

# Foreign Direct Investment and Growth: the role of regional territorial capital

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## Abstract

*This paper analyses the impact of FDI on the growth rates of European regions. In so doing, we discuss the role of different soft and hard components of the territorial capital in determining such an impact. In particular, we try to answer the following research questions: do different levels of agglomeration economies determine different levels of FDI-induced growth? Is social capital able to enhance the impact of FDI on regional economic growth rates? Does relational capital matter in the FDI-growth relationship? In order to achieve our research objectives, we analyse empirically the impact of different measures of FDI density on regional economic performance measured as real GVA growth rates. In order to mitigate possible endogeneity problems and control for non-linearities in such a relationship, we use a counterfactual framework. As expected, our findings indicate that FD is able to affect economic growth, but the magnitude and the direction of such an effect may vary according to regions' endowments of hard and soft territorial capital. This rich approach may help policy makers in designing FDI promotion policies that are effective also for the development of hosting regions.*

JEL: F23; O18; O52

Keywords: FDI; regional development; Europe; propensity score matching.

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# **Foreign Direct Investment and Growth: the role of regional territorial capital**

## **1. Introduction**

The purpose of this paper is to disentangle the impact of foreign investments on the increasingly differentiated trajectories of regional growth. Recent developments in regional science show that growth determinants cannot be fully identified through deterministic cause-effect relationships, but needs to take into account manifold relationships between economic agents, largely dependent on perceptions. Given that economic growth mainly depends on the ability of regions to take advantage of potential opportunities to sustain their competitiveness, the idea is that the latter largely depends on a complex combination of factors both formal and informal, soft and hard. These factors have been defined in the literature with the concept of territorial capital (Camagni 2008; OECD, 2001).

The traditional approach to discuss the relation between FDI and regional growth is based on theoretical arguments regarding the likely sources of knowledge and technological spillovers from foreign direct investment (FDI) to issues concerning the role these spillovers can play in fostering growth and development at regional level. Many policy makers and academics argue that FDI can have important positive effects on a host location's development efforts, the main reason being that, in addition to the direct capital financing it supplies, FDI is also a valuable source of technology and know-how. Hence, the impact of FDI on growth is expected to be manifold (Bode and Nunnekamp, 2007). FDI may complement local investments and can add to local production capacity. Moreover, it can promote growth by stimulating productivity gains resulting from spillovers to local firms. While technology may widespread through several channels, FDI is one of the main mechanism through which host economies can gain access to advanced technologies as well as managerial knowledge and skills. This may help in relaxing human capital constraints and increasing development opportunities.

These arguments are very common in the literature based on country level evidence and do not consider that at sub-national level the FDI-growth relationship becomes more ambiguous. At the regional level, indeed, important local factors can undermine or reinforce the FDI-growth relationship, depending on the regional ability to fully exploit their economic potential. Local externalities, local assets, relational distance, local governance, cultural elements and values are all crucial elements in defining the flexibility and the catching up ability of regions in taking advantage of FDI spillovers and complementarities. Theoretical arguments motivating the potential of territorial capital for higher returns on investments are manifold and can be found in different strands of theoretical literature, such as the limited rationality theory (Malgrem,

1961; Simon, 1972), contract theory (Williamson, 2002) and the cognitive approach to district economies (Camagni, 1991; Storper, 1995).

These considerations suggest that FDI alone is not enough to generate a sustainable pattern of economic growth. There are factors that can magnify or inhibit the impact of FDI on growth, all other growth determinants held constant. In this paper, we argue that the extent to which a region would take advantage of FDI depends on the endowment and composition of its territorial capital. Do different levels of agglomeration economies determine different levels of FDI-induced growth? How social capital influences the impact of FDI on the process of economic growth at local level? Does relational capital matter in the FDI-growth relationship?

In order to provide an answer to these research questions, we start from a general assessment of the impact of FDI on economic growth; then, we try to identify those factors that cause FDI to have an enhanced effect on economic growth. In so doing, we consider different measures of FDI as well as those components of the territorial capital that may exert an impact on the transmission of FDI-induced spillover to the local economy, such as agglomeration economies, and several components of social and relational territorial capital.

The rest of the paper is organized as follows. Section 2 discusses the theoretical foundations of this study. Section 3 is devoted to the presentation of territorial capital endowments of European regions and the empirical trends in FDI and growth in Europe, with a focus on the emerging themes from our database. Section 4 deals with the empirical issues, such as data sources and methodology, while section 5 comments on the results. Major conclusions and a summary of the findings are instead discussed in Section 6.

## **2. Theoretical background**

The existing empirical literature on FDI has focused on three different aspects: *i)* why foreign firms invest abroad; *ii)* what drives inward FDI flows; *iii)* what the impacts on host economies are and whether they are positive or negative. Only the third aspect is of interest for the present study, given that we assume the European NUTS2 regions as territorial units.

Generally speaking, the literature acknowledges that FDI plays a relevant role in economic development processes of host economies through several channels, which go far beyond the increase in the local endowment of financial and physical capital. In the neoclassical growth models *à la* Solow (Solow, 1956) this implies that local economies switch to a higher growth path, but the growth rate remains constant in the long run. In endogenous growth models, instead, the impact of FDI may be more relevant because of the presence of indirect effects which are able to potentially affect all variables included in the production

function. Capital productivity improves because of the increase in the endowment of equipment and the number and variety of intermediates; labour productivity increases because of the acquisition of knowledge and managerial techniques coming from abroad; and total factor productivity may improve because of the transfer of new technologies. Consequently, growth rates may permanently increase, thus improving development prospects in the long run.

These indirect effects that benefit the host economies, called more properly spillovers, arise since multinational firms cannot completely internalize the benefits of knowledge and technologies which are at the base of their competitive advantage (Kokko, 1994; Markusen, 1995). The intensity of these spillovers may vary according to their nature intra- or inter-sectoral. While multinational firms try to avoid intra-sectoral spillovers because they benefit their direct competitors, they may produce inter-sectoral spillovers since they benefit suppliers and clients (Kugler, 2006). Another important indirect effect arising from the presence of multinational firms is export spillover, which affects local firms' export decisions (Girma et al., 2004; Kneller and Pisu, 2007).

The literature suggests that FDI affects host economies through different channels both direct, such as the composition, competition and employment effects, and indirect, such as spillovers (Barba Navaretti and Venables, 2004). The transmission of the latter may occur through imitation processes, labour force training, pro-competitive effects, and input-output linkages (Blomstrom and Kokko, 1998). Regardless of the channel chosen, the impact of FDI on growth is far from being automatic; rather, it depends on the degree of complementarity and substitutability between foreign and domestic capitals (De Mello, 1999), the degree of development of the host economies (Johnson, 2006; Carkovic and Levine, 2005; Blonigen and Wang, 2005), the capacity of the host economy to absorb new technologies and knowledge brought by foreign firms (Borensztein et al., 1998), the degree of openness of the host economies (Balasubramanyam et al., 1996), the degree of embeddedness of foreign firms in the local economies (Markusen and Venables, 1999; Rodriguez-Clare, 1996) and other host economies' characteristics, such as the quality of the institutions and, generally speaking, the business environment (Olofsdotter, 1998; Blomstrom and Kokko, 2003; Xu, 2000).

Despite the *plethora* of FDI-growth studies, the relationship between FDI and growth is still not clear, since many of these works are based on *aggregate* data on FDI, which do not allow either to distinguish between different types of FDI (vertical vs. horizontal; greenfield vs. other forms of FDI), which is potentially important (Beugelsdijk et al., 2008) or to consider host economies at a finer geographical disaggregation (sub-national levels). Consequently, it is implicitly assumed that, on the one hand, different types of FDI have the same impact on economic growth rates, and, on the other hand, that the impact of FDI on economic growth is constant across space.

However, from the literature one can logically deduce the opposite: different types of FDI affect growth in different ways because the nature of the investment partly determines the way FDI affects growth. For examples, the impact on employment and production capacity will be higher in the presence of greenfield FDI than in the presence of mergers and acquisitions of existing local firms, though the creation of spillovers may be the same (Krugman, 2000; Wang and Wong, 2009). Moreover, horizontal FDI may create more spillovers because of their relatively more intensive use of capital in local economies, while Vertical FDI has a higher impact on local labour demand (Beugelsdijk et al., 2008) and generates inter-sectoral spillovers. Finally, with few exceptions, most studies focus on FDI in manufacturing, while ignoring either finer disaggregation within the manufacturing sector or FDI in services.<sup>2</sup>

When the FDI-growth relationship is considered at sub-national level, ambiguities increase even more. Generally speaking, Mullen and Williams (2005) argue that the impact of FDI on growth is not affected by the dimension of the geographical unit taken into consideration, while Girma and Wakelin (2001) claim for a regional dimension of FDI for several reasons. First of all, the effects of FDI-related spillovers are expected to be localized. Secondly, it is not clear whether laggard regions are able to benefit from the presence of foreign firms: a foreign investment increases local capital accumulation, but the host economy might not possess the capacity to absorb the knowledge and the technology incorporated in such an investment (Findlay, 1978; Blomstrom and Kokko, 1998). Other ambiguities relate to the expected transfer of superior technology from foreign to domestic firms, based on the assumption that foreign firms are by definition technologically superior to domestic firms (Markusen, 1995). But, what happens when foreign firms undertake an investment in a technologically advanced region in order to exploit its knowledge (Dunning, 1999; Cantwell, 1989)?

In conclusion, there remains a clear need to quantify the impact of FDI on regional economic performance. This paper addresses these issues in the context of the European Union. In so doing, we will not only augment the existing evidence on the impact of FDI on EU regions' performance, which is quite scarce, at least in our knowledge, but also try to overcome some of the ambiguities that still plague the literature.<sup>3</sup> More specifically, our study aims at uncovering whether the complexity of the FDI- growth relationship depends on the substantial heterogeneity in regional identities. Such identities encompass both soft and hard resources of local economies, that constitute the building blocks of the so called "territorial capital".

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<sup>2</sup> Bobonis and Shatz (2007), Alfano (2003) and Girma and Wakelin (2001) represent notable exceptions.

<sup>3</sup> Studies examining the regional dimension of FDI generally deal with location choice rather than the impact on growth and productivity. Exceptions include Figlio and Blonigen (2000), Leichenko and Ericson (1997), Bode and Nunnekamp (2010), Bode et al. (2009) and Mullen and Williams (2005). All of them refer to the experience of US State. As for Europe is concerned, the existing works concentrate on specific countries or groups of them, mainly located in Central and Eastern Europe (Girma and Wakelin, 2007; Driffield, 2006; Nicolini and Resmini, 2011).

*“It is now recognized that each area has a specific capital – its ‘territorial capital’ – that is distinct from that of other areas and is determined by many factors [...]. These factors may include the area’s geographical location, size, factor of production endowment, climate, traditions, natural resources, quality of life or the agglomeration economies provided by its cities, but may also include its business incubators and industrial districts or other business networks that reduce transaction costs. Other factors may be “untraded interdependencies” such as understandings, customs and informal rules that enable economic actors to work together under conditions of uncertainty, or the solidarity, mutual assistance and co-opting of ideas that often develop in clusters of small and medium-sized enterprises working in the same sector (social capital). Lastly, according to Marshall, there is an intangible factor, ‘something in the air’, called the ‘environment’ and which is the outcome of a combination of institutions, rules, practices, producers, researchers and policy makers, that make certain creativity and innovation possible. This ‘territorial capital’ generates a higher return for specific kinds of investments than for others, since they are better suited to the area and use its assets and potential more effectively” (OECD, 2001, p.15).*

The role of territorial capital is increasingly recognized in its importance for the effectiveness of regional policies and is inspiring the reform of European regional policies towards a more place-based approach, that started after the publication of the well known Barca Report (Barca, 2009). Theoretical arguments sustaining the importance of a cognitive approach vis-à-vis regional development are manifold: from the theory of limited rationality (Malmgren, 1961; Simon, 1972) to contract theory (Williamson, 2002) and the cognitive approach to district theory (Camagni, 1991; Storper, 1995).

### **3. Empirical Evidence on territorial capital, FDI and growth in Europe.**

#### **3.1. The general trend**

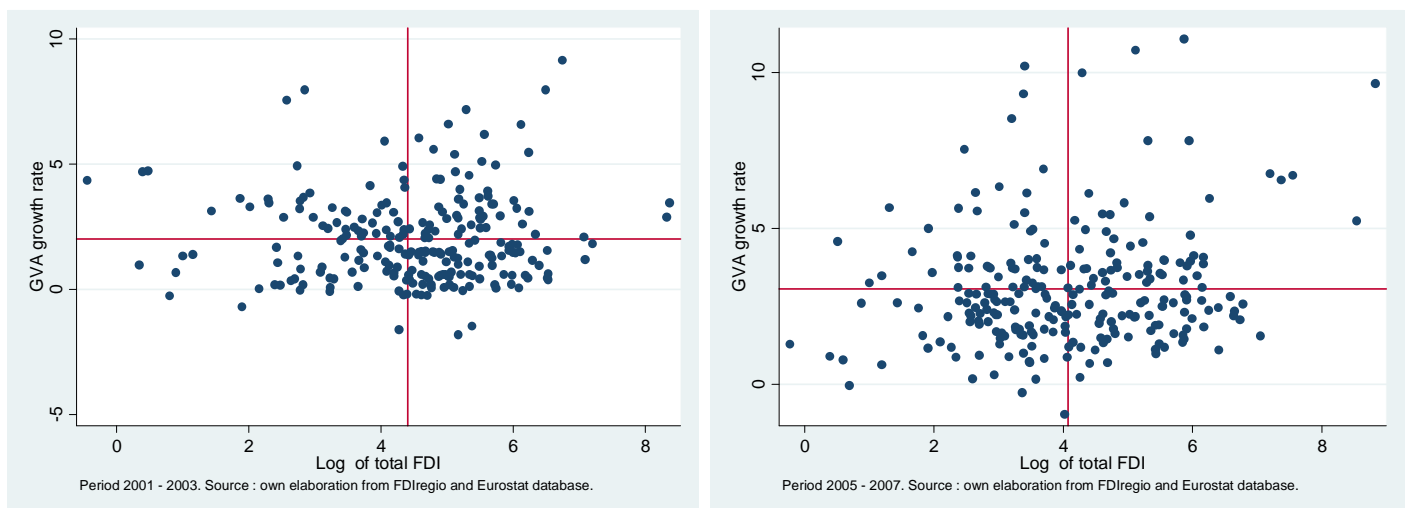
A widespread wave of globalization affected world economy since the beginning of the past decade, with FDI playing a major role as a way of internationalizing economic activity. Despite the slowdown caused by the recent crisis, the importance of worldwide economic integration as a fuel for sustained growth has been recognized by all international organizations, with the European Commission stating the importance of reinforcing the single market and ease investment procedures as a major stimulus for growth (Europe 2020 Agenda). Indeed, multinational enterprises (MNEs) play a leading role in shaping and driving cross-border integration through the transfer of production facilities, functions and or technology across space (Baldwin and Martin, 1999; OECD, 2007).

A recent report on the progress of the EU towards the Europe 2020 Agenda shows that the EU is the largest provider and recipient of FDI in the world, with intra-EU investments increasing rapidly (Hamilton and Quinlan, 2011). These trends have been reinforced by the liberalization of new markets, especially in the

services sectors, the reduction of capital movement restraints, and the creation of a friendly environment for Foreign Direct Investment (FDI), especially in the services sectors. Despite the cyclical character of FDI flows and their dependence from economic fundamentals, inward FDI stocks in the EU have increased exponentially since the 1980s, reaching their peak in 2007, with more than 7,000 billions of USD and a percentage of world stocks of about 45%.<sup>4</sup> In particular Intra-EU FDI, that represents around 62% of total FDI, have increased markedly, resulting in significant economic gains: 2.1% of EU GDP over the period 1992-2006 (500 Euros per head) and 2.75 million jobs<sup>5</sup>.

Despite that, a positive and linear relationship between foreign direct investments and regional growth rates does not seem to emerge in Europe. As it is shown in Figure 1, the regions with the largest concentration of foreign firms are not necessarily those with the highest gross value added growth rates. Moreover, the relationship between FDI and GVA growth rates is far from being linear.

**Figure 1. The FDI-growth relationship in Europe**



The recent literature in regional science (see Camagni, 2008, for a comprehensive discussion) suggests that deterministic cause-effect relationships cannot explain the complexity and diversification of present regional development patterns. The competitiveness of each region, in fact, largely depends on a multifaceted combination of factors both formal and informal, soft and hard, which encompass to the territorial capital, as discussed in the previous section: *“Each Region has a specific ‘territorial capital’ that is distinct and generates a higher return for specific kinds of investments than for others. Territorial*

<sup>4</sup> See UNCTAD, *World Investment Reports*, various issues for an in-depth analysis of FDI flows and stocks at European and world levels.

<sup>5</sup> EUROPE 2020, Background Information for the Informal European Council, 11 February 2010

*development policies should first and foremost help areas to develop their territorial capital*" (European Commission-DG Regio, 2005, quoted from Camagni, 2008).

Following Van Schaik (2002), Capello et al. (2011), and Caragliu and Nijkamp (2012) we measure social capital using results of the European Values Study<sup>6</sup>. Needless to say, we do not consider all possible elements of the territorial capital, but only those that we believe can crucially affect the ability of regions to take advantage of FDI for local development. The spatial distribution of these factors is quite uneven, as it will be shown in what follows.

In more detail, we consider four different elements of the territorial capital. The first concerns the *agglomeration of the economic activity* within a common area. Firms might concentrate geographically for a number of reasons. First of all, spatial agglomeration makes the transmission of knowledge spillovers, including both technical and informal knowledge, easier. Secondly, it provides a denser market for specialized skills, and greater opportunity for the development of specialized inputs and services, i.e., forward and backward linkages. Agglomeration may arise among firms belonging to the same industry or between firms belonging to different industries (Fujita et al., 1999). In the first case each region may be specialized in a particular sector of the economic activity, while in the second case we can observe a spatial concentration of the economic activity only in specific regions

Then we have considered the *social capital*, which relates to several basic dimensions of social life (Putnam, 1993 and 2000). Generally speaking, it can be defined as the ensemble of norms and values that are at the basis of inter-personal interactions, institutions that embed them and the social cohesion of a territory. We concentrate on two components of social capital (Van Schaik, 2002): institutional trust, and interpersonal trust and norms of reciprocity. As said before, in order to obtain a quantitative measure for each region's endowment of both types of social capital we exploit the EUV database.

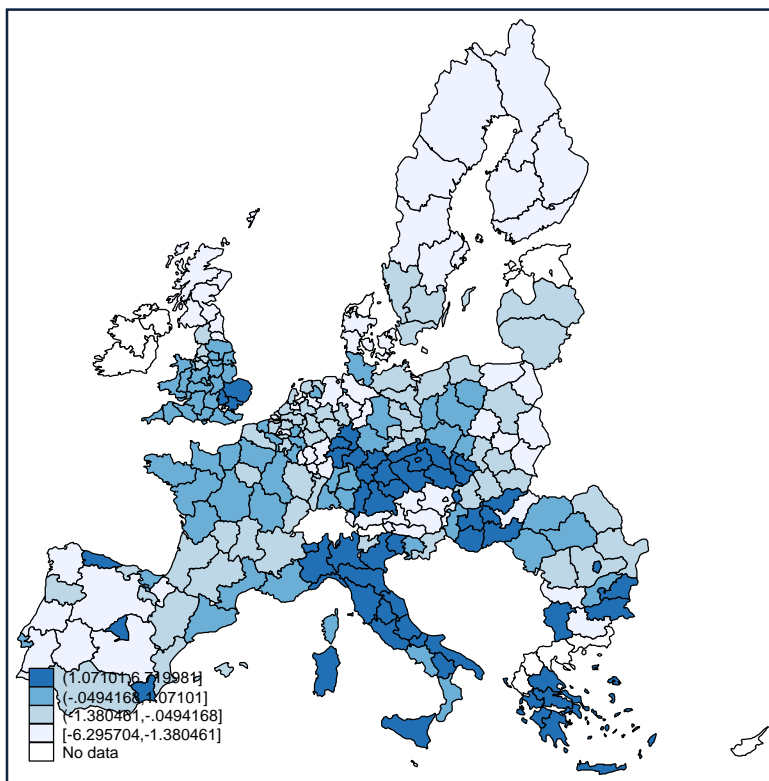
As for the Institutional trust, we aggregated at regional level individual answers to eight questions concerning trust in the education system, trade unions, the police, the parliament, the civil service, the social security system, the health care system and the justice system. Answers are expressed on a scale 1-4, with 1 indicating complete trust in institutions and 4 no trust at all. Regional means to the eight above mentioned questions have been computed and then aggregated in a unique index using a Principal Components Analysis (PCA). The first factor explains 52 per cent of total variance and thus represents a good summary indicator of trust in institutions. Results are mapped in Figure 2 below.

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<sup>6</sup> The European Values Study (EVS) is a large-scale, cross-sectional, and longitudinal survey research project on basic human values, initiated by the European Values Systems Study Group in the late seventies. The EVS questionnaire was developed to measure basic value orientations in important domains of life such as religion and morality, socio-economic life, politics, work, leisure time, family, marriage, and sexuality. We focus in particular on results of the 1999/2000 wave of the survey, which included all European countries, except for Norway and Switzerland, Albania and parts of former Yugoslavia.



**Figure 2. The Social Capital: trust in institutions**



The map shows that trust in institutions is very high in Scandinavian countries and quite low in Czech Republic and Mediterranean countries, Greece and Italy *in primis*. The United Kingdom, and to a lesser extent Spain and Bulgaria, show considerable heterogeneity in the spatial distribution of the endowment of social capital. In all these countries it is lower in the capital region than in the rest of the country. This pattern is common to other EU member states, especially those of Central and Eastern Europe.

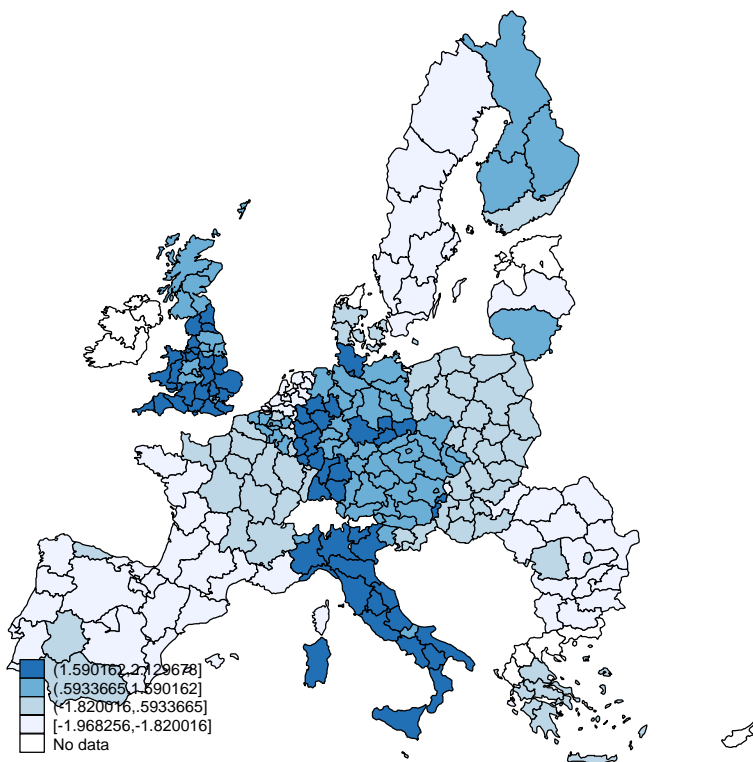
The second component of social capital refers to interpersonal trust and trustworthiness in other people. Trustworthiness or “norms of reciprocity” represents the degree of civic cooperation that appears from the willingness to put other groups or other individual’s interests ahead of personal interests. In other words, it measures people’s willingness to cooperate among each other. For this reason, it can be considered as a measure of interpersonal distance. Trust and trustworthiness are measured by constructing an index based on the answers to the following questions:

- Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?”.
- In your opinion, how many people in this country are doing the following?
  - o Claiming state benefits to which they are not entitled
  - o Cheating on tax if they have the chance
  - o Paying cash for services to avoid

- Lying in their own interest
- Accepting a bribe in the course of their duties

The PCA suggests the existence of two different components: the first concerns interpersonal trust and it is largely explained by answers to the first question, while the second refers to perceived corruption since it is explained mainly by answers to the second question. All together, the two factors explain about 87 per cent of total variance and thus represent a good summary of the underlying variables. Results are shown in Figure 3 and 4. Generally speaking, interpersonal distance is lower in the peripheries than in the continental Europe. In particular, willingness to cooperate seems to be high in Italy, in the United Kingdom and in some German regions, while it is very low in Romania, Bulgaria, Greece, Spain and France.

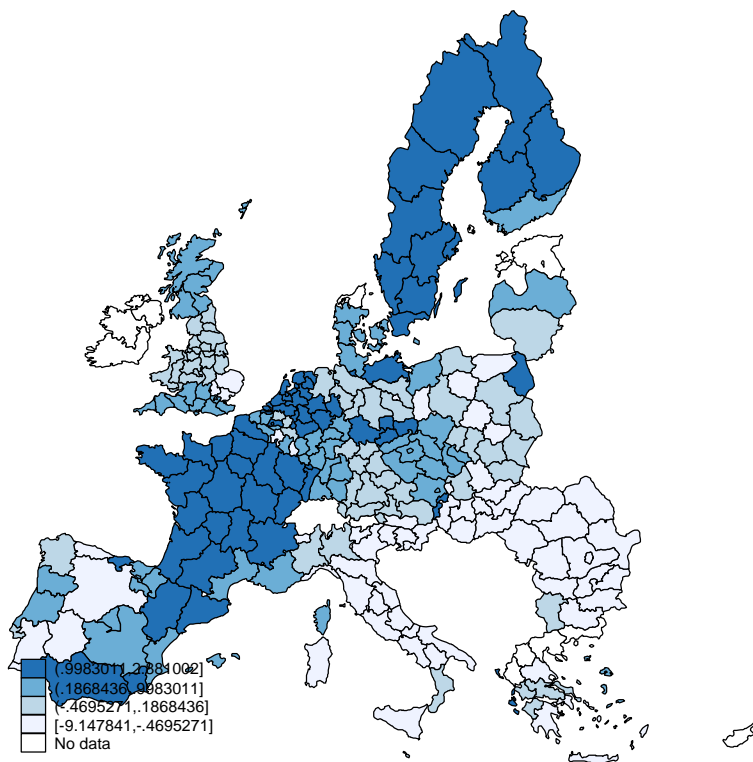
**Figure 3. The Social Capital: interpersonal distance**



Note: the higher the index the lower the interpersonal distance.

As far as perceived corruption is concerned (Figure 4), the picture is quite different. The EU seems to be divided into two part, with virtuous countries, i.e. countries with a low perceived corruption, located above an upward sloping diagonal going from South Spain to Finland and including France, the Benelux countries, most German regions and Denmark. Italy, Greece and virtually all EU member states of Central and Eastern Europe are below this diagonal, thus showing a very high perceived corruption. It is worth noticing that high corruption does not hinder trustworthiness: Italy has a high perceived corruption but a low interpersonal distance.

**Figure 4. Perceived corruption**



Given the objective of this paper, we added to these components of social capital other two elements. The first is what we called “*closed social capital*”. It measures the degree of cultural closeness of a region along three dimensions: the concerns with foreigners, the lack of confidence in big companies and the importance of national identity with respect to European identity. By aggregating these variables with the help of a PCA we obtain a component that explains about 50 percent of total variance, thus representing a good approximation of our definition of closed social capital.

Closed social capital seems to be particularly high in Austria, Italy, Spain and Czech Republic, while it is quite low in Northern European regions, as it is shown by Figure 5.

Another important informal component of territorial capital is *relational capital*, i.e. the system of bilateral and multilateral relations built by local economic actors among each others. This capital is very important to reduce uncertainty in economic relationships and to facilitate the diffusion of information. Following Van Schaik (2002), Capello et al. (2011), and Caragliu and Nijkamp (2012), we measured relational capital as participation in civil society, broadly defined, i.e. clubs and voluntary associations (sport, cultural, communal), religious communities, as well as unpaid voluntary work and social activities with friends and colleagues. The PCA allows us to build a single factor explaining relation capital. Results are mapped in Figure 6 below. Northern regions are better endowed with relation capital than Southern and Eastern regions.

Figure 5. The Social Capital: closed social capital

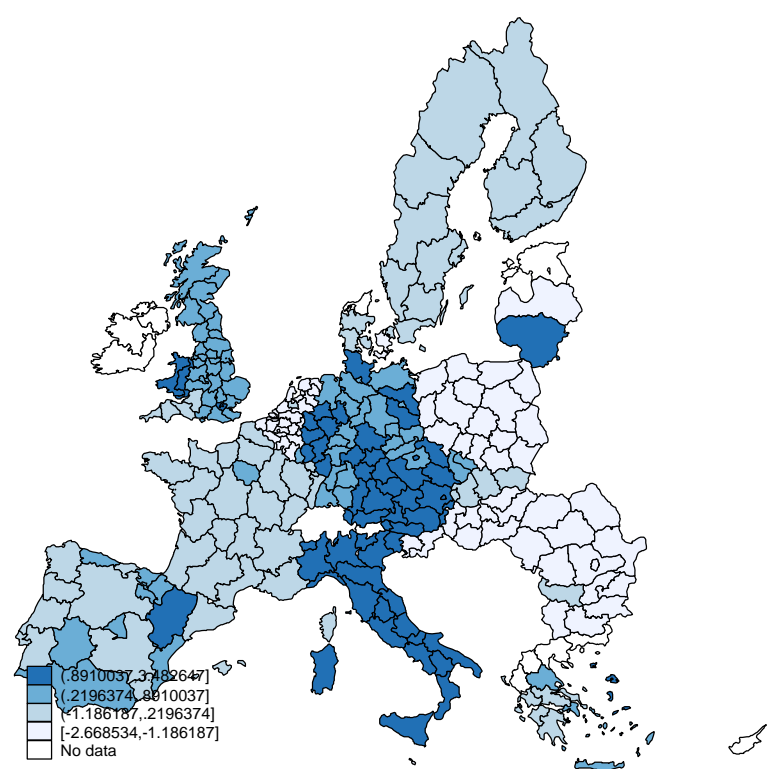
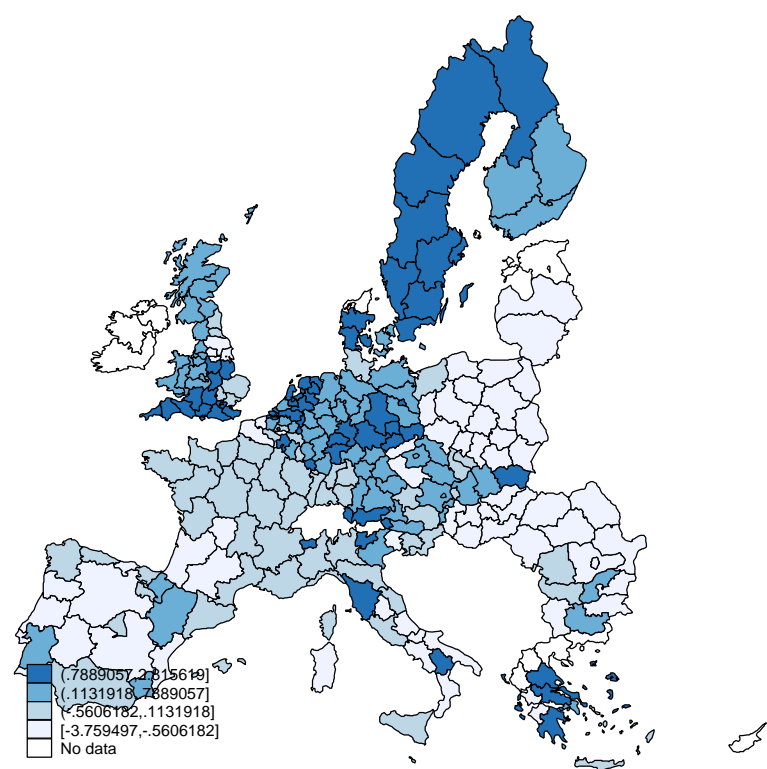


Figure 6. The Relational Capital



All these hard and soft components of territorial capital make identities of EU regions very heterogeneous and suggest the idea that the ability of the regions to take advantage of FDI spillovers might be very different along all these axis territorial capital is measured on.

#### **4. Empirics: methodological issues and implementation**

When analyzing the relationship between foreign investments and regional economic growth several methodological issues have to be taken into consideration. First of all, it is not possible to define a priori the direction of causality: do foreign investors identify more dynamic regions as best destinations of their capital flows because they anticipate higher future profits, or does regional growth depend directly on the contribution of foreign investors? The best answer is probably that both mechanisms are acting contemporaneously and reinforce one another<sup>7</sup>. For this reason, simple OLS regressions explaining regional growth in terms of FDI would most likely lead to inconsistent results due to reverse causality bias. This source of endogeneity should be partially mitigated by the regional perspective, given that foreign investors locating in any of the European regions are more likely to be interested in the whole EU market rather than in the local one, which is surely too small for their profit objectives.

Apart from this endogeneity-related aspect, two other issues are relevant in our context. First of all, though growth theory provides well-established suggestions for the estimation of growth relationships (Islam, 2003), it is *ex ante* unclear which functional form is more appropriate for the effects of FDI. Since, as stated by the theory, FDI may affect simultaneously each element of the production function, there may be non-linearities and interactions which may lead to biased estimates if not accounted for. Secondly, there may be a selection bias. In order to estimate the impact of FDI on regional growth rates properly, we should know the difference between regions' growth rates with and without FDI. Clearly, we cannot observe both growth rates for the same region at the same time and taking the average growth rate of regions without FDI as an approximation may not be advisable since regions with and without FDI may differ in many aspects, other than the presence of FDI. As discussed above, one of this aspect refers to territorial capital endowments.

These considerations bring us to choose a counterfactual framework. This framework allows to estimate the effect of FDI – the treatment – on economic growth – the outcome – controlling for the presence of several regions' socio-economic characteristics, which may affect either foreign firms location choice or regional growth patterns – the so called confounding factors. Such approach is particularly useful in the context of this paper because it allows us to identify non parametrically the change in the outcome due to

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<sup>7</sup> The existence of a reciprocal relationship between FDI and growth is confirmed by Choe (2003) and Chowdhury and Mavrotas (2006), while Feridun and Sissoko (2006) find that, according to Singapore's experience, it is growth to determine FDI. An opposite result has been found by Zhang (2001) and partially by Chowdhury and Mavrotas (2006).

the treatment effect, without imposing a specific functional form to the FDI-growth relation. Moreover, the treatment effect estimation method can be applied even though the treatment is not randomized, as in our case, provided that some specific assumptions hold.

In more detail, let  $i = 1, \dots, N (\equiv N_T + N_U)$  index regions, where  $N_T$  and  $N_U$  are number of treated and untreated regions, respectively. Also, let  $T_i$  be a binary variable that indicates exposure of region  $i$  to treatment, so that  $T_i = 1$  if the  $i$ -th region hosts foreign firms and  $T_i = 0$  otherwise. Finally, variables  $Y_{1i}$  and  $Y_{0i}$  identify potential outcomes with and without treatment, respectively. Potential outcomes refer to gross regional GVA growth rates and, therefore,  $Y_{1i} - Y_{0i}$  is the treatment effect for the  $i$ -th region, i.e. the impact of FDI on regional growth rates. Depending on the value of  $T_i$ , one of the two potential outcomes is realized and observed.

In order to identify the average effect of the treatment, a comparison of average outcomes between treated and untreated regions does not work, since this difference may be contaminated by the effects of other variables that are correlated either with the treatment,  $T_i$ , or with the potential outcomes,  $Y_{0i}$  and  $Y_{1i}$ . These confounders may create a correlation between  $T_i$  and the outcomes, which can be eliminated by randomization. In the absence of the latter, the following assumptions may help in estimated the average treatment effect provided that all confounders are observed:

1. *Stable Unit Treatment Value.* This assumption requires that the distribution of the outcome of the  $i$ -th region is independent of the treatment status of the  $j$ -th region, conditional on the vector of confounders,  $X_i$  (Rubin, 1980; Imai and van Dijk, 2004). This implies, first of all, that no interactions or general equilibrium effects take place among units; and, secondly, that the outcomes are independent of the treatment status conditional on  $X_i$ , i.e.  $Y_{1,i} \perp T_i \mid X_i$  and  $Y_{0,i} \perp T_i \mid X_i$ . This is often referred to as Conditional independence assumption.
2. *Common Support:*  $0 < \Pr(T_i = 1 \mid X_i) < 1$ . This assumption ensures that there is sufficient variation in the two groups, excluding situations of perfect predictability of the treatment status given  $X_i$ , and ensuring that there exist both treated and untreated regions with the same  $X_i$  (Heckman et al., 1999).

In the literature, the typical goal is the estimation of the of the average effect on the treated (ATT), which assume the following form:

$$ATT = E(Y_{1,i} - Y_{0,i} \mid X_i, T_i = 1) = E(Y_{1,i} \mid X_i, T_i = 1) - E(Y_{0,i} \mid X_i, T_i = 1) = E(Y_{1,i} \mid X_i, T_i = 1) - E(Y_{0,i} \mid X_i) \quad (1)$$

In our case,  $E(Y_{1,i} \mid T_i = 1)$  is observed and represents the GVA growth rate of region  $i$  in presence of FDI, while  $E(Y_{0,i} \mid T_i = 1)$  is the potential GVA growth rate of region  $i$  in absence of FDI. It is not observed, but under assumption 1 can be approximated with  $E(Y_{0,i} \mid X_i, T_i = 0)$ .

In order to estimate eq. (1) we first define treated regions as those regions which get an amount of FDI per inhabitant higher than the 6<sup>th</sup> decile of FDI penetration distribution. Then we select the matching technique. Matching process allows to identify treated and untreated regions which are as similar as possible in all relevant predictors. The main problem in this phase is that matching estimators are not consistent if the match is performed on more than one continuous covariate (Abadie and Imbens, 2006). In order to solve this problem, it is possible to use propensity score techniques (Rosembaum and Rubin, 1983), which summarize all covariates in a scalar function,. This approach, however, implies the choice of a specific functional form for the scalar function (i.e. a logit or a probit fuction) and no consistent estimator is available for related standard errors (Abadie and Imbens, 2008), which makes inference difficult to discuss. In order to overcome this disadvantage we will use the Abadie and Imbens (2011) bias-adjusted estimator to derive the ATT. This technique combines matching with regression adjustment techniques, using a polynomial function of the covariates to remove large-sample bias.<sup>8</sup>

We estimate the ATT using a *Nearest Single Neighbor Matching*, which allows each observation to be used as match more than once. In implementing this methodology on a pooled sample of EU regions, the following set of variables have been used:<sup>9</sup>

- *Treatment*: n. of new foreign firms per million of inhabitants established in each EU27 region (NUTSII level) during the periods 2001-2003 and 2005-07. We used different measures for FDI, from total number of FDI to more disaggregated penetration variables, which distinguish between sectors of economic activity (manufacturing vs. services) and origin of the foreign investors inside or outside Europe;
- *Outcomes*: real gross regional value added growth rate. The latter is measured as average yearly growth rate in the periods 2001-2003 and 2005-2007.
- *Confounders*:<sup>10</sup> This vector includes the number of new foreign firms established in the region in the previous period (2001-2003), the GVA growth rate of the previous period and the initial level of GVA, a proxy for the settlement structure of each region, regional market accessibility, credit access,<sup>11</sup> labour cost and the quality of human capital. We also included a dummy that identifies EU12 regions and a set of variables to control for the quality of the institutions: government efficiency, rule of law and control of corruption. Since regions' attractiveness is not independent of country relative attractiveness (Casi and Resmini, 2010), we interact labour cost, human capital endowment and FDI

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<sup>8</sup> See Abadie et al. (2004) for a discussion of the STATA implementation of the estimation.

<sup>9</sup> See Appendix 2 for a detailed explanation of each explanatory variable and source of data.

<sup>10</sup> The set of confounder variables is the result of a compromise between the need for taking into account all relevant variables in order not to bias results (Rubin and Thomas, 1996) and the importance of parsimony in order to avoid support problem and ensure efficiency (Bryson et al., 2002).

<sup>11</sup> Credit access is measured at country level.

agglomeration variables with specific country dummies in order to take into account this potential country effect.<sup>12</sup>

#### 4. Results

Table 2 below presents the estimates of the average treatment effect on the treated obtained with the above defined matching techniques. The coefficients reported in Table 2 can be interpreted as the FDI growth premium that benefits regions with a high concentration of different types of FDI.

**Table 1. ATT: results using different treatments**

	Total	sig.	manufacturing	sig.	services	sig.
All FDI	0.93	***	-1.42		0.61	*
Intra-EU FDI	1.06	***	-0.91		1.77	***
Extra-EU FDI	1.77	***	-0.35	*	0.86	

\*\*\*, \*\*, \* indicate significance at 1, 5 and 10 percent level, respectively. Bootstrap SE.

On average, these results confirm that FDI can enhance economic growth at regional level. In particular, we found that both intra and extra-Europe FDI are able to positively affect growth processes, though the effect generated by intra-Europe FDI is weaker than that of the extra-EU FDI. The growth premium, however, arises in presence of FDI in services only, while the impact of FDI in manufacturing on growth, when significant, turns out to be negative. These results indicate a superior growth effect of horizontal FDI over vertical FDI, a result not new in the literature (Beugelsdijk et al., 2008).

We use the endowments of different components of territorial capital to identify groups of homogeneous regions. We first consider hard components, i.e. agglomeration forces. As explained above, we model both regional specialization and sectoral concentration. Although preliminary, the results, shown in Table 2, are encouraging and help us in better understanding the FDI-growth nexus.

<sup>12</sup> These variables have been inspired by the literature on FDI determinants. See among many others Barba Navaretti and Venables (2004), Markusen (1995), Helpman (1984), and Bloningen, (2005).



**Table 2. ATT: the role of agglomeration forces**

	total	sig.	manufacturing	sig.	services	sig.
Total FDI						
all regions	0.93	***	-1.42		0.61	*
Rich regions (GDP pc >75% of EU mean)	10.37	*	-2.38		-4.05	
Poor regions	1.83	**	-2.64	**	2.08	***
same specialization	-		1.87	***	-1.81	***
different specialization	-		-2.18		6.29	*
Intra-EU FDI						
all regions	1.06	***	-0.91		1.77	***
Rich regions (GDP pc >75% of EU mean)	4.03	**	33.81	**	-24.9	**
Poor regions	1.35	**	-0.79		1.88	**
same specialization	-		1.39	***	-3.04	***
different specialization	-		1.02	**	9.77	*
Extra-EU FDI						
all regions	1.77	***	-0.35	*	0.86	
Rich regions (GDP pc >75% of EU mean)	7.71	**	-1.48	**	10.64	***
Poor regions	2.61	***	0.29		2.29	***
same specialization	-		-0.02		-0.09	
different specialization	-		-0.06		4.7	*

\*\*\*, \*\*, \* indicate significance at 1, 5 and 10 percent level, respectively. Bootstrap SE.

Agglomeration economies, in fact, seem to differentiate the growth enhancing effect of FDI in several way. First of all, FDI in manufacturing sectors is able to further boost economic growth rates in regions specialized in manufacturing activities, suggesting that intra-sectoral spillovers are more important than inter-sectoral spillovers for economic growth. The opposite occurs in services sectors, where the FDI-induced growth effect arises because of inter-sectoral spillovers. These effects seem to be driven by intra-EU foreign firms, while extra-EU FDI does not add any additional growth either to specialized or non-specialized regions, with the exception of FDI in services, whose effect on economic growth is however very weak. Secondly, it is worth noticing that, on average, FDI in services is more conducive for growth than FDI in manufacturing, as indicated by the magnitude of the corresponding coefficients. Finally, the impact of FDI on growth in peripheral regions is driven mainly but not exclusively by FDI in manufacturing, while in core regions, where economic activities is more concentrated and diversified, the FDI-growth bonus depends only on the presence of FDI in services.

As far as the soft components of territorial capital are concerned, they act as “absorptive” effect in several circumstances, as it is shown in Table 3. On average, our findings indicate that the FDI-induced growth effect is higher the lower the perceived corruption and the interpersonal distance and the higher the relational capital. FDI in services is more sensitive to the endowment of social capital and, in particular of institutional trust, relational capital and open social capital, than FDI in manufacturing, whose impact on economic growth remains negative. To this respect, it is however worth noticing that it is significant only

when regions are not well endowed with social capital, i.e. when the interpersonal distance is high, social capital is closed and relational capital is low. When we distinguish between intra- and extra-EU FDI, we found a completely different picture. While intra-EU FDI growth effect is barely affected by social capital, the latter ensures a stronger growth effect of extra-EU FDI. In particular, the growth effect of FDI in services

**Table 3. ATT. The role of social capital**

		total	sig.	manufacturing	sig.	services	sig.
<b>Total FDI</b>							
trust in institutions	high	-4.08		-2.09		3.02	**
	low	-2.09	**	0.16		-1.98	
civiness	high	-0.14		-6.43		-0.43	
	low	4.39	**	-0.78		-8.31	**
interpersonal distance	high	-17.66	***	-5.29	**	-15.85	***
	low	1.48	***	0.46		-0.75	
relational capital	high	7.59	**	-2.67		7.61	**
	low	1.04	*	-5.62	***	0.44	
closed social capital	high	-1.57		-6.05	***	-4.77	
	low	-0.76		-0.04		2.04	***
<b>intra-EU FDI</b>							
trust in institutions	high	4.29	***	-1.67		-1.41	
	low	-0.9		1.08	***	-0.96	
civiness	high	-3.11		-0.86		-3.95	*
	low	-2.65	**	-0.43		-2.05	
interpersonal distance	high	3.49	***	-4.87	**	-11.16	***
	low	-0.49	*	0.39		-0.36	
relational capital	high	-1.47	**	-0.55		0.91	*
	low	0.48		1.57	***	0.56	
closed social capital	high	27.19		3.92		17.92	
	low	2.25	***	0.38		0.41	
<b>extra-EU FDI</b>							
trust in institutions	high	-0.79		-3.36	*	1.64	*
	low	2.4	***	-0.21		-1.61	**
civiness	high	-0.2		-0.26		-0.89	
	low	-0.3		2.54	*	1.65	**
interpersonal distance	high	-0.5	***	-7.97	**	-10.87	***
	low	1.93	**	2.26	***	2.02	***
relational capital	high	1.45	***	2.88	*	0.18	
	low	1.18	***	1.05	**	-0.04	
closed social capital	high	-0.32		-2.51		-6.09	***
	low	1.81	***	1.09	***	1.2	**

\*\*\*, \*\*, \* indicate significance at 1, 5 and 10 percent level, respectively. Bootstrap SE.

is magnified by institutional trust, low perceived corruption , low interpersonal distance and low closed social capital, while FDI in manufacturing may enhance regions' growth rate when perceived corruption is low and the social capital is open. Also, the growth effect of extra-EU FDI is larger the higher the relational capital.

#### **4. Conclusions**

The aim of this paper is to evaluate the growth effect of FDI at the regional level, introducing the idea that development patterns can be very heterogeneous depending on the variety of European regional identities. The latter are measured along different axis: both soft and hard elements of territorial capital are taken into consideration. Preliminary results confirm that, generally speaking, FDI can enhance economic growth at the regional level, but they also suggest that this relationship is far from being a deterministic cause-effect link. Indeed, the impact of FDI is constrained by several regions' socio-economic characteristics, which all together represent their territorial capital, and by the investment characteristics that we proxied by considering intra- and extra-EU FDI as well as manufacturing and services FDI. In particular our findings show that local returns of FDI are boosted by high institutional trust, high relational capital, low interpersonal distance and open social capital. Moreover, we found that the growth enhancing effect of FDI is stronger in the services sectors than in manufacturing.

In conclusions, given the positive FDI growth impact, foreign firms can represent a key contribution for EU regions. In order to maximize benefits from FDI, the latter have to develop sound institutions, relational capital and open social capital, while reducing perceived corruption. Since

#### **References**

- Abadie A., Drukker D.M., Herr J.L. and G.W. Imbens (2004), "Implementing matching estimators for average treatment effects in Stata", *Stata Journal*, 4(3):290-311
- Abadie A. and G.W. Imbens (2006), "Large sample properties of matching estimators for average treatment effects", *Econometrica*, 235-267
- Abadie A. and G.W. Imbens (2008), "On the failure of the Bootstrap for Matching Estimators", *Econometrica*, 76(6):1537-1557
- Abadie A. and G.W. Imbens (2011), "Bias-corrected matching estimators for average treatment effects", *Journal of Business and Economic Statistics*, 29(1):1-11
- Alfaro L. (2003), "Foreign direct investment and growth: does the sector matter", mimeo.

- Balasubramanyam V., Salisu M. and D. Spasford (1996), "Foreign Direct Investment and Growth in EO and IS Countries", *Economic Journal*, 106: 92-105.
- Barba Navarretti G. and A. Venables (2004), *Multinational Firms in the World Economy*, Princeton University Press.
- Barca F., "AN AGENDA FOR A REFORMED COHESION POLICY. A place-based approach to meeting European Union challenges and expectations.", Independent Report prepared at the request of Danuta Hübner, Commissioner for Regional Policy, 2009
- Becker S. O. and A. Ichino (2002), "Estimation of average treatment effects based on propensity scores", *The Stata Journal*, 2 (4): 358-377
- Beugelsdijk S., Smeets R. and R. Zwinkels (2008), "The impact of horizontal and vertical FDI on host's country economic growth", *International Business Review*, 17: 452-472.
- Blomstrom M. And A. Kokko (1998), "Multinational Corporations and Spillovers", *Journal of Economic Surveys*, 12: 247-277.
- Blomstrom M. and A. Kokko (2003), "The Economics of Foreign Direct Investment Incentives", NBER working paper 9489.
- Blonigen B. and M. Wang (2005), "Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies", in Moran T., Graham M. And M. Blomstrom (eds.), *Does Foreign Direct Investment Promote Development?*, Institute for International Economics, Washington D.C.
- Blonigen B. (2005), "A Review of the Empirical Literature on FDI Determinant", *Atlantic Economic Journal*, 33: 383-403.
- Bobonis G. and H. Shatz (2007), "Agglomeration, Adjustment and State Policies in the Location of Foreign Direct Investment in the United States", *Review of Economics and Statistics*, 89 (1): 30-43.
- Bode E. and P. Nunnekamp (2007), "Does Foreign Direct Investment Promote Regional Development in Developed Countries? A Markov Chain Approach for US States", Kiel working paper n. 1374.
- Bode E., Nunnekamp P. and A. Waldkirch (2009), "Spatial Effects of Foreign Direct Investment in US State", Kiel working paper n. 1535.
- Borensztein E., De Gregorio J. and J. Lee (1998), "How Does Foreign Direct Investment Affect Economic Growth?", *Journal of International Economics*, 45: 115-135.
- Byrson A., R. Dorsett and S. Purdon (2002), "The use of Propensity Score Matching in the Evaluation of Labour Market Policies", Department of Work and Pensions Working paper No.4
- Caliendo M. and S. Kopeinig (2005), "Some practical Guidance for the implementation of Propensity Score Matching", IZA discussion paper No. 1588
- Camagni, R. (1991), "Local milieu', uncertainty and innovation networks: towards a new dynamic theory of economic space", in R. Camagni (ed.), *Innovation networks: spatial perspectives*, London (UK): Belhaven Press

- Camagni, R. (2008), "Regional specificities: towards a theory of territorial capital", in Capello,-Camagni-Chizzolini-Fratesi (eds.), *Modelling regional scenarios for the enlarged Europe: European competitiveness and global strategies*, Berlin: Springer-Verlag.
- Cantwell J. (1989), *Technological Innovation and Multinational Corporations*, Oxford, Basil Blackwell.
- Capello R., Caragliu A. and P. Nijkamp (2011), "Territorial capital and regional growth: increasing returns in knowledge use", *Tijdschrift voor economische en sociale geografie*, 102 (4): 385-405
- Caragliu A. And P. Nijkamp(2012), "Cognitive capital and islands of innovation: the Lucas growth model from a regional perspective", *Regional Studies*, forthcoming
- Carkovic M. and R. Levine (2005), "Does Foreign Investment Accelerate Growth?", in Moran T., Graham M. And M. Blomstrom (eds.), *Does Foreign Direct Investment Promote Development?*, Institute for International Economics, Washington D.C.
- Choe J. (2003), "Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth?", *Review of Development Economics*, 7: 44-57.
- Chowdhury A. and G. Mavrotas (2006), "FDI and Growth: What Causes What?", *The World Economy*, 29: 9-19.
- De Mello L. (1999), "Foreign Direct Investment-Led Growth: Evidence from Ime Series and Panel Data", *Oxford Economic Papers*, 51: 133-151.
- Driffield N. (2006), "On the search for spillovers from foreign direct investment (FDI) with spatial dependency", *Regional Studies*, 40 (1): 107-119.
- Dunning J. (1999), "Globalization and the Theory of MNE Activity", discussion paper in International Investment Management n. 264, Whiteknights, Reading: University of Reading.
- Feridun M. and M. Sissoko (2006), "Impact of FDI on Economic Development: A Causality Analysis for Singapore, 1976-2002", MPRA working paper n. 1054.
- Figlio D. and B. Blonigen (2000), "The Effects of Foreign Direct Investment on Local Communities", *Journal of Urban Economics*, 48 (2): 338-363.
- Findlay R. (1978), "Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: a Simple Dynamic Model", *Quarterly Journal of Economics*, 92: 1-16.
- Girma S. and K. Wakelin (2001), "Regional Underdevelopment: Is FDI the Solution? A Semiparametric Analysis", CEPR discussion paper 2995, Washington D.C.
- Girma S., Gorg H. and M. Pisu (2004), "The Role of Exporting and Linkages for Productivity Spillovers", Research Ppaper Series n. 30, The University of Nottingham.
- Girma S. and K. Wakelin (2007), "Local Spillovers from Foreign Direct Investment in the U.K. Electronics Industry", *Regional Science and Urban Economics*, 37 (3): 399-412.
- Hamilton D.S. and J. P. Quinlan (2011), *Europe 2020: Competitive or Complacent?*, John Hopkins University's Centre for Transatlantic Relations, Washington D.C.

- Heckman J., LaLonde R. and J. Smith (1999), "The Economics of Econometrics of Active Labour Market Programs" in Ashenfelter O. and D. Card (eds.), *Handbook of Labour Economics*, vol. III, pp. 1865-2097, Elsevier, Amsterdam.
- Helpman E. (1984), "A Simple Theory of International Trade with Multinational Corporations", *Journal of Political Economy*, 93: 451-471.
- Imai K. and D. van Dijk (2004), "Causal Inference with General Treatment Regimes: Generalizing the Propensity Score", *Journal of the American Statistical Association*, 99: 854-866.
- Imbens G. (2004), "Nonparametric estimation of average treatment effects under exogeneity: a review", *The Review of Economics and Statistics*, 86 (1): 4-29.
- Islam N. (2003), "What Have we Learnt from the Convergence Debate?", *Journal of Economic Surveys*, 17: 309-362.
- Johnson A. (2006), "FDI and Exports: The Case of High Performing East Asian Economies", CESIS Electronic working paper series n. 57.
- Kneller R. and M. Pisu (2007), "Industrial Linkages and Export Spillovers from FDI", *The World Economy*, 30: 105-134.
- Kokko A (1994), "Technology, Market Characteristics and Spillovers", *Journal of Development Economics*, 43: 279-293
- Krugman P. (2000), "Fire-sale FDI", in Edwards S. (ed. by), *Capital Flows and the Emerging Economies*, Chicago: The University of Chicago Press.
- Kugler M. (2006), "Spillover from Foreign Direct Investment: Within or Between Industries?", *Journal of Development Economics*, 80:444-474.
- Leichenko R. and R. Ericson (1997), "Foreign Direct Investment and State Export Performance", *Journal of Regional Science*, 37 (2): 307-329.
- Leuven, E. and B. Sianesi, 2003, "Psmatch2: Stata Module to Perform Full Mahalanobis and Propensity score Matching, Common Sport Graphing, and Covariate Imbalance Testing," available at <http://ideas.repec.org/c/boc/bocode/s432001.html>
- Malmgren H. B., 1961. "Information, Expectations, and the Theory of the Firm", *Quarterly Journal of Economics*, 75: 399-421
- Markusen J. (1995), "The boundaries of Multinational enterprises and the Theory of international trade", *Journal of Economic Perspectives*, 9: 169-89
- Markusen J. and A. Venables (1999), "Foreign direct investment as a catalyst for industrial development", *European Economic Review*, 43: 335-358.
- Mullen J. and M. Williams (2005), "Foreign Direct Investment and Regional Economic Performance", *Kyklos*, 58 (2): 265-282.
- Nichols A. (2007), "Causal inference with observational data", *The Stata Journal*, 7 (4): 507-541

Nicolini M. and L. Resmini (2011), "Productivity Spillovers, Regional Spillovers and the Role Played by Multinational Enterprises in the New EU Member States", in Kourtis K., Njikamp P. and R. Stough (eds), *Drivers of Innovation, Entrepreneurship and Regional Dynamics*, pp. 105-120, Berlin, Springer-Verlag.

OECD (2001), *OECD Territorial Outlook 2001*, OECD, Paris.

Olofsdotter K. (1998), "Foreign Direct Investment, Country Capabilities and Economic Growth", *Weltwirtschaftliches Archiv*, 134: 534-547.

Rodriguez-Clare A. (1996), "Multinationals, Linkages and Economic Development", *American Economic Review*, 86: 852-873.

Rosembaum P. and D.B. Rubin (1983), "The Central Role of Propensity Score in Observational Studies with Binary Outcome", *Biometrika*, 70: 41-55.

Rubin D. B. and N. Thomas (1996), "Matching using estimated propensity scores: relating theory to practice", *Biometrics*, 52: 249-264

Rubin D. (1980), Discussion of "Randomization analysis of experimental data: the Fisher Randomization Test" (by D. Basu), *Journal of American Statistical Association*, 75: 591-93

Simon, H. (1972) "Theories of Bounded Rationality". In R. Radner and C.B. McGuire. (eds.), *Decision and Organisation*

Solow R. (1956), "A Contribution to the Theory of Economic Growth", *The Quarterly Journal of Economics*, 70: 65-94

Storper, M. (1995). "Regional technology coalitions an essential dimension of national technology policy", *Research Policy*, 24(6): 895-911

Van Schaik T. (2002), "Social Capital in the European Values Study Surveys", Country paper prepared for the OECD-ONS International Conference on Social Capital Measurement London, September 25-27, 2002

Wang M. and M. Wong (2009), "What Drives Economic Growth? The Case of Cross-Border M&A and Greenfield Activities", *Kyklos*, 62 (2): 316-330

Williamson O. E. (2002), "The Theory of the Firm as Governance Structure: From Choice to Contract". *Journal of Economic Perspectives*, 16 (3): 171-195

Xu B. (2000), "Multinational Enterprises, Technology Diffusion and Host Country Productivity Growth", *Journal of Development Economics*, 62: 477-493

Zhang K. (2001), "Does Foreign Direct Investment Promote Economic Growth? Evidence from East-Asia and Latin America", *Contemporary Economic Policy*, 19: 175-185

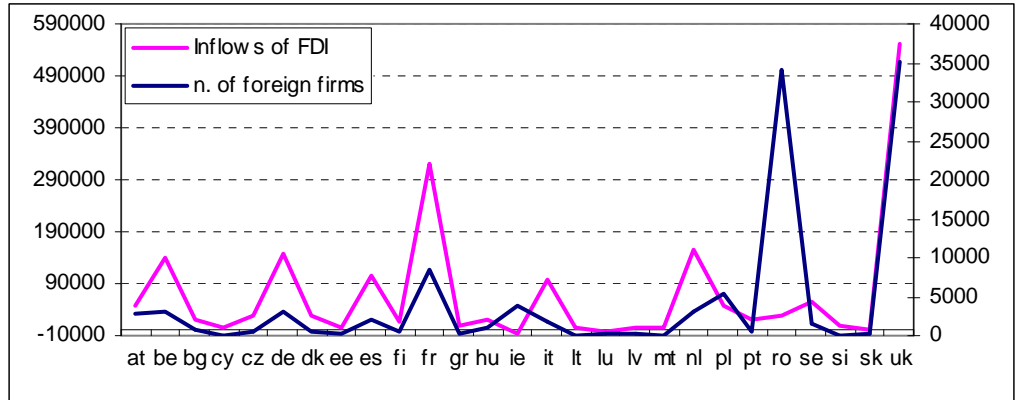
## **Appendix 1 : Representativeness of the sample**

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 firms 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% 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 firms 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. 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.

Table A1. Official inflows of FDI (millions of USD) vs. newly established foreign firms (2005-07)



Pearson correlation coefficient: 0.626; p-value>0.000.



## Appendix 2. Definition of variables and respective sources

VARIABLES	DESCRIPTION
GDP growth	% annual change in real regional GVA per capita. Reference years:2001-2003 and 2005-2007. Data source: Eurostat
Labour Cost	Average annual labour cost: salaries and wages in 2000 and 2004 (excluding apprentices and trainees). Data source: Eurostat
Market Accessibility	Weighted average of GDP of all European regions j other than i. The weights are the reciprocal of the time 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: 2001-2003 and 2005-07 for the dependent variable and 1997-1999 for the independent variable. Data source: Eurostat and Amadeus.
Initial GVA	Annual regional GVA in per capita ppp. Reference year: 2001 and 2005. Source: Eurostat.
Professionals and Scientists	ISCO-88/ 2 employment share on total regional employment (three-year average) Reference years:1999-2001 and 2002-2004. Data provided by DGRegio
Credit Access	Dummy variable that equals one if credit access is above European average. Credit access is proxied by loans to non financial corporations as a % of GDP and it is measured at national level. Reference years: 2001-2003 and 2005-2007. Source: ECB, Eurostat.
Mega	Dummy that equals 1 if the region host a mega-city. Source: own calculation.
Eu12	Dummy variable that equals 1 if the region belongs to member states belonging to the EU since the 2004 enlargement.
Quality of Government indicators	Measured by 4 indicators: corruption, rule of law,bureaucratic effectiveness, government voice and accountability/ strength of democratic and electoral Institutions. Reference year: 2000. Source: World Bank and European Commission, DG-Regional policy.
Population	Regional population measured in millions of people resident in the region. Reference years: 2001 and 2005. Source: Eurostat