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LOCATION OF INTERNATIONAL INVESTMENT PROJECTS IN EUROPE: WHAT CRITERIA FOR WHAT TYPES OF PROJECT?

Analysis Applied to Service and Production Activities

Paris, 9-10 October 2008

This document, prepared by Fabrice Hatem and Loriane Py, will be discussed under item 8 of the draft agenda.

Contact: Structural Policy Division, Mr. Thomas Hatzichronoglou ; Tel: +33 1 45 24 93 97 ;
Fax : +33 1 44 30 62 57 ; E-mail : thomas.hatzichronoglou@oecd.org

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Loriane Py[1] **and Fabrice Hatem**[2]

Summary

1. The increase in Foreign Direct Investment in service activities is the most striking aspect of the way our economies are evolving at present. The two trends involved are, first, the internationalisation *of the service sector* and, second, the internationalisation within multinational firms of what are known as "*tertiary support" functions*. There are no studies that provide an explanation as to how location choices for these activities differ from those identified with respect to manufacturing. We propose to tackle this question by means of an analysis - segmented according to their sectoral and then functional nature - of location decisions concerning 14 000 investment projects in Europe over the period 2002-2006. The findings confirm the existence of location criteria specific to the different sectors of activity or functions within firms. Market size, skilled labour resources and a shared official language are particularly attractive factors for the services sector. A comparison of location criteria by function for its part reveals even more marked differences between activities.

JEL classification: F12, F15, F23
Key words: location choice, multinational firms, conditional logit, services.

Introduction

2. With the growing internationalisation of our economies, attracting multinational firms has gradually become a major economic challenge. With numerous bodies having been set up at national and even local level, specializing in territorial promotion and in looking after foreign investors, this is an issue that has also given rise to a wealth of literature on how to identify foreign firms' location criteria. Market access, agglomeration effects and the rate of tax on company profits are put forward as the main determinants of location decisions.[3] There is, however, some uncertainty regarding the role played by the level of wage costs – a factor frequently taken into account in case studies, but not usually of any significance in econometric analyses.

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1 Doctoral student, Paris 1 University School of Economics.

2 Chief economist at the *Agence Française pour les Investisseurs Internationaux* (AFII), Director of research at the METIS laboratory (Normany School of Management).

3 See, for example, Devereux and Griffith (1998), Mayer and Mucchielli (1999), Head and Mayer (2004), Crozet et al. (2004).

3. This literature has benefited from the considerable progress that has been made. First, improvements in econometrics have made for a more realistic approximation of investors' real behaviour. Second, theoretical analysis of location choices has moved forward appreciably in the framework of the New Geographical Economics[4]. And, lastly, project segmentation by type of activity has greatly improved analysis of location decisions. A number of recent studies have in fact suggested that location criteria vary considerably depending on the functional nature[5] of investment within the manufacturing sector.

4. Hitherto, however, this literature has been based on analysis of manufacturing. Yet it is a sector that accounts for a declining, though admittedly still large share of foreign direct investment. The surge in international investment in services is one of the most striking features of current trends in our economies, with FDI in services having in recent years seen much faster growth than that of manufacturing, accounting in 2005 for two-thirds of the inward stock of investment.[6] This phenomenon, which is moreover increasing skilled workers' exposure to international competition, does therefore have significant economic implications.

5. As far as we know, there is no theoretical or empirical approach that accounts for why the location criteria for service activities should differ from those emerging in the context of manufacturing projects. The prime aim of this paper is therefore to identify, on the basis of a segmentation of the global international investment projects market in Europe, the existence of location criteria specific to service activities.

6. The second aim is to incorporate the twofold, sectoral and functional dimension of these activities. There are in fact two separate trends that contribute to the intensity of this phenomenon: first, the internationalisation of service sectors (telecommunications, business services, call centres, etc.) and, second, the internationalisation – often within manufacturing firms – of so-called "tertiary support" functions (head offices and internal administrative services, R&D centres, commercial offices, etc.). According to Trefler (2005), because of the international fragmentation of the production process, the contrast between the manufacturing and service sectors is no longer sufficiently apposite, as a result of which our analysis will use a twofold approach: sectoral (by comparison with the manufacturing sector), and then functional (with Defever's 2006 analysis being extended to all activities).

7. The results confirm, over and above a "core" of shared determinants, the existence of location criteria specific to the different sectors of activity or functions within firms. Skilled labour resources and a shared official language are, for example, particularly attractive factors for the service sector. That said, analysis at the functional level reveals specificities that are even more marked. The market size criterion, for example, which is globally more important where service activities are concerned, is not significant when it comes to on-line services such as call centres which are likely to operate at some distance from the final consumer. The wage costs criterion, while not significant for the majority of tertiary activities, is of decisive importance when choosing where to locate production centres. From the geographical point of view, lastly, a number of findings suggest that there are big differences in attractiveness between Eastern and Western Europe, depending on the activity being considered.

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4 This progress is mainly attributable to Fujita et al. (1999), Fujita and Thisse (2002), Head and Mayer (2004).

5 Defever (2006) compares location approaches by function (head offices, R&D, production, logistics, sales); Strauss-Kahn and Vives (2005) examine the relocation of head offices in the United States; Sachwald and Chassagneux (2007) analyse the location of R&D centres in Europe.

6 See, in this connection: "World Investment Report", UNCTAD (2004, 2007).

8. After first mentioning the existing theoretical literature on the subject and saying what we expect from our segmented approach, we present the data used (extracted from the AFII base) to implement the said segmentation. We will then outline the econometric methodology used and the variables that will be introduced in order to test the reduced form adopted. Finally, we will present the results obtained.

Location criteria: what sectoral and functional specificities?

9. The existing literature rests on the assumption that a firm will choose the location that maximizes its profits. On the basis of global analyses, the said literature has identified four major groups of determinants (see Mayer and Mucchielli, 1999): demand, profits derived from the agglomeration of firms, production factor costs and tax rates on corporate profits. Thanks to recent developments in the New Economic Geography, it is now possible to devise a theoretical framework (Box 1) for analyzing location decisions. However, the conclusions still remain relatively limited as regards systematically building in the sectoral or functional specificities of investment projects, notably where service activities are concerned. After first outlining the main conclusions arrived at in past studies, this part of the paper looks at the conclusions to be expected from a more discriminating segmentation of investment projects. There will be a particular focus on the following criteria: market access, agglomeration and co-location effects, the role of taxation and subsidies and, lastly, wage costs and labour skills.

Market access: a fundamental location criterion

10. Most empirical studies have analysed horizontal-type firms[7] whose location strategies are shaped by consumer proximity (individuals or firms), so that market access becomes a core criterion in location decisions. Some studies suggest, moreover, that firms are sensitive to local demand on one hand, and to demand from neighbouring markets on the other. The concept of "market potential", introduced in order to take the above factor into account, can in fact be seen to be a major determinant (Crozet et al., 2004; Head and Mayer, 2004). The importance of this criterion is also emphasized by most of the surveys conducted among heads of multinational groups (UNCTAD, 2007).

11. That said, the influence of this criterion is likely to vary appreciably with the nature of the project. Some activities, and those in the area of services in particular (sectors or functions), have to be located in the immediate proximity of the final consumer (e.g. distribution, service provision), while others have little or no need to be. This is true of a lot of manufactures likely to be the subject of international trade. The market access criterion can therefore be assumed to be globally more decisive in service activities (sectors or functions) than in manufacturing. This very broad comparison can, however, hide a wide variety of cases within each of the two groups. The studies by Sachwald and Chassagneux (2007) and by Kuemmerle (1997) show that R&D centres specialised in adapting products have a strong propensity to locate close to their final markets, while this particular criterion does not seem decisive in the case of call centres and on-line services (Hatem, 2005), or as regards head office location (Strauss-Kahn and Vives, 2005).

The positive role of agglomeration effects

12. Two opposing effects are liable to have an impact on the geographical concentration of activities: on the one hand there is the "centripetal" effect resulting from positive externalities (employment area and labour turnover, diversity of nearby suppliers and sub-contractors, potential partnerships and mimicry

[7] A horizontal multinational is a firm which replicates the same production process in various countries with the object of providing a direct service to foreign consumers. A vertical firm is one that produces abroad and then reimports its output or exports it to other markets. It is worth noting that the dividing line between the two strategies may seem clear in theory, but in practice it is rather more indistinct.

effects); while on the other hand there is the "centrifugal" effect stemming notably from the concern not to locate in the immediate vicinity of competitors, and from congestion effects. When applied to the location of international projects, this approach brings out the dominant role of agglomeration effects. The location, for example, of Japanese firms in the United States would appear to be strongly influenced by the presence of firms of the same nationality and belonging to the same sector (Head et al., 1995, 1999). Similar effects have been observed in France (Crozet et al., 2004).

13. Agglomeration effects can, however, differ in intensity depending on the type of activity. What is more, over and above the sectoral or industry influences confirmed by the work of Head and Mayer (2004),[8] they can also obey functional arguments. Recent urban economy studies (Duranton and Puga, 2005) point to the existence of a functional specialisation dynamic at work in numerous metropolitan areas. Strauss-Kahn and Vives (2005) show that headquarters relocation in the United States is greatly influenced by the above phenomenon, firms preferring to set up in urban areas where there are already large numbers of headquarters, preferably in the same sector of activity. It may be, therefore, that agglomeration forces affecting service activities are influenced more by functional than by sectoral considerations.

Box 1
A theoretical model of location choice: Head and Mayer (2004) increased by tax rates

Take a firm which locates its production in region i, i=1,...,R where R is the number of regions. The firm uses the labour and inputs available in the region in order to produce. Each firm produces a variety of a differentiated good in an industry assumed to be representative. Consumers have a constant elasticity of substitution between sub-utilities and maximise this utility function in relation to their expenditure. Demand emanating from a representative consumer in region j for a firm located in region i is given by:

$$q_{ij} = \frac{p_{ij}^{-\sigma}}{\sum_{r=1}^{R} n_r p_{rj}^{1-\sigma}} E_j, \quad (1)$$

where E_j is expenditure by a representative consumer in region j, where σ is the elasticity of substitution between varieties and where p_{ij} is the price "after delivery" paid by the consumer in region j for a good produced in all possible regions R. The above delivery price is a combination of the ex-factory price and iceberg-type transport costs τ. If it is assumed that the representative industry is in a monopolistic competition situation à la Dixit-Stiglitz (1977), to obtain the optimum price the firm sets a constant profit margin on its costs:

$$p_i = \frac{\sigma}{\sigma - 1} c_i, \quad (2)$$

where c_i is the marginal cost of production of the representative firm located in region i. By substituting (2) into (1), we obtain the quantity that a firm in region i can supply in each destination j:

$$q_{ij} = \frac{\sigma - 1}{\sigma} \frac{(c_i \tau_{ij})^{-\sigma}}{\sum_{r=1}^{R} (c_r \tau_{rj})^{1-\sigma}} E_j, \quad (3)$$

By introducing the fixed costs F attaching to setting up a new plant, the profit obtained by a firm located in region i for each destination region j is given by:

$$\pi_{ij} = (p_i - c_i)\tau_{ij} q_{ij} - F_i, \quad (4)$$

By substituting expressions (2) and (3) into (4), the profit obtained by a representative firm located in region i which is operating in market j is given by:

$$\pi_{ij} = \tau_{ij} \frac{c_i}{\sigma - 1} \frac{\sigma - 1}{\sigma} \frac{(c_i \tau_{ij})^{-\sigma}}{\sum_{r=1}^{R} (c_r \tau_{rj})^{1-\sigma}} E_j - F_i = \frac{1}{\sigma} \frac{(c_i \tau_{ij})^{-\sigma}}{\sum_{r=1}^{R} (c_r \tau_{rj})^{1-\sigma}} E_j - F_i, \quad (5)$$

[8] These authors are the only ones to control for real market potential. The agglomeration variables remain very significant, but introducing them greatly reduces the magnitude of the real market potential. There are therefore agglomeration forces other than those of demand emphasized by Krugman (1991).

By adding together the potential profits earned on each market, we obtain the firm's net aggregate profit earned in each potential location r:

$$\Pi_r = \sum_{j=1}^{R} \pi_{rj} = \frac{c_r^{1-\sigma}}{\sigma} M_r - F_r, \quad (6) \qquad \text{avec} \quad M_r = \sum_{j=1}^{R} \frac{\Phi_{rj}}{\sum_{r=1}^{R} n_r (c_r \tau_{rj})^{1-\sigma}} E_j, \quad (7)$$

In line with Krugman (1992), M_r represents Real Market Potential[9]. At this point, we add a further assumption to the Head and Mayer model (2004): like Devereux and Griffith (1998), we assume that the firm pays a rate of tax on gross profits. The firm's net profit is therefore represented by:

$$\Pi_r = (1 - T_r) \frac{c_r^{1-\sigma}}{\sigma} M_r - F_r, \quad (8)$$

When choosing a location, the firm compares the profits to be made in different potential locations. To derive a profit equation which is easier to manipulate at the estimation stage, Head and Mayer (2004) propose to perform a number of transformations which we too have adopted. They begin by assuming that the fixed production cost is the same everywhere, i.e. $Fr=F$, and they then add it to profits; next, they multiply the expression obtained by σ, and lastly they write this expression to the power 1/ σ-1. Initially, they thus obtain V_r:

$$V_r \equiv \left[\sigma (\Pi_r + F) \right]^{1/\sigma - 1}, \quad (9)$$

After a logarithmic transformation:

$$U_r \equiv \frac{1}{\sigma - 1} \ln M_r - \ln c_r + \frac{1}{\sigma - 1} \ln (1 - T_r), \quad (10)$$

Where production costs are concerned, let us assume that the cost function is Cobb Douglas with constant returns, that it uses work (w) and other inputs (z) such as intermediate goods or land. Taking α as the share allocated to work and A_r as total factor productivity, we obtain:

$$U_r = \frac{1}{\sigma - 1} \ln M_r - \alpha \ln w_r - (1 - \alpha) \ln z_r + \frac{1}{\sigma - 1} \ln (1 - T_r) + \ln A_r, \quad (11)$$

Unlike a firm, econometrics cannot observe z_r and A_r which are assumed to be accounted for by a random term. Ultimately, a firm's hoped-for profit on each market should depend positively on market potential[10] and negatively on the cost of labour and taxation and, lastly, be influenced (an indeterminate but often positive effect) by the number of firms already in situ. In the majority of studies, therefore, only the following reduced form[11] is estimated:

$$\pi = \beta_1 \, Demand + \beta_2 \, Agglomeration \; effects + \beta_3 \, Wages + \beta_4 \, Taxes + \varepsilon$$

The effects of co-location

14. The international fragmentation of value chains[12] has been a major factor in the recent growth of international investment flows. As they become more specialized, the different segments and functions can be located autonomously on a broadened geographical base. However, this autonomization is not complete and the location of some functions can still be sensitive to the earlier presence of complementary functions. Defever (2006) analyses these co-location phenomena and shows that there is, within the same given firm, a mutual attraction between R&D activities and production. We will therefore be seeking in our paper to verify the existence of these cross co-location effects between all business functions.

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9 The term Φ_{rj} represents freedom to trade (Baldwin, 2003). It is given by $\Phi = \tau^{1-\sigma}$

10 To estimate real market potential, the authors use a method based on international bilateral trade flows. It is a method explicitly described by Head and Mayer (2004), pp. 961-962.

11 The variables are expressed in logarithmic form, as the above model suggests.

12 Another name for the phenomenon, described in the introduction, of the internationalisation within firms of a certain number of functions providing tertiary support for production.

Tax pressure plays a bigger role than location subsidies

15. Also tested in the literature is the effect that taxation and set-up subsidies have on location decisions. On the whole, the level of tax has the expected negative impact (Devereux and Griffith, 1998; Bénassy-Quéré et al., 2003), but the effect of subsidies often appears to be marginal – even at regional level (Crozet et al., 2004). Our segmented approach will enable us to check the assumption that sensitivity to tax pressure may or may not vary according to the nature of the activity concerned[13].

Uncertainty as to the role of wage costs

16. The existing empirical literature does not produce any clear verdict as to whether wage costs have a major impact on location decisions. A number of studies even arrive at the conclusion that they are not a significant variable (Devereux and Griffith, 1998; Head et al., 1999; Head and Mayer, 2004). However, for those working in investment promotion agencies who observe on a daily basis that numerous manufacturing projects are being located in Eastern Europe for reasons relating directly to wage costs, the above finding is somewhat counterintuitive. Also, some studies would seem to show that the impact of wage costs may previously have been underestimated in empirical work (Liu et al., 2006)[14]. A number of analyses can be put forward to explain these findings. First, regions with a high market potential are also those where wages are highest (Head and Mayer, 2006). Second, some location criteria count more in the choice of region than in the choice of country. Mayer and Mucchielli (1999) show that wages play a more significant role in the infranational choice of location. Lastly, it seems to us that estimations that are too global can mix up activities whose location is sensitive to wage costs to varying degrees. A more detailed analysis would suggest that the location of activities resulting in the production of transportable goods or in remote service provision ought to be very sensitive to the level of wage costs. Conversely, projects whose location is chosen necessarily on grounds of consumer proximity ought not to be very sensitive to this criterion.

Labour force skills: a variable still given insufficient consideration

17. A number of surveys conducted among multinational firms confirm the influence of labour skills on location decisions. According to UNCTAD (2007), it plays at least as important a role as wage costs; however, it has often been used as a control variable to avoid the cost of labour also reflecting skill levels. In reality, it is a factor that can have a decisive influence where certain activities are concerned. Maurin and Thesmar (2004) show that the overall increase in the need for skilled staff is due to structural changes taking place in firms, the fact being that the share of labour involved in basic production tasks is diminishing because the said activities can be automatized, whereas the share of functions that are difficult to programme in advance (R&D, marketing) is increasing. So what is needed is to measure the differing impact of the variable in question by sector and by function. For the reasons just outlined, the influence of this variable can be expected to be generally greater in tertiary activities than in manufacturing.

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13 The effect of set-up subsidies generally being seen in the relevant literature as marginal or not significant, we are not incorporating this variable in our study.

14 There could in fact be potential endogeneity problems. However, we are unlikely to be faced with this concern. For the entry of firms to have a significant impact on the cost of labour, there would have to be a sudden, massive influx of firms in a limited space of time and only reduced labour displacement – conditions contained in their study on China at the regional level, but which can hardly be applied generally.

Taking projects' sectoral and functional specificities into account

18. Identifying precise location criteria therefore seems to be part and parcel in taking into account the sectoral and functional specificities of investment projects. We therefore make the assumption that the importance of the different criteria varies according to the activity. The reduced form we want to estimate is therefore as follows:[15]

$$\pi=\beta^{i}_{1}Demand+\beta^{i}_{2}Agglomeration\ effects+\beta^{i}_{3}Wages+\beta^{i}_{4}Taxes+\beta^{i}_{5}Distance+\beta^{i}_{6}Skills+\varepsilon^{i}$$

where i varies by sector of activity and by function, respectively

19. The AFII base on international investment in Europe contains detailed data by means of which investment projects can be classified by sector, by function and by country of origin and destination. As we shall now see, a descriptive analysis of major trends in international investment in Europe over the period 2002-2006 supports our intuition and allows us to identify a number of important stylized facts.

Empirical analysis: the hosting of projects is marked by strong geographical specialisation

The AFII "projects" database

20. The data used in this study come from the AFII's Observatory of international investment in Europe. The base contains information on tangible investment projects in Europe over the period 2002-2006 and is fuelled by reading the international economic press and by information available on the web (press agency, sites...). A comparison with other databases (Ernst and Young's European Investment Monitor, IBM-PLI's world base GILD) points to quite good data compatibility.

21. The data relate solely to creation and extension projects (which accounted, respectively, for 2/3 and 1/3 of investment), the particular significance of which is their job creation potential. The projects in question were carried out by multinational firms from 91 countries in 29 "enlarged European Union" countries.[16] European investors were nevertheless responsible for 55% of the projects and North Americans for one-third. The base contains nearly 14 000 observations, with very detailed information for each recorded project: the investing firm, the country and date of set-up, the sector of activity and the function within the firm.

22. Analysis of Tables 1 & 2 confirms the significance of the internationalisation of service activities as a phenomenon. First, while the share of manufacturing is globally preponderant, 40% of the projects carried out during the period in question belong to the service sector. Second, over 64% of the projects performed involve tertiary support functions.

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15 The introduction of geographical and cultural distance variables will be justified in the section on data presentation.

16 These are the 27 Member countries of the European Union, with the exception of Cyprus. The non-EU countries contained in the base are Switzerland, Norway and Iceland.

Table 1: Sectoral nomenclature of the AFII "Europe" Observatory[17]

Sector	All projects	% of all projects	% of projects going to Eastern Europe	% of projects going to Western Europe
Agro-food, agriculture and fisheries	666	4,8%	34,4%	65,6%
Furniture and home equipment	286	2,1%	47,2%	52,8%
Biotechnologies	122	0,9%	9,0%	91,0%
Chemicals, plastics technology	749	5,4%	28,3%	71,7%
Electronic components	238	1,7%	31,9%	68,1%
Motor vehicle and components manufacturers	1377	9,9%	51,1%	48,9%
Consumer electronics	309	2,2%	49,2%	50,8%
Energy, other concessionary services	418	3,0%	25,4%	74,6%
Electrical, electronic, computer and medical equipment	1368	9,8%	23,8%	76,2%
Machinery and mechanical equipment	634	4,6%	36,3%	63,7%
Aeronautical, naval and railway equipment	190	1,4%	26,3%	73,7%
Drugs, cosmetics	550	4,0%	17,1%	82,9%
Metals, metalworking, recycling	398	2,9%	48,2%	51,8%
Textiles, clothing	242	1,7%	51,2%	48,8%
Glass, ceramics, minerals, wood, paper, publishing	761	5,5%	44,3%	55,7%
Total, Manufacturing	**8308**	**59,8%**	**35,8%**	**64,2%**
Other commercial or financial services	1159	8,3%	19,8%	80,2%
Business services	1204	8,7%	13,8%	86,2%
Computer software and services	2192	15,8%	10,4%	89,6%
Telecom operators, Internet	184	1,3%	22,8%	77,2%
Transport, storage, public buildings and works	856	6,2%	27,9%	72,1%
Total, Services	**5595**	**40,2%**	**16,2%**	**83,8%**
Total	**13903**	**100,0%**	**27,9%**	**72,1%**

Table 2: Functional nomenclature of the AFII "Europe" Observatory

Type of project	All projects	% of all projects	% of projects going to Eastern Europe	% of projects going to Western Europe
Production	**4935**	**35,5%**	**47,9%**	**52,1%**
Commercial or liaison office	4680	33,7%	15,2%	84,8%
R&D centre	737	5,3%	18,0%	82,0%
Call centres and on-line services	301	2,2%	25,9%	74,1%
Distribution, logistics, packaging	1059	7,6%	25,8%	74,2%
Service provision	1254	9,0%	20,1%	79,9%
Internal administrative service or HQ	937	6,7%	7,2%	92,8%
Total, tertiary support functions	**8968**	**64,5%**	**16,9%**	**83,1%**
Total	**13903**	**100,0%**	**27,9%**	**72,1%**

17 The OECD defines four groups of services: financial services, insurance services, real estate services and, lastly, business services, the latter being for the most part in the base.

Strong sectoral and functional specialisation with regard to location in Europe

Production in the East, services and high value-added activities in the West?

23. Sectoral analysis of the geographical distribution of projects reveals patterns of specialisation that differ between Eastern and Western Europe. The first of these two regions appears to be very attractive to manufacturing activities, while West European performance levels seem distinctly preferable for high value-added and service activities (sectors or functions). What is more, almost 84% of service sector projects were set up in Western Europe during the period in question.

Specialisation by sub-region and by country

24. This first overall dichotomy does, however, mask the fact that attractiveness profiles differ across countries. On the one hand, there are marked differences within Eastern Europe:[18]

25. *Manufacturing output activities with average value added* (consumer electronics, motor vehicles), plus *a growing share of certain service activities* (software and even R&D) are tending to locate in the Centre-East region which is made up of the Eastern European countries that were the first to open up to international investment (Hungary, the Czech Republic and Poland). This is no doubt due to these countries catching up, with their characteristics in terms of resources, market potential and even production costs beginning to approach those in the West. What is more, the co-location of functions – a phenomenon described by Defever (2006), implies that tertiary support activities (R&D) and logistics will gradually locate close to the production sites already set up by multinational firms in these countries. *Low value-added sectors* (production of furniture, equipment for the home and garments) are particularly attracted to the other Eastern European countries. These countries, which are now in the economic take-off phase, are undoubtedly basing a sizeable proportion of their growth on hosting manufacturing activities of which the products are scheduled for re-export.

26. On the other hand, the countries of Western Europe also have differing specialisation profiles:

27. *Service activities* (administrative services, call centres, software, other provision of services) are particularly highly concentrated in the United Kingdom which also attracts a few high value-added sectors of industry. The UK is also the target of a very large proportion of North American investment in Europe, which may perhaps be attributable to language and a certain cultural affinity (company law…). *High-level service activities and high-tech manufacturing* tend to locate quite extensively in the Germanic and North European countries. *Certain labour-intensive manufacturing activities* (motor vehicles, other transport equipment), are still locating in the countries of southern Europe (especially in Spain and Portugal), but this is a region that is highly exposed to competition from the low-cost East European countries. France, finally, which seems less specialized than the majority of its European neighbours, performs well in terms of *tertiary activities in general and all the medium and high tech sectors* (machinery, drugs, aircraft).

28. This analysis would suggest that different location approaches are involved, depending on the activity. In the next part of this paper we are going to try to demonstrate the existence of these sectoral and functional specificities in location criteria, so as to be able to provide precise guidelines for attractiveness policies.

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[18] See Hatem (2007) for a more detailed analysis.

Econometric methodology

29. The reduced form that we want to test will first be estimated using the conditional logit technique, with all the potential locations being considered "simultaneously" by the investor. Next, we shall look at the possibility that choice structures are actually hierarchical, *i.e.* that investors begin by choosing a major region and then choose a country inside the said region. This type of estimation is made possible by using the nested logit model. Two types of approach need to be briefly described.

From the conditional logit model to the nested logit model

30. The principle is to assume that location decisions are based on the intention to maximize expected profits. Econometricians are not in a position to observe each country's potential profitability; instead, they observe the location choices made by firms in countries with characteristics that can be observed. Using conditional logit analysis (McFadden, 1974), for example, it is possible to estimate the probability of a country being chosen for its characteristics over and above those of other potential host territories. The conditional logit model is thus a discrete-choice model involving several possible alternatives (Box 2). The coefficients estimated thus measure the impact of the variation in a given variable on the probability of the location being chosen.

31. The crucial problem with this model is that it rests on the IIA assumption (the assumption that error terms are independently and identically distributed): the probability of region r being chosen in preference to region k has to depend solely on the characteristics of the said two locations and in no way on the characteristics of a third location. What this means, in other words, is that if two regions appear to investors to be close substitutes, the error terms will be positively correlated and the parameters estimated will be distorted. Now it is highly likely that we will be faced with this problem if investors have a hierarchical choice structure (Mayer and Mucchielli, 1999; Crozet et al., 2004; Disdier and Mayer, 2004). Disdier and Mayer (2004), in particular, find that there is an East-West-type structure in French firms' location choices in Europe. It may be that this structure is also valid for all international investors between these two groups of regions, the characteristics of which may appear extremely different: low production costs and rapid growth of the market in the East, compared to a large-sized market in the West. Investors could therefore adopt a hierarchical choice approach, directing their projects initially towards one of the two major regions, on the basis of its characteristics, and then selecting a country within a preferred region.[19] Using the nested logit model (Maddala, 1983; Train, 2003), it is possible to model this sort of choice structure and hence to limit the IIA problem. The principle is in fact to collect apparently similar countries together within a given group (or "nest"). Once that has been done, the IIA holds within each group but not between the different groups.

[19] Though the choice process is described in two stages, it is nevertheless not a sequential process (see Box 2).

Box 2
Conditional logit and nested logit

Conditional logit

Let $R= (1,...,r,...N)$ all the potential locations. Each potential location offers firm i a profit Π_{ir} expressed as:

$$\Pi_{ir} = V_{ir} + \varepsilon_{ir} \quad \text{avec} \quad V_{ir} = \beta X_{ir} \quad (1)$$

where V_{ir} depends on the observable characteristics X_{ir} of each location r, on a vector β of coefficients to be estimated and on a set of unobservable characteristics captured in the stochastic error term ε_{ir}. Firm i chooses the location which provides it with the highest profits. In other words, the probability of firm i chosing region r is expressed as:

$$P_{ir} = prob(\pi_{ir} > \pi_{ik}) = prob(\varepsilon_{ik} < \varepsilon_{ir} + V_{ir} - V_{ik}), \quad \forall r \neq k \quad (2)$$

McFadden (1974) shows that, if the error terms are independently and identically distributed according to a type I extreme value distribution, the probability of firm i choosing location r is expressed as:

$$P_{ir} = \frac{e^{\beta X_{ir}}}{\sum_{r=1}^{N} e^{\beta X_{ir}}}, \quad (3)$$

This type of model is then estimated by means of the maximum likelihood method. The problem with this type of model is that the assumption that the error terms are independently and identically distributed (IIA) can be disregarded when the location approaches are ranked. The nested logit method can be used to model this sort of choice structure.

Nested logit

The nested logit principle (Maddala, 1983; Train, 2003) consists of gathering together those countries that appear similar in the eyes of investors in a given group (or nest) so that they present the same degree of substitutability. Thus the IIA holds within each of these groups but does not hold between these groups. We make the assumption that alternative countries R are grouped in Z nests (or zones). Let $Z= (1,...,z,...L)$, all the possible nests, and $R= (1,...,r,...Nz)$, all the countries belonging to each zone z. In this model, the upper decision structure (in this instance the choice between East and West) and the lower structure (choice of country within the zone) are not independent. Clearly, the choice of a region depends on the characteristics of each region, but also on the attributes of the countries in the region. The choice of a country also depends on the choice of region.

A firm (which we take to be representative so as to simplify the ratings) that chooses to locate in country r belonging to zone z obtains the following profit:

$$\Pi_{zr} = V_{zr} + \varepsilon_{zr} \quad \text{avec} \quad V_{zr} = \alpha Y_z + \beta X_{zr} \quad (1)$$

Unlike the preceding model, certain observable characteristics V_{zr} depend on the characteristics of both the countries and the regions (i.e. X_{zr}), whereas certain others vary solely between regions (ie Y_z). The same goes for the unobservable characteristics of the potential locations captured by the stochastic error term ε_{zr}. The probability of choosing country r can thus be expressed as the product of two probabilities: the probability of choosing country r conditional on the choice of zone z, ($P_{r/z}$), and the marginal probability of choosing zone z, (P_z). Whence:

$$P_{zr} = P_{r/z} \times P_z \quad (2)$$

The probability of choosing region r depends on the characteristics of the said region, but also on the characteristics of all the countries in the region:

$$P_z = \frac{e^{[\alpha_z (Y_z + (1/\beta_z) VI_z]}}{\sum_{m=1}^{L} e^{[\alpha m (Ym + (1/\beta m) VIm]}} \quad \text{en définissant } VI_z = \log\left(\sum_{r=1}^{N_z} e^{\beta X_{zr}}\right) \quad (3)$$

Here V_{iz} is called the inclusive value. It corresponds to the anticipated utility that the representative firm derives from setting up in a country belonging to region z. In a second phase, the probability pf choosing country r conditional on the choice of region z is given by:

$$P_{r/z} = \frac{e^{\beta X_{zr}}}{\sum_{r=1}^{N_z} e^{\beta X_{zr}}} \quad (4)$$

Lastly, by substituting (3) and (4) into (2), we obtain the probability of choosing country r belonging to region z:

$$P_{zr} = \frac{e^{\beta X_{zr}}}{\sum_{r=1}^{N_z} e^{\beta X_{zr}}} \times \frac{e^{[\alpha_z (Y_z + (1/\beta_z) VI_z]}}{\sum_{m=1}^{L} e^{[\alpha_m (Y_m + (1/\beta m) VI_m]}} \quad (5)$$

Equation (5) can be estimated using the maximum likelihood. The key parameter in this equation is the coefficient, $\Phi = \alpha_z / \beta_z$, of the inclusive value which should show the relevance of the proposed structure (see Box 4).

The variables selected and their sources

Investment projects

32. As stated earlier, we are using data taken from the AFII's Observatory of international investment in Europe, a base which contains 13 903 observations. All the explanatory variables (see Table 3 for the statistical sources) were constructed on the basis of the information available for the period 2001-2005, and this for two reasons. The first aim was to avoid the inverse causality problems, although these are probably not very important at national level. Also, this approach is better at reflecting investors' decision-making processes, it being reasonable to think that, when investing in t, investors compare the information available in t-1 on the characteristics of the potential host countries. In line with the theoretical framework presented earlier (Box 1), these variables are converted into logarithmic form to carry out the estimations, the exception being the qualitative variables.

Market size

33. We use two types of measurement to gauge the size of national markets. The first is GDP by country at constant prices (Eurostat). The second is the Harris-type market potential (1954), adding to distance-weighted GDP by country an external market potential (GDP of neighbouring countries weighted by the bilateral distance to the country considered):

$$PM_i = \frac{PIB_i}{D_{ii}} + \sum_{\forall j \neq i} \frac{PIB_j}{D_{ij}}$$

34. This measurement has the advantage of considering that demand that can be exploited by a firm stems both from local demand and from demand emanating from the surrounding locations. Countries with strong geographic centrality (in terms of GDP distribution) are therefore favoured by this indicator. It should be noted that we are not using the Krugman-type (1992) real market potential described in Box 1 for two reasons. First, the trade flows needed to construct the said variable are not available for the whole of the period in question. Second, Head and Mayer (2004) having compared the use of these different measurements, it transpires that using real market potential gives forecasts of location behaviour that are slightly inferior to those produced by Harris-type nominal market potential (1954).

Agglomeration effects

35. Three variables were used to measure agglomeration effects. The first is designed to take account of the overall size of the sector in the host country. Size is approximated by the total number of firms –domestic and foreign – in the sector and country concerned in the year preceding the decision to invest (Eurostat). The second is designed to measure the overall extent of foreign presence in the country and sector concerned. This factor is measured by the cumulative stock of foreign projects, as registered by the AFII Observatory during the year preceding the investment. The third variable, finally, is designed to measure the agglomeration effects between firms in the same sector and from the same country of origin. The indicator used was constructed in the same way, on the basis of projects stemming from the same country of origin and belonging to the same sector of activity.

Labour

36. The local labour market can be characterized by three criteria: the cost of labour, its skill level and its availability. The first variable to be introduced is therefore that of the "cost of labour", measured by the average wage level by sector of activity.[20] The second variable, designed to measure skill levels, is the percentage of the population to have had a university-level education. Lastly, an "unemployment rate" variable is introduced to take account of the degree of saturation of the labour market. This variable is therefore expected in principle to have a positive coefficient. There is, however, a certain ambiguity about it since high unemployment can also signal labour market rigidity, which would not be attractive to foreign investors. So a negative coefficient cannot be ruled out.

Geographic and cultural proximity

37. Two distance variables have been introduced to measure the volume of the transaction costs (attaching to distance, to adjusting to a new cultural and legal environment) resulting from setting up a subsidiary in a foreign country. The first, designed to measure geographic proximity, relates to the spatial distance between the countries of origin and the countries hosting the projects. The second, which concerns cultural proximity, is represented in the model by the existence of a shared official language. The latter ought to counterbalance the negative effect of geographic distance. The data in question come from the CEPII.

Taxation

38. Overall tax pressure on firms is represented by the rate of tax on company profits. One would rather expect the value of this variable to be negative, but its effect is thought to be limited. For one thing, the rate of tax on company profits is only a partial and no doubt biased indicator of the level of tax pressure on companies; for another, a high level of taxation may be counterbalanced by an abundant supply of quality public goods, which will increase attractiveness. However, this latter factor is not represented by an explicit variable in our formulation.

Variables specific to function analysis

39. A number of explanatory variables have had to be reconstructed in order to conduct the function analysis. First of all, the average unit cost of labour by function was calculated by constructing a table of correspondence between Eurostat data and the functions shown in the AFII database (see Annex 2). Then,

[20] Since the AFII and NACE nomenclatures of activity are not exactly similar, a correspondence table has been created so as to be able to calculate sectoral wages for use in our study on the basis of Eurostat data (see Annex 1).

in order to measure functional agglomeration effects, a specific variable was constructed using the AFII database by means of a process similar to that used for sectoral agglomeration variables. This variable corresponds to the total stock of projects of foreign origin in the function and the country concerned during the year preceding the investment. Lastly, analysis of co-location phenomena required a functional agglomeration variable which was constructed using the same method but was introduced separately for each function. It should be noted that, not having the data with which to identify the subsidiaries' parent companies, these phenomena are considered at country level between different firms whereas Defever (2006), for his part, analyses this aspect within firms.

Table 3. Presentation of explanatory variables

Variable	Definition	Availability	Source
GDP	GDP in € million at constant prices (1995 prices and exchange rates)	2001-2005	Eurostat – National accounts
Market potential	Harris-type market potential (1954) in € million at constant prices (1995 prices and exchange rates)	2001-2005	Based on Eurostat and Distance-CEPII
Wage	Average unit labour cost at sector level (19 AFII sectors)	2004	Eurostat-Industry and Construction
Skill level	Percentage of the population with a university-level education, for persons aged between 25 and 34	2004	IMD-World Competitiveness Yearbook
Tax	Rate of tax on corporate profits	2001-2005	IMD-World Competitiveness Yearbook
Unemployment	Rate of unemployment as a percentage of the labour force	2001-2005	IMD-World Competitiveness Yearbook
Distance	Distance between country of origin and country of location, based on bilateral distances between the biggest towns in these countries		CEPII-Distance (dist_cepii)
Shared official language	Dummy variable taking a value of 1 when the two countries share the same official language		CEPII-Distance (dist_cepii)
Number of firms	Total number of firms (domestic and foreign) at sector level (19 AFII sectors)	2002-2005	Eurostat-Industry and Construction
Total FDI in same sector	Sum of the number of projects carried out in the same sector in the year preceding the investment	2002-2005	Constructed using the AFII database
Total FDI in same sector and of same origin	Sum of the number of projects originating from the same country, carried out in the same sector in the year preceding the investment	2002-2005	Constructed using the AFII database
Total FDI in same function	Sum of the number of projects carried out in the same function in the year preceding the investment	2002-2005	Constructed using the AFII database

Control variables

40. In order, finally, to avoid problems to do with variables that are omitted, most studies analysing location choices at the infranational level introduce country fixed effects. To the extent that several of our explanatory variables defined at country level are constant over time, we introduce fixed effects at a higher geographical level. Given the stylized facts described earlier, they are East-West fixed effects.

Application: multinational firms' choice of location in Europe

41. We begin by presenting the overall results, with all activities combined, so as to make them comparable with earlier studies. They are on the whole very consistent with those contained in the existing literature. More detailed analyses are then presented by sector and by function, and they make it possible to identify numerous specificities in the location criteria, particularly where service activities are concerned. From the geographical standpoint, finally, a number of results (significativeness of fixed East-West effects, identification of a hierarchical choice structure) demonstrate the existence of attractiveness profiles which differ between Eastern and Western Europe.

Overall results

42. The results [21] arrived at for the projects as a whole, all activities combined, are very consistent (see Table 4). Most of the variables have the expected signs and our results are in the main consistent with those found in the existing empirical literature on the subject. In columns (1) and (2) of the Table we compare the use of two indicators for market size. In column (3), we have introduced fixed East-West effects.

Table 4: Conditional logit, overall results

	(1)	(2)	(3)
Wage	-0.62***	-0.18***	-0.24***
	(0.04)	(0.03)	(0.04)
Unemployment	0.08**	0.39***	0.40***
	(0.03)	(0.03)	(0.03)
Skill level	0.16***	0.21***	0.19***
	(0.04)	(0.04)	(0.04)
Tax	-0.22***	-0.49***	-0.51***
	(0.06)	(0.06)	(0.06)
Distance	-0.16***	-0.10***	-0.10***
	(0.02)	(0.02)	(0.02)
Shared official language	0.62***	0.54***	0.53***
	(0.03)	(0.03)	(0.03)
Total FDI in same sector	0.29***	0.30***	0.29***
	(0.02)	(0.02)	(0.02)
Total FDI in same sector and of same origin	0.54***	0.53***	0.53***
	(0.02)	(0.02)	(0.02)
Number of firms	0.04***	0.25***	0.24***
	(0.02)	(0.01)	(0.01)
GDP	0.40***		
	(0.02)		
Market potential		0.74***	0.76***
		(0.04)	(0.06)
Dummy variable "East"			-0.13**
			(0.05)
Observations	252881	252881	252881
Likelihood function	-31568.90	-31621.02	-31618.66
Pseudo R2	0.15	0.15	0.15

Standard deviations between brackets, *10% significant, ** 5% significant, *** 1% significant

[21] The number of observations corresponds to the number of projects multiplied by the number of possible choices (apart from the missing values). Six countries are not in the sample for want of data (Iceland, Latvia, Lithuania, Malta, Switzerland and Romania). Initially, firms outside Europe had a choice between 29 countries, compared to only 28 for European firms. This is not a problem inasmuch as if the IIA holds up, the choice between two countries has not to be affected by the choice of a third.

Positive role of the market, of agglomeration effects and of geographic and cultural proximity

43. In the first place, location decisions are very sensitive to market size, a 10% increase in market potential prompting a 7% rise in the probability of attracting new investors (see Box 3 for the interpretation of the estimated coefficients). This result can be observed whatever the indicator selected. It is apparent, however, that investors are twice as sensitive to changing market size in the specification incorporating "market potential" as they are to that in the specification based solely on domestic GDP. This result, which is consistent with that arrived at by Head and Mayer (2004), confirms the notion that in the integrated European area, the perception of a "market area" accessible from a given location extends well beyong the borders of the host country alone.

44. Secondly, the agglomeration phenomena appear to be broadly confirmed by our results. The three variables introduced in our model have a positive and significant sign. Location decisions appear especially sensitive to the presence of firms from the same country, which have invested in the same sector. This "pace-setting effect" can be explained by a number of factors: better information about the area, an enhanced feeling of security, the existence of positive externalities due to the presence of colleagues with the same technical concerns and the same business culture. It has already been referred to in a number of earlier studies (Crozet et al., 2004).

45. Our studies also point to the positive impact of geographic and cultural proximity, which is as expected.[22] As initially thought, having the same language as the investor acts as a powerful attraction. In this connection, one immediately thinks of how US investment in Europe tends to focus on the British Isles. Similarly, geographic proximity seems to encourage investment – a finding consistent with that described in earlier studies (Disdier and Mayer, 2004; Mejean et al., 2007). This result also corroborates the empirical finding that European investors – in the manufacturing sector especially – favour nearby countries, and no doubt explains the scale of cross-flows of investment between France and Italy, Belgium and the Netherlands.

Negative role of taxation and wage costs

46. Alongside the factors that impact positively on location decisions, we have as expected identified a negative impact exerted by the rate of tax pressure, which is consistent with the findings of earlier studies (Devereux and Griffith, 1998; Bénassy-Quéré et al., 2003). Our findings do, on the other hand, differ on one important point, showing that wage costs have a significantly negative impact on location decisions – even at an aggregated level. There are a number of possible reasons for this. The presence of the East European countries in the sample does, in particular, involve major differences in labour costs and leaves room for a significant tradeoff between potential locations. It should be noted, though, that wage costs have less of an effect in the specification incorporating market potential than in that incorporating GDP. This comes back to the idea that the profits made by firms located in a central region offset the inevitably higher wage costs. Lastly, the introduction of fixed East-West effects does not alter the magnitude of the coefficients, although the dummy variable for the East appears with a negative and significant effect. This suggests that there are other factors making the East less attractive than the West in investors' eyes, and these could include a difference in the perceived quality of the respective institutions – a result found by Disdier and Mayer (2004) with respect to French firms setting up in Europe between 1980 and 1999.

47. In the continuation of the analysis we will take specifications (2) and (3), incorporating market potential, because they occur more frequently in the relevant literature. In addition, we did separate tests for greenfield and brownfield sites, and it is apparent that there are marked specificities attaching to the

[22] Few studies incorporate this variable, even though it appears to be significant in all the specifications.

latter.[23] In the continuation of this paper we will be focusing solely on greenfield sites which, in our view, better reflect the issues of "free" location, not constrained by the existing network of sites of the firm concerned.

Box 3
Interpreting the coefficients in endogenous qualitative variable models

Interpretation of the coefficients not being as direct as in linear estimations, two approaches are described.

The first involves considering that the coefficient itself is close to an elasticity given by $\beta(1-P_r)$ where P_r is the reciprocal of the number of choices. Using column 2 in Table 4 gives 0,74(1-1/23)=0,70. This means that a 10% increase in market potential results in a 7% increase in the probability of attracting new investors. The limitation of this first approach in terms of elasticity of probability is that the imposed variation is not necessarily realistic.

Using a second approach, it is possible to propose a realistic variation for the explanatory variable. To take two examples. The "number of firms" variable comprises the total number of domestic and foreign firms in a given sector and country. The "total FDI in the same sector" variable, on the other hand, which is constructed from the AFII base, takes account only of the number of foreign firms that came in during the period. Supposing that, in a given country, there were 100 domestic firms but only one foreign firm in motor vehicle manufacturing. Just one new firm locating in that country and that sector would be sufficient for the above variable to increase by 100%, whereas the "number of firms" variable would increase by less than 1%. So it is important to take a realistic order of magnitude regarding the real variation in the explanatory variable. The proposed method is therefore as follows (taking the "number of firms" variable as an example). Let us suppose that there is a hypothetical country in which the number of firms is equal to the average observed for all countries and let us consider the initial probability (P) of that country being chosen. Next, let us suppose that we increase the number of firms in such a way that it increases by a standard deviation in the country concerned (which has very little impact on the attractiveness of the other countries). The new probability of this country being chosen is P'. Consequently, the increased probability of attracting a new investor may be expressed as:

$$\frac{P'}{P} = \left[1 + \frac{studev(nombre\ de\ firmes)}{mean(nombre\ de\ firmes)}\right]^{\beta}$$

where β is the estimated coefficient and where the ratio (studv/mean) corresponds to the coefficient of variation for the "number of firms" variable. Using this approach it is therefore possible to measure, for a given variable, the effect of a variation in a standard deviation on the probability of attracting investors.

Analyses broken down by project segments

Segmentation by sector

48. The estimations carried out separately for the manufacturing and service sectors (Table 5) produced a number of interesting results, most of them consistent with what we expected. By and large, all of the variables significant for the base as a whole remain so – with the expected sign – for each of the two major sectors. However, a certain number of specificities do appear where the service sector is concerned.

49. In the first place, project location in the service sector appears to be very sensitive to skill levels, whereas the coefficients are close to zero where manufacturing is concerned. This finding is consistent with our theoretical discussion and confirms the fact that, broadly speaking, service activities are more demanding in terms of skilled labour. This is a particularly interesting aspect, one of the major challenges

[23] The results are not given here but can be obtained from the authors on request. It should be noted, however, that the results for greenfield projects (which are in a majority in the base) are very similar to those for the projects as a whole.

stemming from the present increase in FDI in services being that skilled workers are exposed to international competition, having hitherto been thought to be relatively sheltered from this "threat". This being the case, any policy aimed at promoting a country's skilled labour resources may prove to be very effective in terms of attractiveness, and hence jobs created.

50. Second, market size is an important criterion in both sectors of activity, but investors are more sensitive to it in the service sector. This result is in line with our intuition in the sense that "remote" services (those identified as such in the base, call centres and on-line services) are in a minority in our sample.

51. Third, project location in the service sector is more sensitive to the existence of a shared language, whereas in manufacturing the impact of geographic proximity between the country of origin and the host country is more marked in manufacturing. These results are consistent with several of the empirical observations referred to above, such as the scale of US investment in the UK service sector. However, the lack of significance of physical distance in the service sector may possibly be more generally due to the nature of the projects in question. It may reasonably be thought, for instance, that the initial investment needed to start up service activities is not as heavy (in terms of capital, premises and equipment) as it is in the case of a production activity. In this connection, distance would have only a marginal impact on the cost for the service sector of locating abroad, whereas its effect would be significant in the case of manufacturing activities.

Table 5: Conditional logit, comparison by sector of activity

	Manufacturing sector		Service sector	
	(1)	(2)	(3)	(4)
Market potential	0.66***	0.65***	0.83***	0.93***
	(0.07)	(0.07)	(0.07)	(0.08)
Wage	-0.23***	-0.21***	-0.11***	-0.44***
	(0.04)	(0.06)	(0.05)	(0.07)
Unemployment	0.36***	0.36***	0.37***	0.43***
	(0.04)	(0.04)	(0.05)	(0.05)
Skill level	-0.02	-0.02	0.47***	0.44***
	(0.05)	(0.05)	(0.07)	(0.07)
Tax	-0.45***	-0.44***	-0.30***	-0.43***
	(0.09)	(0.09)	(0.10)	(0.10)
Distance	-0.13**	0.13***	-0.01	-0.03
	(0.03)(0.03)	(0.03)	(0.03)	(0.03)
Shared official language	0.54***	0.54***	0.73***	0.71***
	(0.05)	(0.05)	(0.05)	(0.05)
Total FDI in same sector	0.33***	0.33***	0.12***	0.09***
	(0.03)	(0.03)	(0.03)	(0.03)
Total FDI in same sector and of same origin	0.58***	0.58***	0.40***	0.42***
	(0.03)	(0.03)	(0.03)	(0.03)
Number of firms	0.22***	0.22***	0.35***	0.34***
	(0.02)	(0.02)	(0.02)	(0.02)
Dummy variable "East		0.04		-0.64***
		(0.09)		(0.11)
Observations	109904	109904	97157	97157
Likelihood function	-14398.68	-14398.57	-11596.23	-11577.39
Pseudo R2	0.12	0.12	0.18	0.18

Standard deviations between brackets, * 10% significant, ** 5% significant, *** 1% significant.

52. Last, the dummy variable "East" introduced in our regressions (columns 2 and 4) takes on a very significantly negative value in the case of the service sector. This points to the existence of a number of factors that are specifically unfavourable to investment in the East where the service sector is concerned.

These would include factors to do with governance, with the absence of towns able to host high-level tertiary services, with differences in labour resources, etc. According to Defever and Desbordes (2007), the East's unattractiveness for investment projects in the area of services may be due not so much to the lack of skilled labour (resources are relatively comparable between the two regions) as to the negative role played by problems to do with public governance. Since institutions take a long time to evolve, this latter aspect may therefore be accounted for by the introduction of fixed effects. Also, this fully corroborates the stylized fact alluded to above, according to which the bulk of international investment projects in the service sector were located in Western Europe during the period in question.

53. This initial segmentation by major sectors pointed to significant sectoral specificities as regards the location of service activities. However, approaches by major sector only partially account for location decisions because, apart from the existence of sectoral specificities[24] within the categories themselves, the boundary between the manufacturing and service sectors is no longer as relevant as beforehand (Trefler 2005). This is because firms have not only to manufacture the product or provide the service they market, but they have also to put in place a whole raft of support functions upstream and downstream: research and development, head offices, marketing departments and call centres, commercial and representative offices, logistics and distribution. The location of each of these types of function[25] can be based on specific arguments that are more or less independent of the sector to which the investor belongs, whence the symmetrical occurrence at territorial level of functional specialisation phenomena (a phenomenon described by Duranton and Puga, 2005).

Segmentation by function

54. There have also been some empirical studies on specific location criteria for the various functions of manufacturing firms. Our study, which focuses on a more overall set of functions, all sectors combined, also arrives at new and interesting results[26] in this connection (see Table 6). Generally speaking, a number of results observed at the overall level remain valid for each of the functions concerned: sensitiveness to the market and to agglomeration effects and the effects of geographic and cultural proximity, the negative impact of tax rates. Also, however, there are strong functional specificities, in particular concerning the following points:

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24 Tests conducted at a more detailed sectoral level show very labour-intensive production projects to be extremely sensitive to wages. Such projects include textiles/wearing apparel and motor vehicles (not shown for want of an adequate number of observations). This finding is consistent with the experience gained by experts who know that projects of this type tend habitually to be located in low-cost countries, from which the products are then exported.

25 List to which must obviously be added the "production" function proper, which in our study is called "production" for manufacturing and "provision of services" for the service sectors.

26 We began by conducting tests without the co-location variables by introducing a functional agglomeration variable (see Annex 3). The results are in general broadly similar, only the significativeness of a few coefficients being affected. We therefore give the estimates directly with co-location.

Table 6: Conditional logit, analysis by function and co-location phenomena							
	Head offices	R&D centre	Production centre	Distribution	Commercial offices	Provision of services	Call centres
Market potential	1.34***	0.44*	0.33***	0.77***	0.78***	1.02***	0.26
	(0.22)	(0.23)	(0.12)	(0.19)	(0.09)	(0.20)	(0.45)
Unemployment	0.26*	0.37**	0.35***	0.32***	0.20***	0.34***	0.38
	(0.15)	(0.15)	(0.06)	(0.12)	(0.06)	(0.11)	(0.23)
Wage	0.14	0.30**	-0.30***	-0.12	-0.10*	0.14	0.20
	(0.17)	(0.14)	(0.06)	(0.12)	(0.06)	(0.12)	(0.24)
Skill level	0.81***	0.21	-0.34***	0.28	0.30***	0.34*	0.33
	(0.24)	(0.23)	(0.09)	(0.17)	(0.08)	(0.17)	(0.41)
Tax	-0.40	-0.10	-0.63***	0.15	0.40***	-0.54**	-1.09**
	(0.30)	(0.30)	(0.12)	(0.24)	(0.13)	(0.24)	(0.45)
Distance	0.42***	0.28**	-0.27***	-0.02	0.16***	0.02	-0.04
	(0.13)	(0.12)	(0.03)	(0.07)	(0.04)	(0.07)	(0.15)
Shared official language	1.09***	0.77***	0.68***	0.70***	0.93***	0.97***	0.69***
	(0.12)	(0.14)	(0.08)	(0.12)	(0.05)	(0.10)	(0.23)
Total FDI in same sector	0.69***	0.29***	0.69***	0.14	0.30***	0.19**	-0.04
	(0.10)	(0.08)	(0.05)	(0.09)	(0.04)	(0.09)	(0.16)
Co-location							
Head offices	0.25	-0.04	-0.06	-0.05	-0.38***	-0.50***	-0.04
	(0.16)	(0.16)	(0.07)	(0.13)	(0.06)	(0.12)	(0.27)
R&D centre	0.08	0.80***	0.10	-0.05	0.19***	0.05	0.09
	(0.15)	(0.17)	(0.07)	(0.12)	(0.06)	(0.13)	(0.29)
Production centre	0.15	0.55***	0.49***	0.47***	0.09	0.41***	0.87***
	(0.14)	(0.14)	(0.06)	(0.11)	(0.06)	(0.12)	(0.22)
Distribution	-0.12	-0.39***	-0.10*	0.20*	-0.09*	-0.05	-0.27
	(0.12)	(0.12)	(0.05)	(0.10)	(0.05)	(0.10)	(0.20)
Commercial office	0.03	0.06	0.28***	0.10	0.62***	0.39***	0.31
	(0.15)	(0.15)	(0.06)	(0.12)	(0.06)	(0.12)	(0.23)
Provision of services	-0.27*	-0.38**	-0.38***	-0.04	-0.06	0.34***	0.14
	(0.14)	(0.15)	(0.07)	(0.12)	(0.05)	(0.11)	(0.23)
Call centres	-0.10	-0.13	-0.00	-0.03	0.11**	-0.09	-0.04
	(0.11)	(0.12)	(0.05)	(0.10)	(0.05)	(0.10)	(0.20)
Observations	15320	12022	59838	17342	83481	20190	4488
Likelihood functi	-1684.12	-1516.70	-7373.88	-2200.57	-9939.80	-2449.69	-546.68
Pseudo R^2	0.24	0.13	0.14	0.11	0.16	0.15	0.14

Standard deviations between brackets. *10% significant. ** 5% significant. ***1% significant.

55. In the first place, the only function that is sensitive (to a particularly negative and significant degree) to wage costs is production, while it is also the function with the least sensitiveness to the market. This result is in line with that found by Defever[27] (2006), who demonstrates a substantial difference

[27] The functions contained in the Defever study belong to the manufacturing sector and are five in number: head offices, R&D centres, production, logistics, sales and marketing.

between the production function (where wages and agglomeration phenomena are very significant) and support services (sensitive above all to market size and to functional agglomeration effects).

56. Conversely, a number of tertiary functions (especially head offices or headquarters) are extremely and positively sensitive to manpower skills, whereas the sign of the estimated coefficient is reversed for production activities. One immediately thinks of the location of low-tech factories in countries with low wage costs and low average skill levels. It is important to realize that the measurement used to approximate skill levels undoubtedly influences the significativeness of the coefficients for this variable. Head offices on the whole want staff educated to university level, whereas R&D centres tend to look for people more specialized in sciences and engineering.

57. The results for R&D centres show their location to be somewhat sensitive to the market, which can be the case (Kuemmerle, 1997; Sachwald-Chassagneux, 2007) when it is a matter of adapting products to the local market rather than creating new ones. Such projects are also sensitive to the prior existence of production sites (which is consistent with the co-location effect also demonstrated by Defever, 2006). It is interesting, however, to note the low significativeness of several major variables, and especially labour force skill levels. This apparently counter-intuitive result can also be explained if it is acknowledged, as Sachwald and Chassagneux do, that there are at least three distinct types of R&D centre (local development, global development and fundamental research laboratories), with very different location criteria in each case[28]. In this study, in particular, the level of education does not seem to be a major determinant of location for local development/adjustment centres, which are by far the most numerous.

58. Where head offices are concerned, our estimations point to fairly high sensitivity to skill levels, to market proximity, to shared language effects and to both sectoral and functional agglomeration effects. This latter result is especially consistent with those obtained by Vives and Strauss-Kahn (2005). The significativeness of the market size criterion is less so, but is no doubt linked to the role played by the sharing of a common language[29] where this function is concerned, it being the United Kingdom which attracted the most head offices over the period (27% of the total, compared to 10% for France which was in second position). And of the head offices which set up in the United Kingdom (location with high centrality), 66% were of US origin.

59. The market size criterion seems to be very significant where service provision is concerned. The "call centre and on-line services" function is the only one not to show any significant sensitivity to the market – a result which is perfectly consistent with the fact that it is an activity likely to be performed at some distance from the final customer.

60. Sectoral and functional agglomeration effects are found to coexist where most functions are concerned (see Annex 3), tertiary activities being more sensitive to the latter and production being more sensitive to the presence of firms in the same sector. This result corroborates the work done by Duranton and Puga (2005), confirming that there is indeed a functional specialisation trend at territorial level. The only exception concerns the "administrative services and head offices" function, where sectoral

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28 Cost-effectiveness of labour for global development centres, proximity to centres of technological excellence for research laboratories, proximity to the market and to productions sites for local development centres.

29 Where the positive sign for distance is concerned, the sample was separated into non-European and European firms. In the case of the former, the distance impact is negative, while for the latter the effect is positive. One of the explanations could be that European firms already have a head office in their country of origin, from where they can manage a foreign subsidiary as long as the country is nearby. The further the subsidiary is from the country of origin, on the other hand, the more necessary it may be to set up a head office.

agglomeration is highly predominant (a result consistent with the work of Strauss-Kahn and Vives, 2005).

61. Lastly, among the factors that determine project location, co-location phenomena can play a significant role. With these effects being frequently observed in practice, it seemed worthwhile confirming their existence by means of an econometric approach. Because of the nature of the data available, it was not possible to test the existence of such phenomena at enterprise level; it was possible, though, to do so at country level, the feeling being that if this type of phenomenon was important at enterprise level, it ought to be observable at the aggregated level. The results show first of all that the location of R&D centres is highly sensitive to the prior existence of production sites. This result confirms that obtained by Defever (2006) with respect to firms and doubtless explains the increase in the number of R&D centres located in Eastern Europe during the period 2002-2006. It then transpires that the location of logistics centres is quite sensitive to the existence of production sites, a result which is consistent with the essentially "mixed" nature of the location criteria for logistics networks the purpose of which, upstream, is to supply components to factories and, downstream, to take finished products away and supply them to the final consumer. Lastly, the production function is a strong explanatory factor for the co-location of other functions, with the exception of head offices and commercial offices.

A hierarchical choice structure?

62. As was mentioned above, if countries appear to investors to be similar, this is likely to distort the econometric results obtained from the conditional logit model. This, moreover, is no doubt what is happening in Europe where two groups of countries with markedly different characteristics coexist: in the West there are the high wage, high market potential industrialized countries, while in the East there are the transition countries where wage costs are lower. It may therefore be assumed, in technical terms, that the countries belonging to each of these groups are highly likely to be close substitutes. This being the case, using a hierarchical choice structure of the "nested logit" type would seem justified. However, one difficulty raised by this type of model is to identify an appropriate choice structure (see Box 4).

63. Disdier and Mayer (2004) find that there is a significant East-West type structure in French firms' location choices in Europe. Mayer and Mucchielli (1999) believe that there is in Japanese firms' location choices in Europe a country-region type structure which is more prolific in their study than a centre-periphery type structure. Before selecting an East-West type structure, we therefore carried out a number of prior tests by estimating several potential choice structures.[30] The relevance of the proposed choice structure may be verified in two ways (see Table 7), using the likelihood ratio test and the inclusive value coefficient.

[30] They are not shown here but are available from the authors on request.

Box 4
How to verify the relevance of a hierarchical structure?

The likelihood ratio test
The likelihood ratio test, which appears in nested logit estimations, indicates that it is relevant to model foreign firms' location choices like a hierarchical structure. What is involved is a test of heteroscedasticity against the null hypothesis of homoscedasticity (in which case the inclusive value parameters are equal to 1). It is therefore a conditional logit test against a nested logit test.

The inclusive variable coefficient
The inclusive variable coefficient is of special interest because (1-Φ) provides an indicator of the similarity between countries within a region. If (1-Φ)=0, two countries within a given region are no "closer" than two countries from different regions. In the latter case, regions do not count and one can revert to the conditional logit. If, on the other hand, (1-Φ)=1, the countries in a given region are extremely similar in investors' eyes and the choice can be confined to that between regions. The difficulty is that in nested logit estimations, only βz (the inclusive value coefficient) appears and, as already seen in the econometric methodology, βz has to be greater than 1. Hensher and Greene (2002) observe that the estimations require a certain normalisation and suggest making the numerator equal to one. In other words, the estimated coefficients of the inclusive value parameter are $1/\beta z$.
It follows that the regression tables should be interpreted as follows:

-If βz =1, then ϕ =1: there is complete independence and the nested logit model no longer being necessary, it is the conditional logit model that must be used.

-If βz <1, then ϕ > 1: the countries within the areas (nests) are less similar than the regions or nests, suggesting that the proposed structure is inappropriate.

-If βz >1, then ϕ <1, so that the regions within the nest are more similar than outside. The proposed choice structure is therefore relevant if □=$1/\beta z$ is in the range between 0 and 1 and significantly different from 1. The inclusive variable parameter therefore makes it possible to verify the relevance of introducing a hierarchical choice structure, and also to choose among different potential choice structures.

Table 7: Nested logit, East-West-type hierarchical choice structure			
	Manufacturing sector	Service sector	Production function
Market potential	0.65***	0.91***	0.19*
	(0.07)	(0.08)	(0.11)
Unemployment	0.36***	0.44***	0.49***
	(0.04)	(0.05)	(0.05)
Skill level	-0.03	0.42***	-0.41***
	(0.05)	(0.07)	(0.08)
Tax	-0.47***	-0.35***	-0.40***
	(0.09)	(0.11)	(0.10)
Distance	-0.13***	-0.01	-0.25***
	(0.03)	(0.04)	(0.03)
Shared official language	0.51***	0.73***	0.61***
	(0.05)	(0.05)	(0.07)
Total FDI in same sector	0.33***	0.11***	0.57***
	(0.03)	(0.03)	(0.04)
Total FDI in same sector and of same origin	0.56***	0.44***	
	(0.03)	(0.03)	
Number of firms	0.22***	0.32***	
	(0.02)	(0.02)	
Wage (sector)	-0.20***	-0.45***	
	(0.06)	(0.07)	
Wage (function)			-0.14**
			(0.06)
Total FDI in same function			0.34***
			(0.04)
Inclusive value parameter (East-West)			
βz	1.24****	0.64***	1.72***
$\Phi z=1/\beta z$	0.8***	1.5***	0.58***
Observations	109904	97157	59838
Likelihood function	-14394.08	-11570.90	-7379.99
Likelihood test	8.98***	12.98***	26***
Pseudo R^2	0.12	0.18	0.14

Standard deviations between brackets, * 10% significant, ** 5% significant, *** 1% significant

64. Applying this model demonstrates the existence of a hierarchical choice structure which is relevant for the manufacturing sector and for the production function. For the majority of investors, therefore, the two regions have sufficiently separate specialization profiles within which the countries are sufficiently close substitutes for one of the two regions to be favoured in the quest for the location country. Table 7[31] shows clearly, on the other hand, that there is no East-West type structure in the location of service activities (the inclusive value coefficient φz not being between 0 and 1, the proposed choice structure is inappropriate). This can probably be explained by the fact that very few service sector-related projects were located in the East during the period in question, meaning that the reasons for locating

[31] In nested logit estimations, pseudo R^2 is not given directly. To calculate it, we used the following formula: pseudo $R^2 = 1-(L_1/L_2)$ where L_1 is the "likelihood function" and L_2 the "likelihood function for the model with only a constant".

service sector projects must be essentially national. Lastly, it can be seen that the coefficients obtained as a result of estimations with the nested logit model are not very different from those obtained with the conditional logit model; only their interpretation changes. Where the production function is concerned, for example, the wage is negative and significant, which means that investors are sensitive to wage costs in their choice of country within each of the two regions. The magnitude of the coefficient is nevertheless not as great as in the estimations with the conditional logit model, suggesting that wage costs must also play a part in location choices between Eastern and Western Europe. These results are indicative, however, of a new characteristic of location behaviour patterns in the service sector.

Conclusion: several location choice models

65. The aim of this paper has been to analyse location behaviour in service activities – a topic that has not until now been the focus of much attention. Over and above a certain number of broad similarities (the role of market access and agglomeration effects in particular), the results point to the existence of very specific location criteria for these activities. We began by using a sectoral approach to compare the manufacturing sector, which is more sensitive to wage costs and to physical distance, with the service sector in which the role played by market access, skill levels and the sharing of a common language is more decisive. A functional approach then enabled us to identify determinants specific to each function within the firm (wage costs for production, the importance of a common language for head offices, non-significativeness of market size for call centres, the importance of this criterion for service provision). Finally, from the geographic point of view, it transpired that Eastern and Western Europe had attractiveness profiles which differed according to activity, so that this very innovative segmented approach proved extremely worthwhile.

66. It would appear, however, that location decisions are based on premises even more diverse than these global dichotomies would suggest. Witness the rare analyses targeting a function or certain robustness tests that we conducted. FDI growth in the service sector and the international fragmentation of the value chain are having and will continue to have a major impact on the way our economies evolve, because they expose to international competition workers from different countries performing the same tasks (Baldwin 2006). This means that more in-depth analyses, using even more meticulous segmentations than those in this paper, need to be conducted in order to describe location behaviour in all its diversity. The fact is that they are crucial to the implementation of effective policies to enhance attractiveness.

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ANNEXES*

Annexe 1: Table de correspondance entre la nomenclature sectorielle NACE et la nomenclature sectorielle AFII

Secteurs de la nouvelle nomenclature unique AFII	Secteurs NES 114	Code Nace	Secteurs Nace
Agro-alimentaire, agriculture et pêche	B01-B06- 1AA (plus agriculture, partiel)	Da	Da-Industries agricoles et alimentaires
Textile-Habillement	C11-Habillement et Fourrures ; C12-Cuir et Chaussure ; F21-Filature et tissage ; F22-Textiles ; F23-Etoffes et articles en maille	Db;Dc	Db-Industrie textiles et habillement; Dc-Industrie du cuir et de la chaussure
Médicaments, Cosmétiques	C31-Médicaments et produits pharmaceutiques de base ; C32-Savons, parfums et produits d'entretien	Dg244;Dg245	Dg244-Industrie pharmaceutique; Dg245-Fabrication de savons, de parfums et de produits d'entretien
Ameublement & Equipement du foyer	C41-Meubles ; C42-Bijoux et instruments de musique ; C43-Articles de sport, jeux et activités diverses.	Dn36	Dn36-fabrication de meubles, industries diverses
Electronique grand public	C44-Appareils domestiques ; C45-Télévisions, réception, enregistrement, reproduction son et image ; C46-Lunettes, instruments d'optique et de photographie, horlogerie.	Dk297; Dl322; Dl323	Dk297-Fabrication d'appareils domestiques; Dl322-Fabrication d'appareils d'émission et de transmission; Dl323-Fabrication d'appareils de réception, enregistrement;
Constructeurs automobiles et équipementiers	D01-Automobile ; D02-Equipements automobiles	Dm34	Dm34-Industrie automobile
Matériels aéronautiques, navals et ferroviaires	E11-Bateaux de plaisance et construction navale ; E12-Locomotives et autres matériels ferroviaires roulants ; E13-Avions, construction aéronautique et spatiale ; E14-Cycles, motocycles et autres matériels de transport	Dm35	Dm35-Fabrication d'autres matériels de transports
Machines et équipements mécaniques	E21-Eléments en métal pour la construction ; E22-Chaudronnerie, fabrication de réservoirs métalliques et de chaudières ; E23-Moteurs, pompes, robinetterie, joints, organes mécaniques ; E24-Appareils et machines d'usage général, ascenseurs, fours ; E25-Tracteurs et machines agricoles ; E26-Perceuses et autres machines-outils ; E27-Modèles et machines spécifiques à certaines industries ; E28-Armes et munitions	Dk	Dk-Fabrication de machines et équipements
Composants électroniques	F62-Composants électroniques passifs et condensateurs, composants électroniques actifs.	Dl321	Dl321-Composants électroniques
Equipements électriques, électroniques, informatiques, médico-chirurgicaux	E31-Ordinateurs, machines de bureau et autres matériels informatiques ; E32-Génératrices, moteurs et transformateurs électriques ; E33-Téléphones, équipements d'émission et de transmission ; E34-Imagerie médicale, matériel médico-chirurgical et d'orthopédie ; E35-Instrumentation, appareils de mesure et de contrôle ; F61-Matériel électrique	Dl30; Dl31; Dl33	Dl30-Fabrication de machines de bureau et de matériel informatique; Dl31-Fabrication de machines et appareils électriques; Dl33-Fabrication d'instruments médicaux, de précision, d'optique et d'horlogerie
Verre-Céramique-Minéraux-Bois-Papier-Edition	F11-Minerais métalliques ; F12-Pierres, produits de carrière et minéraux divers ; F13-Verre et articles en verre ; F14-Céramiques et matériaux de construction ; F31-Bois et articles en bois ; F32-Papier et carton ; F33-Emballages papier ou carton, articles en papier ou carton ; C20-Edition, imprimerie, reproduction (y compris du son et CD-ROM)	Dd; De; Di	Dd-Travail du bois et fabrication d'articles en bois; De-Industrie du papier et du carton, édition et imprimerie; Di-Fabrication d'autres produits minéraux non métalliques
Chimie, Plasturgie	F41-Chimique minérale ; F42-Chimie organique ; F43-Parachimie ; F44-Fibres artificielles ou synthétiques ; F45-Caoutchouc ; F46-Plasturgie	Dg241- Dg242; Dg243; Dg247;Dh251; Dh252	Dg241-Industrie chimique de base; Dg242-fabrication de produits agrochimiques; Dg243-Fabrication de peintures et vernis; Dg246-Fabrication d'autres produits chimiques; Dg247-fabrication de fibres artificielles ou synthétiques; Dh251-Industrie du caoutchouc; Dh252-transformation des matières plastiques
Métaux, travail des métaux, recyclage	F51-Sidérurgie et première transformation de l'acier ; F52-Non ferreux ; F53-Fonderie ; F54-Travail des métaux ; F55-Coutellerie, serrures, emballages et autres articles métalliques ; F56-Récupération de matières recyclables métalliques ou non métalliques.	Dj27; Dj28; Dn37	Dj27-Métallurgie; Dj28-Travail des métaux; Dn37-Récupération (de matières métalliques et non métalliques
Transport, Stockage, Bâtiment et Travaux publics	H01à K09- Transport, logistique, bâtiment et travaux publics	F45; I60; I61; I62; I63	F45-Construction; I60-transports terrestres; I61-transports par eau; I62-Transports aériens; I63-servies auxiliaires de transports
Opérateurs télécoms et fournisseurs d'accès à l'Internet	N11-N12- Opérateurs de télécommunication et de poste, fournisseurs d'accès internet	I64	I64-Postes et télécommunications
Logiciels et prestations informatiques	N21a- Logiciels et autres activités informatiques en compte propre ; N21b-Prestations informatiques	K72	K72-Activités informatiques
Conseils, Ingénierie et services opérationnels aux entreprises	N22- Conseils, ingénierie, publicité, études de marché, R&D et autres services professionnels ; N31-N34-Location d'équipements, intérim, recrutements, traductions et autres services opérationnels.	K73; K74	K73-Recherche et développement; K74-Services fournis principalement aux entreprises
Autres activités de services, commerciales ou financières	N21c- Commerce spécialisé à distance P10-Q20- Tourisme, établissements de santé, films, formation	K70; K71;J65;J66; G50;G51;G52;h55	K70-Activités immobilières; K71Location sans opérateur; J65-Intermédiation financière; J66-Assurance; J67-Auxiliares financiers et d'assurance; G50-Commerce et réparation automobile; G51Commerce de gros et intermédiaires de commerce; G52-Commerce de détail et réparation d'articles domestiques, h55-hotels et restaurants;
Energie, autres services concédés	Gl1-G22- Energie, pétrole, nucléaire, traitement et distribution de l'eau	E	E-Production et distribution d'électricité, de gaz et d'eau
Biotechnologies	Partiels à préciser		A reclasser dans médicaments

* Annexe 1 is only available in French.

Annexe 2: Table de correspondance entre nomenclature NACE et nomenclature fonctionnelle AFII

Fonctions	Code	Classification Nace
Headquarter	K	Immobilier, location et services aux entreprises (1)
Centres de R&D	K73	Recherche et Développent
Production, Réalisation, Assemblage	D	Industrie manufacturière
Distribution, logistique, conditionnement	I	Transports et communications
Bureau commercial ou de liaison	G	Commerce; réparation automobile
Prestations de Services (y compris centres d'appels)	K72;I64	Services fournis principalements aux entreprises; postes et télécommunications

Note: (1)Defever (2006) utlise la nomenclature nace J (Activités financières) mais ces données n'étaient pas disponibles pour notre période d'étude.

Annex 3

Table 6 bis: Conditional logit conditionnel, analysis by function

	Headquarters	R&D centre	Production centre	Distribution	Commercial office	Service provision	Call centres
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Market potential	1.28***	0.28	0.23**	0.75***	0.50***	0.83***	0.53
	(0.20)	(0.20)	(0.11)	(0.17)	(0.08)	(0.17)	(0.38)
Unemployment	0.22*	0.42***	0.53***	0.39***	0.33***	0.66***	0.72***
	(0.13)	(0.13)	(0.05)	(0.11)	(0.05)	(0.10)	(0.20)
Wage	0.11	0.24**	-0.25***	-0.21*	-0.04	0.01	0.01
	(0.14)	(0.12)	(0.05)	(0.11)	(0.05)	(0.11)	(0.21)
Skill level	0.65***	-0.24	-0.47***	0.03	0.00	0.06	0.07
	(0.20)	(0.17)	(0.08)	(0.15)	(0.06)	(0.14)	(0.31)
Tax	-0.25	-0.09	-0.43***	0.02	0.41***	-0.11	-0.70**
	(0.22)	(0.23)	(0.11)	(0.22)	(0.11)	(0.19)	(0.35)
Distance	0.42***	0.27**	-0.27***	-0.02	0.17***	0.02	-0.02
	(0.13)	(0.12)	(0.03)	(0.07)	(0.04)	(0.07)	(0.14)
Shared official language	1.13***	0.77***	0.69***	0.69***	0.95***	0.94***	0.61***
	(0.12)	(0.14)	(0.08)	(0.12)	(0.05)	(0.10)	(0.22)
Total FDI in same function	0.15*	0.53***	0.28***	0.45***	0.45***	0.46***	0.55***
	(0.07)	(0.09)	(0.05)	(0.08)	(0.04)	(0.07)	(0.14)
Total FDI in same sector	0.59***	0.25***	0.66***	0.27***	0.30***	0.19**	0.30**
	(0.08)	(0.07)	(0.04)	(0.08)	(0.04)	(0.08)	(0.13)
Observations	15320	12022	59838	17342	83481	20190	4488
Log likelihood	-1688.39	-1529.04	-7396.14	-2211.49	-9966.21	-2474.67	-561.45
Pseudo R^2	0.24	0.12	0.14	0.11	0.16	0.14	0.12

Standard deviations between brackets, *10% significatnt, **5% significant, ***1% significant.