Where do Multinationals Locate Service and Manufacturing Activities in Europe and Why ?*

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Preliminary version, August 2009

Abstract

The recent surge of FDI in services has the potential to increase the exposure of high educated workers to international competition. This tends to reinforce fears about offshoring, especially in Europe, where Western countries are increasingly concerned about the possible disappearance of their service and manufacturing industries. In this paper we try to quantify the threat of offshoring by investigating 14 000 location choices in Europe of multinational firms originating from 91 countries over the period 2002-2006. A first descriptive analysis reveals differences in the location of manufacturing and services in Europe. We then try to explain these patterns by comparing location determinants, first at the sectoral level (to compare the service with the manufacturing sector), and second at the functional level (by distinguishing production, headquarters, R&D, distribution, commercial offices, service provision and call centers). Sectoral results indicate that most developed economies remain relatively sheltered from international competition. While the location of both the manufacturing and the services sector is very sensitive to market size and to cultural proximity, skilled abundant economies are more attractive for FDI in services. These findings are confirmed by the analysis at the functional level. In contrast to the location of production units, the location of services functions is more driven by market access and skilled resources than by cost considerations. In particular, skilled labor resources are an important determinant for the location of skilled intensive activities such as headquarters or service supply whereas this is not the case for the location of call centers. Hence the results suggest that in Europe, high income and skilled abundant countries tend to specialize in services. However, this trend is less clear for low skilled and easily offshorable activities.

JEL classification: F12, F15, F23.

Keywords: Location choices, Multinational Firms, Conditional Logit, Services.

*We are grateful to Thierry Mayer for his useful comments and advices. We would like also to thank Farid Toubal and Fabrice Defever for their helpful remarks and the French - German ANR on FDI in services for financial support. All remaining errors are ours.

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1 Introduction

The increase in international investment in services is one of the most striking features of current trends, with Foreign Direct Investment (FDI) in services accounting now for the largest share of global FDI stock and flows (UNCTAD, 2004 and 2008). There are in fact two separate trends that contribute to the rapid growth of FDI in services: first the internationalization of the service sectors, and second, the internationalization - including within manufacturing firms - of tertiary support functions[1]. As pointed out by Richard Baldwin (2006), one important implication of this new trend is that "international competition - which used to be primarily between firms and sectors in different nations - now occurs between individual workers performing similar tasks in different nations" [2]. This phenomenon, which increases workers exposure to international competition, reinforces the anxiety about the potential negative consequences of firms' internationalization, especially in developed countries.

Not surprisingly, the question of service offshoring has generated a great deal of attention. Three questions have been addressed by the recent literature. First, some studies have focused directly on the effect of offshoring on labour demand. This strand of the literature concludes to quite limited effects in magnitude (see for instance Barba Navaretti and Castellani 2004; Amiti and Wei, 2005), or effects that vary depending on the income-level of destination countries (Ekholm and Hakkala, 2006). Second some studies have analyzed whether, as for goods, the remote supply of services remains limited. Head *et al.*(2008) find that distance shields workers to a significant extent from the threat of offshoring, but that distance costs have declined over the period of study. Finally, recent studies have focused on the location of FDI in services, in order to determinate whether, as for manufacturing, investments are more driven by market size and agglomeration effects than by cost considerations (see for instance, Head and Mayer, 2004; Crozet *et al.*, 2004). Nefussi and Schwellnus (2007) compare the location determinants in the manufacturing and in the service sectors of French firms abroad. While they find no fundamental difference between the location of these two types of activities, they demonstrate that the location of business services is dependent of the French downstream demand generated by manufacturing affiliates, suggesting that domestic services production will decrease together with manufacturing production. Defever (2006) examines the location determinants of services surrounding production activity. He demonstrates that each function favors different country characteristics but also find evidence of some complementarities at the firm level, especially between the location of R&D and production.

In this paper, we try to contribute to this latter strand of the literature by investigating the location determinants of FDI in services in Europe, where Western European countries are increasingly concerned about the possible disappearance of their manufacturing and service base. We first analyze the location patterns of 14 000 investments projects over the period 2002-2006. This descriptive analysis re-

[1]This refers to the so-called international fragmentation of the value chain in which firms engage in service activities that surround production and where the production stage itself only accounts for one stage.

[2]Baldwin (2006), The great unbundling(s),page 5

veals significative differences in the location of manufacturing and services especially between Eastern and Western Europe. We then try to explain this difference by comparing location criteria, first, at the sectoral level (to compare the service with the manufacturing sector) and second, at the functional level (by distinguishing headquarters, R&D, production, distribution, commercial offices, service provision and call centers).

Our contributions are twoflod. First, contrary to Nefussi and Schwellnus (2007) and Defever (2006) who focus respectively on the service sector only and on service activities carried out by manufacturing firms only, our analysis incorporates both the sectoral and the functional dimension of service activities. This presents two advantages. First, as pointed by Trefler (2005), with the international fragmentation of the production process, the distinction between the manufacturing and service sectors is no longer relevant as many manufacturing firms carry out services activities that surround production. Hence by focusing on the service sector only, we would underestimate the importance of service activities. Second, our approach extends the literature that has recently introduced the functional dimension of investment in the analysis of location criteria (Strauss-Kahn and Vives, 2005; Defever, 2006; Sachwald and Chassagneux, 2008)[3]. In particular, it allows us to assess the relevance of the sectoral approach as compared to the functional one when it comes to identify location criteria. Besides, our empirical analysis is based on a very-large dataset which enables us to consider investment carried out by non European and European multinational firms in 29 countries in Europe, including new members of the European Union. Europe is of particular interest as it became the largest recipient of foreign direct investments over the past decade. Other studies have focused on Europe (Disdier and Mayer, 2004; Defever, 2006; Basile et al., 2008), but our database covers a relatively more recent period and a larger sample of origin and recipient countries than the previous ones. Hence, our dataset accounts for a quite representative sample of all investments received by European countries in a context of rise in FDI in services and of European Union enlargement.

Our results indicate that, as for manufacturing, location decisions in services are very sensitive to market size and to cultural proximity (measured by a shared language). But in contrast to the manufacturing sector, countries featured by high skilled labor resources are particularly attractive for FDI in services. This suggests that in spite of the present increase of FDI in services, developed economies remain relatively sheltered from international competition. The results by function suggest that functional approaches are more appropriate than sectoral ones when it comes to identify location criteria both for service and production activities. The market size criterion, which is important when service activities are concerned, has no effect when it comes to call centers, which are likely to operate at some distance from the final consumer. The wage costs criterion is of decisive importance only when choosing where to locate production centers. Skilled labor resources are an important determinant for the location of functions especially skilled intensive ones such as headquarters. Finally, results of the nested logit show that in manufacturing activities, location decisions follow an East-West structure which is mainly influenced

[3]Strauss-Kahn and Vives (2005) examine the determinants of the relocation of headquarters in the US; Sachwald and Chassagneux (2008) study the location of R&D centers in Europe; Defever (2006) compares location criteria by function (headquarters, R&D, production, logistics, sales)

by a trade-off between wage costs and market size. However, the location of services is more driven by national specificities.

The remaining part of the paper is organized as follows. Section 2 presents the data on investment projects from which are presented the key features of FDI in Europe. Section 3 presents the theoretical framework from which is derived the reduced form that we estimate. In section 4, we present the econometric methodology. Section 5 describes the data and the explanatory variables that are introduced in our estimations. The section 6 illustrates the econometric results. Section 7 concludes.

2 Main features of FDI in Europe

2.1 Firm-level Data on Location Decisions

Each year, the Invest In France Agency (IFA)[4] Observatory collects data on tangible investment projects in Europe. The data used in this study cover the period 2002-2006. During this short period, nearly 14 0000 investments have been carried out by multinational firms from 91 countries in 29 European countries[5]. European investors were nevertheless responsible for 55% of the projects and North Americans for one-third. The data relate solely to greenfields and brownfields projects (which accounted, respectively, for 2/3 and 1/3 of investment). The dataset contains very detailed information for each recorded project: name of the investing firm, country and date of set-up, sector of activity and function within the firm. This dataset is gathered thanks to official announcements or by reading the international economic press and the 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) which points to quite good data compatibility, enables to limit potential problems of non exhaustiveness. Such a comparison, together with a verification procedure, ensures that the quasi totality of projects registered have been achieved.

The main advantage of this database is that projects are registered along two dimensions. First, investments projects are classified according to their sector of activity, which corresponds to the main line of business in which the investing firm is active. Second, investments projects are classified according to the function (headquarter, R&D, production, distribution, commercial office, service provision, call center and on-line service). For the reasons outlined in the introduction, this classification is particulary important for our purpose (table 7 and 8 of the appendix present the sectoral and functional nomenclature od the IFA). As shown by table 1, most of the firms pertaining to the manufacturing sector engage in some service activities that surround production. So in the following of the study we define two measures of service activities. The first one, *the narrow measure of services* refers to investments pertaining to the service sector. The second one, the *broad measure of services* refers to all functions which involve some service activities (whatever the sector) by opposition to production activities. Let's turn now to the presentation of the main patterns of international investment in Europe.

[4]Public Institution under the supervision of French Ministry of Economy and Finance.

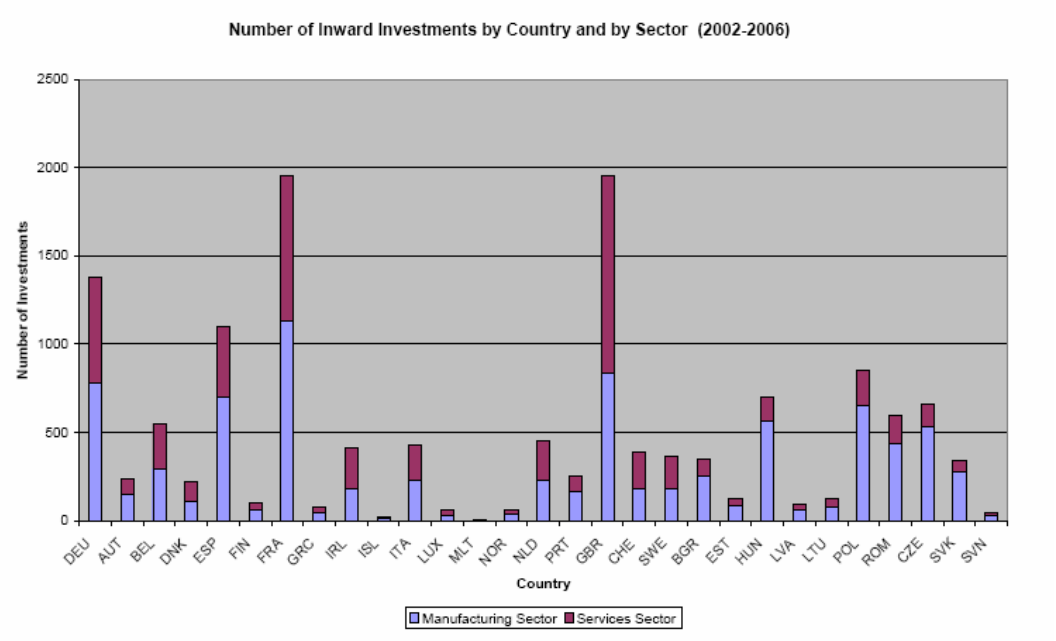
[5]These are the 27 Member Countries of the European Union, with the exception of Cyprus. The non-EU countries contained in the dataset are Switzerland, Norway and Iceland.

Table 1: Classification of the Invest in France Agency

Function	Manufacturing sector	Service Sector	Total Total	Total in %	% going to Eastern Europe	% going to Western Europe
Production	**4926**	**9**	**4035**	**35,40%**	**47,90%**	**52,10%**
Headquarters	491	446	937	6,74%	7,20%	92,80%
R&D centres	530	207	737	5,30%	18,00%	82,00%
Distribution	430	629	1059	7,62%	25,80%	74,20%
Commercial Office	1635	3045	4680	33,66%	15,20%	84,20%
Service Provision	248	1005	1253	9,01%	20,10%	79,90%
Call centers, on-line Services	48	253	301	2,17%	25,90%	74,10%
Total Service functions	**3382**	**5585**	**8969**	**64,60%**	**16,90%**	**83,10%**
Total number	8308	5594	**13902**			
Total in %	**59,76%**	**40,24%**		**100%**		
% going to Eastern Europe	**35,80%**	**16,20%**			**27,90%**	
% going to Western Europe	**64,20%**	**83,80%**				**72,10%**

2.2 Main location patterns of international investments in Europe

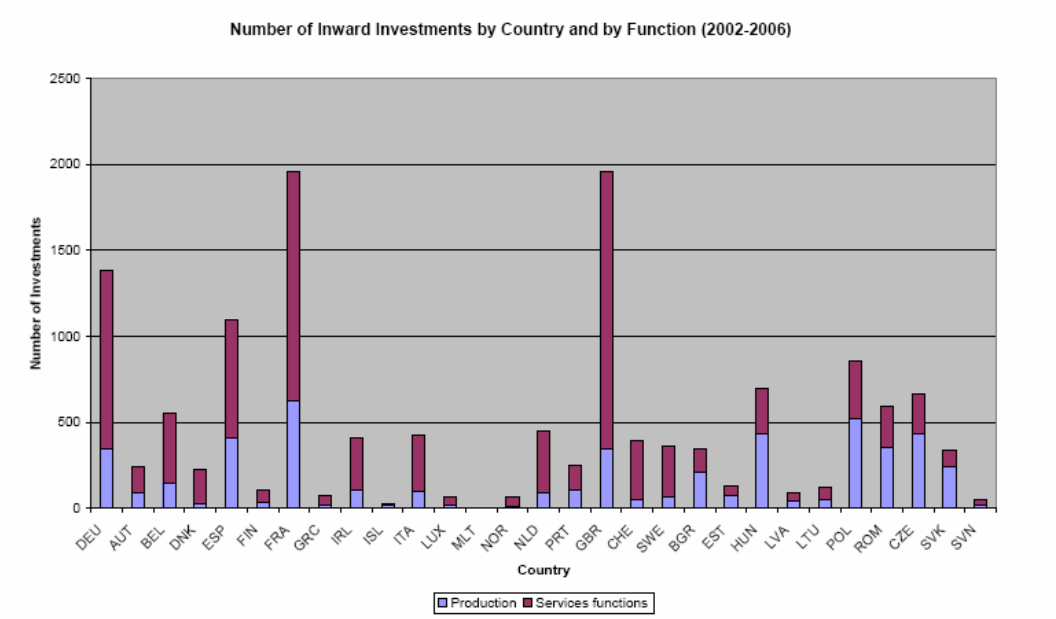
Europe is a major recipient of FDI worldwide. While it has become the largest host region over the past decade[6], countries within Europe remain very unequal as regards their performances in terms of inward investments, as shown by the two graphics.



According to the dataset of the Invest in France Agency, France and the United

[6]According to the UNCTAD (2008), the European Union attracted almost two thirds of total FDI inflows into developed countries in 2007.

Kingdom are the top recipients countries, they each received more than 14% of investments projects investments over the period 2002-2006. In contrast, peripheral countries such as Greece, Malta, Iceland and Slovenia attracted less than 0,5% of total inward FDI.



Turning to the sectoral and functional composition of inward investments, the analysis of Table 1 confirms the importance of FDI in Services. First, while the share of manufacturing is globally preponderant in Europe over the period of study, 40% of the projects carried out during the period in question belong to the service sector. Second, turning to the *broad measure*, over 64% of the projects performed involve service activities. More importantly, as shown by the graphics, the geographical distribution of projects reveals patterns of specialization that differ between Eastern and Western countries. 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. What is more, almost 84% of service sector projects were set up in Western Europe during the period in question. Turning to the broad measure of services, the geographical repartition of activities is quite similar. While production centers were located both in Eastern and Western Europe, only 17% of projects pertaining to service functions were located in Eastern Europe over the period. This descriptive analysis suggests that while multinationals tend to locate manufacturing both in Eastern and Western Europe, services activities are more prone to be located in Western countries. This suggests that there might be some specificities in the location determinants of FDI in Services.

3 Theoretical Framework

The existing literature has largely benefited from recent developments in the New Economic Geography theory [7]. The underlying models assume that a firm will choose the location that maximizes its profits. Before describing the reduced form that we estimate, we first present the conclusions of the existing literature that still remain relatively limited as regards potential specificities of FDI in services.

3.1 Related literature

The existing literature suggests that the horizontal motive for FDI (Markusen, 1984) is more important than the vertical one (Helpman, 1984)[8]. In such a context, most empirical studies which focused on the manufacturing sector, conclude that the market access is a core determinant in location decisions (see for instance Head and Mayer, 2004; Amiti and Javorcik, 2006). This criterion also appears decisive in the location of service sectors (Nefussi and Schwellnus, 2007). However, while the divide between these two motives is clear on the theoretical side, with the international fragmentation of the value chain, this frontier becomes less clear on the empirical side. The location of some service activities, in particular those that surround production can be less sensitive to market size. The studies by Sachwald and Chassagneux (2007) and by Kuemmerle (1997) show that R&D centers specialized 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 fundamental R&D. This criterium neither seems to be important in the case of call centers and on-line services, (Hatem 2005), or as regards the the location of headquarters (Strauss-Kahn and Vives, 2005).

Agglomeration forces are also central in location decisions. The location of Japanese firms in the United States appears 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). These sectoral or industry influences have recently been confirmed by the work of Head and Mayer (2004)[9]. Agglomeration effects can, however, differ in intensity depending on the type of activity. 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. Defever and Mucchielli (2004)and Defever (2006) find evidence of functional agglomeration in the case of headquarters and R&D centers in Europe. It may be, therefore, that agglomeration forces affecting service activities are influenced more by functional than by sectoral considerations. Besides, as the international communication costs decline, the different functions or stages of the value chain can be

[7] These developments are mainly attributable to Fujita *et al.*(1999), Fujita and Thisse (2002), Head and Mayer (2004).

[8] See Markusen (2002) and Yeaple (2003) for a synthesis of these two motives in an integrated framework.

[9] These authors are the first ones to control for real market potential.

located autonomously on a broadened geographical base. However, this autonomy 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 verify the existence of these co-location effects between all business functions[10].

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), while the effect of subsidies often appears positive but marginal - even at regional level (Crozet *et al.*, 2004, Basile *et al.*, 2008). 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.

Regarding wage costs, 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, as pointed out by Liu *et al.*, (2006), the effect of wages may previously have been underestimated in empirical work [11]. A number of analyses can be put forward to explain these findings. First, wages also reflect the skill level of workers. Second, regions with a high market potential are also those where wages are highest (Head and Mayer, 2006). Lastly, it seems that estimations that are too global can mix up activities whose location is sensitive to wage costs to varying degrees. In particular, Defever (2006) finds that the wage cost criterion is important only for the location of the production stage. A more detailed analysis should allow to disentangle the effect of wages on location decisions.

Finally, a number of surveys conducted among multinational firms confirm the influence of labour skills on location decisions. According to UNCTAD (2007), it plays an important role. 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.

[10]Nefussi and Schwellnus (2007) also demonstrate the existence of complementarities between the location of services and manufacturing but for the subsector of business services only, that is why we test the existence of such complementarities only in the analysis by function.

[11]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. These conditions were contained in their study on China at the regional level, but can hardly be applied in national-level studies.

3.2 Underlying Model

The reduced form that we estimate is based on the recent development of the New Economic Geography Theory. Our theoretical framework follows Head and Mayer (2004). Take a firm which locates its production in region i, i=1,...,R where R is the number of regions. The firm uses the labor 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:

$$q_{ij} = \frac{p_{ij}^{-\sigma}}{\sum_{r=1}^{R} n_r p_{rj}^{1-\sigma}} E_j \tag{1}$$

where E_j is expenditure by a representative consumer in region j, where s 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 mill price and iceberg-type transport costs τ. If it is assumed that the representative industry is in a monopolistic competition à la Dixit-Stiglitz (1977), to obtain the optimum price the firm sets a constant mark-up over costs:

$$p_i = \frac{\sigma}{\sigma - 1} c_i \tag{2}$$

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:

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

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:

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

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

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

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

$$\Pi_r = \sum_{j=1}^{R} \pi_{rj} = \frac{c_r^{1-\sigma}}{\sigma} M_r - F_r \tag{6}$$

with

$$M_r = \sum_{j=1}^{R} \frac{\phi_{rj}}{\sum_{r=1}^{R} n_r (c_r \tau_{rj})^{1-\sigma}} E_j \tag{7}$$

In line with Krugman (1992), M_r represents the "Real Market Potential". 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:

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

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 have adopted too. They begin by assuming that the fixed production cost is the same everywhere (i.e. $F_r = F, \forall r$), and they then add it to profits; next, they multiply the expression obtained by s, and lastly they write this expression to the power $1/\sigma - 1$. Initially, they thus obtain V_r:

$$V_r = [\sigma(\Pi_r + F_r)]^{\frac{1}{\sigma-1}} \tag{9}$$

After a transformation on logrithms:

$$U_r \equiv \frac{1}{\sigma - 1} ln M_r - ln C_r + \frac{1}{\sigma - 1} ln(1 - T_r) \tag{10}$$

The equation above shows that profits increase with Market Potential (M_r) and decrease with variable costs (C_r)and with tax rate on corporate profits (T_r). Where variables costs are concerned, let's assume as in Mayer *et al.* (2007) that they depend on transaction costs (tc_r) and on production costs. The former capture the facts that it is probably easily to manage production in a country which shares the same official language and which is not too far. Regarding the latter, let's assume that the production function is Cobb Douglas with constant returns, that it uses work (w_r) and other inputs (z_r) such as intermediate goods or land. Taking α as the share allocated to work and A_r as total factor productivity, we obtain:

$$U_r \equiv \frac{1}{\sigma - 1} ln M_r - \alpha ln(w_r) - (1-\alpha) ln(z_r) - ln(tc_r) + \frac{1}{\sigma - 1} ln(1 - T_r) + ln(A_r) \tag{11}$$

We do not observe z_r and A_r which will be captured by several proxies and a random term, observed by the firm but not by the econometrician. In particular, in order to take into account cross regional differences in human capital, we will assume that the productivity of the region r is an increasing function of the proportion of skilled workers. At this point of the analysis, we depart from the literature by assuming that even if the underlying model of location decisions decisions is likely to be quite similar for manufacturing and service, there might be huge variation in the importance of determinants according to the activity i considered. The reduced form that we estimate is then given by:

$\pi = \beta_1^i \text{Demand} + \beta_2^i \text{Agglomeration} + \beta_3^i \text{Wage} + \beta_4^i \text{Skills} + \beta_5^i \text{Tax} + \beta_5^i \text{Distance} + \epsilon^i$

4 Econometric methodology

The reduced form that we want to test will first be estimated using the conditional logit model. 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. These two types of approach need to be briefly described.

4.1 The Conditional Logit

The principle is to assume that firm's location decisions are based on the maximization of a profit function subject to uncertainty. 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. Let R= (1,...,r,...N) all the potential locations. Each potential location offers to firm i a profit Π_{ir} given by:

$$\Pi_{ir} = V_{ir} + \epsilon_{ir} \tag{12}$$

with

$$V_{ir} = \beta X_{ir} \tag{13}$$

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 choosing region r is expressed as:

$$P_{ir} = prob(\pi_{ir} > \pi_{ik}) = prob(\epsilon_{ik} < \epsilon_{ir} + V_{ir} - V_{ik}), \tag{14}$$

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:

$$P_{ir} = \frac{e^{\beta X_{ir}}}{\sum_{r=1}^{N} e^{\beta X_{ir}}} \tag{15}$$

This type of model is then estimated by means of the maximum likelihood method. The problem with this type of model is that it rests on the assumption of the independence of irrelevant alternatives (IIA): 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), in particular, find that there is an East-West-type structure in French firms location choices in Europe. Given the descriptive analysis presented before, it may be that this structure is also valid for all international investors. The nested logit method can be used to model this sort of choice

structure and enables to limit the problem of IIA.

4.2 The Nested Logit

The nested logit model (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 regions).Let $Z = (1, ..., z, ...L)$, all the possible nests, and $R = (1, ..., r, ...N_z)$, all the countries belonging to each zone z. In this model, the upper decision structure (for 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 region z obtains the following profit:

$$\Pi_{zr} = V_{zr} + \epsilon_{zr} \tag{16}$$

with

$$V_{zr} = \alpha Y_z + \beta X_{zr} \tag{17}$$

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 region z, ($P_{r/z}$), and the marginal probability of choosing region z, (P_z). Whence:

$$P_{zr} = P_z \times P_{r/z} \tag{18}$$

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

$$P_z = \frac{e^{\alpha_z(Y_z + (1/\beta_z))VI_z}}{\sum_{m=1}^{L} e^{\alpha_m(Y_m + (1/\beta_m))VI_m}} \tag{19}$$

with

$$VI_z = log(\sum_{r=1}^{N_z} e^{\beta X_{zr}}) \tag{20}$$

Here VI_z 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 of choosing country r conditional on the choice of region z is given by:

$$P_{r/z} = \frac{e^{\beta X_{zr}}}{\sum_{r=1}^{N_z} e^{\beta X_{zr}}} \tag{21}$$

Lastly, by substituting (20) and (22) into (19), the probability of choosing country r belonging to region z:

$$P_{rz} = \frac{e^{\beta X_{zr}}}{\sum_{r=1}^{N_z} e^{\beta X_{zr}}} \times \frac{e^{\alpha_z (Y_z + (1/\beta_z)) VI_z}}{\sum_{m=1}^{L} e^{\alpha_m (Y_m + (1/\beta_m)) VI_m}} \tag{22}$$

This last equation 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.

4.3 Relevance of the hierachical Structure

Two aspects are to be taken into account in order to asses the relevance of the hierachical structure, the likelihood ratio test and the inclusive value parameter.

The likelihood ratio test, which appears in nested logit estimations, indicates that it is relevant to model 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 value coefficient is of special interest because $(1 - \phi)$ provides an indicator of the silimarity bewteen countries within a nest. The difficulty is that in nested logit estimations, only β_z appears. Hensher and Greene (2002) observe that the estimations require a certain normalisation and suggest making the numerator equal to one, so that $\phi = 1/\beta_z$. The regression tables should then be interpreted as follows. If $\beta_z = 1$, then $\phi = 1$, there is complete independence and the nested logit model is no longer necessary, it is the conditional logit model that must be used. If $\beta_z < 1$, then $\phi > 1$, the countries within the areas (nests) are less similar than the regions or nests, suggesting that the proposed structure is inappropriate. If $\beta_z > 1$, then $\phi < 1$ so that the regions within the nest are more similar than outside, suggesting that the proposed structure is appropriate.

The proposed choice structure is therefore relevant if and only if $1/\beta_z$ is in the range between 0 and 1 and significantly different from 1.

5 Data

As pointed out before, the data on individual location choices come from the Invest in France Agency. Regarding the independent variables (see Table 2 for the statistical sources), they were constructed on the basis of the information available on host country characteristics for the period 2002-2006. In line with the theoretical framework presented earlier, these variables are converted into logarithmic form to carry out the estimations, the exception being the qualitative variables.

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):

$$MP_i = \frac{GDP_i}{D_{ii}} + \sum \frac{GDP_j}{D_{ij}} \tag{23}$$

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 previously 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).

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 IFA 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.

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 unit cost of labor by sector of activity [12]. This measure has the advantage to account for potential differences in productivity. 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.

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.

Overall tax pressure on firms is represented by the rate of tax on company profits.

[12]Since the IFA and NACE nomenclatures of activity are not exactly similar, a correspondence table has been created so as to be able to calculate sectoral wages on the basis of Eurostat data (this table is available upon request).

Table 2: Presentation of independent variables

Variable	Definition	Availability	Source
GDP	GDP in euro million at constant prices (1995 prices and exchange rates)	2001-2006	Eurostat National Accounts
Market Potential	Harris-type market potential (1954) in euro million at constant prices (1995 prices and exchange rates)	2001-2006	Constructed using Eurostat and Distance-CEPII
Wage	Average unit labour cost at industry level (19 industries IFA) (19 industries IFA)	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	2001-2006	IMD Competitiveness Yearbook
Unemployment	Rate of unemployment as a percentage of the labour force	2001-2006	IMD World Competitiveness Yearbook
Distance	Distance between origin and destination country, based on bilateral distances between the biggest towns in these countries		CEPII Distance ($\text{dist}_c epii$)
Shared official language	Dummy taking a value of 1 when the two countries share the same official language		CEPII Distance ($\text{dist}_c epii$)
Number of firms	Total number of firms (domestic and foreign) at industry level (19 industries IFA).	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 IFA 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 2002-2005	Constructed using the IFA database
Total FDI in the 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 I IFA database

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.

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 IFA database [13]. Then, in order to measure functional agglomeration effects, a specific variable was constructed using the IFA 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 parent company of the subsidiaries, these phenomena are considered at country level between different firms whereas Defever (2006), for his part, analyses this aspect within firms.

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.

6 Empirical Results

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.

6.1 Location determinants of multinational firms in Europe

The results[14] for the projects as a whole (see Table 3), all activities combined, are very consistent with those found in the existing empirical literature. In columns (1) and (2) of table 3, we compare the use of two indicators for market size. In column

[13] This table is available upon request.

[14] 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 as if the IIA holds up, the choice between two countries has not to be affected by the choice of a third.

(3),(4),(5) and (6), we have added separately different measures of agglomeration forces. In column 7, we have introduced East-West fixed effects.

Table 3: Conditional Logit: Overall Results

	Dependent Variable: Choice of Location						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wage	-1.19***	-0.22***	-0.40***	-0.19***	-0.20***	-0.26***	-0.36***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
Unemployment	-0.15***	0.70***	0.35***	0.55***	0.41***	0.34***	0.35***
	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Skill	0.46***	0.18***	0.55***	0.05	-0.04	0.16***	0.13***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Tax	0.12*	0.05	-0.35***	-0.11*	0.04	-0.30***	-0.33***
	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)
Distance	-0.07***	0.07***	-0.00	-0.09***	0.01	-0.10***	-0.10***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Same language	1.15***	1.03***	1.01***	0.50***	0.83***	0.60***	0.59***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
PIB	0.74***						
	(0.01)						
Market Potential		1.49***	1.09***	1.03***	0.67***	0.68***	0.71***
		(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Number firms (sect)			0.48***			0.26***	0.25***
			(0.01)			(0.01)	(0.01)
FDI (origin)				0.85***		0.48***	0.49***
				(0.02)		(0.02)	(0.02)
FDI (sect)					0.73***	0.28***	0.27***
					(0.01)	(0.02)	(0.02)
Dummy East							-0.20***
							(0.06)
Investment x countries	212983	212983	207061	212983	212983	207061	207061
Pseudo R^2	0.11	0.07	0.11	0.12	0.12	0.14	0.14

Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

In the first place, location decisions are very sensitive to market size. In column (2), a 10% increase in market potential corresponds to a 7% rise in the probability of attracting new investors. 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 in the specification based solely on domestic GDP. This result, which is consistent with the results 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 beyond the borders of the host country alone.

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 can probably be

explained by a better information about the area. It has already been referred to in a number of earlier studies (Crozet *et al.*, 2004).

Our study also points to the positive impact of geographic and cultural proximity, which is as expected. As initially thought, having the same language as the investor acts as a powerful attraction. Similarly, geographic proximity seems to encourage investment - a finding consistent with that described in earlier studies (Disdier and Mayer, 2004; Mayer *et al.,* 2007).

Alongside the factors that impact positively on location decisions, we have as expected identified a negative impact exerted by the rate of tax, which is consistent with the findings of earlier studies (Devereux and Griffith, 1998; Bénassy-Quéré *et al.*, 2003). Our findings also show that wage costs have a significantly negative impact on location decisions - even at an aggregated level. It should be noted, though, that wage costs have less effect in the specification incorporating market potential than in that incorporating GDP. This comes back to the idea that the potential profits expected by firms located in a central region offset the inevitably higher wage costs. Lastly, the introduction of East-West fixed 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. 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.

In the continuation of the analysis we will take specification 7 which corresponds to our theoretical reduced form.

6.2 Location determinants in the service and the manufacturing sectors

In columns (1) to (4) of table 4, we carried out estimations separately for the manufacturing and service sectors. In colums (5) to (9), we estimated separate regressions for different subsectors of Services in order to account for potential heterogeneity between each of them. Overall, the coefficients have the expected sign. Globally, the model of location decisions in the manufacturing sector explains well location determinants in services. However, a certain number of specificities appear in the location criteria of the service sector.

In the first place, location choices in the services sector appear very sensitive to skilled labor resources, whereas the coefficients are close to zero where manufacturing is concerned. This finding is consistent with the facts that services are especially skilled intensive activities except for telecom operator [15].This result is particularly interesting in the context of the present increase in FDI in services, as it suggests that skilled workers remain relatively sheltered from international competition.

Second, market size is an important criterion in both manufacturing and service

[15]However, this could be also the case for some manufacturing activities. Several studies show that the availability of skill labor affects positively location decision of the manufacturing sector (see for instance Toubal, 2004; Becker *et al.*, 2005). This is certainly because, inside the manufacturing sector, some activities (headquarters, R&D are also skilled intensives. The analysis by function might be more appropriate as regards this point.

sectors. Besides, market size is very important for all services subsectors except for telecom operators and internet, a sector that not necessarily requires an immediate proximity between the supplier and the final consumer. These results are important as they suggest that country with a high market potential remain attractive attractive for FDI in services.

Third, proximity (cultural and physical) affects positively the location of FDI in the manufacturing sector. However, the location of FDI in services is sensitive only to the fact to share a common language. As pointed out by Navaretti and Venables (2004), trade costs are very high in some service sectors so that it is more viable to serve foreign markets via FDI than via export. This could explain the non significant sign of distance in the service sector.

Table 4: Conditional Logit by Sector

Dependent Variable: Location Choice									
	Total Manuf		Total Service		Busin. Serv	Comp. Soft	Transport	Telecom	Finance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Market	0.65***	0.64***	0.81***	0.92***	1.17***	1.19***	1.27***	0.23	0.56***
Potential	(0.07)	(0.07)	(0.07)	(0.08)	(0.16)	(0.13)	(0.21)	(0.39)	(0.16)
Wage	-0.24***	-0.23***	-0.12**	-0.44***	-0.67***	-0.67***	-0.52***	0.42	-0.26*
	(0.04)	(0.06)	(0.05)	(0.07)	(0.14)	(0.15)	(0.19)	(0.46)	(0.14)
Unemp.	0.37***	0.37***	0.38***	0.45***	0.40***	0.59***	0.73***	0.96***	-0.10
	(0.05)	(0.05)	(0.05)	(0.05)	(0.12)	(0.09)	(0.15)	(0.33)	(0.13)
Skill	-0.02	-0.01	0.46***	0.43***	0.92***	0.63***	0.10	-0.50*	0.73***
	(0.05)	(0.05)	(0.07)	(0.07)	(0.16)	(0.11)	(0.15)	(0.30)	(0.16)
Tax	-0.43***	-0.42***	-0.30***	-0.43***	-0.88***	-0.52***	-0.30	-0.49	-0.36
	(0.09)	(0.09)	(0.10)	(0.10)	(0.24)	(0.18)	(0.28)	(0.49)	(0.22)
Dist.	-0.13***	-0.13***	-0.01	-0.02	0.00	-0.01	-0.08	-0.04	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.08)	(0.07)	(0.08)	(0.16)	(0.07)
Same	0.54***	0.54***	0.73***	0.71***	0.91***	0.67***	0.43***	0.98***	0.93***
language	(0.05)	(0.05)	(0.05)	(0.05)	(0.11)	(0.08)	(0.14)	(0.28)	(0.11)
FDI(sect)	0.33***	0.33***	0.11***	0.08***	-0.20***	-0.06	-0.06	0.35*	0.15**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.08)	(0.06)	(0.11)	(0.21)	(0.07)
FDI(origin)	0.58***	0.58***	0.40***	0.41***	0.53***	0.36***	0.50***	0.09	0.39***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.07)	(0.05)	(0.08)	(0.25)	(0.06)
Number	0.22***	0.22***	0.35***	0.35***	0.53***	0.44***	0.29***	0.31***	0.52***
firms	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.04)	(0.05)	(0.10)	(0.07)
Dummy		0.03		-0.65***	-1.15***	-1.38***	-0.52**	-0.21	0.24
East		(0.09)		(0.11)	(0.23)	(0.21)	(0.26)	(0.58)	(0.22)
Inv. x Ctry	109904	109904	97157	97157	19999	39330	14002	3055	20771
Pseudo R^2	0.12	0.12	0.18	0.18	0.19	0.23	0.11	0.11	0.16

Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

Last, the dummy variable "East" introduced in the regressions take a very significantly negative value for most of the services sector. 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.

This initial segmentation suggests that investors in the services sectors locate preferably in countries with high market potential and with a high availability of skilled resources. However, approaches by major sector only partially account for location decisions because, apart from the existence of sectoral specificities 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, commercial and representative offices, logistics and distribution. The location of each of these types of function 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 specialization (a phenomenon described by Duranton and Puga, 2005).

6.3 Analysis of location determinants by function

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 in this connection (see Table 5). A number of results observed at the overall level remain valid for each of the functions concerned: sensitiveness to the market size to agglomeration effects, effects of geographic [16] and cultural proximity, negative impact of tax rates. Also, however, there are strong functional specificities, in particular concerning the following points.

In the first place, the location of production is sensitive to wage costs and this is also the function with the least sensitiveness to Market Potential. This result is in line with that found by Defever (2006), who demonstrates a substantial difference between the location of production units (where wages and agglomeration phenomena are very significant) and services surrounding production (sensitive above all to market size and to functional agglomeration effects).

The market size criterion seems to be very significant for tertiary support functions and for production center, though the magnitude is weaker for the latter. But interestingly, market size is not a significant factor for the "call center and on-line services" a result which is perfectly consistent with the fact that it is an activity likely to be performed at some distance from the final consumer.

Regarding the effect of the skill level on location decisions, the results are encouraging. The results confirm previous findings at the sectoral level. They indicate that the location of services activities, especially high skilled intensive ones such as headquarters, commercial offices and service provision, is sensitive to the availability of skilled labor. However, this is not the case for low skilled intensive activities such as production units or call-centers and on-line services. One should note that the coefficient of the skill variable is not significant for R&D. This suggests that several robustness checks using other measures of skilled workers should be carried out.

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 Defever (2006) finds similar results. This is likely due to the fact that central locations are more strategic when it comes to manage international production. Besides, this is likely to be influenced by the role played by the sharing of a common language in the location of headquarters in our sample.

[16] For R&D and headquarters the coefficient of the distance is positive. This is likely due to the fact that in our sample, there are non-European and European investors. We separated our sample into non-European and European firms and the impact of distance becomes negative for the former.

Table 5: Conditional Logit by Function

	Dependent Variable: Choice of location						
	Head-quarters	R&D	Production	Distri-bution	Commercial office	Service Provision	Call-center on-line service
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Market	1.37***	0.53**	0.28**	0.89***	0.90***	1.03***	0.33
Potential	(0.22)	(0.23)	(0.13)	(0.20)	(0.09)	(0.20)	(0.45)
Unemp.	0.18	0.44***	0.36***	0.45***	0.26***	0.36***	0.42
	(0.17)	(0.17)	(0.06)	(0.13)	(0.07)	(0.13)	(0.26)
Wage	-0.08	0.05	-0.25***	-0.41**	-0.45***	0.06	0.01
	(0.21)	(0.18)	(0.07)	(0.17)	(0.07)	(0.14)	(0.27)
Skill level	0.83***	0.22	-0.32***	0.26	0.32***	0.34*	0.24
	(0.24)	(0.22)	(0.09)	(0.17)	(0.08)	(0.17)	(0.40)
Tax	-0.38	-0.22	-0.59***	-0.05	0.31**	-0.59**	-1.25***
	(0.30)	(0.30)	(0.12)	(0.25)	(0.14)	(0.25)	(0.47)
Distance	0.40***	0.27**	-0.27***	-0.03	0.14***	0.02	-0.06
	(0.13)	(0.12)	(0.04)	(0.07)	(0.04)	(0.07)	(0.14)
Same	1.07***	0.74***	0.69***	0.68***	0.88***	0.96***	0.65***
language	(0.12)	(0.14)	(0.08)	(0.12)	(0.05)	(0.10)	(0.23)
FDI (sect)	0.70***	0.30***	0.68***	0.14	0.30***	0.19**	-0.04
	(0.10)	(0.08)	(0.05)	(0.09)	(0.04)	(0.09)	(0.16)
Co-location							
Headquarter	0.19	-0.08	-0.05	-0.07	-0.45***	-0.50***	-0.10
	(0.16)	(0.16)	(0.07)	(0.13)	(0.06)	(0.12)	(0.27)
R&D	0.11	0.78***	0.07	-0.05	0.22***	0.04	0.10
	(0.15)	(0.17)	(0.08)	(0.12)	(0.06)	(0.13)	(0.28)
Production	0.16	0.63***	0.46***	0.54***	0.17***	0.46***	1.03***
	(0.15)	(0.15)	(0.06)	(0.12)	(0.06)	(0.12)	(0.25)
Distribution	-0.14	-0.46***	-0.10*	0.15	-0.12**	-0.07	-0.33
	(0.12)	(0.13)	(0.05)	(0.10)	(0.05)	(0.10)	(0.20)
Commercial Office	0.04	0.10	0.31***	0.09	0.57***	0.41***	0.34
	(0.15)	(0.15)	(0.06)	(0.12)	(0.06)	(0.12)	(0.23)
Service Provision	-0.25*	-0.41***	-0.36***	-0.06	-0.08	0.33***	0.08
	(0.14)	(0.15)	(0.07)	(0.12)	(0.06)	(0.12)	(0.23)
Call center and	-0.10	-0.13	-0.01	-0.02	0.12***	-0.11	-0.03
on-line Services	(0.11)	(0.12)	(0.05)	(0.10)	(0.05)	(0.10)	(0.20)
Dummy East	-0.37	-0.62**	0.16	-0.67***	-0.85***	-0.19	-0.63
	(0.31)	(0.28)	(0.11)	(0.26)	(0.12)	(0.21)	(0.45)
Observations	15320	12022	59838	17342	83481	20190	4488
Pseudo R^2	0.24	0.13	0.14	0.11	0.17	0.15	0.15

Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

Indeed, over the period 2002-2006, the United Kingdom 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.

Regarding agglomerations forces, sectoral and functional agglomeration effects are found to coexist where most functions are concerned. This result corroborates the work done by Duranton and Puga (2005), confirming that there is indeed a functional specialization trend at territorial level.

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 firm level; it was possible, though, to do so at country level, the feeling being that if this type of phenomenon was important at firm level, it ought to be observable at the aggregated level. The results confirm the existence of strong complementarities between activities. In particular, the results show that the location of R&D centers 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 centers located in Eastern Europe during the period 2002-2006. Globally, the production function is a strong explanatory factor for the co-location of other functions, with the exception of head offices and commercial offices. The existence of such complementarities suggests that countries that experienced a decline of a part their manufacturing base are likely to experience also a decline of a part of their service base.

6.4 An Est-West Structure in location decisions ?

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 is likely what is happening in Europe where there exist potential market differences between Western and Eastern Countries. It may therefore be assumed, 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. 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) show that there is, in Japanese firms' location choices in Europe, a country-region type structure which is more relevant in their study than a center-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[17]. The relevance of the proposed choice structure may be verified in two ways (see Table 6[18]), using the likelihood ratio test and the inclusive value coefficient.

Applying this model demonstrates the existence of a hierarchical choice structure which is relevant for the manufacturing sector and for the location of production [19]. 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 favored in the quest for the location country. 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

[17]Results are available upon request.

[18]In nested logit estimations, pseudo R^2 is not given directly. To calculate it, we used the following formula: pseudo $R^2 = 1 - (L1/L2)$ where L1 is the "likelihood function" and L2 the likelihood function for the model with only a constant .

[19]We also tested the presence of an East-West structure for each of others functions but this structure was not relevant.

Table 6: Nested Logit: East-West Structure

	Dependent Variable: Choice of Location		
	Manufacturing Sector	Service Sector	Production
	(1)	(2)	(3)
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)
Same language	0.51***	0.73***	0.61***
	(0.05)	(0.05)	(0.07)
FDI (sector)	0.33***	0.11***	0.57***
	(0.03)	(0.03)	(0.04)
FDI (origin)	0.56***	0.44***	
	(0.03)	(0.03)	
Number 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)
FDI (function)			0.34***
			(0.04)
Inclusive value Parameter (East-West)			
β_z	1.24****	0.64***	1.72***
$\phi_z = 1/\beta_z$	0.8***	1.5***	0.58***
Investments x countries	109904	97157	59838
Likelihood ratio test	8.98***	12.98***	26***
Pseudo R^2	0.12	0.18	0.14

Standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%

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, and this is also the case for the coefficient of market size. This suggests that location choices between Eastern and Western Europe are influenced by a trade-off between wage costs and market potential.

Table 7 shows clearly, on the other hand, that there is no East-West type structure in the location of service activities (the inclusive value coefficient ϕ 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, so that investors are sensitive to national specificities in the location of services.

7 Conclusion

In this paper we analyzed the location determinants of multinational firms in Europe. The recent internationalization of FDI in services is a topic of anxiety that has not until now been the focus of much attention in the literature on location determinants. We first carried out a descriptive analysis which revealed significative differences in the location of manufacturing and services in Europe. We then try to explain these patterns by investigating wether there were differences in location criteria between service and manufacturing activities. We began by using a sectoral approach to compare the manufacturing sector with the service sector in which the role played by market access, skilled labor resources and cultural proximity is more decisive. A functional analysis then enabled us to identify determinants specific to each function.

The results indicate that in Europe, Western countries tend to specialize in services while Eastern countries are more attractive for manufacturing activities. The results show that multinational firms locate FDI in services in high-income and skilled abundant countries, which suggests that educated workers in advanced economies are relatively sheltered from international competition. However, this evidence does not hold for all service activities, especially for low skilled and easily offhorable ones. Besides, the existence of complementarities between the location of production units and surrounding services activities suggest that this trend is likely to change.

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8 Appendix

Table 7: Functional Classification of the Invest in France Agency

Function	**All projects**	**% Total of all projects**	**% of projects going to Eastern Europe**	**% of projects going to Western Europe**
Production	**4935**	**35,50%**	**47,90%**	**52,10%**
Commercial or liaison office	4680	33,70%	15,20%	84,80%
R&D centre	737	5,30%	18,00%	82,00%
Call centres and on-line services	301	2,20%	25,90%	74,10%
Distribution, logistics, packaging	1059	7,60%	25,80%	74,20%
Service provision	1254	9,00%	20,10%	79,90%
Internal administrative service or Headquarter	937	6,70%	7,20%	92,80%
Total, tertiary support functions	**8968**	**64,50%**	**16,90%**	**83,10%**
Total	**13903**	**100,00%**	**27,90%**	**72,10%**

Table 8: Sectoral Classification of the Invest in France Agency

Sector	**All projects**	**% Total of all projects**	**% of projects going to Eastern Europe**	**% of projects going to Western Europe**
Agro-food, agriculture and fisheries	666	4,80%	34,40%	65,60%
Furniture and home equipment	286	2,10%	47,20% 4	52,80%
Biotechnologies	122	0,90%	9,00%	91,00%
Chemicals, Plastics technology	749	5,40%	28,30%	71,70%
Electronic components	238	1,70%	31,90%	68,10%
Motor vehicule and component manufacturers	1377	9,90%	51,10%	48,90%
Consumer electronics	309	2,20%	49,20%	50,80%
Energy, other concessionary services	418	3,00%	25,40%	74,60%
Electrical, electronic, computer, medical equipment	1368	9,80%	23,80%	76,20% 7
Machinery, mechanical equipment	634	4,60%	36,30%	63,70%
Aeronautical, naval and railway equipment	190	1,40%	26,30%	73,70%
Drugs, cosmetics	550	4,00%	17,10%	82,90%
Metals, metal working, recycling	398	2,90%	48,20%	51,80%
Textiles, clothing recycling	242	1,70%	51,20%	48,80%
Glass, ceramics, minerals, wood, paper, publishing	761	5,50%	44,30%	55,70%
Total, Manufacturing	**8308**	**59,80%**	**35,80%**	**64,20%**
Other Commercial or financial services	1159	8,30%	19,80%	80,20%
Business Services	1204	8,70%	13,80%	86,20%
Computer software and services	2192	15,80%	10,40%	89,60%
Telecom operator Internet	184	1,30%	22,80%	77,20%
Transport, storage,public buildings and works	856	6,20%	27,90%	72,10%
Total, Services	**5595**	**40,20%**	**16,20%**	**83,80%**
Total	**13903**	**100,00%**	**27,90%**	**72,10%**