The spatial distribution of FDI across European regions: does a country effect exist?

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This version: March 2011

Abstract

This study aims at investigating empirically the factors that drive the uneven distribution of foreign direct investments (FDI) inflows to European regions. In order to achieve our research objective, we first perform a detailed analysis of the location determinants of foreign investments and then we try to understand whether and to what extent regions' capacity to attract FDI is strengthen or hampered by a "country effect", which can take two different forms. The first relates to the relative performance of the country a region belongs to in Europe (between country effect), while the second concerns the relative performance of regions' within their own country (within country effect). Once identified the "national" and the "regional" components of factors able to attract FDI, more effective FDI promotion policies can be implemented at national, regional and sectoral levels.

Key words: Foreign direct investments, spatial distribution of FDI, country effect, spatial econometrics

JEL codes: F23, R12, C21

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1. Introduction

Over the last decades foreign direct investment (FDI) has played a major role as a way of internationalizing the economic activity. Indeed, FDI is one of the prominent feature of the recent wave of globalization, recording growth rates higher than those of international trade flows and GDP. The importance of FDI, however, is not limited to the quantitative aspects of the phenomenon. Rather, it depends on the fact that FDI is one of the most important vehicle for transferring not only financial capitals, but also technologies, know-how and capabilities across space and national borders (Romer, 1993, OECD, 2007).

Most of the world inflows of FDI have been directed towards the European Union (EU), reflecting both the increasing internationalization of the European economies and the instigation of the European integration process (Barrell and Pain, 1999; Van Aarle, 1996; Mold, 2003). FDI inflows in the EU rose from about USD 97 billion in 1990 to USD 900 billion in 2007, 45 percent of world inflows, making the EU the world's most important recipient area for FDI.

Despite this impressive record, some concerns on the activity of multinational enterprises (MNEs) do exist and put policy makers in front of new challenges related to the harmonious development of all territories within Europe. The spatial distribution of foreign capitals in the EU, in fact, is far from being uniform, both within and across countries, as it is shown in Figure 1, which summarizes the distribution of foreign firms across the EU regions by boxplots. The presence of spatial diversity raises the question on what factors are at the base of potential foreign investors' location decisions. To shed further light onto this issue may be of interest not only for scholars but also for policy makers dealing with local development issues: with a skewed distribution of foreign firms over space, the positive impact of FDI in terms of technology transfer and knowledge diffusion may be limited and it may further exacerbate the existing regional disparities. Therefore, there is a need to know more in depth which factors are able to condition the distribution of FDI across EU regions.

(Insert Figure 1 about here)

Causes and consequences of FDI have been extensively explored by the literature, both at theoretical and empirical level (Barba Naveretti and Venables, 2004; Blonigen, 2005). However most of this literature is based on a two-country framework where FDI between country *i* and *j* depends exclusively by the characteristics of the origin and destination countries. This approach may be problematic and misleading for several reasons. First of all, it does not allow to explain some stylized facts concerning FDI, and in particular, the surge of (horizontal) FDI within the EU (Neary, 2009). Secondly, the two country perspective is rather limited, as compared with the rest of world and does not consider potential interdependencies between FDI decisions across host destinations. Thirdly, the omission of spatial interactions may lead to biased, inconsistent or inefficient parameter estimates of FDI determinants or incorrect inferences (Anselin, 1988).

Given these potential shortcomings, this paper aims at investigating empirically the factors that drive the uneven distribution of FDI across EU regions, by incorporating the spatial characteristics of the data into the analysis. To this respect, it is among the few to date to take spatial linkages with respect to FDI into account.[2]

In order to achieve our research objective we exploit a unique database, *FDIRegio*, which includes information on the number of foreign firms established in the EU27 regions (NUTS2 level) during the 2005-07 period disaggregated by sector and country of origin.[3]

Our empirical analysis is divided into two interrelated parts. We first investigate the location determinants of foreign investments by considering a set of variables for which we have theoretical priors that they are potentially correlated with FDI inflows. Then we try to explain whether and to what extent spatial interdependences may determine the distribution of FDI across EU regions. In so doing we use spatial econometrics, which allows to explore different spatial characteristics affecting the distribution of FDI (Anselin, 1988 and 2003). In particular, we test for not only whether FDI in a region is affected by FDI in neighbouring regions, that is, the presence of spatial dependence, but also the stability over space of the estimated relationships, i.e. spatial heterogeneity.

The way we model geographical heterogeneity represents the real novelty of this paper. Previous similar studies usually include regional and/or country dummies in order to account for variation across space (Basile et al., 2009). This methodology allows to capture unobserved regional fixed effects or specific effects which are constant over regions belonging to the same country. Although the literature has demonstrated that spatial effects are largely control for by using specific fixed effects (Blonigen et al., 2007), we were unable to use region and country dummies because of the lack of sufficient degrees of freedom. Hence, we adopt a different approach, which we believe may help us in answering research questions not yet fully explored by the literature and, thus, improving our understanding of FDI patterns in Europe. As it will be clear in what follows, our strategy allows us to control for the impact of region and country specific effects in *relative* rather than *absolute* terms.

Our starting point is twofold. First, there is a huge literature in regional science that claims that regions' performance is in many aspects affected by their own nations' performance. Secondly, also regions belonging to the same country may differ one from each other for many reasons.[4] Following this reasoning, we argue that FDI attractiveness at sub-national level is affected by a sort of own country effect, which possesses two dimensions:

- a *within country dimension*, which relates to the relative performance of a region within the country it belongs to;
- a *between country dimension*, which refers to the relative performance of the country a region belongs to in the EU.

This strategy allows us to understand, among other things, whether a laggard region in a well performing country is likely to attract more (or less) foreign firms than an over-performing region in a laggard country.

[2] Recent studies that have relaxed the two country framework in studying FDI determinants include Blonigen et al. (2007), Garretsen and Peeters (2009), Ledayeva (2009), and, as far as Europe is concerned, Casi and Resmini (2010) and Basile et al. (2009). Other studies have taken spatial issues into account when investigating technological spillovers. See, among others, Driffield, 2006 and Nicolini and Resmini (2011, forthcoming).

[3] See the Annex 1 for an in depth description of the database and its representativeness.

[4] Think about a federal nation – such as Germany – where sub-national administrative units are allowed to have their own regulations in specific economic and social fields that may affect economic activities, or to autonomous regions in centralized countries (i.e. Catalunia and Basque Country in Spain or Valle d'Aosta and Trentino Alto Adige in Italy).

Once identified the within and between country components of factors able to attract FDI, more effective FDI promotion policies can be implemented at national, regional and also sectoral levels.

Our results suggest that spatial heterogeneity is able to affect the relationship between regional characteristics and FDI flows. The within country effect is weaker than the between country effect, which, on average, is able to further boost regions' capacity to attract FDI.

The structure of this article is as follows. Section 2 provides a short overview of the regional characteristics that may affect investment patterns, while the following sections are devoted to explain the concentration of foreign activity across European space. We first present the methodology (section 3) and then discuss the econometric results (section 4). Section 5 is devoted to further specifications and robustness checks. Section 6 concludes with some final remarks and policy implications.

2. Explaining the geography of FDI

The literature on the location-related determinants of FDI proposes few important factors that are able to condition MNEs' choice of a location for their production plants.[5] Very briefly, these factors can be grouped into two broad sets, i.e. demand factors and supply characteristics.

Local demand conditions usually refer to market size, market access and growth prospects. The size of the local market as well as access to other neighbouring markets is likely to exert a strong influence on FDI location. In particular, market access can magnify the impact of local demand in presence of increasing return to scale in production (Davis and Weinstein, 1999 and 2003). Therefore, it would exert a strong influence on foreign firms producing on a large scale and seeking to export their products to the rest of the EU. Despite the rapid integration process that took place over the last decade, market access is rather unequal across EU regions, mainly because of intangible barriers, such as cultural and administrative ones, to intra-EU trade that still maintain fragmented the EU market (Head and Mayer, 2004). Because of these barriers, regions with a good geographical and economic accessibility to the European core markets are likely to receive more FDI than other regions. Also, GDP growth rate is often used in the literature as a proxy for potential local demand. Many studies indicate the existence of a positive relationship between FDI and GDP growth rate (Billington, 1999; Kravis and Lipsey 1982, Wheeler and Mody 1992). It is also argued that this variable may well be expected at a local level within a host country, though in the EU its importance may be reduced because of the easy access to neighbouring regions (Mariotti and Piscitello, 1995).

Supply conditions include a wide set of factors, ranging from the structure of the local economy, factor costs, resource endowments, skills of labour force and all those factors affecting the general business environment faced by foreign firms. As for the latter, agglomeration effects usually signal high quality of infrastructure, specialization, higher competition and also a business environment conducive for foreign investors. The existing empirical literature shows that firms tend to locate where other firms with similar characteristics – in terms of nationality of ownership and sector of activity – are already established (Head et al, 1999; Crozet et al., 2004; Pusterla and Resmini, 2007). The role of factor costs, and, in particular, labour costs is highly debated in the literature. At theoretical level, they are likely to be important for FDI location choice: multinationals are able to fragment production processes across space and usually chose the best location for

[5] As argued by Dunning (1993), location advantages are only one of the three sets of factors that firms take into consideration in order to decide whether to become multinationals. The other two are Ownership and Internalization advantages.

each production stage, thus minimizing total production costs. Therefore, it can be expected that multinational firms chose low cost locations for activities relatively intensive in labour. This implies the existence of a negative relationships between labour costs and FDI. Empirically, this relationship is not very robust. Labour cost is found to be positively related to FDI by Wheeler and Mody (1992) and Feenstra and Hanson (1997), while it is negative for Culem (1988) and insignificant for Lucas (1993) and Defever (2006).[6] Finally, it has been argued (Dunning, 1981; Schneider and Frey, 1985) that the degree of human capital development has a favourable impact on FDI inflows in terms of ensuring adequate supply of skilled labour. Moreover, skilled labour is also assumed as a proxy for productivity. The implied relationship is therefore positive, though the empirical literature is not unanimous on this.

Apart from methodological differences, this general lack of consensus on the main determinants of FDI indicates that their relevance may depend on location, and that geographic specificities and interdependencies cannot be properly identified at national or firm level.

There are a limited number of empirical papers encompassing spatial effects. Head et al. (1999) and Head and Mayer (2004), in investigating the location decisions of Japanese firms across the United States and Europe respectively, find that they are affected by market potential, i.e. the whole market that a foreign firm can serve from a potential location. Market potential is usually measured as the sum of host location GDP and the GDPs of neighbouring regions, weighted by distance. A more systematic approach to spatial interrelations can be found in Garretsen and Peeters (2009), Blonigen et al. (2007), Baltagi et al. (2007), Ledyaeva (2009) and Coughlin and Segev (2000). All these studies use spatial econometrics techniques and demonstrate that spatial effects matter even after controlling for traditional determinants of FDI, and that FDI is affected both by FDI in neighbouring locations and by shocks to FDI in adjacent locations. Moreover, the empirical findings of these papers allow to overcome the traditional dichotomy between vertical and horizontal FDI (.Markusen, 1984; Helpman, 1984) and to categorize new forms of FDI, such as export-platform and vertical-complex FDI (Ekholm et al. 2007; Baltagi et al., 2007), which better fit with some stylized facts on recent patterns of FDI (Neary, 2009).

Despite these important advances, most of the empirical analyses quoted above are still based on country and/or industry data. Therefore, whether theoretical considerations concerning the traditional location advantages and motivations for FDI are valid at sub-national level is still a rather unexplored question, which deserves further analysis. Our paper tries to answer this question by examining spatial effects on FDI patterns across European NUTSII territorial units.

3. Empirical Strategy

Our benchmark model is a simple log-linear specification:

$$\begin{aligned} ln(FDI_{jt}) = \beta_{00} + \beta_{01} * D_{jRO} + \beta_{02} * D_{jPL} + \beta_{11} * ln(FDI_{jt-1}) + \beta_{12} * ln(LCOST_{jt-1}) + \beta_{13} \\ * GROWTHGDP_{jt-1} + \beta_{14} * ln(MKTPOT_{jt-1}) + \beta_{15} * \ln(INDSPEC_{jt-1}) + \beta_{16} \\ * ln(SER_{jt-1}) + \beta_{17} * ln(HUMCAP_{jt-1}) + \varepsilon_{jt} \qquad \text{(eq. 1)} \end{aligned}$$

for any $j=1,\ldots,N$, where N is the total number of European regions.

[6] Head et al. (1999), Devereux and Griffith (1998), and Guimaraes et al. (2000) are other authors finding an insignificant or positive relationship between labour costs and FDI.

The dependent variable is measured as the total number of foreign firms per millions of inhabitants in region *j* at time *t*. In some of our estimations we will use sub-samples of FDI, namely, manufacturing and services, and extra- and intra-EU foreign firms, in order to capture the effects exerted on the choice of a foreign location by different motivations for becoming multinationals (Cantwell, 2009; Dunning, 2009).

All the explanatory variables are lagged one period with respect to the dependent variable. This helps to solve possible endogeneity problems and reflects the simple hypothesis that foreign firms make an investment decision by referring to observable variables of previous years. Explanatory variables include the number of new foreign firms established in region *j* in the previous period (FDI_{jt-1}), the GDP growth rate and each region's market potential ($GROWTHGDP_{j,t-1}$ and $MKTPOT_{j,t-1}$) as proxies for the business environment and for demand conditions.[7] The supply side characteristics have been proxied by labour costs ($LCOST_{jt-1}$), and the economic structure of the regions ($INDSPEC_{jt-1}$) as a proxy for the role of agglomeration economies. In particular, we include the shares of three manufacturing macro-branches (i.e. low tech, medium-tech and high-tech sectors), and one service sector, namely business services, on total regional value added. Finally, we include some measures of the quality of the labour force ($HUMCAP_{jt-1}$). Differently from previous similar studies we do not use the level of education, but different functions and tasks, ranging from command and control functions, such as corporate and SMEs' managers, and scientists and professionals, to low level functions, such as clerks and plant and machine operators.[8]

The regression equation also includes two dummies, one for Romania (D_{jRO}) and one for Poland (D_{jPL}), in order to account for a possible bias given by unobserved country-specific effects that have made Romania and Poland the two outstanding receivers of FDI in the EU in terms of number of foreign firms but not in terms of FDI value.

In estimating eq. (1), we follow a "specific-to-general approach", since the literature has demonstrated that it fits better than the "general-to-specific approach" when using cross-sectional data (Elhorst, 2010; Florax and Folmer, 2003). This implies that we start from a non-spatial linear regression model, estimated by traditional OLS techniques, and then incorporate the spatial characteristics of our data.[9] There are two main reasons for taking into account spatial effects. First of all, they signal the nature and degree to which a fundamental statistical assumption – the independence of the error terms – is violated when non-zero spatial autocorrelation is detected. Secondly, the measurement of spatial autocorrelation makes it possible to describe the overall spatial patterns of a variable, supporting spatial prediction and allowing to detect striking deviations. Since we found evidence of spatial autocorrelation (see Table A3.1 in Annex 3) we have to switch to a spatial model.

There are two basic models to test for spatial effects (Anselin, 1988): spatial lag and spatial error models. The former implies the inclusion among the explanatory variables of a spatially lagged dependent variable, $\rho WFDI_{jt}$, where ρ is the parameter to be estimated, which lies between -1 and +1 and *W* is a distance matrix, which identifies the spatial relationship among host regions. This variable would allow us to establish whether and to what extent FDI inflows to region *j* are affected, positively or negatively, by FDI flowing into other EU

[7] Region *j*'s market potential has been computed as the sum of region *k* (with $\mathrm{k} \neq \mathrm{j}$ and $k=1, \ldots, N$) GDPs weighted by the inverse of the bilateral distance between region *j* and any other region *k*, as suggested by Head et al. (1999). The higher the market potential the larger the market a foreign firm can serve from that region.

[8] See Annex 2 for a detailed explanations of each explanatory variable and sources of data.

[9] Despite the presence of a dynamic term in eq. (1), i.e. FDI_{jt-1}, we are exploiting the cross section dimension of our data rather than the time one. For this reason the validity of OLS estimations is based on the assumption that errors are serially uncorrelated over time. This assumption is less restrictive that one may think at first sight given that we are considering FDI flows rather than stocks. As a further robustness check we used the second lag of FDI inflows as an instrument for FDI_{jt-1} and results – not shown here but available upon request – do not vary substantially.

regions weighted by the distance between region *j* and the other EU regions. In spatial error models, instead, spatial autocorrelation is reflected in the error term, which takes the form of $\varepsilon_j = \lambda W \varepsilon_j + \mu_j$. λ, the spatial autoregressive coefficient, lies between ∓ 1 and measures the degree to which a shock to FDI in EU regions spills over FDI in region *j*. Spatial diagnostics on the residuals of the OLS regression suggest that in our case the spatial error model fits better than the spatial lag model (see Table A3.2 in Annex 3). Results are presented in the next section.[10]

As for the specification of the distance matrix, we use an inverse distance row-normalized matrix . This implies that row/column sums of *W* (and all matrix terms where *W* is involved) are not uniformly bounded in absolute value as *N* goes to infinity (Kelejian and Prucha, 1998 and 1999). Nonetheless they do diverge to infinity at a lower rate than the sample size, thus assuring the consistency of the results (Lee, 2004; Elhorst, 2010).

The literature has widely debated on the underlying assumption of spatial models, i.e. on the idea that the structure of spatial dependence present in the data is known, and not estimated. Therefore, imposing an *a-priori* spatial structure is a less strong assumption than forcing spatial independence. Given the objects of this paper, we believe that the most appropriate spatial structure capturing the underlying reality of FDI inflow patterns is the inverse distance matrix. Indeed, foreign investors entering any region in Europe want ideally to take advantage of the access to the whole European market. Despite that, it is clear that the higher the distance between two regions, the more difficult is for an investor located in the first to have contacts with suppliers and clients located in the other one for a variety of reasons that we can broadly define as the costs of doing business at distance. For these reasons, we do not impose boundaries to the possible interdependence of observations.[11]

In the second part of the analysis we investigate the role of both the within and the between effects. To this aim, we built up two sets of dummies:

- the first set comprises a dummy d_1 for each explanatory variable *x* included in equation (1). d_1 equals 1 if the variable *x* assumes in region *j* a value which is above the mean of the country which region *j* belongs to and 0 otherwise;
- the second set includes a dummy d_2 for each explanatory variable *x* included in equation (1). d_2 equals 1 if the region *j* belongs to a country which performs better than the EU in the variable *x* and 0 otherwise.

Given the introduction of these sets of dummies, equation (1) becomes (using matrix notation):

$$\ln(FDI) = \mathbf{I}\beta_0 + \boldsymbol{D_1}\gamma + \boldsymbol{D_2}\delta + \boldsymbol{D_1}\boldsymbol{D_2}\eta + \boldsymbol{X}\beta_1 + \varepsilon \qquad \text{(eq. 2)}$$

where:

- $\mathbf{I}$ is a (*jx3*) matrix which includes the constant term and the dummies for Poland and Romania;

[10] According to previous similar studies the spatial lag model should be preferred to the spatial error model since the former can be rooted into FDI theory, while the latter cannot (Baltagi et al., 2007; Garretsen and Peeters, 2009). In fact, while the theory is not able to explain why we should expect spatial autocorrelation, it can be used to interpret the sign and significance of the spatial lag coefficient. Despite that, it is not possible to exclude *a priori* that spatial effects may arise through channels different from FDI in neighbouring regions. This hypothesis makes the spatial error model as relevant as the spatial lag model (Coughlin and Segev, 2000; Baltagi et al., 2007).

[11] More specifically, we considered a standardized matrix of inverse physical distances. As a robustness check we substituted it with a time distance matrix where travel distance is measured in terms of minutes and with a first order contiguity matrix. Results remain almost unchanged. They are available upon request to the authors.

- $\mathbf{D_1}$ is a (*jxk*) matrix that collects all *k* dummies d_1, as described above, one for each dimension along which the performance of regions is considered;
- $\mathbf{D_2}$ is a (*jxk*) matrix that collects all *k* dummies d_2, one for each variable measuring countries' performance;
- $\mathbf{D_1 D_2}$ is a (*jxk*) matrix resulting from the Hadamard product of D_1 and D_2;[12]
- **X** is the (*jxk*) matrix of regressors, where *j* is the number of regions and *k* is the number of variables through which the performance of regions is assessed.

Note that eq. (2) allows us to capture the effect of spatial heterogeneity on a relative, rather than absolute terms, since it compares each region's performance with its own country average, and each country's performance with the EU average. Hence, the potential effect on FDI flows is eventually due, *ceteris paribus*, to the combination of the within and the between country effects. In particular, four possible specific cases can be identified:

1. Regions performing better than the respective national mean and located in a country performing better than the European mean.

2. Regions performing better than the respective national mean and located in a country underperforming with respect to the European mean.

3. Regions performing worse than the respective national mean but belonging to a country performing better than the European mean.

4. Regions performing worse than the respective national mean and belonging to a country underperforming with respect to the European mean. In that case, neither the between or the within country effects are in place. This correspond to the benchmark case in which regions' capacity to attract foreign firms depends on their own socio-economic characteristics and the intercept term (β_0) assume the usual meaning.

We follow the same methodology pursued in the first part of the study. Therefore, after having estimated eq. (2) with OLS, we departed from it in order to take into account the spatial structure of the data. Since the latter was not clear, we estimated both the spatial error and the spatial lag models, which, however, proved to be unable to fully accommodate spatial autocorrelation. In fact, as it will be discussed in details in the next section, while the spatial lag coefficient (rho) was not significantly different from zero, the spatial autocorrelation coefficient (lambda) was positive and significant. In order to verify whether this residual spatial autocorrelation might depend on an omitted variable problem, we estimated different specifications of a spatial Durbin model, where the spatial lag of the explanatory variable matrix $\boldsymbol{X}$ can be added either to the traditional spatial lag of the dependent variable or the spatial autocorrelation in the error terms.[13] Quite surprisingly, these models were not able to fully solve the problem of spatial autocorrelation, since we found that the spatial lags of both the dependent variable and the error term were not significant, while some spatial lags of the observables did in both models. For this reason we estimated a restricted Spatial Durbin model where only the spatial lags of the observables were included. This final specification was able to fully capture

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[12] It is also known as entrywise product / Schur product of two matrices of the same dimension. The result is a matrix of the same dimension of the original ones, whose elements are given by the product of the corresponding elements of the initial matrices.

[13] See again Elhorst (2010) for a detailed discussion of the different specifications of the Durbin model. Note also that the Durbin model is very demanding since many new regressors have to be included. In order to derive meaningful inference from our estimates, we have therefore excluded the term D_1D_2 given that in previous estimations it was never significant.

the spatial structure of the data and adds some interesting insights on the patterns of FDI location in European regions.[14]

It is worth noticing that the results concerning the regional determinants of FDI are always robust to all different specifications, from the simplest to the more demanding one. Results along with a more detailed discussion of different findings are presented in the next sections.

4. Empirical Results

4.1 The basic model

As stated above, we start from the analysis of regional characteristics that explain spatial patterns of foreign firms in Europe. Table 1 gives the estimation results for the whole sample as well as for some sub-samples of foreign firms, i.e. intra- and extra-European foreign firms and foreign firms operating in manufacturing and service sectors. Column (1) reports the results for eq. (1) obtained through OLS regression analysis, while the remaining columns do the same for the spatial error model. Spatial diagnostics, summarized in Table A3.2 in Annex 3, have suggested that spatial dependence does exist and can be controlled for through a spatial error model.

(insert Table 1 about here)

Overall, the results are interesting, though in line with previous studies. First of all, it is worth noticing that traditional FDI determinants are quite robust to the inclusion of spatial effects (column 2 of Table 1). The latter arise mainly trough shocks occurring to FDI located in neighbouring regions, as indicated by the λ coefficient, which is positive and significant and through the market potential variable, though, as expected, it is only marginally significant, given that foreign firms can serve the whole EU market regardless of the region they are located in. This may also indicate that, within the EU, transportation costs are not important. As far as the other explanatory variables are concerned, agglomeration among FDI seems to play an important role in foreign firms' location choice, as well as the growth prospects of the region. The higher the number of foreign firms which set up production plants in the previous period and the higher the growth rate of regional GDP, the larger the number of new foreign firms that a region is able to attract. Labour costs are not significant, though they enter the regression with a positive sign, indicating that regional attractiveness relies on high productivity rather than low costs of labour. Regions' specialization variables indicate that location externalities arise in low-tech manufacturing sectors and in business services, while regions specialized in high-tech manufacturing sectors do not seem to be attractive, since competition effects are stronger than localization externalities, as indicated by the negative sign of the estimated coefficients. What turns out to be really crucial in attracting FDI is the human capital endowment. In particular, we found that a one per cent increase in the presence of corporate managers generates additional FDI inflows of about 20 percent; the same increase in professionals and clerks and plant and machine operators improves regions' capacity to attract FDI by almost 6 and 11 percent, respectively.[15] The SME manager variable represents an exception. We interpret this result as a signal that MNEs and local industrial networks are two separate networks that do not collaborate and compete to each other for local production factors and local demand. Overall, these results indicate that MNEs

[14] Spatial diagnostics are summarised in Table A3.2 in Annex 3.

[15] The fact that different types of human capital competencies are simultaneously significant should not surprise. It depends on the fact that we are using composite measures of FDI, which sum up the number of foreign firms in each regions or macro-sectors regardless of the specific economic activity they carry out. Therefore, our results indicates that foreign firms need a labour force with a wide range of competencies.

investing in Europe are looking mainly for European regions well endowed with human capital and they are willing to pay a higher cost to gain access to those specific skills.

When introducing firm's heterogeneity, other striking features do emerge. This is due to the fact that organization and location issues are intertwined and both firm and sector characteristics may determine the result of the location decision process (Helpman, 2006). We model possible differences in firms' motivations for investing in Europe by considering separately, first the origin of foreign firms (intra- vs. extra-EU FDI) and then the economic activity of foreign firms (manufacturing vs. services). Generally speaking, the results for these specifications are rather similar, with very few exceptions. Concerning the geographical origin of FDI (columns 3 and 4 of Table 1), it is worth noticing that high labour productivity and regions' specialization in business services affect only intra-European FDI flows, while extra-European foreign firms seem to be more industry oriented. The quality of human capital endowment, agglomeration among foreign firms and GDP growth rate are confirmed to be crucial factors for both Intra- and extra-European FDI. Quite surprisingly, market accessibility seem to be more important for intra- rather than extra-European FDI; these results may suggest that intra-EU foreign firms have a strong preference for the EU internal market while extra-EU foreign firms may follow more complex strategies in penetrating the EU market.[16] Spatial effects matter for extra-EU foreign firms only. This implies that a shock in extra-EU FDI in region j has an impact on extra-EU foreign firms in region i, but this does not hold for intra-EU foreign firms, as indicated by the λ coefficient which is positive but insignificant at the conventional statistical levels. Although the theory is not informative on this issue, this result may reflect the fact that extra-EU foreign firms are more conditioned by other foreign firms' behaviour than intra-EU foreign firms because of their little knowledge of the EU market.[17]

Also sectoral characteristics affect foreign firms' location choice. Manufacturing and service FDI follow different patterns of location, as suggested by our results (columns 5 and 6 of Table 1). In particular, we found that manufacturing FDI are not driven by market reasons, as indicated by the insignificance of the coefficients of the demand variables, and, being motivated mainly by efficiency reasons are sensitive to low level functions, such as white and blue collars. Foreign firms providing service, instead, are mainly motivated by market reasons, and attracted by regions well endowed with high level functions. Spatial effects are relevant for both kinds of FDI.

4.2 The own country effect

In this section we depart from the baseline model outlined before in order to analyse whether and to what extent country's performance is able to affect regions' attractiveness. This implies the estimation of equation (2). To the extent which the within and/or the between country effects will result significantly different from zero, we provide evidence that any explanation of regional attractiveness formulated in terms of pure regional effects is only partial and may be potentially misleading in driving FDI promotion policies.

Before discussing the estimation results, it is interesting to noticing that spatial dependence is still present in the data, as indicated by the Moran I's statistics, but it is now less significant than in the previous specifications

[16] On this issues see Ekholm et al. (2007). and Baltagi et al. (2007).

[17] The significance of the spatial error coefficient may also be driven either by data or by a possible mis-specifications of the underlying model in terms of omitted variables (see, for instance, Le Sage and Pace, 2009). We will discuss in details this issue in section 4.3.

(see Table A3.2 in Annex 3).[18] This result is not surprising since we are now directly modelling spatial heterogeneity. Given the impossibility to identify the right channel through which spatial effects arise, we estimate both the spatial error and the spatial lag model. However, while the spatial error coefficient maintains its significance, the spatial lag coefficient does not. As for the determinants of FDI, estimates are robust to both specifications. Main results are reported in Tables 2 and 3.[19]

(insert Table 2 and 3 about here)

We found that regions' capacity to attract foreign firms is strongly affected by the country effect, which arises through a large set of variables. To this respect, notable exceptions concern agglomeration among foreign firms, regions' specialization in low tech manufacturing sectors and in business services, as well as regions' endowment of SMEs managers. As before, this implies that the larger the flow of FDI received in the past, the higher the shares of low-tech manufacturing sectors and business services on total regional GVA and the lower the share of SMEs managers in a given region, the larger the number of new foreign firms this region is able to attract regardless of the performance of the country it belongs to in the same variables.

As far as the other factors are concerned, country effects are no longer neutral. More interestingly, the between country effect (Tables 2 and 3, column d_2) is stronger than the within country effect (Tables 2 and 3, column d_1). This implies that being a well-performing region in a laggard country does not assure any additional advantages in terms of FDI attraction, while the opposite does it. Generally speaking the between country effect boosts regions' capacity to attract FDI by magnifying the impact of several factors, such as the GDP growth rate, market potential, industry specialization (medium-tech manufacturing sectors) as well as human capital endowment, corporate managers and clerks in particular.

The interplay between regional and country effects is not always easy to interpret. According to our results, regions growing faster than others attract more foreign firms. This general effect is further boosted by the performance of the country the region belongs to. In particular, all else equals, regions belonging to countries with a GDP growth rate above the EU average see an increase of about 0.7 per cent in the number of foreign firms they are able to attract, regardless of the rate the regional GDP is growing at. Market accessibility matters more at country than at regional level. In other words, regions located in countries with high market potential attract more FDI, regardless of their relative position within either the country or the EU. When we look at the human capital endowment as a determinant of FDI, the interplay between regional and country level characteristics becomes even more sophisticated. For example, as in the baseline model, it turns out that the larger the region's endowment of corporate managers the larger is its capacity to attract FDI. This effect is further boosted by the country performance but only up to a certain edge. In particular, if a region is located in a country that has relatively more corporate managers than other European countries it attracts a one percent more FDI inflows; however, if the region itself has a specialization in command and control functions which is above the national mean, then the "FDI premium" is lower. A similar, though weaker, effect regards clerks, while a country's endowment of professionals above the EU mean weakens regions' attractiveness of about 0.7 per cent. Therefore, once a foreign firm chooses to locate in a country well-endowed in terms of professionals and scientists, regions' endowment of this kind of human capital become irrelevant. Finally, it is worth noticing that labour costs enter negatively in the regression when the country effect is taken into account. However, the combination of the within and between country effect is positive, meaning that productivity considerations are more important than efficiency considerations.

[18] These results hold for different specifications of the dependent variable, with the exception of manufacturing FDI. Results are not included here, but available upon request.

[19] Before using spatial autoregressive models, we estimated eq. (2) by OLS. We conclude that the inclusion of spatial terms does not generally affect other coefficients.

Overall our results confirm the idea that regional absolute characteristics are not enough to explain regional ability to attract FDI. Indeed the capacity of regions to attract foreign investments is affected by the country they are located in, in an interplay of the within- and between-country effects that assume different roles along the different dimensions of the analysis. These results tell us more than what we would have learnt by including simple country and/or region dummies, as previous literature did.[20]

4.3 Other specifications and robustness

In this section we present additional results that allow us to discuss other interesting issues, namely the role of the omitted variables. Post-estimate diagnostics on the residuals obtained by estimating eq. (2) with the spatial lag and the spatial error model discussed in the previous section indicate that some residual spatial autocorrelation still exists. In particular spatial correlation decreases in the Spatial Error Model but it is still not completely solved, as shown in Table A3.2 in Annex 3.[21]

For this reason we suspect it may be driven by an omitted variable problem. On the basis of this consideration, we re-estimate eq. (2) with a spatial Durbin and a spatial error Durbin model to take simultaneously into account the role of the spatial lags of the dependent variable, the error term, and the explanatory variables. Unfortunately, this strategy does not allow us to completely filtering out spatial dependence. Therefore, we estimate a restricted Durbin model, i.e. a specification without the spatial lag of the dependent variable and the spatial coefficient of the error term, since they were not significant in the previous Durbin specifications. This final model, which includes the spatial lag of all the explanatory variables included in eq. (2) is the only one able to fully capture the spatial structure of the data, as indicated by the diagnostic tests (see Table A3.2 Annex 3). Results of these three specifications are presented in Tables from 4 to 6.[22]

First of all, it is worth noticing that results are robust across the different specifications, from the simplest to the more demanding ones. This holds not only as for the Durbin models, but also for the specifications discussed in the previous sub-sections. Secondly, estimates obtained with the three different specifications of the spatial Durbin model are able to add some interesting insights on the patterns of FDI location across European regions. Our findings suggest that regions' capacity to attract FDI depends also on the type of neighbouring regions, as indicated by the significance of the estimated coefficients of some spatial lags (see Table 6). In particular, being surrounded by regions belonging to a well performing country –in terms of GDP growth rate – substantially reduces the capacity to attract FDI. Of course, the opposite is also true: neighbouring regions belonging to less dynamic countries would tend to increase FDI inflows. This may create problems to regions bordering with well-performing countries, while favouring regions bordering with laggard countries. Also, our results confirm that labour costs become a relevant driver for FDI within rather than between countries. In particular, being surrounded by well performing regions – in terms of labour

[20] In order to demonstrate this, we augmented eq. (2) by an institutional variable, i.e. the doing business index calculated by the World Bank at country level. This variable can be considered as a proxy for specific fixed effects, traditionally captured by country dummies, whose inclusion is precluded by the lack of sufficient degrees of freedom. The within and between country effects do not disappear, regardless of the significance of the institutional variable. Results are available upon request.

[21] Note that here we are interested in determining whether there exists spatial dependence and not which form it takes. Therefore, the Moran's I statistics suffices.

[22] Note that the coefficients reported in the same columns of these tables have been estimated simultaneously. For sake of clarity we decided to split the estimated coefficients in three separate groups. Therefore, Table 4 reports the estimated coefficients of the main determinants of FDI computed at regional level; Table 5 shows the estimated coefficients of the dummy variables that capture the between and within country effects, while Table 6 shows the estimated coefficients of the spatially lagged explanatory variables.

productivity – reduces FDI attractiveness. Therefore, regions neighbouring with “national champions” – at least as far as labour productivity is concerned – may see a reduction in their inflows of FDI.

(insert Tables 4, 5 and 6 about here)

5. Conclusions

This paper has explored the spatial distribution of FDI across EU regions and tried to understand whether European regions' capacity to attract FDI is affected by national performances. In order to achieve this research objective, we first explored FDI drivers at regional level. In so doing, we were inspired by the economic literature, which has stressed the importance of several variables as determinants for foreign investments, at country, region, industry, and firm level. We found that foreign firms are attracted by dynamic regions with a good market access, though this effect is weaker than the former. Supply conditions matter more than demand conditions. In particular, we found that agglomeration forces are important, but only in two specific sectors, i.e. traditional labour intensive manufacturing sectors and business services. More importantly, FDI prefers to locate in regions where other foreign firms have already set up production plants, and well endowed with different varieties of human capital, ranging from command and control functions to plant and machine operators. Generally speaking, these effects also hold when firms' heterogeneity is accounted for, with few notable exceptions. We refer here to market access that is more relevant for intra-EU foreign firms than for extra-EU FDI, and to regions' specialization in high-tech manufacturing sectors, which seems to exert a negative effect on intra-EU foreign firms because of competition effects.

Spatial heterogeneity seems to be more important than firms' heterogeneity. In particular, we found that the intensity of the above mentioned relationships substantially changes when regional and country performance are interlinked. We have considered two different effects: the first relates to the relative performance of a region within the country it belongs to, while the second concerns the relative performance of the country in the EU. We demonstrated that the second effect is stronger and more significant than the previous one. The between country effect is on average positive, therefore it further boosts regions' capacity to attract FDI, with a notable exception that concerns regional endowment of human capital and, in particular, scientists and professionals.

These results, though preliminary, have important policy implications. From our analysis it becomes clear that spatial heterogeneity more than spatial autocorrelation, matters for foreign firms location processes. This makes the implementation of FDI promotion policies more difficult, since they have to take into account both regional and country characteristics in order to be effective. We argue that the lack of co-ordination between these two levels of governance, together with the type of surrounding regions may be a possible explanation of the present unsatisfactory performance of several European regions, mainly those located in the South-Western countries, in terms of attraction of FDI.

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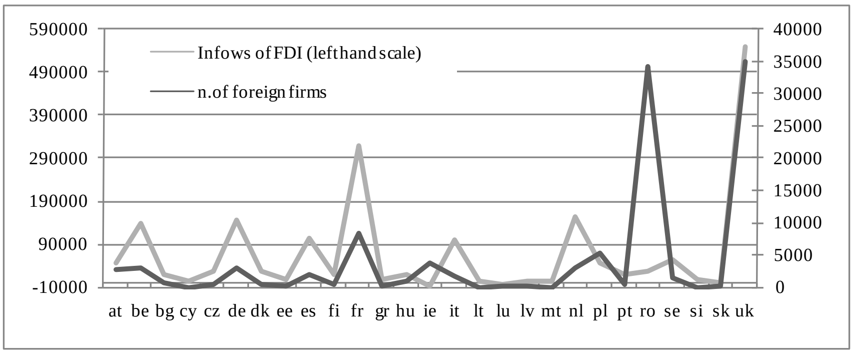
Annex 1: The dataset

This paper exploits a new database, *FDIRegio*, which has been built up starting from Amadeus database. It consists of company accounts reported to national statistical offices concerning 11 million public and private companies in 41 European countries. For each company Amadeus provides the year of incorporation, the country/region and the ownership structure by nationality. The data also include the region where the firm were founded, as well as the sector of activity. Firms newly created during the 2005-07 period whose percentage of assets owned by non-residents was at least 10 percent have been considered as foreign. Then they were aggregated in each European NUTS2 region by sector and by origin within or outside Europe. The overall sample includes 264 NUTS2 regions and 25 NACE1 manufacturing and service sectors.

A limitation of these data for studying the geographical patterns of foreign firms is that they include either plant or firm level information. This can potentially bias the location of FDI in favour of regions and/or countries where headquarters tend to locate. An advantage of this approach is instead represented by the fact that the regional distribution of foreign firms is directly observed and not indirectly derived from a "regionalization" of national data. This top-down approach, in fact, is based on the simplifying assumption that the sensitivity of foreign firms to employment data – or whatever it is used to regionalize patterns of FDI – is constant across foreign firms, regardless the internationalization strategy they pursue (efficiency, market and resource seeking FDI), the country of origin and the role foreign affiliates can play within the group (productive vs. research units).

In order to have an idea of the degree of inclusiveness of the dataset, we compared official (UNCTAD) data on inward FDI flows at country level with the total number of foreign firms extracted from Amadeus following the criteria described above. Figure A1 shows the results. It is worth noticing that the correlation between the two measures of FDI flows is quite high (Pearson correlation coefficient: 0.726; p-value>0.00). Thus, by considering number of foreign firms instead of values of FDI we do not introduce any significant distortion in the patterns of FDI, though foreign investments in some destination countries have a relative importance that is different in terms of number of firms with respect to the value of FDI inflows.

Figure A1



Infows of FDI (lefthand scale)
n.of foreign firms
590000
490000
390000
290000
190000
90000
-10000
40000
35000
30000
25000
20000
15000
10000
5000
0
at be bg cy cz de dk ee es fi fr gr hu ie it lt lu lv mt nl pl pt ro se si sk uk

Annex 2: The variables: description and source

VARIABLES	DESCRIPTION
GDP growth	% change real regional GDP (2004). Data source: Eurostat
Labour Cost	Average annual labour cost: salaries and wages in 2004 (excluding apprentices and trainees). Data source: Eurostat
Market potential	Weighted average of GDP of all European regions *j* other than *i*. The weights are the reciprocal of the bilateral distances between the respective capitals. Reference year: 2004. Data source: Eurostat and DGRegio
FDI /Lag_FDI	Number of new foreign firms per million inhabitants. Reference period: 2005-07 for the dependent variable and 2001-2003 for the independent variable. Data source: Eurostat and Amadeus
Low Tech	Specialization Index. Share of regional value added generated by sectors with low technological intensity on total value added generated by the region. Reference year: 2004. Source Eurostat
Medium Tech	Specialization Index. Share of regional value added generated by sectors with medum technological intensity on total value added generated by the region. Reference year: 2004. Source Eurostat
High Tech	Specialization Index. Share of regional value added generated by sectors with high technological intensity on total value added generated by the region. Reference year: 2004. Source Eurostat
Business Services	Specialization Index. Share of regional value added generated by business services sectors on total value added generated by the region. Reference year: 2004. Source Eurostat
Corporate Managers	ISCO-88/12 employment share on total regional employment (three-year average, 2002-2004). Data provided by DGRegio
SME's Managers	ISCO-88/13 employment share on total regional employment (three-year average, 2002-2004). Data provided by DGRegio
Professionals and Scientists	ISCO-88/2 employment share on total regional employment (three-year average, 2002-2004). Data provided by DGRegio
Clerks (White Collars)	ISCO-88/4 employment share on total regional employment (three-year average, 2002-2004). Data provided by DGRegio
Skilled Workers (Blue Collars)	ISCO-88/8 employment share on total regional employment (three-year average, 2002-2004). Data provided by DGRegio

Annex 3: Statistical Annex

Table A3.1. Measures of global spatial autocorrelation

Variables		E	Sd	z	p-value
		Moran's I			
FDI	0.171	-0.004	0.006	29.834	0.000
FDI_{t-1}	0.143	-0.004	0.006	25.055	0.000
		Geary's c			
FDI	0.784	1.000	0.013	-16.406	0.000
FDI_{t-1}	0.830	1.000	0.014	-12.386	0.000

1-tail test

Table A3.2. Spatial diagnostics

Test	statistics	p-value
Eq. (1) – OLS		
Spatial error:		
Moran's I	14.953	0.000
LM	47.449	0.000
Robust LM	54.2444	0.000
Spatial lag		
LM	0.724	0.395
Robust LM	7.518	0.006
Eq. (2) – OLS		
Spatial error:		
Moran's I	6.385	0.000
LM	0.709	0.400
Robust LM	0.139	0.710
Spatial lag		
LM	1.002	0.317
Robust LM	0.432	0.511
Eq. (2) (Moran's I)		
Spatial error model	0.015	0.001
Spatial lag model	0.024	0.000
Spatial Durbin	0.030	0.000
Spatial error Durbin	0.009	0.017
Constrained spatial Durbin	0.003	0.108

Figure 1 The distribution of FDI in the EU

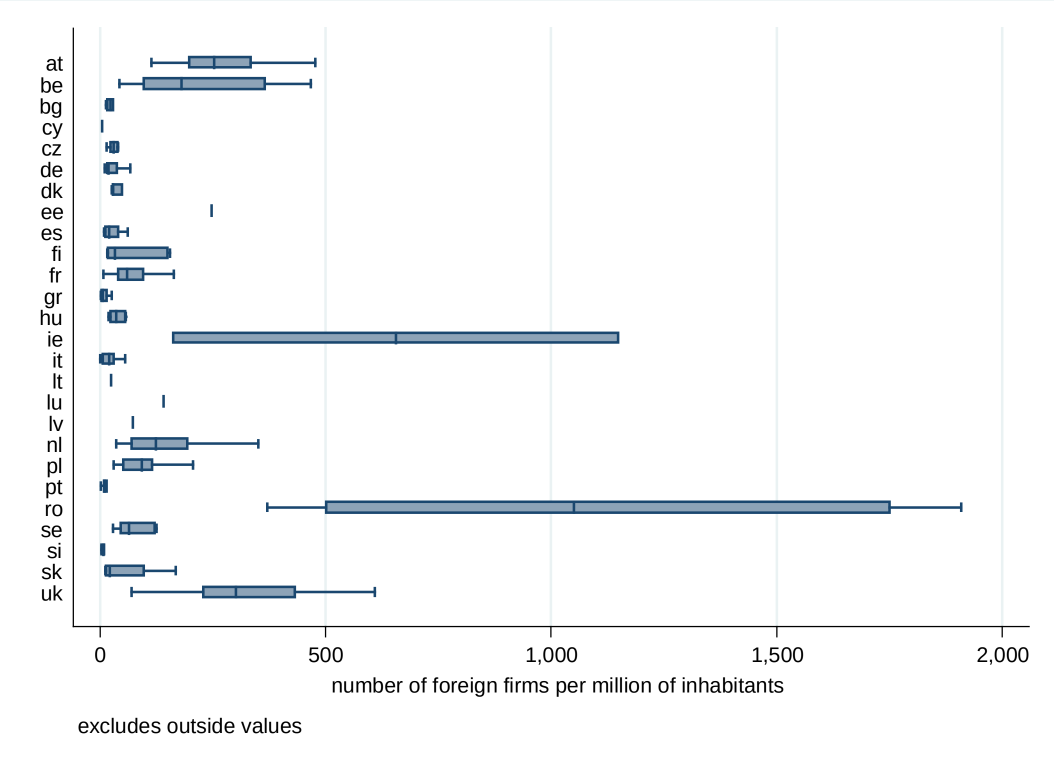


Table 1. Factors of region attractiveness

	(1) All	(2) All	(3) IntraEU	(4) ExtraEU	(5) Services	(6) Manufacturing
lag_FDI	0.366***	0.393***	0.296***	0.389***	0.467***	0.237***
	(6.53)	(9.67)	(8.01)	(9.15)	(10.72)	(6.84)
GDP_growth	0.0387**	0.0422**	0.0533***	0.0344*	0.0674***	0.00443
	(1.98)	(2.24)	(3.13)	(1.75)	(3.34)	(0.28)
Labour_Cost	0.0776*	0.0788	0.0878*	0.0722	0.0652	0.0866*
	(1.81)	(1.47)	(1.85)	(1.29)	(1.14)	(1.90)
Market_Accessibility	0.0883	0.0904*	0.147***	0.0915*	0.139***	-0.0103
	(1.65)	(1.83)	(3.31)	(1.77)	(2.62)	(-0.25)
Low_Tech	5.136**	4.963**	-2.296	5.645**	4.390*	3.318*
	(2.07)	(2.32)	(-1.18)	(2.52)	(1.91)	(1.82)
Medium_Tech	-0.446	-0.581	-0.391	-1.098	-1.219	0.441
	(-0.26)	(-0.42)	(-0.32)	(-0.77)	(-0.83)	(0.38)
High_Tech	-3.848	-5.670*	2.865	-7.267**	-7.218**	-3.144
	(-1.29)	(-1.70)	(0.96)	(-2.08)	(-2.02)	(-1.11)
Business_Services	2.872*	2.604**	2.267*	1.992	2.874**	1.433
	(1.81)	(1.98)	(1.91)	(1.45)	(2.04)	(1.28)
Corporate_Managers	20.84***	21.37***	27.15***	18.78***	20.80***	20.02***
	(8.74)	(8.29)	(12.25)	(6.95)	(7.52)	(9.19)
SMEs_Managers	-6.584	-6.422**	-6.373**	-5.713*	-5.673*	-6.071**
	(-1.57)	(-2.16)	(-2.41)	(-1.84)	(-1.78)	(-2.40)
Professionals_Scientists	5.853***	6.019***	2.848*	6.569***	6.043***	3.558**
	(2.92)	(3.33)	(1.77)	(3.47)	(3.11)	(2.32)
Clerks	5.838***	5.260**	1.010	6.304**	4.470	6.702***
	(2.67)	(2.07)	(0.45)	(2.37)	(1.64)	(3.10)
Plant_Machines_Operators	11.35***	10.55***	6.114***	11.26***	7.774***	12.78***
	(4.29)	(4.85)	(3.11)	(4.95)	(3.33)	(6.90)
Dummy_RO	3.942***	4.013***	4.302***	3.920***	3.942***	3.981***
	(7.99)	(8.42)	(10.20)	(7.86)	(7.70)	(9.83)
Dummy_PL	1.773***	1.762***	0.673***	1.876***	1.384***	2.009***
	(9.76)	(7.40)	(3.17)	(7.53)	(5.42)	(9.94)
_cons	-2.869***	-2.911***	-2.889***	-3.010***	-3.393***	-2.566***
	(-3.83)	(-3.24)	(-4.42)	(-3.07)	(-3.59)	(-3.73)
lambda						
_cons		0.930***	0.586	0.937***	0.926***	0.897***
		(13.27)	(1.59)	(14.83)	(12.64)	(8.81)
sigma						
_cons		0.622***	0.565***	0.650***	0.667***	0.529***
		(22.71)	(22.75)	(22.71)	(22.71)	(22.71)
N	260	260	260	260	260	260
R^2	0.815					
variance_ratio		8.863	0.836	0.865	0.876	0.809
Squared_correlation		8.814	0.869	0.776	0.819	0.802
Log_likelyhood		-247.7	-221.1	-259.5	-266.1	-205.4

(1) OLS estimation (Note that robust t-statistics reported in parentheses are based on sandwich estimator of variance and allow model misspecification but require independent observations. As a robustness check we estimated the same model using clustered standard errors to control for the country dimention. No significant changes affect the results. Clustered standard errors are computed on the basis of a sandwich formula that allows for correlation within clusters and for heteroskedasticity. Note however that small sample properties of this estimator -low number of clusters, in our case there are only 25 countries- are proved to be poor. Therefore it may be unreliable because of low degrees of freedom of the underlying statistic.) (2)-(6) Spatial Error ML estimation

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2. Estimates of the between and within country effects (spatial error model)

All FDI	slope	d1	d2	d1d2
lag_FDI	0.616***	0.105	0.0453	-0.0824
	(11.52)	(0.83)	(0.25)	(-0.63)
GDP_growth	0.0475**	0.00653	0.783***	-0.164
	(2.40)	(0.07)	(4.25)	(-1.20)
Market_Accessibility	0.0171	0.0914	0.367***	
	(0.37)	(0.98)	(2.94)	
Labour_Cost	0.0721	-0.286**	-0.243	0.296*
	(1.18)	(-2.05)	(-0.81)	(1.71)
Low_Tech	7.544***	-0.151	0.502	-0.0565
	(3.18)	(-1.39)	(1.60)	(-0.42)
Medium_Tech	1.712	-0.0614	0.287*	0.0269
	(1.13)	(-0.54)	(1.77)	(0.22)
High_Tech	-1.856	0.101	0.154	-0.114
	(-0.43)	(1.17)	(0.71)	(-0.73)
Business_Services	4.089***	-0.161	-0.217	0.0311
	(3.03)	(-1.14)	(-0.80)	(0.18)
Corporate_Managers	9.080**	0.0155	1.041***	-0.316*
	(2.16)	(0.17)	(4.82)	(-1.94)
SMEs_Managers	-7.407*	0.0127	-0.183	0.114
	(-1.83)	(0.14)	(-0.92)	(0.78)
Professionals_Scientists	6.282***	-0.177	-0.720***	0.160
	(2.59)	(-1.27)	(-3.87)	(1.05)
Clerks	0.00411	0.262*	0.697**	-0.254*
	(0.00)	(1.89)	(2.32)	(-1.65)
Plant_Machines_Operators	-1.488	0.133	0.315	0.0814
	(-0.54)	(1.20)	(1.53)	(0.56)
Dummy_RO	3.032***			
	(6.51)			
Dummy_PL	1.485***			
	(4.92)			
_cons	-4.612***			
	(-5.23)			
lambda				
_cons	0.651*			
	(1.84)			
sigma				
_cons	0.439***			
	(22.72)			
N	260			
Variace_ratio	0.916			
Squared_correlation	0.916			
Log_likelyhood	-156.0			

t statistics in parentheses
Spatial Error Model. ML estimation
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3. Estimates of the between and within country effects (spatial lag model)

All FDI	slope	d1	d2	d1d2
lag_FDI	0.616***	0.105	0.0453	-0.0824
	(11.52)	(0.83)	(0.25)	(-0.63)
GDP_growth	0.0475**	0.00653	0.783***	-0.164
	(2.40)	(0.07)	(4.25)	(-1.20)
Market_Accessibility	0.0171	0.0914	0.367***	
	(0.37)	(0.98)	(2.94)	
Labour_Cost	0.0721	-0.286**	-0.243	0.296*
	(1.18)	(-2.05)	(-0.81)	(1.71)
Low_Tech	7.544***	-0.151	0.502	-0.0565
	(3.18)	(-1.39)	(1.60)	(-0.42)
Medium_Tech	1.712	-0.0614	0.287*	0.0269
	(1.13)	(-0.54)	(1.77)	(0.22)
High_Tech	-1.856	0.101	0.154	-0.114
	(-0.43)	(1.17)	(0.71)	(-0.73)
Business_Services	4.089***	-0.161	-0.217	0.0311
	(3.03)	(-1.14)	(-0.80)	(0.18)
Corporate_Managers	9.080**	0.0155	1.041***	-0.316*
	(2.16)	(0.17)	(4.82)	(-1.94)
SMEs_Managers	-7.407*	0.0127	-0.183	0.114
	(-1.83)	(0.14)	(-0.92)	(0.78)
Professionals_Scientists	6.282***	-0.177	-0.720***	0.160
	(2.59)	(-1.27)	(-3.87)	(1.05)
Clerks	0.00411	0.262*	0.697**	-0.254*
	(0.00)	(1.89)	(2.32)	(-1.65)
Plant_Machines_Operators	-1.488	0.133	0.315	0.0814
	(-0.54)	(1.20)	(1.53)	(0.56)
Dummy_RO	3.032***			
	(6.51)			
Dummy_PL	1.485***			
	(4.92)			
_cons	-4.612***			
	(-5.23)			
lambda				
_cons	0.651*			
	(1.84)			
sigma				
_cons	0.439***			
	(22.72)			
N	260			
Variace_ratio	0.916			
Squared_correlation	0.916			
Log_likelyhood	-156.0			

t statistics in parentheses
Spatial Error Model. ML estimation
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Spatial Durbin model: estimated coefficients of FDI determinants

	(1) FDI	(2) FDI	(3) FDI
lag_FDI	0.630***	0.612***	0.626***
	(12.54)	(12.11)	(9.81)
GDP_growth	0.0390**	0.0410**	0.0393**
	(2.10)	(2.24)	(2.07)
Labour_Cost	0.0282	0.0108	0.0301
	(0.52)	(0.20)	(0.52)
Market_Accessibility	0.0770*	0.0908**	0.0804
	(1.75)	(2.03)	(1.59)
WithinC_Market_Accessibility	0.00106	0.0736	-0.000498
	(0.01)	(0.73)	(-0.01)
BetweenC_Market_Accessibility	0.432***	0.526***	0.446***
	(3.10)	(3.77)	(2.72)
Low_Tech	7.177***	7.901***	7.241**
	(3.27)	(3.50)	(2.52)
Medium_Tech	1.829	2.454	1.816
	(1.28)	(1.62)	(1.00)
High_Tech	-0.866	-1.069	-0.945
	(-0.25)	(-0.31)	(-0.22)
Business_Services	2.819**	3.438**	2.847*
	(2.12)	(2.49)	(1.76)
Corporate_Managers	9.004**	10.60***	9.485**
	(2.45)	(2.90)	(2.01)
SMEs_Managers	-7.813**	-7.913**	-8.173
	(-2.12)	(-2.15)	(-1.38)
Professionals_Scientists	-0.418	-3.301	-0.699
	(-0.17)	(-1.18)	(-0.20)
Clerks	-3.032	-3.056	-3.214
	(-1.19)	(-1.29)	(-0.92)
Plant_Machines_Operators	-5.739**	-8.197***	-5.951*
	(-2.23)	(-3.06)	(-1.81)
Dummy_RO	1.323***	1.132**	1.330*
	(2.61)	(2.27)	(1.87)
Dummy_PL	1.146***	1.182***	1.233***
	(3.58)	(4.07)	(3.19)
Constant	-5.288***	-4.394***	-4.461***
	(-3.38)	(-3.94)	(-2.89)

t statistics in parentheses
(1) Spatial Durbin Model; (2) Spatial Error Durbin Model; (3) Constrained Spatial Durbin Model;
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note that in this table only slope coefficients are reported.

Table 5. Spatial Durbin model: estimated coefficients of the between and within country effects

	(1) FDI	(2) FDI	(3) FDI
d1_lag_FDI	0.0860	0.0938	0.0919
	(0.84)	(0.93)	(0.70)
d1_GDP_growth	0.00392	-0.00492	0.000521
	(0.05)	(-0.07)	(0.01)
d1_Labour_Cost	0.0000457	0.0317	-0.00167
	(0.00)	(0.36)	(-0.02)
d1_Low_Tech	-0.157*	-0.165*	-0.158
	(-1.80)	(-1.83)	(-1.63)
d1_Medium_Tech	-0.0542	-0.0605	-0.0506
	(-0.58)	(-0.63)	(-0.47)
d1_High_Tech	0.0328	0.0351	0.0309
	(0.44)	(0.47)	(0.33)
d1_Business_Services	-0.0838	-0.0829	-0.0767
	(-0.75)	(-0.74)	(-0.58)
d1_Corporate_Managers	-0.0197	-0.0357	-0.0209
	(-0.24)	(-0.43)	(-0.22)
d1_SMEs_Managers	-0.000405	-0.0310	-0.00857
	(-0.01)	(-0.41)	(-0.10)
d1_Professionals_Scientists	0.0854	0.140	0.0817
	(0.87)	(1.36)	(0.63)
d1_Clerks	0.107	0.0906	0.104
	(1.36)	(1.15)	(1.09)
d1_Plant_Machines_Operators	0.214**	0.256***	0.220*
	(2.33)	(2.74)	(1.89)
d2_lag_FDI	0.0610	0.0748	0.0717
	(0.27)	(0.33)	(0.20)
d2_GDP_growth	1.755***	1.994***	1.771***
	(7.15)	(7.53)	(5.60)
d2_Low_Tech	0.889***	0.824***	0.899**
	(2.96)	(2.71)	(2.42)
d2_Medium_Tech	0.389**	0.428**	0.397*
	(2.04)	(2.19)	(1.66)
d2_High_Tech	-0.463*	-0.550**	-0.441
	(-1.78)	(-2.11)	(-1.20)
d2_Business_Services	0.241	0.228	0.255
	(0.98)	(0.96)	(0.83)
d2_Corporate_Managers	1.043***	0.943***	1.046***
	(4.33)	(3.82)	(3.80)
d2_SMEs_Managers	-0.645***	-0.635***	-0.623**
	(-2.92)	(-2.90)	(-2.00)
d2_Professionals_Scientists	-0.838***	-0.689***	-0.823***
	(-4.35)	(-3.45)	(-2.92)
d2_Clerks	1.235***	1.075***	1.201***
	(3.55)	(3.17)	(2.61)
d2_Plant_Machines_Operators	0.238	0.324	0.251
	(1.04)	(1.43)	(0.74)

t statistics in parentheses
(1) Spatial Durbin Model; (2) Spatial Error Durbin Model; (3) Constrained Spatial Durbin Model;
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note that this table reports coefficients on the dummies d1(national champions) and d2 (european champions) only.

Table 6. Spatial Durbin model: estimated coefficients of the spatially lagged explanatory variables

	(1) FDI	(2) FDI	(3) FDI
lag_FDI	0.288*	0.416**	0.324
	(1.65)	(2.39)	(1.36)
d1_lag_FDI	0.310	0.317	0.336
	(0.56)	(0.59)	(0.51)
d2_lag_FDI	0.166	-0.0455	0.225
	(0.34)	(-0.10)	(0.31)
GDP_growth	0.0801	0.0651	0.0856
	(0.93)	(0.73)	(0.90)
d1_GDP_growth	-0.225	-0.0670	-0.214
	(-0.64)	(-0.19)	(-0.50)
d2_GDP_growth	-2.803***	-3.031***	-2.771***
	(-5.68)	(-6.12)	(-4.24)
d1_Labour_Cost	-1.371***	-1.615***	-1.418***
	(-4.26)	(-5.36)	(-3.68)
Labour_Cost	-0.0225	0.237	0.0285
	(-0.07)	(0.81)	(0.09)
d1_Low_Tech	0.0654	-0.0754	0.00977
	(0.21)	(-0.25)	(0.03)
d2_Low_Tech	0.640	0.693	0.635
	(1.43)	(1.58)	(0.98)
d1_Medium_Tech	0.450	0.329	0.480
	(1.36)	(1.00)	(1.45)
d2_Medium_Tech	0.608	0.510	0.607
	(1.21)	(1.03)	(0.88)
d1_High_Tech	0.265	0.358	0.265
	(0.93)	(1.25)	(0.82)
d2_High_Tech	0.792	1.020*	0.834
	(1.41)	(1.89)	(1.11)
d1_Business_Services	-0.605	-0.741	-0.555
	(-1.14)	(-1.45)	(-0.94)
d1_Corporate_Managers	0.252	0.272	0.280
	(0.71)	(0.81)	(0.65)
d2_Corporate_Managers	0.584	0.910**	0.727
	(1.19)	(2.04)	(1.22)
d1_SMEs_Managers	-0.0441	-0.429	-0.0886
	(-0.14)	(-1.27)	(-0.24)
d2_SMEs_Managers	0.440	0.616	0.481
	(0.92)	(1.33)	(0.76)
d1_Professionals_Scientists	-0.227	-0.146	-0.259
	(-0.63)	(-0.42)	(-0.57)
d2_Professionals_Scientists	1.076**	0.961**	1.017
	(2.27)	(2.15)	(1.55)
d1_Clerks	-0.0817	-0.301	-0.0934
	(-0.26)	(-0.91)	(-0.26)
d2_Clerks	-2.546***	-2.638***	-2.467***
	(-4.37)	(-4.73)	(-2.91)
d1_Plant_Machines_Operators	-0.291	-0.295	-0.269
	(-0.94)	(-0.94)	(-0.72)
d2_Plant_Machines_Operators	0.693	0.894	0.714
	(1.22)	(1.61)	(0.80)
rho / lambda	0.289	-3.326**	
	(0.79)	(-2.48)	
sigma	0.383***	0.369***	
	(22.80)	(21.00)	
N	260	260	260
R^2			0.937
Variance_ratio	0.936	0.962	
Squared_correlation	0.936	0.932	
Log_likelyhood	-121.9	-117.2	

t statistics in parentheses
(1) Spatial Durbin Model; (2) Spatial Error Durbin Model; (3) Constrained Spatial Durbin Model;
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Note that this table reports coefficients of all spatial lags (some variables are omitted because of collinearity).