.7	38.5	90.1
<i>International comparison</i>			
Canada ^a	29.8	34.7	16.4
United States	13.3	13.8	3.8
Japan	1.5	5.4	260.0

Note: – means not available

a

1995 instead of 1994

b

1997 instead of 1994

c

2004 instead of 2006

d

2005 instead of 2006

e

Manufacturing sector only

f

Mean for the EU countries considered

g

Total increase (%) from 1994 to 2006

Source: OECD AFA Database

Table options

— The share of MNC subsidiaries in domestic R&D varies widely across the different EU countries, ranging from 17% in Finland to 76% in Ireland. These differences suggest that policies related to FDI in R&D are more critical to some member states (e.g. Ireland, Slovakia, Czech Republic) than to others (e.g. Finland, France, Poland). The ratio tends to be higher in smaller EU countries, but the coefficient of correlation between population and share of R&D performed by foreign subsidiaries, albeit negative, is weak (-0.51). Indeed, it is striking that the first and last countries in the list, Finland and Ireland, are also the least populated countries in the sample.

To analyze the historical evolution of this indicator, 1994 is taken as the point of departure because it is the first year with data available for the majority of countries. The share of foreign subsidiaries increased in all countries of the sample between 1994 and 2006, on average from 24% to 39%. Central and Eastern European countries exhibit a higher than average increase in the share of foreign subsidiaries in business R&D expenditure, much of which originates from foreign acquisitions of privatized state-owned firms in the transition from a socialist to a capitalist system (Čadil et al., 2007). For different reasons, the increase is also significantly high in Sweden and Germany, while it is lower than average in Ireland, Spain and Finland.

After some attempts to categorize, it becomes apparent that there are no clear patterns and that the interpretation of this ratio is not straightforward (see also Molero and

Álvarez, 2003). Indeed, a high contribution of foreign subsidiaries to domestic R&D holds an ambiguous interpretation: it may reflect an innovative ecosystem that is successful in attracting the R&D activity of foreign firms but, from a different angle, it may indicate that nationally owned firms are poor performers in R&D (Patel and Pavitt, 1991). The share of foreign subsidiaries in domestic R&D also reflects the country's economic structure, in particular its industrial specialization patterns and its degree of openness.

In any case, the data shows clearly that foreign subsidiaries are very relevant actors in European innovation systems and that their relative importance in domestic R&D expenditure has grown substantially during the period analyzed. There is also a wide range of qualitative research showing that many of the most successful technology clusters in Europe have emerged thanks to the contribution of the subsidiaries of foreign MNCs (e.g. Brown and Raines, 2000, Dosi et al., 2006, Dunning, 1998, Ruane and Buckley, 2006 and Rugman and D'Cruz, 2000).

3.2. The emergence of new policy strategies

Government strategies to attract FDI in R&D are at different stages of development across the EU, and different countries are focusing on different policy instruments. While some countries have responded more aggressively, others strongly support corporate R&D in general, but lack differentiated strategies towards FDI in R&D. Examples of the former are the UK and France, which have recently launched comprehensive strategies aimed explicitly at making their innovation systems more attractive to foreign investors (UK Government, 2006 and Invest in France Agency, 2008). For instance, the UK Science and Investment Framework 2004–2014 lists as one of its objectives that “the UK should be a partner of choice for global businesses looking to locate their research and development” (p. 127). Ireland is another clear example of a country with very explicit policies towards attracting FDI in R&D (Harris, 2005). The Irish Strategy for Science, Technology and Innovation 2006–2013 contains specific targets related to the R&D expenditure of foreign-owned companies and to the number of foreign affiliates performing significant levels of R&D.

In a recent survey conducted by an Expert Group of the European Commission 10 of the 21 European participant countries indicated that they already have a comprehensive national strategy to benefit from the internationalization of R&D. Moreover, eight of the remaining 11 countries stated that they are in the process of developing one (CREST Working Group, 2008). According to this survey, the most frequently applied policy measures include the promotion of local strengths abroad, the active recruitment of foreign companies, cluster policies to attract FDI in R&D, administrative support for foreign investors, provision of infrastructure, direct financial support and fiscal incentives.

Normally, these policy strategies focus on attracting FDI in R&D, while policies towards outward FDI are neglected (Edler, 2008). As discussed in Section 2.4, this reflects that outward FDI in R&D tends to be perceived as an undesired outcome. However, this is slowly changing and some governments have implemented new policy instruments to reap the potential benefits. For instance, up to 2007 the UK government offered the Global Watch Service aimed at helping UK firms to improve their

competitiveness by identifying and accessing innovative technologies and practices from other countries.

Despite the differences across the EU it can be concluded that a majority of EU governments are becoming increasingly concerned with the importance of raising their attractiveness as R&D locations and are now more explicitly targeting FDI in R&D. To further support this proposition, the following sections point out three relevant manifestations of how policies across EU member states are evolving in response to the globalization of corporate R&D.

3.3. The shift in FDI promotion policies towards targeting R&D

Virtually all EU countries and regions, including the new member states, are now actively trying to position themselves in the minds of investors as locations for R&D and many are investing in international advertisement campaigns for this purpose (Table 3). Similarly, the websites of the IPAs of most EU countries now provide thorough information highlighting the strengths of their country's national innovation system. They also provide testimonials from existing foreign investors in R&D, reflecting the belief that location decisions may be influenced by 'imitation' and 'demonstration' effects (Krugman, 1997).

Table 3.
Slogans used by EU governments in international promotion campaigns.

Austria	An ideal location to spark innovation
Catalonia (Spain)	Look at innovation. Look at Catalonia
Czech Republic	The skills hub of Central Europe
Denmark	Creative Denmark
France	Save money by thinking
Germany	Land of ideas
Ireland	Knowledge is in our nature
Italy	Log on to Italy
Latvia	Innovation goes hand in hand with Latvia's technological competitiveness
Lower Austria (Austria)	Enjoy high performance in the high-tech business
Luxembourg	An attractive IP destination
Madrid (Spain)	Center of excellence and opportunity
North Rhine-Westphalia (Germany)	We love the new knowledge
Northern Ireland (UK)	Smart at work
Paris Region (France)	A rich, dynamic, diversified, competitive, creative and innovative economy
Portugal	Technology from the heart

Scotland (UK)	Scotland introduced the world to whisky, golf and algebra. And inevitably the aspirin.
Slovenia	A high-specification location
Spain	Science Business Class
Sweden	New ways of thinking
United Kingdom	Want to be part of the UK cutting-edge technological revolution?
Yorkshire (UK)	Driving business success through innovation
Wallonia (Belgium)	The pursuit of technological excellence
Wielkopolska (Poland)	Passion for Innovation

Sources: Official promotional documents and advertisements in international magazines, 2007–2010.

Table options

Beyond advertisement, a higher emphasis is now placed on providing customized value-added services to foreign investors in R&D. In the words of [Molero and García \(2008; p. 752\)](#), the mandate of IPAs is shifting “from *quantity* (more FDI) to *quality* (higher R&D activities)”. [Brown and Raines \(2000\)](#) speak of a shift in FDI policy since the 1990s in Europe, from strategies to attract investment towards those designed to securing additional investments from existing investors and deepening their impact on the local economy. This implies a higher focus on aftercare services, which as argued earlier becomes especially relevant when the main target is to attract FDI in R&D, given that the R&D mandates of multinational subsidiaries tend to occur sequentially rather than overnight.

Along these lines, EU governments are increasing their efforts to encourage existing foreign investors to get involved in R&D and to participate in national funding programs. A few examples help illustrate the kind of aftercare services provided across Europe:

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The Netherlands Foreign Investment Agency provides a Technology Matchmaking service to facilitate the search process for a suitable technology partner in the country.

-

The Irish investment promotion agency, IDA Ireland, established in the early 1980s a National Linkage Program to foster links between inward investors and the domestic industry. More recently, it set up a Strategic Competitiveness Grant in the early 2000s, to assist local managers of foreign subsidiaries in their efforts to consider what they might be able to offer the corporation in terms of moving to higher value-added positions and in particular to R&D.

-

[Brown and Raines \(2000\)](#) provide examples of the new kind of aftercare services that have emerged since the 1990s in different European regions such as Wales and Scotland, including technology support, skills development and supplier development.

-

Among the new member states of the EU, the IPA of the Czech Republic, CzechInvest, is often cited as a best practice in aftercare ([Čadil et al., 2007](#)). For example, CzechInvest runs since 1999 the Czech Supplier Development Program with the objective of intensifying and strengthening contacts between domestic suppliers and multinational companies investing in the country.

-

A typical approach is to offer ‘research hosting’ services to foreign firms through technology parks, which may include subsidized office space, access to research equipment, and administrative services such as support in the process of requesting and obtaining R&D incentives from the regional and national governments or from the EU.

In their efforts to target FDI in R&D efficiently, the IPAs of EU countries are also developing new screening systems or checklists to evaluate the quality of incoming R&D proposals and determine the level of support to provide. IPAs targeting R&D face the challenge of adapting their performance measurement systems – which were traditionally based on targets such as number of jobs created or quantity of the investment – to incorporate more intangible measures. As explained by Sean Dorgan, former CEO of IDA Ireland (1999–2008), “targeting FDI in R&D is a real challenge in the sense that there are no clear measures, and although we have started using new indicators, they do not convert easily into political speech or newspaper headlines, which jobs created always did” (*Source*: Personal interview, Dublin, January 2007).

3.4. The rise of fiscal and financial incentives to corporate R&D

Fiscal incentives consist in a favorable tax treatment to R&D expenditure and may take the form of accelerated depreciation, tax credits or import tariff exemptions, while financial incentives refer to the direct funding of business R&D projects by the government through grants or subsidies, preferential loans (including interest allowances) or equity stakes ([International Bureau of Fiscal Documentation \(IBFD\), 2004](#) and [Warda, 2001](#)). While the specialized literature suggests that incentives are not a significant driver of the location decision, it is also recognized that they can influence the final decision when competing locations rate similarly in the rest of the attraction factors ([Cantwell and Mudambi, 2000](#)).

Public incentives to corporate R&D, both fiscal and financial, have grown significantly in recent years in the EU, resulting in a ‘bidding contest’ among competing locations ([Mudambi, 1999](#), [OECD, 2007](#) and [UNCTAD, 2005](#)). Although the increased use of incentives to R&D cannot be fully attributed to the globalization of corporate R&D (because incentives also aim at promoting the R&D activity of domestic firms), the way that governments communicate their incentives to foreign investors through official websites and advertisements reveals that foreign investors are a clear target of their R&D incentive schemes.

When aiming at attracting FDI in R&D through incentives, a first obvious policy is the non-discrimination of foreign-owned firms against indigenous firms in national technology programs and R&D funding. Most EU countries offer an equal treatment to foreign investors, among other things because they are obliged to by international law. In particular, EU competition regulations prohibit all kinds of unequal treatment between national- and foreign-owned firms so that, with few exceptions, practices such as exclusion of R&D funding or specific performance requirements for foreign-controlled firms are illegal. This does not exclude, however, the possibility of bias among policy-makers motivated by nationalistic industrial policies.

In recent years most EU countries have introduced new fiscal incentives to business R&D or improved existing ones, to the point that they now constitute a substantial part of the total public effort to support business R&D in EU countries (European Commission, 2006). Indeed, the OECD statistics on fiscal incentives to business R&D show a substantial increase in most EU countries between 1999 and 2007 (OECD, 2007). In particular, a EU country, Spain, was the country that offered the most generous tax incentives to business R&D among OECD countries in 2007, the main features of which are a tax credit of 30% for R&D expenditures and an additional 20% for labor costs of full-time researchers and for R&D work subcontracted to universities or public research centers. However, fiscal incentives to business expenditure in R&D are currently under reformation in Spain and, at the same time, France doubled its R&D tax incentive in 2008, becoming the most generous in Europe according to the French government (Invest in France Agency, 2008). After the change, France launched an international advertising campaign with the lemma “Save money by thinking—France offers 50% tax credit, the best in Europe”. Other EU countries with higher than average fiscal incentives to business R&D are Portugal, the Czech Republic, Hungary, Denmark and the UK. On the opposite end, the EU countries with lower fiscal incentives are Germany, Italy, Sweden, Luxembourg, Greece, Finland and the Slovak Republic (OECD, 2007). Fiscal incentives vary in design across the EU, with some countries using a flat or volume-based tax (UK, Italy, Netherlands, Denmark) and others an incremental rate based on increase in R&D spending (Belgium, France, Ireland) or a mixture of both (Austria, Portugal, Spain, Hungary) (PRO INNO Europe, 2007).

With regard to financial incentives, state support to foreign investors is partly constrained by EU regulations, but the flexibility is higher when it comes to promoting FDI in R&D. Currently, the permissible grant under the EU VII Framework Program depends on whether it is experimental, industrial or fundamental research, with the limit for the proportion of state aid at 25%, 50% or 100%, respectively (European Commission, 2005). In addition, EU cohesion policies are becoming more targeted to innovation and knowledge. For example, in 2009 Spain was the first country to use the new European Technology Fund (2007–2013), and the Spanish government decided to dedicate part of it to stimulating the R&D activity of MNE subsidiaries by providing 24 million euro for subsidies to be distributed by the national investment promotion agency, Invest in Spain.

A clear trend across EU countries is to offer financial incentives primarily to firms that collaborate with other firms and public research centers, with the aim of inducing ‘behavioral additionality’ effects, in particular increasing firms’ propensity to collaborate with other agents in their R&D efforts (OECD, 2006). In this context, the challenge is to engage foreign subsidiaries in national research consortia. In addition, an

increasing number of EU countries offer incentives not only to the inputs, but also to outputs of R&D processes, such as incentives to cover patenting costs and to reduce taxes on income from patent licensing. The specific mix of R&D incentives and the application processes vary widely across countries as there are many possible options which, at the same time, are constrained by national institutions. Incentives tend to be complemented by other policy measures such as staff training programs and property or equipment support, as well as public commitments to provide various types of aftercare services including research hosting services, as discussed in [Section 3.3](#).

In terms of governance, most EU countries have set up public agencies to distribute R&D incentives to business, which offer equal treatment to foreign firms as long as they already have a subsidiary in the country. Normally, investment promotion agencies only inform of the incentives available but lack any control over incentives themselves. But some governments, such as the Irish, are more proactive at offering tailored incentives to foreign-owned MNCs, and their investment promotion agencies may negotiate incentives directly.

3.5. Attracting and supporting talented researchers

Since the attraction of FDI in R&D is often connected to the attraction of human capital, governments across the EU are now more explicitly aiming at attracting foreign researchers. Facilitating the inflow of highly skilled researchers from abroad helps enlarge the home talent base and enables flexible intra-firm employee mobility as demanded by foreign investors ([Inzelt, 2008](#)). This can be achieved through different policies such as making the conditions of local researchers and university professors more attractive to foreign candidates; reforming the immigration legislation and procedures; reducing income taxation for high-skilled immigrants; or facilitating the accreditation of foreign qualifications.

For example, the UK has recently introduced fast-track visa procedures for highly skilled immigrants and intra-company transfers. Similarly, the French government highlights that “new regulations are being launched to make it easier than ever for foreign talent to work in France, thanks to the multi-year resident permit including a selective process that could open doors to over 300 000 jobs in a variety of dynamic sectors” ([Invest in France Agency, 2008](#)). Improved administrative and visa procedures apply not only to researchers, but also to their families, for instance through spousal work visas and faster accreditation of qualifications. Another policy option is to provide incentives for the return of national researchers located abroad, with the aim of transforming the original brain drain into brain circulation with benefits for the national innovation system. Indeed, many EU countries (including Spain, Finland, Germany, Italy, Denmark, the Netherlands and Poland) have implemented support schemes for the return of expatriate scientists and engineers ([OECD, 2008](#))

In parallel, the investment promotion agencies of most EU countries and regions are now placing a higher focus on conveying their country’s capacity to attract international talent. For example, the regional government of Madrid launched an international advertising campaign from 2007 to 2010 highlighting that Spain appeared as the preferred destination for European workers in a Financial Times/Harris survey, with testimonies from foreign researchers working in the R&D centers of multinational corporations in Madrid.

In some cases, FDI in R&D is driven entirely by the bargaining power of highly talented scientists. An early example was the decision of Microsoft to open up its first R&D center outside the US in Cambridge in the mid-nineties, to draw upon the expertise of Professor Needham ([University of Cambridge, 1997](#)). A recent example in Spain is the case of Yahoo!, which opened up an R&D center in Barcelona in 2006, thanks to the initiative of Professor Baeza-Yates, a renowned expert in search technology. Baeza-Yates was previously working for a public research center and was hired by Yahoo! as Director of the new R&D center. As explained by Baeza-Yates, “in the end, the most important factor behind location decisions are always people and networks of people” (*Source*: Personal interview, Barcelona, April 2006). In this sense, governments targeting FDI in R&D are advised to provide customized support to talented scientists and to build upon their expertise for investment promotion purposes.

3.6. Discussion

The globalization of corporate R&D has led to a more proactive role of European governments aimed at attracting and embedding the R&D activity of MNCs. This may have the positive effect of fostering the upgrading of innovation systems EU-wide, as governments face the pressure of competition. In this sense, it is a *race to the top* as opposed to the classical *race to the bottom* or competition based on lowering costs and taxes ([Basinger and Hallerberg, 2004](#)). From a different angle, it could be argued that the globalization of corporate R&D is driving a shift in EU policies from *customization around national champions* towards *customization around foreign champions*.

Against this background, a relevant question to be raised is what the role of EU-level institutions should be, if any. It seems clear that the European Commission does have a role to play in improving the attractiveness of the EU for internationally mobile R&D by developing further the so-called European Research Area (ERA), with new instruments such as pan-European research infrastructure and industry-led technology platforms ([European Commission, 2008a](#)). Indeed, in a Green Paper issued in 2007, the European Commission states that “a sense of urgency in revisiting ERA stems from the fact that globalization of research and technology is accelerating and new scientific and technological powers – China, India and other emerging economies – are attracting considerable and increasing amounts of R&D investments. These developments (...) raise the question of Europe's ability to sustain a competitive edge in knowledge and innovation” ([European Commission, 2007, p. 5](#)).

In the specific case of attracting foreign talent ([Section 3.5](#)) an important action at the EU Community level was the approval in 2005 of the EU Directive 2005/71/EC on a specific procedure for admitting third-country nationals for the purposes of scientific research (also known as “scientific visa”). This directive instructed member states to pass into national law before October 2007 specific fast-track procedures for foreign researchers, relying on local research centers to establish applicants' credentials and acknowledge their involvement in a research project. However, progress has been slow so far and many countries have still not implemented this Directive ([European Commission, 2008b](#) and [Pincock, 2007](#)).

With regard to incentives to FDI in R&D, the risk is that the escalation in the use of incentives discussed in [Section 3.4](#) leads to a Prisoner's dilemma whereby all countries are actually worse off when pursuing independent incentive policies, as noted by [PRO](#)

INNO Europe (2007). Indeed, according to OECD (2007) an increase in fiscal incentives to business expenditure in R&D results in revenue losses to governments of over 1 000 000 million USD in France, 937 300 million in the UK, 419 300 million in the Netherlands, 355 400 in Belgium and 343 300 in Spain. The European Commission should strive to avoid this race to the bottom, although it is far from clear how this could be achieved.

Finally, as discussed in Section 3.3, FDI promotion policies across virtually all EU countries are becoming more focused on attracting internationally mobile R&D investments. This creates increasing competition within the EU and raises the question of whether it is realistic that all member states simultaneously attempt to become locations of choice for R&D and leading-edge clusters in high-technology industries. On the other hand, with the transfer of certain FDI competences from the member states to the EU following the Lisbon Treaty, which was approved in 2009, a more active promotion of the EU as a regional block in the future is expected. In this context, the European Commission could consider setting up an EU investment promotion agency, with a focus on the following activities (Guimón, 2010):

- Promoting internationally the strengths of the EU as a location for R&D and communicating more clearly abroad the institutional and technological features of the European Research Area.
- Stimulating collaboration between European national IPAs, for example by organizing joint missions abroad.
- Acting as a helpdesk to provide information about the mechanisms to engage in European research networks and to benefit from European R&D funding.

However, a major challenge in this endeavor would be to balance the competition among EU member states with the need for cooperation to forge a common strategy to better compete globally as a regional block. Thus, the hypothetical EU investment promotion agency should remain neutral, focusing solely on efforts to promote the EU as a whole and referring foreign investors to the different national contact points when asked about specific locations within the EU.

4. Concluding remarks

This article has contributed to the study of the globalization of corporate R&D by focusing on its policy implications, with particular attention to the case of the EU. One of the main conclusions is the need for a flexible and systemic approach to policy intervention, focussed on subsidiary development and linkage facilitation. Another important implication is that the interplay between FDI policies and innovation policies becomes more relevant and needs to be further nurtured. The need to pay more attention to policies oriented to reaping the benefit of outward FDI in R&D has also been emphasized.

Rodrik (2004) envisages contemporary industrial policy as a necessarily *experimental process* involving a more *flexible form of strategic collaboration* between public and private sectors. Such forms of strategic collaboration between investment promotion agencies, national policy-makers, universities and research centers, established subsidiaries, potential foreign investors and domestic firms are of critical importance to attract and embed the R&D of MNCs.

Despite my attempts to generalize, it should be stressed that each individual country or region would require a different policy mix depending on its technological and institutional profile. The challenges for peripheral countries to link advantageously into global innovation networks are especially acute, given their lower absorptive capacity. According to Laranja (2009) the focus of government intervention in peripheral countries should be to foster a demand oriented upgrading of technological infrastructure through *proactive intermediation policies*.

The policy implications of the globalization of corporate R&D are complex and the strategic options for policy-makers remain largely unclear (Borrás et al., 2008). The efficiency of alternative policy instruments is hard to evaluate; because outcomes are hard to measure and because it is often impossible to attribute outcomes to underlying policies (Hsu et al., 2009). Thus, policy strategies and in particular fiscal and financial incentives should be designed very cautiously, after carefully considering what the potential spillovers and linkages will be, and how these can be converted to actual benefits for the national innovation system.

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Vitae

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