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## GOVERNMENT STRATEGIES TO ATTRACT R&D-INTENSIVE FDI

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### **Session 2.1.: International Investment and Innovation**

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# Government strategies to attract R&D-intensive FDI

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**Abstract:** Due to the increased internationalization of business R&D, foreign-controlled multinational enterprises are now seen by most governments as a central actor in national innovation systems and as a catalyst for upgrading in global value chains. As a result, competition among countries to attract the R&D activities of multinational enterprises has increased substantially during the last years. The objective of this paper is to classify the main policy instruments used by governments in their efforts to attract internationally-mobile R&D and to discuss some key implementation challenges. The main conclusion is that an efficient promotion of R&D-intensive FDI requires a closer coordination between innovation policy and inward investment promotion, which are two policy areas that have traditionally operated rather separately. In addition, inward investment agencies targeting R&D-intensive FDI are advised to reconfigure the scope of services they provide by placing more emphasis on “after-care”, since R&D-intensive FDI tends to be evolutionary rather than purely “greenfield”.

**Keywords:** R&D; FDI; multinational enterprises

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## 1. Introduction

Although corporate research and development (R&D) activities still remain highly concentrated close to headquarters, the evidence available shows that R&D-intensive foreign direct investment (FDI) has grown significantly in recent years. For example, according to UNCTAD (2005) almost 16% of the R&D expenditure of firms in 2003 occurred in their subsidiaries abroad, up from 10% a decade earlier<sup>1</sup>. The existing literature supports the view that inward R&D-intensive FDI constitutes a powerful mechanism of international technology transfer which can enable host locations to develop specialized clusters and integrate more advantageously in global value chains (e.g. Carlsson, 2006; Cantwell and Piscitello, 2000; Cantwell and Iammarino, 2001; Audretsch, 2000). Foreign-controlled subsidiaries are now seen by most governments as a central actor of national innovation systems, and the competition among regions and countries for internationally-mobile R&D has grown accordingly (Mudambi and Mudambi, 2005; Zanatta et al, 2006). While the existing literature is rich in discussing the new rationales for public intervention in an abstract level, it is weak at offering practical guidance regarding the strategic choices for policy makers and the implementation challenges (Borras et al, 2007). In response to this gap, the aim of this paper is to clearly identify the main policy instruments available to stimulate inward R&D-intensive FDI and to point out some key implementation challenges.

Understanding how multinational enterprises decide where to locate their R&D units abroad is a prerequisite for determining the role of policies and selecting the policy mix. The location decision is a multi-faceted process that depends on the nature of the R&D activities being offshored and on the mode of entry of the investment, i.e. on whether it occurs through a greenfield investment, an expansion of an existing subsidiary or a transnational merger and acquisition (M&A). Unfortunately, FDI statistics do not provide the breakdown of R&D-intensive FDI by mode of entry, but the existing literature suggests that R&D-intensive FDI occurs mainly through the expansion of existing subsidiaries rather than through greenfield investments, at least in developed countries (e.g. Erken et al, 2005; Mudambi and Mudambi, 2005; UNCTAD, 2005). In this case R&D-intensive FDI emerges from an evolutionary process whereby the manufacturing or marketing units already located in the country get engaged in R&D after some time, and later may increase the quality and scope of their R&D. When R&D-intensive FDI occurs through transnational M&As, the only short term effect for the host country is a change of ownership but, in the medium to long run, policy makers should weight the potential benefits in terms of foreign knowledge transfer against the risk that the acquirer ends up reducing the subsidiary's R&D mandate to avoid duplicities with other existing units. Normally, governments are not interested in promoting this kind of FDI in R&D but, rather, may want to protect their "national champions" from foreign acquirers (Archibugi and Iammarino, 1999). In contrast to M&As, in the case of both greenfield investments and expansions the potential benefits for the host country (and the rationale for public intervention) become more evident, since these entry modes represent the creation of new technological capacity in the country.

The location of R&D-intensive FDI is driven by the interplay of a wide array of factors which may be classified into three groups: parent company strategies, subsidiary potential and host country characteristics (Birkinshaw, 2003). Governments that aim at attracting R&D-intensive FDI may act upon each of those three groups of factors.

Firstly, regarding the parent company strategies, although the technological strategies of foreign multinational enterprises are largely outside the scope of influence of national policies, governments should aim at understanding and monitoring them in order to evaluate

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<sup>1</sup> The estimations of UNCTAD, 2005 are based on the OECD AFA database and on national statistics.

how the country/region may fit into those strategies and to assess the impact of incoming FDI.

Secondly, the factors related to the capabilities of subsidiaries are critical since R&D mandates are often assigned through a competitive bidding process involving several potentially-capable subsidiaries of the multinational firm already present in different countries and regions. Success in this process is partly driven by the upward influence of subsidiary managers and their capacity to “sell issues” to headquarters (Ling et al, 2005; Simões and Nevado, 2001). It is also essential for multinational subsidiaries to develop “dynamic capabilities”, that is, the ability to identify and profit from new opportunities, and to reconfigure and protect their competences and knowledge in order to attain a sustainable competitiveness (Porter, 1985; Teece, 2000).

Thirdly, among the factors related to the host country the empirical evidence available suggests that the main location drivers are the availability of world-class research infrastructure and skilled labour (EIU, 2004; Cantwel and Iammarino, 2001) as well as the dynamism of the national innovation system, that is, the degree of interaction and collaboration among different firms and other “knowledge producing and diffusing organizations” (universities and research centers, consultants, industrial associations, etc.) (Chaminade and Vang, 2006). The size of the market is also a relevant attraction factor, especially for market-seeking (or asset-exploiting) R&D-intensive FDI, which aims at adapting the product or the production process to the local context (Mansfield et al 1979). However, the market size is not so important in the case of technology-seeking (or asset-augmenting) R&D-intensive FDI, which aims at building globally-oriented R&D centers (or centers of excellence) (Bas and Sierra 2002; Florida, 1997; Kuemmerle, 1996). The cost of labor may also be a relevant location driver, especially for lower-end and routine R&D activities. Other location drivers suggested in the existing literature are the presence of other multinational enterprises active in R&D; public incentives to corporate R&D; the intellectual property rights regime; the climate and quality of life; the English skills of the local population; and the bureaucracy, paper work and time associated with creating and functioning an R&D enterprise.

Public policies can be seen as an attraction factor in themselves (Mudambi, 1995), but they can also be seen as means of reinforcing the different attraction factors. Indeed, a key role of public policies is to stimulate R&D-intensive FDI by acting upon the factors driving the location decision described above. However, while some of those attraction factors may be influenced by policy in the short term (e.g. incentives to business R&D), others can only be influenced in the medium to long term (e.g. human capital), and yet others are outside the scope of policies, such as the size of the market. In addition to acting upon the attraction factors, a second role of policies is to make them more visible to the investment community and to influence the perceptions of decision makers. The first objective falls under the domain of innovation policy while the second is achieved through inward investment promotion, as explained in the section that follows.

## **2. A taxonomy of policy instruments**

The attraction of R&D-intensive FDI can be conceptualized as a horizontal policy which stands in the intersection between innovation policy and inward investment promotion. On the one hand, the role of innovation policy is to improve the investment climate for R&D by identifying and acting upon the strengths and weaknesses of the national innovation system. On the other hand, the role of inward investment promotion is to improve the image of the country as an R&D location and to provide targeted services to both potential and existing foreign investors in R&D. Within each of those policy areas Table 1 identifies a set of key policy instruments which are further discussed in the sub-sections that follow.

**Table 1. Attracting R&D-intensive FDI: The policy framework**

<i>Policy area</i>	<i>Key policies</i>
Innovation policy	<ul style="list-style-type: none"><li>• Fiscal and financial incentives to corporate R&amp;D</li><li>• Human capital development and attraction of foreign talent</li><li>• Enhance the research infrastructure and promote collaboration and linkages</li><li>• Improve the intellectual property rights regime</li></ul>
Inward investment promotion	<ul style="list-style-type: none"><li>• Target R&amp;D-intensive FDI and build the image of the country as an R&amp;D location</li><li>• Provide R&amp;D-specific pre-investment and implementation services</li><li>• Emphasize after-care services</li><li>• Policy advocacy</li></ul>

### 2.1. Innovation policy to attract R&D-intensive FDI

As discussed earlier, the existing literature suggests that the main location drivers for R&D-intensive FDI within the innovation policy domain are the availability of skilled employees; the quality of public research centers and technology parks; the propensity to collaborate of the different agents of the national innovation system; fiscal and financial incentives for R&D; and an efficient intellectual property rights regime. Therefore government strategies to attract R&D-intensive FDI should concentrate on these factors, after benchmarking the competitive strengths and weaknesses of the national innovation system against those of competing countries/regions.

The most straight-forward policy instrument is to provide public incentives to business R&D, which may be both fiscal and financial<sup>2</sup>. The impact of an R&D incentive package is affected by its scope of coverage, its magnitude relative to other countries, its ease of implementation in the different stages of the R&D cycle, and the balanced use of different fiscal and financial instruments (Tassey, 2007; Atkinson, 2007). Incentives to R&D can be across the board or discriminatory. Fiscal incentives are across the board since all firms that comply with the eligibility requirements may benefit from them. Financial incentives are sometimes across the board but more often are discriminatory, i.e. directed only to target sectors/firms/activities.

International organizations such as the European Commission suggest that the beneficiaries of financial incentives should be chosen on the basis of open, transparent and non-discriminatory criteria in order to limit distortions on competition (European Commission, 2005), but in practice some governments prefer a more flexible approach that allows them to respond faster and in a more proactive manner to individual investment projects. In particular, some governments are more proactive at offering tailored incentives to multinational enterprises, and their inward investment agencies may negotiate incentives directly, while others follow exactly the same procedures that apply to local firms, and their inward investment agencies only inform of the different incentives available but lack any control over the incentives themselves. Ireland and Singapore are amongst the most clear

<sup>2</sup> Fiscal incentives consist in a favourable tax treatment to R&D expenditure and may take the form of accelerated depreciation, tax credits, tax holidays or import tariff exemptions. Financial incentives refer to the direct funding of enterprise R&D projects by the government through grants or subsidies, preferential loans (including interest allowances) or equity stakes (Mudambi, 1999; IBFD, 2004).

examples of the first approach, whilst most other countries are keener to the second strategy for accountability reasons (Loewendahl, 2001).

While the specialized literature suggests that incentives (fiscal or financial) are not a significant driver of the location of R&D-intensive FDI, it is also recognized that they can influence the final decision when competing locations rate similarly in the rest of attraction factors (Zanatta et al, 2006; UNCTAD, 2005; Cantwell and Mudambi, 2000). In any case, there appears to be a widespread increase in the use by governments of incentives to corporate R&D, resulting in a “bidding contest” among competing locations (Mudambi, 1999; OECD, 2007).

Beyond incentives, the availability of world-class researchers is arguably a more critical location driver for R&D-intensive FDI. This calls for policies to increase the number of scientists and engineers by encouraging the younger generations to chose a career in science and engineering, by offering grants and increasing the budgets of universities and research centers, and by facilitating the exchange of researchers between the public and the private spheres and the mechanisms for life-long learning. Building a strong human capital base is not only about growing indigenous talent, but also about attracting and retaining talent. Thus the inflow of highly-skilled researchers from abroad should be facilitated, in order to enlarge the home talent base and to enable flexible intra-firm employee mobility as demanded by foreign investors (Inzelt, 2007). This can be encouraged 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. Policy initiatives should also be directed towards providing 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.

In some cases, R&D-intensive FDI is driven entirely by the bargaining power of highly talented scientists, which may convince multinational enterprises to open up R&D centers abroad when they are not willing to move to headquarters. A paradigmatic example of this 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, 1996). A recent example in Spain is the case of Yahoo!, which opened an R&D center in Barcelona in 2006 thanks to the initiative of Professor Ricardo Baeza-Yates, a renowned expert in search technology. Yahoo! was looking into opening an R&D unit in Europe, and Baeza-Yates approached the company and offered to lead the project if it was done in Barcelona. As explained by Baeza-Yates, in the end “*the most important factor behind location decisions are always people and networks of people*” (interview by author, April 2006). Based on this, governments are advised to provide targeted support to talented scientists in a flexible and personalized manner, and to build upon their expertise for investment promotion purposes.

Equally important are the policies aimed at improving the country’s research infrastructure, including public research centers, technology parks and scientific platforms in key technology areas. In particular, technology parks are attractive for foreign multinationals as they facilitate networking with other firms and research centers, provide the necessary infrastructure and administrative support, and offer a pleasant working and living environment for its employees. Attracting R&D-intensive FDI calls for policies such as offering ‘research hosting’ services to foreign firms through technology parks, which may include subsidized office space, administrative services and support in requesting incentives from the government.

In addition, governments should aim at promoting interaction and collaboration in the national innovation system. The importance of interaction and collaboration was already

stressed in the earlier works on national innovation systems (Rosenberg, 1982; Nelson and Winter, 1982; Edquist, 1997) and further emphasized in the “triple helix” framework, which supports the value of efficient industry-university-government collaboration in R&D (Etzkowitz and Leydesdorff 2000). The importance of interaction in innovation systems is becoming more evident today as corporate R&D evolves from a central function of the value chains of multinational enterprises’ towards an activity that builds upon geographically dispersed R&D units and upon a closer collaboration with external organizations (Chesbrough 2003). In this context a key role for policies is to stimulate linkages of foreign subsidiaries with local firms and knowledge producing and diffusing organizations (Chaminade and Vang, 2006). A high degree of embeddedness of foreign-owned firms in the national innovation system is necessary to maximize technology transfer (Rama, 2007) and may also be critical for the sustainability and upgrading of foreign R&D investors already located in the country (Helmut and Nones, 2007).

Finally, another priority is to develop a transparent and enforceable intellectual property (IP) rights regime, since from a headquarters perspective among the main drawbacks of R&D offshoring are the potential loss of control over R&D and the risk of IP theft (EIU, 2007). The EU Commission is working to introduce the so-called Community patent, which aims at reducing cost and bureaucracy and at increasing the enforceability of law across the EU and the speed of the approval and enforcement systems. It also aims at reducing patenting costs, which are more expensive in the EU than in the US or Japan. In order to stimulate the patenting activity of firms, an instrument used by several countries is to offer financial or fiscal incentives to cover patenting costs and/or reduce taxes on income from patent licensing, which may be of interest to foreign investors in R&D. Governments should also try to ensure that an adequate skill formation in IP is available in the country, for example by sponsoring IP specific seminars and courses, and by identifying specialized law firms and consultants that could be contacted by potential foreign investors.

## **2.2. Inward investment promotion**

The previous sub-section has highlighted some key instruments of innovation policy which are critical for attracting R&D-intensive FDI. But as argued earlier innovation policy should be complemented with a targeted promotion of R&D-intensive FDI by inward investment agencies (IIAs). IIAs are usually part of, and financed by, the ministries of trade, economy or industry, and often have offices abroad and strong links to the ministries of foreign affairs to facilitate overseas investment promotion. Their aim is to increase the international visibility of the country through marketing campaigns and to facilitate the investment process by offering tailored services to foreign-owned multinational enterprises. Several international organizations, including the OECD, have developed guidelines to assist IIAs in developing successful FDI promotion strategies based on accumulated knowledge and international best practices<sup>3</sup>, but the specific promotion strategies for R&D-related FDI remain still largely uncovered. In a survey conducted by UNCTAD (2005) comprising 84 national IIAs, 55% declared that they actively promote R&D-intensive FDI (79% in developed countries and 46% in developing countries), which supports the need to reflect further on those specific promotion policies.

Indeed, many countries and regions worldwide, including most EU countries (see Table 2), are attempting to position themselves in the minds of investors as locations for R&D, and are investing strongly in image-building for this purpose. Inward investment agencies often try to ensure that existing and new R&D-intensive FDI projects are properly announced through

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<sup>3</sup> For example, the OECD Strategic Guidelines for Investment Promotion; the Investment Promotion Toolkit of the World Bank/MIGA; and the Guidelines for Investment Promotion Agencies of UNIDO.

different channels including advertisements in targeted publications, newsletters and the news section of the their websites, since location decisions are influenced by “imitation” and “clustering” effects, which are in turn driven by “demonstration” effects and “herd behavior” (Krugman, 1997).

Beyond advertisement, a further step is to select prospective companies for tailored presentations, seminars and meetings. The identification of prospective companies is followed by efforts to gain audiences with decision-makers in these companies but, in the words of Loewendahl (2001, p. 22), “*approaching companies should not be seen as a methodical exercise: it is not about one-off approaches to a fixed number of companies each day, but rather a market intelligence gathering and relationship building campaign*”. Indeed, the increased competition for R&D-intensive FDI often requires an “activist” policy approach aimed at specific foreign investors (Cantwell and Mudambi, 2000). As explained by Mudambi and Mudambi (2005) such activist policies generally encompass a two-stage strategy: the first stage consists in ‘targeting’ the most appropriate investment projects while the second consists in ‘tailoring’ the most appropriate package of incentives and services for the individual firms being considered.

Today, targeting is not only about sectors or industries but rather about technology platforms and key disciplines. In the words of Eamonn Sheehy, a manager of IDA, Ireland’s IIA: “*We have realized that targeting is no longer only by sector, because there is a convergence across sectors (such as ICT-pharma-life sciences-medical devices). We are now working to identify areas of convergence, or platform technologies, where we can be competitive globally*” (interview by author, October 2006).

**Table 2. Advertising as an R&D location across the EU. Selected examples.**

<i>Country or region</i>	<i>Slogans used by inward investment agencies</i>
Germany	• Land of ideas
Italy	• Log on to Italy
United Kingdom	• Want to be part of the UK cutting-edge technological revolution?
Ireland	• Knowledge is in our nature
Sweden	• New ways of thinking
Denmark	• Creative Denmark
Spain	• Technology for life
Catalonia (Spain)	• Look at innovation. Look at Catalonia
Lower-Austria	• Enjoy high performance in the high-tech business
Wallonia (Belgium)	• The pursuit of technological excellence
Portugal	• Technology from the heart
Czech Republic	• The Skills Hub of Central Europe

Source: Websites of inward investment agencies and advertisements published in various international business magazines and newspapers

The next step for inward investment agencies is to provide specific services to foreign investors in R&D before the actual investment (pre-investment services) and during the investment process (implementation services). In the pre-investment phase, it is advisable for IIAs to have a clear and up-to-date document explaining the strengths of the country as a location for R&D, and tailored to specific sectors or technologies. IIAs also prepare visits of potential investors to the country, which include visits to R&D centers, universities, business and technology parks, and meetings with government departments and potential suppliers or partners. IIAs act as a “one-stop-shop” to foreign investors, providing accurate information and assistance in processing permits; applying for incentives; recruiting local employees; subcontracting; etc.

In addition to pre-investment and implementation services, IIAs may also deliver “after-care” services customized to the specific needs of foreign investors already present in the country. As argued earlier, the expansion of existing investors seems to be the most common entry mode of R&D-intensive FDI. If that is the case, then after-care services should be emphasized by IIAs, with the objective of assisting the existing stock of foreign-owned companies in their efforts to attract new R&D mandates (and retain existing ones). After-care services may also target foreign subsidiaries which are under a restructuring process, with the aim of transforming a potential risk of a divestment in manufacturing into the opportunity of a new investment in R&D.

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

### **3. Implementation challenges**

While the different policy instruments to attract the R&D of foreign firms have been described separately in the previous section, those policies are closely connected in practice. The key challenge for policy makers is to design a coherent and efficient strategy that encompasses the right set of policies considering the country’s circumstances. But determining the correct policy mix is an extremely difficult task because it involves different government departments and agencies and because the relative efficiency of the different policy instruments is uncertain ex ante and hard to evaluate ex post.

In addition, the internationalization of corporate R&D means different things to different countries, so there is not a unique strategy towards R&D-intensive FDI. Government strategies to attract the R&D of foreign-controlled multinationals differ across countries depending on their size, level of technological development, institutional profile, and on the relevance of existing foreign subsidiaries in the national innovation system.

That said, in general terms an efficient promotion of R&D-intensive FDI calls for a closer connection between innovation policy and inward investment promotion, which have traditionally operated rather separately. On the one hand, innovation policy should become more sensitive to the importance of foreign-controlled firms in national innovation systems. On the other hand, inward investment agencies should get more involved in innovation policy and become capable of providing tailored services to foreign investors in R&D.

Moreover, inward investment agencies in some countries are becoming directly involved in the formulation and implementation of innovation policy. As an example, one of the most

advanced inward investment agencies, IDA Ireland, has the capacity to negotiate directly R&D grants with foreign investors and, more significantly, has recently financed the creation of new research infrastructure in the country. In 2006, it financed the opening of an R&D center of Georgia Tech in Ireland and in 2005 it dedicated 70 million Euro -its most costly project that year- to the new National Institute of Bioprocessing Research and Training (NIBRT). Both projects aimed explicitly at stimulating the R&D activity of foreign-owned multinational enterprises in the country.

Inward investment agencies are in a position to become a critical interface agent in national innovation systems by promoting the R&D activities of foreign-owned firms located in the country and their collaboration with local institutions, both private (firms of national ownership) and public (universities and public research centers). In this endeavor, they may provide a wide array of tailored services and incentives to foreign investors in R&D, but given the evolutionary nature of R&D-intensive FDI it may be more efficient to focus on supporting the transition of existing foreign investors (after-care services) rather than on attracting greenfield R&D projects (image-building and pre-investment services). The drawback, however, is that after-care services are costly and their efficiency is hard to measure, so it remains uncertain how to provide value-added services that justify their high cost. Services offered in the pre-investment phase (such as providing information and local contacts) are easier to standardize and become less costly to provide, while after-care services are tailored and require the involvement of highly qualified professionals whose work is hard to evaluate.

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