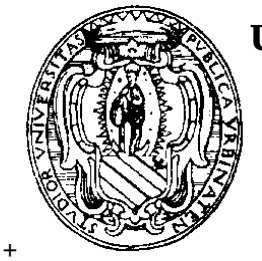

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Location choices of multinational firms in Europe: the role of national boundaries and EU policy

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Abstract

What determines multinational firms' location choices in Europe? Do national boundaries matter in location decisions? To what extent are European regional policies (Structural and Cohesion Funds) able to mitigate the agglomeration forces at work? Do location determinants differ for EU and US MNEs? In this paper, we address these questions using data from 5,761 foreign subsidiaries established in 55 regions in 8 EU countries over the period 1991-1999 and estimating a nested logit model of location choices. Controlling for regional market size and potential, agglomeration economies and labor markets conditions, we find that EU policy, proxied by Cohesion Fund and Objective 1 eligibility, played a significant role in attracting multinationals. Differences emerge in determinants of EU and US multinationals location choices, with special reference to the role of labor markets. National boundaries do not seem to affect location decisions, with the relevant exception of Italy. Results suggest that multinational firms' perceive European regions as geo-economic aggregates different from the actual political boundaries of countries.

JEL Classification: F23, O52, R30

Key words: Europe, Foreign Direct Investments; Location; Nested Logit Models.

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1. Introduction

Accelerating economic integration in Europe over the past decade has favoured, *inter alia*, a significant flow of international investments from both within and outside the EU borders. As a matter of fact, the EU has attracted over 40% of total world flows of foreign direct investments (FDIs) in the 1990's, becoming the largest recipient of multinational activity; multinationals account for a growing share of gross fixed capital formation in Europe (from 6% in 1990 to over 50% in 2000); and about one quarter of large firm R&D carried out in Europe has been conducted under foreign ownership, while the world average is just over one tenth.

Given this general trend of increasing localization of foreign owned activities in Europe, this paper addresses two main empirical questions. First, we aim to assess whether and to what extent the location of multinational investments is in fact affected by national boundaries within the EU. In other words we investigate whether and to what extent national factors still persist and influence decisions of multinational firms to locate their activities within the EU, in spite of the long process of economic integration which has occurred over the past decades. One could expect a variety of possible outcomes from economic integration processes, ranging from persisting national patterns of localization of foreign activities, to the emergence of sub-continental regions competing with each other across and within states for attracting foreign economic activities. While a similar question has been recently asked with specific reference to location choices of Japanese and French multinationals in Europe (Head and Mayer 2002, Mucchielli and Mayer 1999, Mucchielli and Puech, 2002), to the best of our knowledge the issue has never been tackled before with reference to foreign investors from different nationalities, as we do in this paper. Answering this question with no limitation in terms of geographic origin of foreign firms is highly relevant for policy. In fact it enables to identify the proper level of intervention (whether national, regional or supra-national) for the selection, control and support of multinational activities in Europe.

The second key issue addressed in this paper concerns the role of EU policies affecting the localization of FDIs. We are particularly focusing on Structural and Cohesion Funds as policy tools aimed to support backward regions. In fact, as noted in

many recent theoretical and empirical works, agglomeration economies produce a trend toward the spatial concentration of economic activities, and of FDIs in particular, in the richest and more industrialized area, the so-called "Core" regions, widening the gap in economic development with the more "Peripheral" regions (Barrel and Pain 1999, Ciccone 2002, Fujiita, Krugman and Venables 1999, Martin 1999). This uneven spatial impact of economic integration may work against the EU's aim of achieving greater economic and social cohesion and EU regional policies have been implemented to counteract this process. It should be stressed that EC's approach to correcting the problems of spatial agglomeration, is not simply to transfer resources in a bargaining game between countries and regions. Rather, it consists of creating favourable environmental conditions in the backward areas "through investment to strengthen the economic base in recipient regions" (EC 1996). The main question that we address in this respect is whether and to what extent such EU (structural and cohesion) policies have affected the localisation of multinational activities within the continent, thus helping correct a process of uneven concentration of economic activities.

The analysis makes use of the Elios dataset (European Linkages and Ownership Structure), built at the University of Urbino and based on Dun & Bradstreet's Who Owns Whom, which provides information on location choices of 5,761 affiliates of multinational firms between 1991 and 1999 over a set of 55 regions in 8 EU countries (France, Germany, Ireland, Italy, Spain, Portugal, Sweden and United Kingdom). Parent companies are of different nationalities: the single largest home country are the US (25%), but the majority are from EU countries (60%). Additional data on regional and country characteristics are mainly drawn from Eurostat's Regio and Cambridge Econometrics.

A nested logit model is used to evaluate whether national boundaries affect location decision and to what extent multinational firms consider regions belonging to different countries as close substitutes. We single out a number of location determinants capturing the role of regional market, agglomeration economies, experience of a multinational firm of each regional market, local labor market characteristics and policy measures both at the EU level (namely structural and cohesion funds) and at the national level (such as corporate tax rates and public infrastructures).

A number of previous studies address the determinants of location choices of foreign firms in European regions. Head and Mayer (2002) and Mayer and Mucchielli (1999) focus on Japanese investments, while Mucchielli and Puech (2002), and Disdier and Mayer (2002) deal with the location choice of French firms in Europe. Unlike these studies, we are able to investigate a rather representative sample of all firms setting up subsidiaries in Europe and we will concentrate on differences among EU and US multinationals.[1] Other studies have also analyzed the location determinants of foreign direct investment (FDI) within single European countries (see, for example, Basile (2003) for the case of Italy; Crozet, Mayer and Mucchielli (2003), for the case of France; Barrios, Gorg and Strobl, 2002, for the case of Ireland; Guimaraes, Figueiredo and Woodward (2000) for Portugal; Devereux, Griffith and Simpson (2003) for the UK). Literature related to this work analyzes location determinants of innovative activities of multinational firms. Among others, it is worth mentioning Cantwell and Iammarino (2001) and Cantwell and Piscitello (2001) which examine patterns and determinants of patenting activites of large MNEs in European regions.

This paper improves on the existing empirical literature from at least three points of view. First, as stated earlier, this work extends the geographic span of host economies, covering a larger number of EU recipient countries than most previous contributions. Second, we are able to investigate how the nationality of the parent firm will determine a different role for some location characteristics. Finally, we introduce a measure of firm's previous experience of regions based on the number of the established subsidiaries of the same group in a given location, which allows to capture persistence as well as the tendency of foreign firms to cluster in specific areas.

The main results of our analysis are that: (i) country borders do not matters, except for the case of Italy; (ii) EU policy contributed to mitigating agglomeration forces and attracted considerable investments in peripheral regions; (iii) labor market characteristics attract EU and US investments differently.

The paper is organised as follows. Section 2 describes the dataset and illustrates the regional distribution of new foreign establishments in Europe over the nineties. Section 3 discusses theoretical hypotheses concerning the location determinants of foreign firms. Section 4 illustrates the nested logit model used for estimation. Section 5 presents

[1] Devereux and Griffith (1998, 2003) and Barrel and Pain (1999) analyze location of US investments in

the variables introduced in the econometric model. The empirical findings are discussed in section 6, and Section 7 concludes the paper.

2. Regional distribution of FDI in Europe

As recalled earlier, FDI directed towards EU countries have grown remarkably over the last decade. The flow of inward FDIs in Europe have increased by 14 times since 1990, reaching 808,519 millions Euros in 2000, and the cumulated flow over the period 1992-2002 amounts to slightly less than 1.8 billions Euros (Eurostat, 2002), representing over 40% of world's FDI flows (UNCTAD, 2002). Within this context we analyse the determinants of location choices of foreign multinationals in EU regions. Our analysis exploits a novel dataset, built at the University of Urbino, which collects information from Dun & Bradstreet's Who Owns Whom on a large sample of firms active in Europe. In particular, we have data on firms from 8 countries (France, Germany, Ireland, Italy, Portugal, Spain, Sweden and the UK), which *inter alia* account for over 60% of total inward FDI flow in the EU. For each firm we have information on name and country of the ultimate owner, sector of activity (2-digit SIC), location, year of establishment. Exploiting the information on the country of the ultimate owner we identified foreign-owned firms and we restricted our analysis to those which were established over the 1991 to 1999 period. We ended up with a sample of 5,761 foreign-owned firms locating in one of the 8 countries considered over 1991-1999. Consistently with Eurostat's Foreign Direct Investment Statistics (Eurostat 2002), which reports that 72% of total inward FDI over the nineties have been Intra-EU flow, 3,395 (out of 5,761) sample firms are subsidiaries of EU MNEs. Further comforting the idea that our large sample is a good representation of inward FDIs in the EU, the percentage distribution of foreign-owned firms in our sample across countries is remarkably similar to the actual distribution of cumulated FDI flows over the same period as registered by Unctad (see Table 1).

-- Table 1 about here --

Our analysis of location determinants of foreign-owned firms in Europe exploits the information on the region of establishment of each firm in our sample. In many cases

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European countries, but do not address the regional dimension.

such information was available at a rather fine level of aggregation (such as NUTS3 or even cities), but we had to confine our focus on NUTS1 regions, since in some cases (such as for German firms) this was the only available piece of information and also because this allows to keep computational complexity tractable in the subsequent econometric analysis[2]. Figures 1 and 2 illustrate the set of regions that we use in our analysis and define two groupings. In particular, in Figure 1 we highlight regions which are eligible for Objective 1 funds of the EU and in Figure 2 we define, following Keeble, Offord and Walker (1988) and Copus (1999), Core and Peripheral regions in the EU. It is worth noting that Objective 1 regions do not perfectly coincide with the commonly considered aggregate of Peripheral regions. We shall test later whether they are perceived as different by multinational firms as recipient areas.

Figure 3 and 4 show how regions differ in terms of two key determinants of FDI attraction, namely market size and market potential. The former is proxied by GDP of region *i* in manufacturing sectors in 1991, while the latter is the sum of GDP of all regions *j* different from *i* weighted by the inverse of the (euclidean) distance from the largest cities in regions *i* and *j*[3]. It is not surprising that larger markets are regions in the Western Germany (in particular Bayern, Baden-Wurttemberg, Nordrhein-Westfalen), Northern France and Italy, Catalunia in Spain and South East in the UK, while market potential is higher in Core regions and decreases with distance from Continental Europe.

The distribution of foreign investments (as proxied by the number of foreign-owned firms established over 1991-1999) in EU regions, reported in Figure 5 suggests that larger regions attract more FDIs. However, once controlled for market size (figure 6) and market potential (figure 7) some interesting insights can be drawn. In particular, it emerges that some Peripheral regions, such as Ireland, Scotland, Portugal and Eastern Germany have attracted considerably higher share of investments than the size of their market would suggest. This can have to do with the fact that EU policy towards Objective 1 regions have contributed to attracting foreign investors. However, other Peripheral regions, such as the South of Italy, have attracted very few investments. This

[2] In three cases only one region have been identified in one country. In the case of Sweden and Portugal this was due to the lack of more disaggregated data, while in the case of Ireland Nuts1 corresponds to the whole country.

[3] This measure have been proposed by Harris (1954) and utilized *inter alia* in Head and Meyer (2002)

calls for a more accurate analysis assessing the role of EU policy in attracting FDIs controlling for other sources of regional heterogeneity.

- Figure 1-8 about here -

At a closer look, one might notice that the case of Italy is characterized by very low numbers of newly established subsidiaries in any region but Lombardia, while in other countries variability in the propensity of different regions to attract foreign firms is much higher. One may venture saying that in the case of Italy a country effect is at play, decreasing the attractiveness of (almost) all regions within the national boundaries. Conversely, once controlled for market size and market potential, the propensity to attract FDIs is somewhat similar across German and French regions. Econometric results in section 5 will shed further light on this aspect.

Finally, interesting differences emerge in the location of EU MNEs relative to firms from countries outside the EU (of which more than 50% are US MNEs). In particular, figure 8 shows that within the EU FDIs are more likely to be directed towards regions in Southern Europe, France and North-East of Italy; while non-EU firms tend to locate in Anglo-Saxon regions in the UK and Ireland. This result suggests that determinants might differ in the two cases so that in the econometric analysis we will focus on location determinants for US MNEs as opposed to EU MNEs.

3. Location determinants of FDI

Determinants of multinational firms location choices can be borrowed from the more 'traditional' literature on firms' location, from the 'new economic geography' and from contributions which are more specific to international investments. In the 'traditional' literature, determinants of firms' location choice comprise measures of costs and accessibility to production factors (labor and raw materials), transportation costs, size and characteristics of the markets. If the investor produces easily transportable goods, local demand has little influence on location decisions. By considering the entire country as its outlet market, the firm thus chooses its location on the basis of cost considerations and, then, exports to nearby locations. On the other hand, when transport costs are important, the local market size plays a major attraction role.

The traditional literature has also emphasized the role of regional promotion incentives in affecting FDI location decisions. Policy incentives may assume different

forms: (a) financial incentives (public subsidies), (b) tax incentives, (c) labor-promotion incentives and (d) indirect State aid (for example, infrastructure upgrading investments).

Recently, however, the literature on foreign firms' site selection has grown alongside with the advances in the 'new economic geography' (Fujita et al., 1999). Following a typical cumulative causation approach, it is suggested that industrial firms tend to localize where other firms of the same industry are present. The benefits of this form of externality – benefits connected with the number of manufacturing plants clustered in a specific area (agglomeration economies) – are well known: namely, access to a more stable labor market, availability of intermediate goods, production services and skilled manpower, and knowledge spillover between adjacent firms.

By extension, recent developments in the literature on the internationalization of technology has emphasized the role of spatial agglomeration of innovative activities in explaining the localization of R&D FDIs (Cantwell and Iammarino 2001). This line of research highlights that distance hampers the exchange of tacit knowledge, thus spurring firms to localize close to spatial areas where they can enjoy technological externalities and spillovers (Boschma and Lambooy 1999, Martin 1999, Dunning 2000).

Admittedly, agglomeration economies (both in terms of manufacturing plants and in terms of technological activities) tend to reach limit values, and agglomeration diseconomies eventually emerge. Firms operating in markets with relatively large numbers of firms face stronger competition in product and labor markets. This acts as a centrifugal force which tends to disperse activities in space. Once the centrifugal forces exceed the effects of the agglomeration economies in a region, firms will look for locations in contiguous regions where production costs are lower, while at the same time taking advantage to some degree of external economies, given the short distances involved. In this case, agglomeration economies would operate at a supra-regional level, giving rise to an external regional effect. This hypothesis is in line with the process of progressive industrialization in the periphery proposed in Puga and Venables (1996), where the distance between economies plays a role in location selecting.

However, in the case of foreign-owned firms agglomeration economies derive, not only from the generic number of local incumbents, but also from the number of other foreign firms operating in the same geographical area. As suggested by Head et al. (1999), "if foreign investors - who have less initial knowledge about regional locations

than their domestic counterparts - only receive signals on costs and benefits of location decision, but face strong difficulties in observing them directly, they might mimic each others' location decision". DeCoster and Strange (1993) also argue that clustering might occur because of an agency problem: local decision-takers might decide to follow prior investors because they are afraid of the reputation consequences of an 'eccentric' decision which fails. As observed by Head et al. (1995), empirical information on this issue is particularly important for the design of policies aimed at attracting manufacturing investment. For instance, if agglomeration is at least partly nationality-specific, a locality with a sparse domestic manufacturing base in Europe (such as the South of Italy) might find it easier to develop its manufacturing sector by attracting foreign affiliates than by attracting domestic investment.

Finally, agglomeration economies may be generated among firms belonging to the same business group. This idea is that to the extent that firms gain experience and get acquainted with a given context, uncertainty is likely to decrease and MNEs will perceive lower risks from further investments (Castellani and Zanfei, 2003b). As a result, MNE experience will determine persistence in firms'location choices.

4. The econometric model

Location choices can be modelled as the outcome of profit maximization. Firms choose to locate in the region which yields the highest expected profit, conditional on observable variables. The most used econometric modelling technique for this type of problem is the conditional logit model (CL) proposed by McFadden (1974). The CL can be derived from profit maximizing firm behaviour under appropriate assumptions concerning the stochastic term in the profit function[4].

Each firm i obtains a profit π_{ij} from location j determined by a set of observable characteristics or attributes of the decision maker and the regions, which is captured by a deterministic part, V_{ij}, and by some unobservable factors, which are captured by introducing a stochastic term, ε_{ij}.

$$\pi_{ij} = V_{ij} + \varepsilon_{ij} \qquad (1)$$

[4] Original formulations of CLM models are based on the consumer's problem of utility maximization, but extension to the firm's problem is straightforward.

Firm *i* locates in region *j* if it yields a profit higher than all the alternative locations. In other words, the probability that a firm *i* chooses to start up a plant in region *j* is

$$P_{ij} \equiv \Pr(y_i = j) = \Pr\left(\pi_{ij} \geq \pi_{ik}\right) = \Pr\left(\varepsilon_{ik} - \varepsilon_{ij} \leq V_{ij} - V_{ik}\right), \forall k \neq j \qquad (2)$$

Given the deterministic parts of the profit functions, this probability will depend on the assumption on the distribution of the error term. McFadden (1974) shows that under the assumption of independently and identically distributed error terms, ε_{ij}, with type I extreme-value distribution, the probability of choosing location *j* is:

$$P_{ij}^{CL} = \exp\left(V_{ij}\right) \Big/ \sum_{j=1}^{J} \exp\left(V_{ij}\right) \qquad (3)$$

It turns out that this model yields a globally concave likelihood function, and consequently estimation is straightforward. A major problem with the CL model is the assumption of independence of errors across choices. If two alternatives are similar, errors will likely be positively correlated and CL parameters will be biased (Hess, 2002). In our context, the choice of a firm of locating in regions within countries of the EU is very likely to suffer from such a problem. For example, if some country effect occurs, one may argue that firms consider regions within a country relatively similar, or at least that the degree of similarity of regions within a country is higher than for regions of different countries. The nested logit model (NL) extends the CL to overcome this problem. The basic idea is that alternatives can be grouped into nests, according to their degree of similarity. Independence of the error terms holds outside the nests, while positive correlation is allowed within each nest.

Extension of the CL is straightforward. Let us assume that the J alternatives are grouped in to K nests, that is each alternative *j*, belongs to a nest B_k. The profit function can be generalized to:

$$\pi_{ij} = W_{i,k} + Y_{i,j|k} + \kappa_{i,k} + \nu_{i,j|k}, \text{ for } j \in B_k \qquad (4)$$

where W_{ik} denotes profit deriving from every alternative within nest *k*, and Y_{ik} denote the profit stemming the specific alternative *j*. The probability of choosing region j can thus be expressed as the product of two probabilities: the probability of choosing region *j* conditional on having chosen nest *k* times the marginal probability of choosing nest *k*, $P_{ij}^{NL} = P_{i,j|k} \times P_{i,k}$, where

$$P_{i,j|k} = \frac{\exp(\mu_k Y_{i,j|k})}{\sum_{j \in B_k} \exp(\mu_k Y_{i,j|k})}, \qquad (5)$$

$$P_{ik} = \frac{\exp[\gamma_k (W_{i,k} + (1/\mu_k) IV_{i,k})]}{\sum_{\ell=1}^{K} \exp[\gamma_\ell (W_{i,\ell} + (1/\mu_\ell)\ IV_{i,\ell})]} \qquad (6).$$

$IV_{ik} = \log\left(\sum_{j \in B_k} \exp(\mu_k Y_{i,j|k}\right)$ is called inclusive value, and measures the expected utility that a firm *i* obtains from locating in a region within nest *k*[5]. Substituting (5) and (6) into P_{ij}^{NL} yields

$$P_{ij}^{NL} = \frac{\exp[\gamma_k (W_{i,k} + (1/\mu_k) IV_{i,k})]}{\sum_{\ell=1}^{K} \exp[\gamma_\ell (W_{i,\ell} + (1/\mu_\ell)\ IV_{i,\ell})]} \frac{\exp(\mu_k Y_{i,j|k})}{\sum_{j \in B_k} \exp(\mu_k Y_{i,j|k})} \qquad (7)$$

Equation (7) can be estimated by maximum likelihood without many problems, but complexity raises with the number of elemental choices (*J*) and nests (*K*) and with the number of nesting levels. A key parameter in (7) is $\theta_k = \gamma_k / \mu_k$. This coefficient, known as the inclusive value parameter, since it is the estimated coefficient of IV_{ik}, can be interpreted as a measure of dissimilarity between regions within a nest. In fact, $(1-\theta_k)$ turns out to be a measure of correlation among the error terms within a nest. Therefore, a higher value of θ_k means greater independence of the unobserved portion of profits among regions within the same nest. A value of $\theta_k = 1$ suggests complete independence. When $\theta_k = 1$ for all *k* the NL collapses into the CL indicating that no nesting is necessary and, in our case, that foreign investors perceive all regions in the EU as close substitutes. Values of $\theta_k > 1$ suggest that regions within a nest are considered more dissimilar to regions within their nest than to regions outside. This can be interpreted as evidence that the nesting structure is not appropriate. In fact, as noted above, the goal of NL is to group similar alternatives together. In these cases, estimates can be improved by trying a different nesting structure.

Hensher and Greene (2002) notice that estimation requires some normalization in θ_k, and suggest to set the numerator to 1. In other words, the estimated IV parameters are $1/\mu_k$. This solution is implemented in LIMDEP 7.0 and NLOGIT 3.0 under the option RU2, but the reported coefficients are the μ_ks. This implies that IV parameters in regression tables should be interpreted in the following way:

$\mu_k > 1$ means that regions within a nest are more *similar* than regions outside the nest

[5] See Hensher and Greene (2002), Hess (2002), Louviere, Hensher, Swait (2000), Train (2002).

μ_k <1 means that regions within a nest are more *dissimilar* than regions outside the nest and suggests that the nesting structure is not appropriate

μ_k =1 means independence. If this condition occurs for all *k*, NL collapses into CL.

5. Model specification and variable description

The NL model described in the previous section is implemented using a linear specification of the profit function. From equation (4)

$$\pi_{ij} = W_{i,k} + Y_{i,j|k} + \varepsilon_{ij} = \delta\, Z_{ik} + \beta\, X_{ij} + \varepsilon_{ij}\,,$$

where Z is a vector of country characteristics, and X is a vector of regional characteristics, which eventually vary across firms. In both vectors, variables are lagged one year with respect to the dependent variable, which takes value 1 if a given subsidiary *i* was created in region j and zero otherwise.

The explanatory variables in vectors X and Z may be grouped into five categories: market, agglomeration economies, local labor market, European and national policy (see Table 2).

- Table 2 about here -

(1) Market. Following Friedman et al. (1992), we measure the regional market with two variables: lnY_j, the log of GDP in that region, which proxies for the actual market size, and lnY_j', the log of a distance weighted sum of GDP of all other regions, which captures market potential. For a given region *j*, we calculate $lnY_j' = ln\Sigma_k(Y_k / d_{jk})$, where d_{jk} is the Euclidean distance[6] from the major cities in region *j* and region *k*.[7] A large market is expected to increase profit that a multinational firm can extract from a region.

(2) Agglomeration economies. We use different measures of agglomeration to capture the three different types of effects: overall agglomeration, foreign firms agglomeration and MNE experience. Overall agglomeration economies are

[6] The distance matrix have been obtained from ArcView 3.2 and Spatial Analyst, using layers of the administrative boundaries of the EU and population of European major cites.

[7] Head and Mayer (2002) have proposed an alternative measure of market potential based on Krugman (1992) model. In particular, they claim that the market potential variable must be discounted based on bilateral trade impediments and adjusted to take into account the location of competitors. Empirically, they find that market potential does matter for regional location choice of Japanese firms in the European Union. However, they compare the effect of this new market potential variable with the one utilized in this paper, and find not very strong differences.

approximated by the log of the number of manufacturing plants in the same industry *(s)* in each region *(j)*, while the role of foreign firms agglomeration in affecting the location choice of multinational firms is captured by the log of the number of foreign-owned firms within region *j* and sector *s*. Agglomeration forces have been found by virtually any recent study on foreign firms location choices. We allow also for a spatial lag in both measures of agglomeration using the (log of the) sum of all (or only foreign) firms in sector s in regions different from j, weighted by the inverse Euclidean distances. These variables are expected to capture any congestion effect, which will discourage location in highly agglomerated regions and favour establishment in regions nearby. The role of MNE experience is captured by the log of the number of firms in region *j* controlled by the same parent of firm *i*. Consistently with studies showing that MNE experience, by reducing uncertainty, increase the likelihood of commitment intensive operations (such as the creation new subsidiaries) (Castellani and Zanfei, 2003b), we expect a positive sign on this variable.

(3) Local labor market. In measuring observable factor prices, we focus on wages. Wage is measured by the (log of the) ratio between the labor costs and the number of employees at the regional level. High wages would tend to discourage FDI inflows; however, it is also generally acknowledged that high wages could indicate a high level of human capital and skilled workers. Generally speaking, this double effect justifies the non-significance of the coefficient of the wage variable found in many empirical studies on FDI location choice.

We also include the log of tax wedge on labour, measured at the national level, since in Europe there is no room for diversified fiscal treatments within countries. This variable has been borrowed from Martinez and Mongay (2000). Following Layard, Nickell and Jackman (1991, page 209), the total wage wedge "is the gap between the real labour costs of the firm, on the one hand, and the real post tax consumption wage of the worker, on the other". The tax wedge on labour measured by Martinez and Mongay (2000) is the difference between the gross wage deflated by the producer's price (real producer wage) and the gross wage net of social security contributions and personal income taxes on labour income deflated by the consumer's prices (the real consumer wage). In line with De Santis, Mercuri and Vicarelli (2003) who find that FDI inflows in the European Union are more influenced by the total fiscal wedge on labour than by

the corporate tax rate, we expect that the higher is the tax wedge on employment, the lower is the attractiveness of a region.

Finally, among labor market variables, we include the log of the regional unemployment rate (percentage of labour force defined as unemployed at the regional level). As for the wage variable, the coefficient of unemployment may be expected to be both positive and negative. On the one hand, a high unemployment rate could increase the attractiveness of a region by increasing the size of the job applicant pool; on the other hand, foreign firms may interpret a high unemployment rate as a result of rigidities on the labor market.

(4) National policy. we include the log of the national corporate tax rate (corporate income tax revenues in national currency divided by nominal GDP in national currency), borrowed by Gropp and Kostial (2000), and the log of a regional stock index of infrastructure developed by Confindustria for the 1985. Both variables are under (almost) complete control of nation states and can be expected to affect the profitability of regions. One might expect that a higher corporate tax rate discourages investors, while better infrastructure should increase the attractiveness of a region. However, empirical evidence on the impact of the tax rate on inward FDI and foreign firms location choices is mixed (see Devereux and Griffith (2002) and Benassy-Querè et al. (2000) for recent reviews). In fact, a number of issues arise when estimating the effect of tax regimes on international investments. First, the correct measurement of the effective corporate tax rate is not trivial given available data; second tax schemes differ across countries (i.e. full credit vs exemption schemes); third, firms might "accept higher taxes if they are associated with better infrastructures or public services" (Benassy-Querè et al. (2000) p. 7), therefore tax differences could not matter for location decisions, if they simply balance differences in public goods; fourth, agglomeration forces make tax competition too costly because they can be counteracted only by very large differences in tax rates.

In recent years, many EU countries have adopted specific policy measures for attracting FDIs, such financial incentives to foreign firms and local development agencies which implement specific activities to attract multinational firms (Piscitello, 1996). At this stage we are unable to control for such national policies specific for foreign firms.

(5) European policy. While most individual countries have introduced specific incentives targeted to multinational firms, the EU has no specific policy instrument 'dedicated' to the attraction of foreign investments, and foreign firms benefit from 'generic' public incentives, such as those co-financed by the European Union through the Structural and the Cohesion Funds. As well known, the European Union regional policies aim to contrast the "natural" trends of productive localization by trying to achieve near regional uniformity of income and (relative) factor endowments. EC's approach is not simply to transfer resources in a bargaining game between countries. Rather, it consists of creating favorable environmental conditions in the peripheral areas "thorough investment to strengthen the economic base in recipient regions" (EC 1996).[8]. The amount of resources mobilized by the EU regional policies in the period 1989-99 contributed about 6.5% of annual Community GDP. As a reference point, one may consider that the Marshall Plan aids, granted in the period 1948-51 for the post-war reconstruction in Europe, was equivalent to 1% of US GDP per year. Structural Funds have different Objectives; Objective 1 is the most important one. It is aimed at boosting the development of lagged regions (that is regions with a per capita GDP lower than the 75% of the EU average). Cohesion Funds are instead distributed to those countries (Ireland, Portugal, Spain and Greece) with a per capita GDP lower than the 90% of the European average.

The effect of European policy is captured by two variables: a dummy variable set to 1 when the region receives Objective 1 Structural Funds; and a dummy variable set to 1 if the country receives Cohesion Funds (namely, Spain, Ireland and Portugal; Greece is missing in our data set).

6. Regression results

In section 2 we described the regional distribution of foreign subsidiaries established by multinational firms in Europe over the nineties and we noticed three things. First,

[8] Regional policies are based on an undoubtedly grounded assumption, as there are opposing forces pushing towards an excessive agglomeration, on the one side, and dispersion, on the other. In particular, firms and workers tend to migrate from peripheral areas to the centre, on the basis of purely personal convenience, not considering the "external" effects of their choices on other subjects. This implies that the concentration produced by the market may result excessive if firms and workers, while moving towards the centre, do not consider the well-being loss of those who remain in periphery, or insufficient, if firms and workers moving towards the centre only consider their private benefits and not of those deriving from their choices for other firms and for the growth process of the European area (see Puga, 2001).

larger and richer regional markets account for the higher number of investments, but once controlled for market size and potential, some laggard regions in the EU Periphery, which were eligible for structural funds in the Objective 1, attracted a considerable number of multinationals. However, other laggard regions did not attract significant investments. This suggests that in order to control whether EU policies have played a role in attracting FDIs one needs to control for other sources of attractiveness. Second, subsidiaries of EU MNEs are mainly concentrated in southern regions, while US MNEs privileged Anglo-saxon regions, suggesting that investments of the two groups of firms might be driven by different factors. Third, Italy has attracted a significantly lower number of new establishments than regions in other countries. Furthermore, once controlled for market potential, regions from different countries attracted a similar number of investments, suggesting that multinationals might perceive regions within the EU not too dissimilar, despite the fact that they belong to different countries.

In this section we will pursue this issues further, by estimating a nested logit model which allows both to address the question of whether national boundaries are perceived as relevant in location decisions of multinational firms and to examine the impact of various determinants of location. In section 6.1 we will focus on the first question, while in section 6.2 we will consider the determinants of location, comparing the cases of EU and US MNEs.

6.1 Choosing the nesting structure. Do national boundaries matter?

As we anticipated in section 4, the nested logit model improves on the standard conditional logit by allowing different degrees of substitutability among regions. In particular, regions which yield a similar profit can be grouped into common nests, improving the quality of estimation. In this perspective, the choice of the nesting structure is crucial. As we noted in section 4, an appropriate nesting structure requires that $\mu_k>1$ for all the K nests, suggesting that errors (i.e. the stochastic component of profits) for the various regions within a nest are positively correlated, or in other words, that regions within a nest are perceived as similar by investing firms. Countries are the natural nests. Cultural specificities, barriers to trade and to the movement of people should make regions belonging to the same country more similar than regions from different nation states. Consistently with this view, Head and Meyer (2000) show that

markets within the EU are still significantly fragmented due to the consumers' home bias. However, one may argue that within the EU such differences have been declining over time, as a result of the increasing economic and political integration.

In table 3 we report the IV parameters for various nesting structures. First notice that the hypothesis that all regions within Europe are close substitutes, i.e. a test of the CL against the NL, is rejected from a Likelihood Ratio (LR) test in all specifications but (17). Therefore, some nesting is required. In columns (1), (7) and (13) we test the conjecture that regions are similar within countries and we soundly reject it. In fact, IV parameters are above 1 only for Italy and Spain and when attention is limited to US MNEs (column (13)) the latter drops below 1[9]. In other words, a country effect characterizes Italian regions. One may venture saying that, although differences do exist in industrial structures of regions within Italy, Lombardia is perceived by US MNEs as more similar to Italy's Mezzogiorno than to Baden-Wurttenberg, while the latter is considered more similar to Ile de France than to the Berlin region. This result provides some more robust explanation to the fact that almost all Italian regions attract a remarkably lower number of investors than other EU regions. Furthermore, this evidence seems to suggest that, apart from the case of Italy, multinational firms tend to consider the EU as a geo-economic space, not as a sum of independent countries[10]. Then, combining this result with Head and Mayer (2000), who find that the EU market are still fragmented due to the persistence of a home country bias in consumers' preferences, one could venture saying that European integration is far more advanced in firms' perceptions and location decisions than in consumers' preferences.

Having said that national borders do not affect location decisions of MNEs, one needs to find the appropriate aggregation of regions. As noted by Louviere et al. (2000) many nesting structures are plausible and it is difficult to assess which one is better in behavioral/statistical terms. We choose to follow two distinct directions in aggregating regions and stop when a satisfying result was reached. First, we aggregated *countries* with similar geo-economic characteristics. Second, we aggregated *regions* according to

[9] Notice that IV parameters are fixed to 1 in the cases of Ireland, Sweden and Portugal since these nests contain only one region. They are the so-called degenerate nests.

[10] Mucchielli and Meyer (1999) find that in the case of Japanese investors national borders seem to matter. We believe that the different results reached in this paper is due to the fact that we consider investors from many countries and in particular we include EU and US MNEs. Results for Japanese MNEs in our sample are consistent with Mucchielli and Mayer (1999) but, given the relatively low number of observations, estimates are not robust and are not shown.

a Core/Periphery model. Within the first line of analysis we started by creating the Anglo-Saxon and the Iberic nests groupings. Columns (2), (8) and (14) show that still IV parameters for France and Germany are well below 1 and in the case of US MNEs still only Italy has IV parameter above 1. Then, we chose to further aggregate France, Germany and Sweden in the group of Continental regions, and Italy, Portugal and Spain in the nest of Southern regions. This nesting structure seems appropriate both for EU and US MNEs since IV parameters are well below 1 (Column (3), (9) and (15)). In other words, we support the view that multinational firms consider Iberic and Italian regions more closely substitutes with each other than with German, French or UK regions. Similarly, French regions are similar to German ones, but different from UK regions. This latter result is confirmed by estimates in Columns (5), (10) and (16) where a nest with all Northern regions is rejected.

As far as the second direction for the search of the appropriate nesting is concerned, results support a Core/Periphery model. In fact, Core regions are more closely substitute for each others, and are different from Peripheral regions. In the same line, regions eligible for Objective 1 are similar as opposed to other EU regions (columns (6), (12) and (18)).

Then, we found at least three appropriate nesting structures but according to various statistical tests, based on the Bayesian Information Criterion[11], the preferred one is the Anglo-Continent-South.

6.2 Determinants of the location of foreign firms in EU regions

In section 2 we showed that, controlling for market size and market potential, some regions eligible for Objective 1 funds attracted a considerable number of foreign subsidiaries. Results in Table 4 shed further light on this aspect, using the "nesting structure" selected in the previous section (i.e. Anglo-Continent-South) and controlling for a number of exogenous sources of heterogeneity. Column (1) shows that in a dartboard specification, Objective 1 regions do not attract more establishments than other regions. However, allowing for the fact that laggard regions have poorer

[11] Bayesian Information Criteria (BIC) can be used to compare non-nested models. BIC extends tests based on the likelihood functions, by controlling for the number of observations and parameters, as resulting from the following formula $BIC = -2 * \log(L) + \log(N) * K$, where L indicates the value

infrastructures, EU structural funds have attracted a significant number of multinationals (Column (2)).

The role of national and EU policy is assessed in columns (3) and (4), where one notices that both public infrastructure and EU policy, proxied by Cohesion and Objective 1 funds have a positive effect. The corporate tax rate does not seem to have a strong impact in discouraging foreign investments. Its sign is negative and marginally significant in column (4), when we do not control for Cohesion funds eligibility. Once we control for the fact a region is either in Ireland, Portugal or Spain, the corporate tax rate turns surprisingly positive. This is consistent with the fact that a number of Regions within Cohesion countries (like Portugal and Catalunia) having relatively high corporate tax rates attract about the same amount of subsidiaries (as a share of market potential) as Ireland, having a much lower corporate tax rate (10% as compared to 35-40% in Iberic countries) Conversely, in non-Cohesion countries, high tax regions in Germany attract more subsidiaries than UK regions (characterized by a relatively low tax rate). Noticeably, the coefficient is positive for EU MNEs but non-significant for US MNEs (see Table 5) suggesting the latter are more sensitive to corporate taxes than the former. This might have to do with the actual tax differential, which might be lower for European than for US firms. The result confirms the mixed prediction that we derived from the empirical literature (Devereux and Griffith (2002) and Benassy-Querè et al. (2000)) and supports the view that high tax rates might not discourage foreign investors whenever governments compensate the higher cost with some public good, as it might happen in Cohesion countries. However, caution is needed when interpreting this result, given that we are not able to control for incentives specific to foreign firms, which some countries put into practice in the nineties.

As regards the impact of Objective 1 eligibility, it is worth mentioning that in 6.1 we supported the view that a nesting structure based on this criteria was not rejected (although we showed that the Anglo-Continent-South is a "better" (at least in statistical terms) nesting structure). In other words, firms perceive regions within the administrative boundaries defined by EU policy for structural funds more similar than regions within national boundaries. One might wish to interpret this result as evidence of an 'illuminated' policy. In fact, either EU-defined boundaries modified MNEs

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of the likelihood function at convergence, while K and N denote the number of estimated parameters and

perceptions or, the other way around, they adapted to firms' decisions, they ex-post define rather homogenous grouping and contributed to attract new establishments.

These results are robust to the introduction of a number of other variables. It is worth mentioning that in the richer specification (Column 6) market potential seems more relevant than regional market size, the importance of agglomeration economies resulting from a number of recent studies is confirmed and we add an important specification concerning firm-specific agglomeration economies (i.e. MNE experience). In fact, we find that the profit that a MNE receives from a given region is highly responsive to the number of subsidiaries of the same parent. In other words, experience of a given context increases firms' ability of extracting profit from that region and determines a persistency to locate in the same regions. This has important policy implications. While agglomeration economies usually create problems to policy makers because of threshold levels of agglomeration required to induce virtuous cycles, and thus require substantial investments for attracting a considerable number of firms, persistence means that targeted incentives to specific firms might induce them to get rooted in a given context and increase the likelihood of further investments of the same MNE. Eventually, this might attract other firms and create the basis for an agglomerating mechanism.

Finally, the role of labour market conditions differs in the case of US and EU MNEs. In fact, from Table 5 one notices that a high tax wedge on employment discourages investment from US MNEs significantly, while high wages have the opposite effect. This might suggest that US firms look for skilled workers and are willing to pay them higher wages, but are not willing to grant government high taxes on employed labor. Conversely, EU MNEs place more emphasis on wages and unemployment, consistently with the idea that investments within-EU are part of a strategy of reorganization of international activities where the local availability of cheap labor plays a role.

7. Concluding remarks

This paper analyzed the determinants of location choices of multinational firms in European regions. Most of previous studies focused on location decisions within single countries, often analyzing location at a rather geographically disaggregated level, but making the hypothesis that firms choose regions within and not across countries. In

observations respectively. Comparing two models, M_1 and M_2, M_1 can be rejected if $BIC_1 > BIC_2$.

other words, firms are usually assumed to choose countries first and then decide in which region within that country they locate their activities. The process of European integration is making this perspective rather narrow, since regions can be expected to compete to attract FDIs with other regions both within and across national boundaries. This study tests whether and to what extent regions compete with each other to attract FDIs, using empirical evidence on Europe over the nineties. Other recent papers take perspectives close to ours but, due to data limitations, they have to confine to a sub-sample of firms investing in the EU, originating from Japan or France. Exploiting a novel data-set (named Elios), built at the University of Urbino and based on Dun & Bradstreet's Who Owns Whom, we investigated location choices for 5,761 foreign affiliates of EU and non-EU MNEs over 1991-1999.

We asked two basic empirical questions. *First*, we ask to what extent country boundaries affect location choices. *Second*, we analyze what determines regional location choices of foreign-owned firms within the EU, with special attention to the role of EU policies. When addressing these questions we evaluated to what extent patterns of localisation differed according to the nationality of origin of multinationals..

Main results support the view that country boundaries do not matter and that EU policy contributed to attract considerable investments in Peripheral regions, counteracting agglomerative forces which tend to concentrate activities in Core regions. In fact, on the one hand, we find that multinational firms consider regions across countries as closer substitutes than regions within national boundaries. This supports the view that when taking location decisions, multinational firms perceive the EU as a relatively integrated area, rather than a collection of independent countries. However, Italy turns out as a special case. In fact, US MNEs perceive a strong country effect when locating in Italian regions, suggesting that US firms take their location decision on a presumption that investments in Italian regions would yield systematically lower profits than investment in regions from other countries sharing similar observable characteristics. However, this country effect is not as strong when considering the sub-sample of EU multinationals. One may venture saying that information plays a role in determining US presumption and that EU integration, increasing movement of people and trade in goods and services across European countries, have contributed reducing such a presumption in the case of EU MNEs.

We also find that regions eligible for Objective 1 Structural Funds and regions belonging to Cohesion countries are particularly attractive for foreign multinationals. This supports the view that EU regional policy, creating more favourable conditions for investments in Peripheral regions through funding (among others) training, infrastructure and R&D activites, have succeeded in counteracting agglomerative forces which tend to concentrate activities in Core regions. However, further work is required along these lines. First, one would like to control for more direct measures of EU policies, such as the actual amount of funds transferred to the various regions and possibly disentangle the effect of funds for different activities, e.g. training, infrastructures and R&D. Second, careful measurement of national and regional policies specifically targeted to foreign investments is required, in order to assess the differential impact of EU versus national and regional policies correctly.

References

Barrel R. and N. Pain, 1999, Domestic institutions, agglomerations and foreign direct investment in Europe, European Economic Review, 43, pp. 925-934.

Barrios S., H. Gorg and E. Strobl, 2002, Multinationals' location choice, agglomeration economies and public incentives, mimeo.

Basile R., 2003, Acquisition versus Greenfield Investment: the Location of foreign manufacturers in Italy, Regional Science and Urban Economics, forthcoming

Benassy-Quèrè A., Fontagnè L. and A. Lahrèche-Rèvil, 2000, Foreign direct investment and the prospects for tax co-ordination in Europe, CEPII Document de travail n. 2000-06.

Boschma R.A and Lambooy J.G., 1999, Evolutionary economics and economic geography, *Journal of Evolutionary Economics,* **9**: 411-430.

Cantwell J.A. and L. Piscitello, 2003, The recent location of foreign R&D activities by large MNCs in the European regions. The role of spillovers and externalities, mimeo.

Cantwell J.A. and S. Iammarino, 2001, EU regions and multinational corporations: change, stability and strengthening of technological comparative advantage, Industrial and Corporate Change, 10, pp. 1007-1037.

Castellani D. and A. Zanfei, 2003a, Technology gaps, absorptive capacity and the impact of inward investments on productivity of European firms, Economics of Innovation and New Technology, forthcoming

Castellani D. and A. Zanfei, 2003b, Choosing international linkages strategies in the electronics industry. The role of multinational experience, Journal of Economic Behavior and Organization, forthcoming.

Ciccone A., 2002, Agglomeration effects in Europe, European Economic Review, 46, pp. 213-227.

Copus A., 1999, A New Peripherality Index for the NUTS III Regions of the European Union, European Commission, ERDF/FEDER Study 98/00/27/130.

Crozet M., Mayer T. and J.L. Mucchielli, 2003, How do firms agglomerate? A study of FDI in France, Regional Science and Urban Economics, forthcoming.

De Santis R., Mercuri, M.C. and C. Vicarelli, 2003, Taxes and location of foreign direct investments: an empirical analysis for the European Union countries, Economia, Società e Istituzioni, forthcoming

DeCoster, G., Strange, X.V., 1993, Spurious agglomeration. Journal of Urban Economics, 33, pp. 273-304.

Devereux M. and R. Griffith, 1998, Taxes and Location of Production: Evidence from a Panel of US Multinationals, Journal of Public Economics 68, 335-367.

Devereux M. and R. Griffith, 2002, The impact of corporate taxation on the location of capital: a review, Swedish Economic Policy Review, 9, No. 1 - The International Mobility of Tax bases.

Devereux M. and R. Griffith, 2003, Evaluating tax policy for location decision, International Tax and Public Finance, 10, 2, pp. 107-126.

Devereux M., Griffith R. and H. Simpson, 2002, Regional selective assistance, agglomeration and firm location, Presented at the CEPR/IMOP Conference on "FDI and the Multinational Corporation", Hydra, Greece, 20-21/9/2002.

Disdier, A.C. and T. Mayer, 2002, How Different is Eastern Europe? Structure and determinants of location choices by French firms in Eastern and Western Europe, mimeo.

Dunning J.H., 2000, Regions, globalisation and the knowledge economy: the issues stated, in Dunning J.H. (Ed) *Regions, Globalisation and the Knowledge Based Economy*: Oxford University Press, Oxford and New York

European Commission, First Report on Economic and Social Cohesion, Luxemburg, 1996.

Eurostat, 2002, European Union foreign direct investment yearbook 2001.

Friedman, J., D. Gerlowski and J. Silberman, 1992, What Attract Foreign Multinational Corporations? Evidence from Branch Plant Location in the United States, Journal of Regional Science 32, 403-418.

Fujita, M., P. Krugman and A.J. Venables, 1999, The Spatial Economy: Cities, Regions, and International Trade, Cambridge: MIT Press.

Gorg H. and E. Strobl, 2001, Multinational companies and productivity spillovers: a meta analysis, Economic Journal, 11, November, F723-F739.

Gropp R. and K. Kostial (2000), The Disappearing Tax Base: Is Foreign Direct Investment Eroding Corporate income Taxes?, IMF Working Paper n. 173.

Guimaraes P., Figueiredo O. and D. Woodward, 2000, Agglomeration and the location of foreign direct investment in Portugal, Journal of Urban Economics, 47, 115-135.

Harris C., 1954, The market as a factor in the localization of industry in the United States, Annals of the Association of American Geographers, 64, pp. 315-348.

Head, C.K. and T. Mayer, 2000, Non-Europe. The magnitude and causes of market fragmentation in the EU, Weltwirtschaftliches Archiv, 136, 2, pp. 285-314.

Head, C.K. and T. Mayer, 2002, Market Potential and the Location of Japanese Investment in the European Union, CEPR Discussion Paper Series n. 3455.

Head, C.K., J.C. Ries and D.L. Swenson, 1995, Agglomeration Benefits and Location Choice: Evidence from Japanese Manufacturing Investments in the United States, Journal of International Economics 38, 223-247.

Head, C.K., J.C. Ries, D.L. Swenson, 1999, Attracting Foreign Manufacturing: Investment Promotion and Agglomeration, Regional Science and Urban Economics 29, 197-218.

Hensher D. and W. Greene, 2002, Specification and estimation of the nested logit model: alternative normalisations, Transportation Research Part B, 36, pp. 1-17.

Hess F., 2002, Structural choice analysis with nested logit models, The Stata Journal, 2, 3, pp. 227-252.

Keeble D., Offord J. and S. Walker, 1988, Peripheral Regions in a Community of Twelve Member States, Office for Official Publications of the E.C., Luxemburg.

Layard R., Nickell S. and R. Jackman (1991), Unemployment, Macroeconomic Performance and Labour Market, New York, OUP.

Louviere J., D. Hensher and J. Swait, 2000, Stated choice methods. Analysis and application, Cambridge University Press, Cambridge.

Martin R., 1999, Critical survey: the new "geographical turn" in economics – some critical reflections, *Cambridge Journal of Economics,* **23**: 65-91.

Martinez-Mongay C. (2000), ECFIN's Effective Tax Rates. Properties and Comparison with Other Tax Indicators. Economic Papers European Commission, n. 146, October.

Mayer T. and J.L. Mucchielli, 1999, La localisation à l'étranger des entreprises multinationales. Une approche d'économie hiérarchisée appliqué aux entreprises japonaises en Europe. Economie et Statistique, 326-327, 1999-6/7, pp. 159-176.

McFadden D., 1974, Conditional logit analysis of qualitative choice behaviour, in Zarembka P. (ed.) Frontiers in econometrics, Academic Press, New York.

Mucchielli J.L. and F. Puech, 2002, Location and agglomeration of French FDI in European countries and regions: a probabilistic approach, mimeo.

Piscitello L., 1997, L'attrazione dell'IDE in Europa: strutture e politiche, in Cominotti R. and S. Mariotti (eds), Italia Multinazionale 1996, Franco Angeli, Milan.

Puga D. (2001), European Regional Policies in Light of Recent Location Theories, CEPR Discussion Paper, n. 2767, 2001.

Puga, D. and A. Venables, 1996, The Spread of Industry: Spatial Agglomeration in Economic Development, Journal of the Japanese and International Economies 10, 440-464.

Train K.E., 2003, Discrete choice methods with simulation, Cambridge University Press, Cambdridge.

UNCTAD, 2002, World Investment Report 2002. Transnational Corporations and Export Competitiveness, United Nations, New York and Geneva.

Table 1 – Newly established subsidiaries and inward FDI flows in selected EU countries over the nineties

	Subsidiaries established in * 1991-1999						Inward FDI Flows 1990-2000 **	
	EU MNEs	Non-EU MNEs			Total	Total (%)	%	Absolute values
		Total	*US MNEs*	*JPN MNEs*				
France	598	269	*143*	*26*	867	15.0%	18.1%	263,873
Germany	965	655	*361*	*39*	1620	28.1%	21.8%	318,414
Ireland	42	35	*26*	*5*	77	1.3%	4.3%	62,274
Italy	202	93	*53*	*12*	295	5.1%	3.6%	52,875
Portugal	151	27	*13*	*5*	178	3.1%	1.7%	25,227
Spain	368	116	*68*	*19*	484	8.4%	9.8%	143,831
Sweden	96	56	*19*	*2*	152	2.6%	10.5%	152,753
Uk	973	1115	*760*	*108*	2088	36.2%	30.2%	441,315
Total	3395	2366	1443	216	5761	100.0%	100%	1,460,560

Source: * Authors' elaborations on Who Owns Whom
** UNCTAD (http://stats.unctad.org/fdi)

Table 2 - Variable List and Description

	Variables	***Description***	***Source***	***Type***
Demand	Market Size	Log of Manufacturing Value Added in region j	Eurostat	Region
	Market Potential	Log of the sum of manufacturing value added in all regions r≠j weighted by the inverse euclidean distance between the major cities in r and j	Eurostat	Region
Agglomeration Economies	Overall agglomeration	Log of the number of establishments in region j (and sector s)	Elios	Region-Sector
	Foreign-firms agglomeration	Log of the cumulative number of foreign-owned firms within region j (and sector s)	Elios	Region-Sector
	MNE Experience	Log of the number of firms in region j controlled by the same parent of firm n	Elios	Firm-Region
Local labor market	Wages	Log of (labor cost / number of employees)	Eurostat	Region
	Unemployment Rate	Log of Unemployment rate	Eurostat	Region
	Tax wedge on employment	Log of (sum of social contributions, income taxes and consumption duties over total employment)	Martinez-Mongay C. (2000)	Country
EU-policy	Objective 1 region	1 if the region is within Obj.1, 0 otherwise		Region
	Cohesion country	1 if the country receives Cohesion Fund, 0 otherwise		Country
National policy	Public Infrastructure	Index of infrastructure stock in region j at 1985	Confidustria	Region
	Corporate tax rate	Log of Corporate tax rate	Gropp R. and Kostial K. (2000)	Country

Table 3 – Location determinants of FDI in Europe. Nested Logit Regressions. Choosing the nesting structure

	1 All	**2** All	**3** All	**4** All	**5** All	**6** All	**7** EU MNEs	**8** EU MNEs	**9** EU MNEs	**10** EU MNEs	**11** EU MNEs	**12** EU MNEs	**13** US MNEs	**14** US MNEs	**15** US MNEs	**16** US MNEs	**17** US MNEs	**18** US MNEs
IV parameters (μ_k)																		
UK	.903**						.920**						.972**					
France	.807**						.782**						.980**					
Germany	.793**						.795**						.845**					
Italy	1.073**						1.031**						1.327**					
Spain	1.005**						1.037**						.982**					
Ireland	1.00						1.00						1.00					
Portugal	1.00						1.00						1.00					
Sweden	1.00						1.00						1.00					
Anglo (UK-Ireland)		1.023**						1.129**						.929**				
France		.862**						.870**						.953**				
Germany		.840**						.869**						.831**				
Italy		1.193**						1.201**						1.287**				
Iberic (Spain-Portugal)		1.109*						1.216**						.945**				
Sweden		1.00						1.00						1.00				
Anglo (UK-Ireland)			1.195**						1.298**						1.181**			
Continent (Fra-Ger-Swe)			1.019**						1.036**						1.095**			
South (Italy-Spain-Portugal)			1.376**						1.386**						1.545**			
North (UK-Ire-Fra-Ger-Swe)				.855**						.953**						.827**		
South (Italy-Spain-Portugal)				1.070**						1.205**						1.035**		
Core					1.282**						1.410**						1.118**	
Periphery					1.366**						1.542**						1.185**	
Objective 1						1.712**						1.872**						1.512**
Non Objective 1						1.474**						1.550**						1.364**
Number of observations	294,794	294,794	294,794	294,794	294,794	294,794	164,664	164,664	164,664	164,664	164,664	164,664	79,365	79,365	79,365	79,365	79,365	79,365
Number of firms																		
Pseudo R^2	.263	.237	.202	.240	.217	.246	.244	.221	.202	.224	.206	.234	.314	.286	.220	.285	.259	.286
Log-likelihood	-18303.0	-18304.2	-18311.5	-18317.0	-18377.5	-18368.1	-10913.7	-10910.2	-10910.8	-10924.4	-10951.2	-10950.2	-4364.2	-4363.9	-4370.2	-4368.9	-4384.5	-4381.8
Log-likelihood (CL)	-18388.2	-18388.2	-18388.2	-18388.2	-18388.2	-18388.2	-10962.1	-10962.1	-10962.1	-10962.1	-10962.1	-10962.1	-4385.2	-4385.2	-4385.2	-4385.2	-4385.2	-4385.2
LR test	170.4**	168**	153.4**	142.4**	21.4**	40.2**	96.8**	103.8**	102.6**	75.4**	21.8**	23.8**	42**	42.6**	30**	32.6**	1.4	6.8**
H0: CL vs. H1: NL																		
Bayesian information criterion (BIC)	36883	36860	36837	36836	36957	36925	22092	22061	22026	22041	22095	22081	8977	8953	8932	8918	8950	8933

Note: The dependent variable is equal to 1 if firm *i* is set in region *j* and zero for all regions different from *j*. Regressions have been run using the specification of column (6) in Table 3, except (6), (12) and (18) where the dummy Objective 1 have been dropped..
t-values in parenthesis. *denotes *t*-statistics at the 90% confidence level; **, at 95%.

Table 4 – Location determinants of FDI in Europe. Nested Logit Regressions . All foreign investors

Variable	1	2	3	4	5	6
Market Size	0.701**	0.660**	0.638**	0.622**	-0.596**	0.014
	(16.408)	(16.394)	(17.279)	(16.738)	(-2.095)	(0.455)
Market Potential	0.042	0.019	-0.108**	-0.135**	0.467**	0.340**
	(1.040)	(0.489)	(-2.667)	(-3.483)	(4.180)	(3.035)
Objective 1 Regions	0.020	0.154**	0.163**	0.109**	0.474**	0.380**
	(0.617)	(3.648)	(3.992)	(2.777)	(7.627)	(6.144)
Cohesion Funds Countries	0.483**	0.513**	0.699**		0.745**	0.443**
	(8.794)	(9.436)	(11.553)		(9.164)	(4.972)
Public infrastructures		0.239**	0.262**	0.092**	0.070	-0.027
		(6.385)	(7.022)	(2.832)	(1.250)	(-0.449)
Corporate tax rate			0.550**	-0.096*	0.756**	0.597**
			(7.274)	(-1.693)	(8.551)	(6.182)
Overall Agglomeration					0.482**	0.419**
					(10.814)	(9.463)
Foreign-firms agglomeration					0.377**	0.354**
					(8.658)	(8.329)
MNE Experience					1.292**	1.235**
					(27.276)	(26.590)
Spatial Lag of Overall Agglomeration					0.161	-0.338
					(0.760)	(-1.477)
Spatial Lag of Foreign-firms agglomeration					0.055	0.485
					(0.227)	(1.969)
Wages						0.125*
						(1.790)
Unemployment rate						0.087**
						(2.281)
Tax wedge on employment						-1.217**
						(-6.057)
IV parameters (μ_k)						
Anglo	1.069**	1.142**	1.067**	1.281**	1.077**	1.195**
Continent	1.383**	1.458**	1.446**	1.583**	1.029**	1.019**
South	2.203**	2.378**	2.720**	2.374**	1.314**	1.376**
Number of observations	294,794	294,794	294,794	294,794	294,794	294,794
Number of firms	5,761	5,761	5,761	5,761	5,761	5,761
Pseudo R^2	0.117	0.118	0.120	0.113	0.202	0.203
Log-likelihood	-20263.5	-20242.2	-20198.5	-20362.0	-18332.5	-18311.5
Bayesian information criterion (BIC)	40620	40580	40510	40820	36840	36830

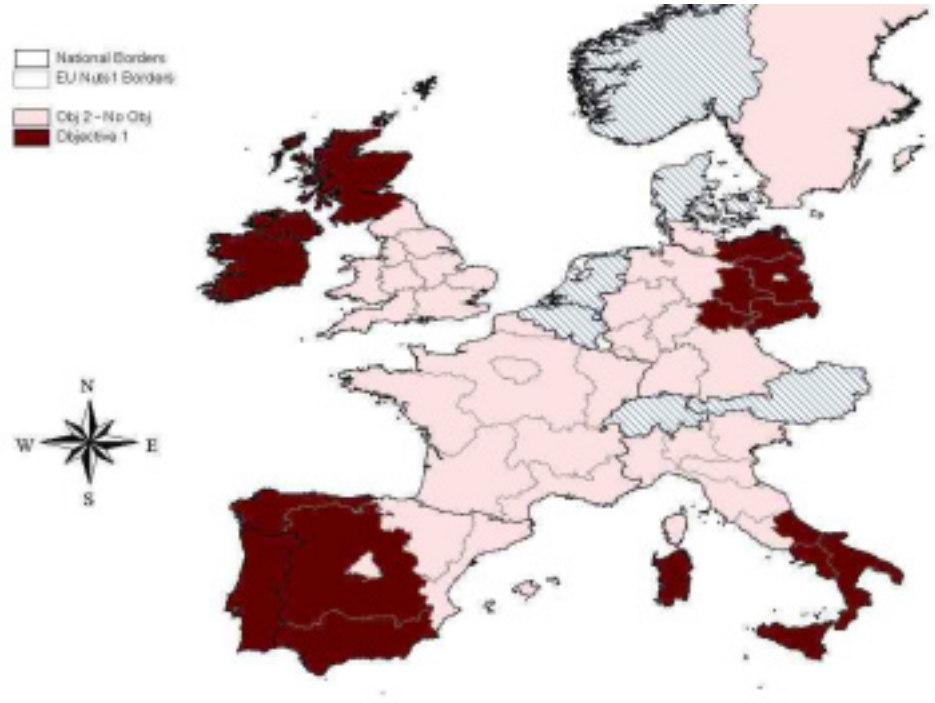
Note: The dependent variable is equal to 1 if firm *i* is set in region *j* and zero for all regions different from *j*.
t-values in parenthesis. *denotes *t*-statistics at the 90% confidence level; **, at 95%.

Table 5 – Location determinants of FDI in Europe. Nested Logit Regressions. European vs. US investors.

Variable	**EU MNEs**	**US MNEs**
Market Size	0.005	0.062
	(0.133)	(0.960)
Market Potential	0.279**	0.347
	(1.992)	(1.517)
Objective 1 Regions	0.359**	0.408**
	(4.631)	(3.190)
Cohesion Funds Countries	0.680**	0.213
	(6.033)	(1.063)
Public infrastructures	-0.031	0.049
	(-0.405)	(0.414)
Corporate tax rate	0.748**	0.280
	(6.320)	(1.275)
Overall Agglomeration	0.409**	0.411**
	(7.383)	(4.389)
Foreign-firms agglomeration	0.332**	0.282**
	(6.285)	(3.286)
MNE Experience	1.122**	1.197**
	(20.207)	(10.571)
Spatial Lag of Overall Agglomeration	0.003	-0.153
	(0.009)	(-0.333)
Spatial Lag of Foreign-firms	0.316	0.248
agglomeration	(1.011)	(0.513)
Wages	-0.033	0.522**
	(-0.369)	(3.544)
Unemployment rate	0.081*	0.063
	(1.745)	(0.722)
Tax wedge on employment	-0.450*	-2.094**
	(-1.782)	(-4.935)
IV parameters (μ_k)		
Anglo	1.298**	1.181**
Continent	1.036**	1.095**
South	1.386**	1.545**
Number of observations	164,664	79,365
Number of firms	3,395	1,443
Pseudo R^2	0.202	0.221
Log-likelihood	-10910.9	-4370.2

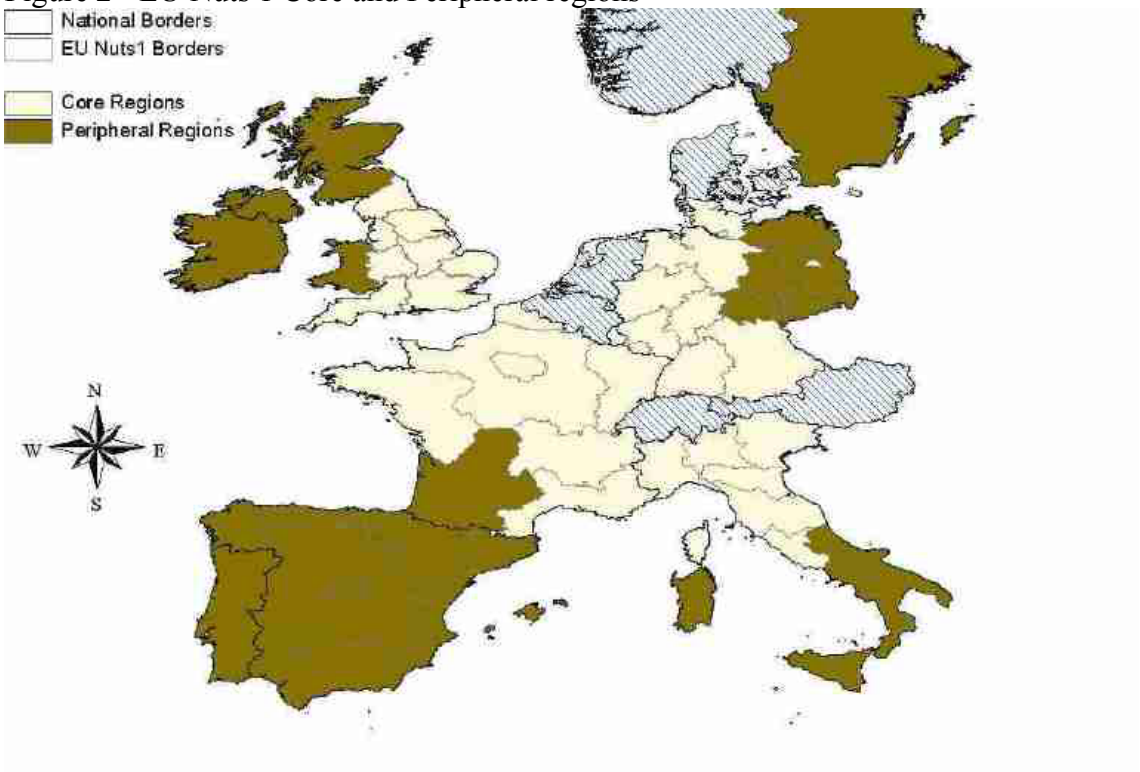
Note: The dependent variable is equal to 1 if firm *i* is set in region *j* and zero for all regions different from *j*.
t-values in parenthesis. *denotes *t*-statistics at the 90% confidence level; **, at 95%

Figure 1 - EU Nuts 1 regions by Objective 1 eligibility



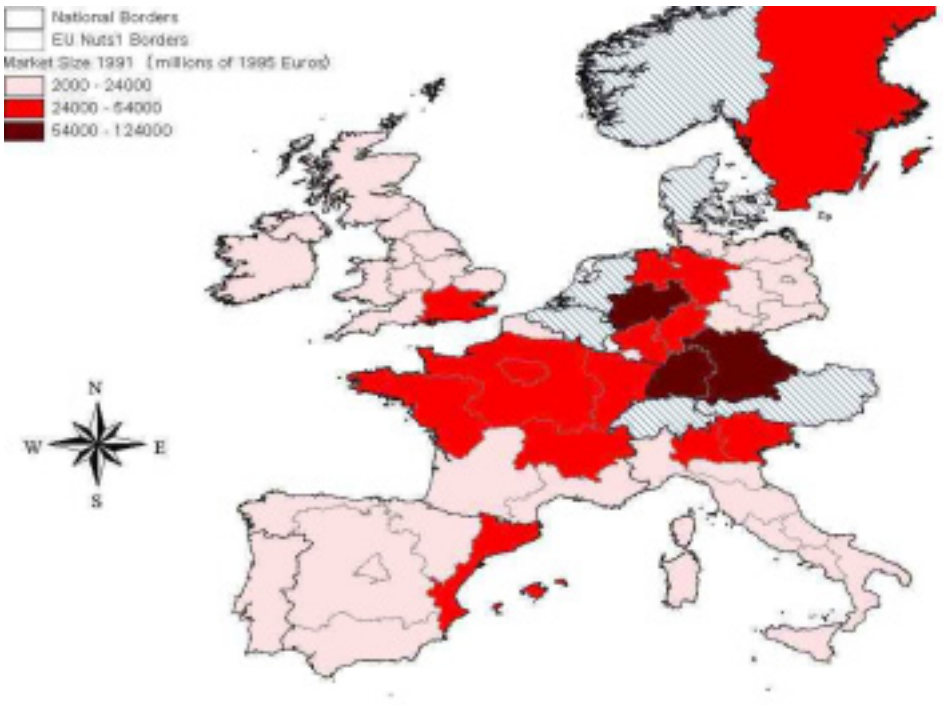
Source: Elaborations on Elios (University of Urbino)

Figure 2 - EU Nuts 1 Core and Peripheral regions



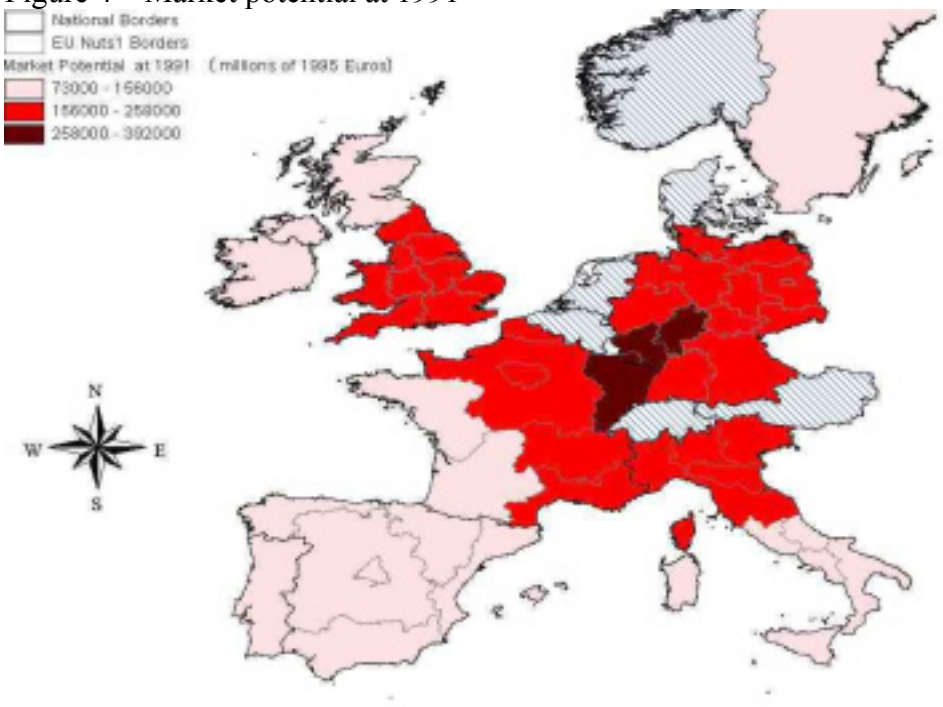
Source: Elaborations on Elios (University of Urbino)

Figure 3 – Market size (regional GDP) at 1991



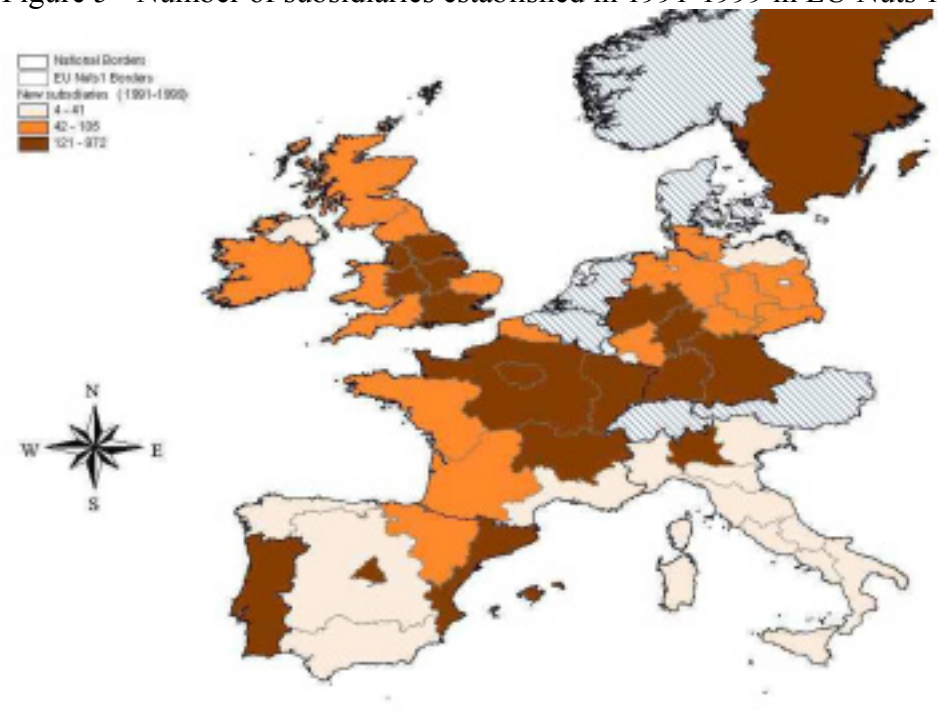
Source: Elaborations on Elios (University of Urbino)

Figure 4 – Market potential at 1991



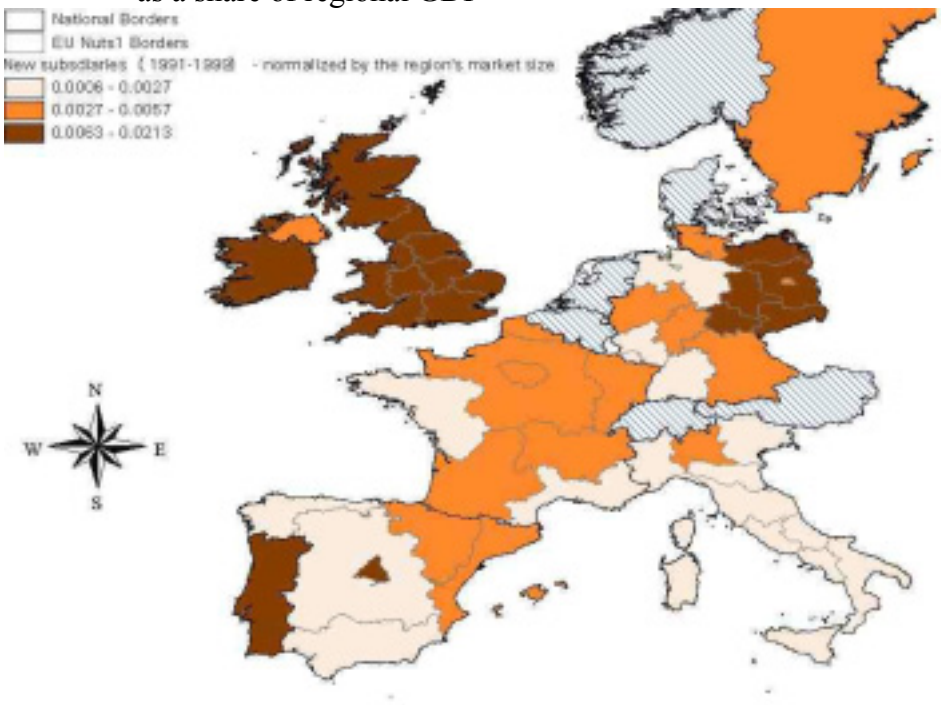
Source: Elaborations on Elios (University of Urbino)

Figure 5 - Number of subsidiaries established in 1991-1999 in EU Nuts 1 regions



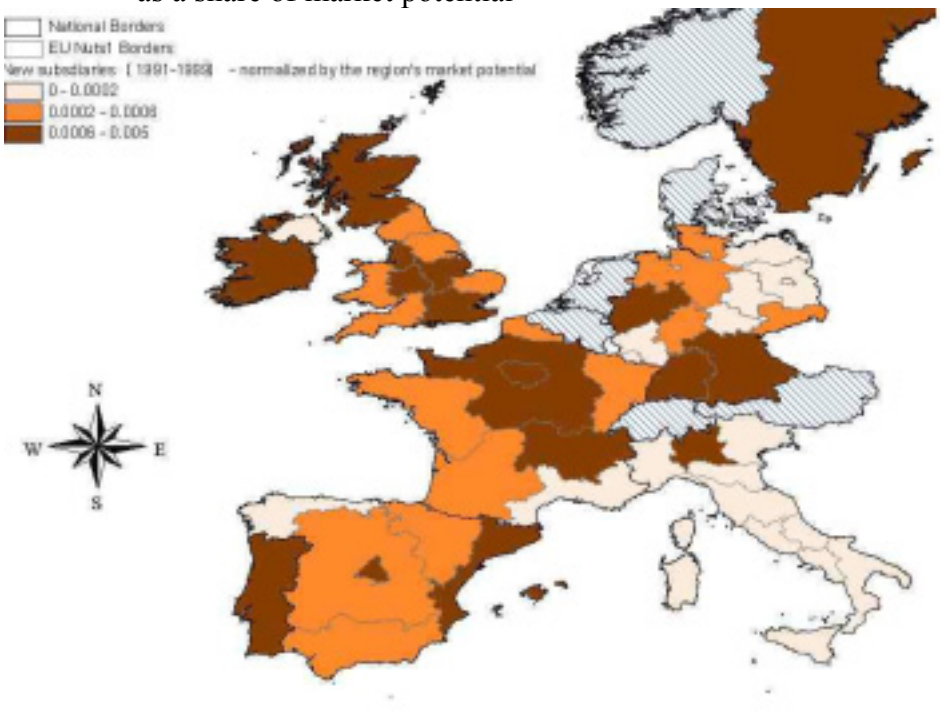
Source: Elaborations on Elios (University of Urbino)

Figure 6 - Number of foreign subsidiaries established in EU Nuts 1 regions (1991-1999) as a share of regional GDP



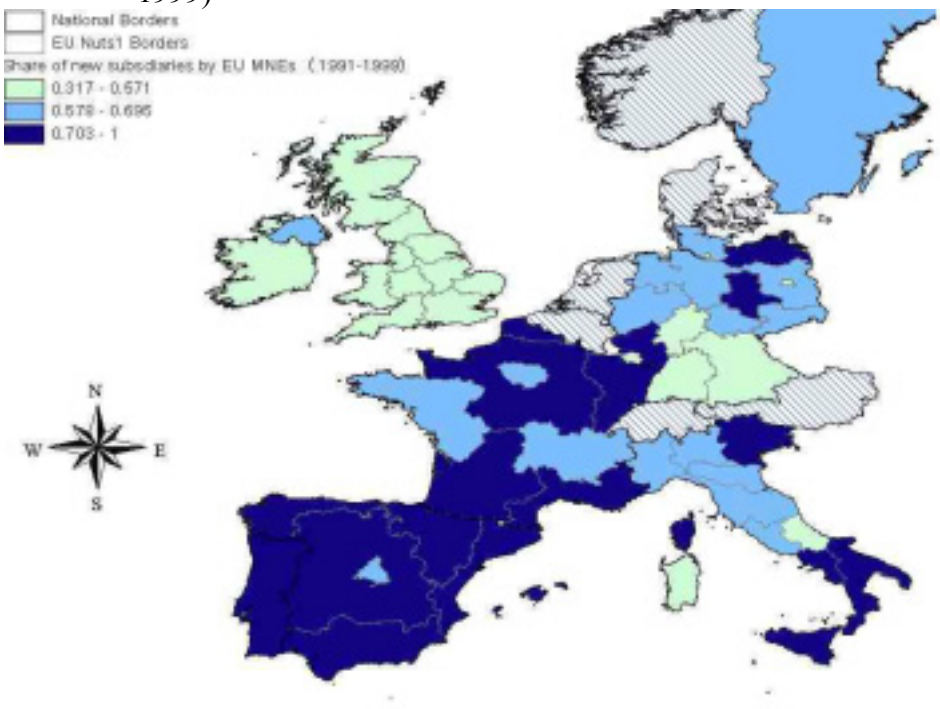
Source: Elaborations on Elios (University of Urbino)

Figure 7 - Number of foreign subsidiaries established in EU Nuts 1 regions (1991-1999) as a share of market potential



Source: Elaborations on Elios (University of Urbino)

Figure 8 - Share of subsidiaries established by EU MNEs in EU Nuts 1 regions (1991-1999)



Source: Elaborations on Elios (University of Urbino)