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Territorial Capital and the Great Recession: a Nuts-3 Analysis for Central and Southern Italy¹

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Abstract

The analyses on the effects of the actual crisis have been mainly concentrated on a national and international dimension, leaving aside the differential effects of the crisis on regions and sub-regional areas. Notwithstanding the international character of the Great Recession, it has to be stressed that the different structural features of regions and urban areas might influence the economic and social impact of the crisis. They also might have an important effect on the resilience and recover chance.

In the present paper, we focus on territorial capital, a concept that takes into account of the different features of goods and services in terms of their degree of appropriability and rivalry and, also, of their material-immaterial content. The aim is to identify the strategic territorial elements which help in the evaluation of the absorption capacity of the recession at regional and sub-regional levels. For that purpose, we use a wide dataset for Central and Southern Italian provinces in order to measure the empirical relations between the territorial capital and the change in the provincial performance. The intent is to measure how the territorial capital endowment might have determined different reactions on a sub-regional scale and, conversely, how the crisis might influence the territorial capital in different areas. If, on one hand, we expect that the “soft” dimensions of the territorial capital (relations among firms, cooperation networks, public-private partnership, territorial governance, innovation linkages, and so on) have some relevance in shaping the growth process of less developed and peripheral areas, the role of these dimensions in the reaction to crisis is still to be debated. The paper examines the relation between territorial capital and performance at NUTS-3 (provincial) level. during the period 1999-2011 and on the basis of exports and employment dynamics.

JEL Classification: R110, O490

Keywords: Territorial capital, crisis, province

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1 Introduction

The hypothesis according to which the territorial capital might act as a driving force of growth highlights the importance of the territorial context and of meta-economic factors characterized by strong territorial features. For that reason, in searching for the role of the territorial capital and its components in fostering the economic growth process, it looks appropriate to focus on a sub-regional dimension.

The theoretical and empirical literature on testing the convergence hypothesis in the last few decades has been vast. That hypothesis has been tested both at a national and at a regional levels, with the purpose of proving the likely persistence or the catching up of international and intra-national gaps. The papers on regional convergence suppose that regions share common characteristics in institutional, economic and political features, such as labour markets, legal systems, saving rates, preferences and policies, among others. As for regional growth processes in Europe, the empirical studies have not reached agreed results. This is also due to the variety of regions, data, sample period and econometric tools used in the analyses².

In spite of the importance of local contexts and institutional variables in influencing the convergence process, only a small part of the literature has been devoted to sub-regional units. In this paper, we focus on the elements of territorial capital as possible driving forces of growth at a provincial level. We, then, consider regional NUTS-3 (provincial) performance during the crisis period and evaluate its link the endowment of territorial capital before 2008. The results highlight the components which have played an important role in determining the performance and, for that way, suggest possible policy actions.

2 The territorial capital and the impact on growth: the main economic literature

The first contribution to the analysis of convergence applied to Italian provinces dates back to Cosci and Mattesini (1995). The authors verify the conditional convergence hypothesis by using provincial data spanning the period 1951-1990 and for four different sub-periods. They find a slower convergence process with respect to the one recorded in other

² The dynamics of per capita GDP and of productivity measured by the GDP variation at regional NUTS2 level highlights a convergence process up till the mid '90s. From year 1996, the convergence process among the EU-15 regions, notwithstanding some fluctuations, appears attenuated.

European countries and in the US. Moreover, the reaction has been higher in the period 1963-1970, mild in the 70s and absent in the 80s. This is also confirmed by the analysis of the sigma convergence. They discover the presence of different steady states and confirm the importance of auxiliary variables such as the degree of infrastructure endowment, crime and the education rate .

In all the regressions, the infrastructure variables and the crime –related variables are significant and with the expected sign, whereas the education-related variables are often not significant and, when they are significant their sign is not the one expected.

The authors conclude that the education rate is not a good proxy for human capital and, also, that it is not correlated with economic growth. The infrastructure rate is, instead, a good proxy for the capital stock accumulated over the 40 year-period under consideration.

After considering the auxiliary variables, the convergence rate for the Italian provinces is close to 0.02, which is the empirical regularity found for many countries and regions by Barro and Sala-i-Martin (1995).

Later, Fabiani and Pellegrini (1997) analyse the differences in per capita GDP between 1952 and 1992 by using the Quah (1996) approach. They end up to rejecting the absolute convergence and to detecting the presence of multiple peaks, with more dynamic provinces reaching the income levels of the richer provinces, while the less dynamic provinces had settled to the bottom.

Pompili (1999) refers to the same period as Cosci and Mattesini to analyze the issue of convergence not only in per capita GDP but also in the product per worker. He considers the role of human capital for the explanation of long run growth, not in terms of education rate but in terms of expertise. He concludes that per capita income and product per worker converge notwithstanding structural conditions. These, however, influence strongly the convergence process.

Perugini and Signorelli (2005) carry out a convergence analysis of provincial (total and female) employment performances. They find strong persistence of the employment disparities among the 103 Italian provinces over the time period 1995-2002. To test for beta convergence they also use a non-parametric technique, the *lowess* (locally weighted scatterplot smoothing), that, through Kernel density estimations, investigates the shape and changes in the distributions of total and female employment rates . The graphical output of the *lowess* technique applied to employment growth reveals weak convergence of the Italian provinces in terms of total employment rate and a divergence trend for the female employment rates.

The parametric version of the beta convergence estimates conditioned to structural factors (sector employment and spatial diversification patterns) show convergence among the northern provinces inside their repartitions (north-west and north-east), while no clear trends emerge inside the groups of the central and the southern provinces. To conclude, the authors draw some provincial labour market profiles by applying a cluster analysis to a wide set of employment indicators.

Another strand of literature, within the regression approach to quantitative measurement of convergence, arises from the main critique moved to the empirical literature on beta and sigma convergence, namely, the fact that the spatial nature of the cross sectional data is missing. For example Arbia and Basile (2005) suggest a new specification for the growth equation which takes simultaneously into account spatial dependence and multiple spatial regimes.

A non parametric local regression model, the same cited above, is firstly applied to identify non-linearities in the relationship between growth rates and initial conditions. The authors verify the convergence at provincial level³ in the period 1951-2000 with models of spatial dependence, identifying two spatial regimes: “1951-1970 during which only provinces with high income converge, and 1971-2000 during which only provinces with low-income converge”. Authors also find evidence of a strong spatial correlation and possible spillovers in the process of convergence, confirming the importance of total productivity differentials between areas. They conclude that neglecting the role of space leads both to misspecification and to severe biases in the estimate of convergence.

They control for spatial interaction in an indirect way, by means of spatial dependent models such as the SAR (Anselin and Bera, 1998; Arbia, 2006), where a spatial lag of the dependent variable is included on the right-hand side of the model, and the SEM (spatial error models; Anselin and Bera, 1998; Arbia, 2006).

Though the convergence literature has identified some explanatory factors for the growth process, very little has been said about the differential role of these factors.

The territorial capital concept, introduced by Camagni (2009), encompasses all the material and immaterial resources, the production factors, the expertises, knowledges and skills and, also, the set of norms, social and relational skills accumulated through time in a specific territory. The territorial capital can be considered one of the most relevant determinants of

³ They considered only the 92 provinces already existing in 1951.

territorial competitiveness in the long run and also the cause of a differential regional ability connected to reaction to changes in demand.

In order to identify the sources of territorial capital, Camagni (2009) introduces a taxonomy on the basis of the different features of territorial assets in terms of degree of materiality and rivalry. To that taxonomy belong dimensions with high degree of materiality and high private content (such as the fixed capital stock) and dimensions with high degree of materiality and public content (such as the social fixed capital). Also, immaterial goods can be classified in terms of their degree of public content, which is lower for human capital, medium for institutional-relational capital and higher for social capital.

The literature on the possible effects on growth of the *material* capital endowment is vast and dates back to the seminal papers on growth models. Whereas there is general agreement on the role played by the private fixed capital, different opinions emerge on the role played by the other components in determining the growth differentials.

The role of infrastructures in fostering economic growth has been traditionally pointed out. In the last few decades, the debate has focused on determining their specific components and of stressing their efficacy in promoting competitiveness. In some analyses⁴ the positive effect on growth has been advocated on the basis of the fact that infrastructures act as fundamental *facilities* for the private sector and improve the productivity of existing resources. Some other analyses⁵, on the other hand, have doubted the results because of the reverse causation between productivity and public capital. In particular, economic infrastructures determine higher increases of productivity compared to the social ones (Capello, 2004).

Among material capital assets we must also include cultural and natural endowments, which are often referred as *amenities* and determine tourists' attractiveness. In this context, the regional assets related to amenities positively influence growth⁶ (Glaeser *et al.*, 2001; Deller *et al.*, 2008). This result, however, differs depending on the country under analysis. Piergiovanni *et al.* (2011), on the basis of Italian provincial data, find that the amenities presence (measured by the number of restaurants per-capita) does not influence employment growth while the same variable is positive and highly significant in the case of USA.

In the case of *non material* assets, the positive role played by human capital in fostering economic growth is widely accepted. The endogenous growth models suppose that

⁴ See, among others, Aschauer (1989), Munnell (1990), Canning and Pedroni (2004).

⁵ See Holtz-Eakin (1994), Garcia-Mila *et al.* (1996).

knowledge accumulation and human capital, besides easing the growth processes, also lead to convergence. On the other hand, divergence scenarios and technological gaps look plausible and can be interpreted on the basis of the evolutionary theory of economic growth (Fagerberg, 1988). This, indeed, because the relation between knowledge and economic growth depends on the presence of *capabilities* and other “context” factors (social, institutional, entrepreneurial, among others).

The nature of the relationship between human capital and growth has been firstly explained on a national scale by referring to the convergence among countries. However, the important explanatory role of local factors and the persistence of differences also in the presence of convergence (Fagerberg and Verspagen, 2002; Gardiner *et al.*, 2004) point out the need of moving the focus of the analysis at a sub-national level.

The analysis on the role of human capital has started to be pursued at a different territorial level; different variables have been considered to measure the human capital and different proxies have been used to represent the quality of education, the skills and, also, the entrepreneurial capital (Audrestch and Feldman, 1996). By analyzing regional European data (1995-2002), Sterlacchini (2008) proves that university education has a fundamental role for GDP per capita growth, even more important than the one of R&D.

Bronzini and Piselli (2009) show that both human capital and infrastructures play an important explanatory role for the dynamics of regional productivity. They also stress the existence of regional spillovers in the public capital since the presence of infrastructures in neighbor regions positively influence the productivity of an area. By considering both patents and human capital indicators as explanatory variables for the growth rate of the per capita added value, Badinger and Tondl (2003), find that, for the sample period 1993-2000 and for 128 European regions, the quantity of patents plays a significant impact on the regional growth.

The analyses on growth models applied to less developed areas have, finally, considered also the role of the public dimensions of territorial capital, such as institutions, trust or, more generally, social capital, in fostering economic growth.

A measure of local criminality might appear, in this context, a significant proxy for these dimensions. Different crime indices have been used but the heterogeneity of the results highlight the complexity of the phenomenon and leads to conclusions that are not sufficiently justified. Indeed, the negative effects of criminal activities on the economic performance are clear. Crime discourages entrepreneurial activities, reduces employment and training opportunities and crowds out the effects of the public investments aimed at promoting growth.

However, some studies (Bagarini, Bonetti and Zampini, 2007, among others) found a positive relation between the crime rate (calculated as the variation of the number of registered crimes with respect the base year 1995) and the per capita GDP growth⁷.

On top of that, empirical evidences show that some policy variables (i.e., aid to firms in Bagarini, Bonetti and Zampini (2007) do not always exert the predicted effect on performance. For that reason, it looks plausible that the degree of efficiency in public management might generate a negative effect for actions initially intended at fostering growth⁸.

Other dimensions of territorial capital combine *material and non material* contents. The proximity between sources and knowledge and financial resources users acts as an important endogenous source of competitiveness⁹. In that context, different strand of research have concentrated on the mechanisms through which these resources accumulate and generate virtuous growth processes.

Knowledge spillovers and spin-off increase the local endowment of knowledge and, also, the diffusion and creation of new knowledge among private agents. However, the externalities diffusion goes beyond the relations among private firms. Greenaway and Kellner (2008) find that agglomeration, besides spillovers, can increase the probability of openness to exports, generating, in that way, additional productivity increments.

At an intermediate (public-private) level, the existence of public-private partnerships has also be considered as a proxy for the local functioning of efficient mechanisms of financial resource transfers among private and public entities¹⁰. In an indirect way, we can consider, as an indicator for private capital investment profitability, the number of public-private initiatives, with some emphasis to project financing.

To conclude, the existing literature does not discriminate among the different dimensions of territorial capital in revealing the impact on growth; moreover, no attempt has been made to analyze how the impact of each component changes during economic downturns.

⁷In a recent paper on crime and economic performance (Lombardo e Falcone, 2011), based on panel data model estimated with Italian data (NUTS3 level), a taxonomy of the provinces on the basis of crime indicators, human capital, employment is provided.

⁸ When referring to innovative actions in a lagging region, it often emerges that, public incentives play a role only in the adoption of innovation rather than in terms of creation of innovation by highly innovative firms (Epifanio, 2005).

⁹ See Greenaway and Kneller (2005).

¹⁰ See Cuticchio, Di Giacomo, Epifanio, and Mazzola (2011)

3 The performance on a provincial scale over the period 1999-2011: a descriptive analysis

In order to analyze the differential effects of the dimensions of the territorial capital on the provincial performance and to evaluate the likely impact of the crisis on this effect, we have considered a model specification that relates the change in the performance indicator at a provincial level with a set of explanatory variables capturing different dimensions of the territorial capital. In order to use time series covering the recent crisis period, we ended up considering, as performance variables, on one hand, the provincial exports, and, on the other, the provincial employment. Both variables allow, differently from the added value, for using a wider set of observations for the post 2007 crisis period and, therefore, enable to evaluate a distinct temporal effect for the crisis period. For that purpose, we have considered three periods characterized, respectively, by a positive cyclical phase (1999-2002), by a phase of substantial stationarity of the main economic variables (2003-2007) and, lastly, by the crisis period (2008-2011). In the case of employment, the lack of consistency in the definition of the series in the official statistics, led us to concentrate on the period 2004-2010 which has been divided into the pre-crisis period (2004-2007) and the post-crisis one (2008-2010).

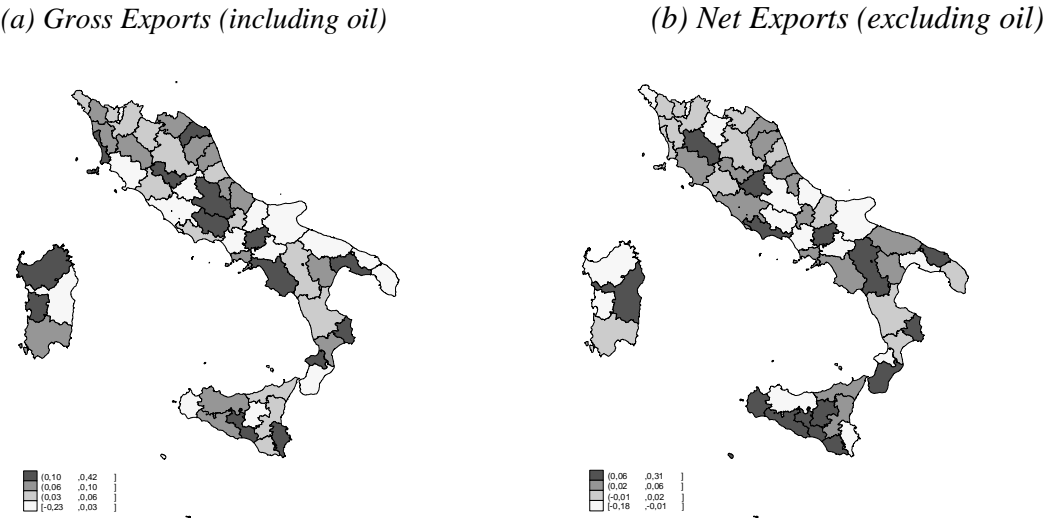
Net foreign demand represents, as known, an important territorial factor of competitiveness. The empirical literature on growth stresses the fact that the more open territorial areas are those who have grown more recently.

From this perspective, in Italy the gap between the South and the rest of the country still remains quite wide. More than 85% of the national exports is covered by the Center-North areas. The Mezzogiorno covers only 7% of the national exports (27% if compared with the Center) even though it counts for 33% of the national population (55% if we also consider only the Center). However, if we consider disaggregated data at a provincial level, the picture for Mezzogiorno is more articulated and diversified than the one arising from macro regions data. There are, in fact, many NUTS-3 regions in the South which, even though belonging to a larger region with a weak productive integration, have shown, in the last decade, some vibrancy in competing in the foreign markets.

If we consider the first sub-period (1999-2002), we find an export performance (in terms of average of annual growth rates) equal to 7.1% for the Center-South provinces (but only 2.8 % if the oil sector is excluded). The variability of the results is quite high (the growth rates are 1.4 for net exports and 2.8 for total exports).

In the first sub-period (see figure 1), the net exports are characterized by a positive dynamics for many Southern provinces and there seem to be not very significant differences between the Center and the South performances.

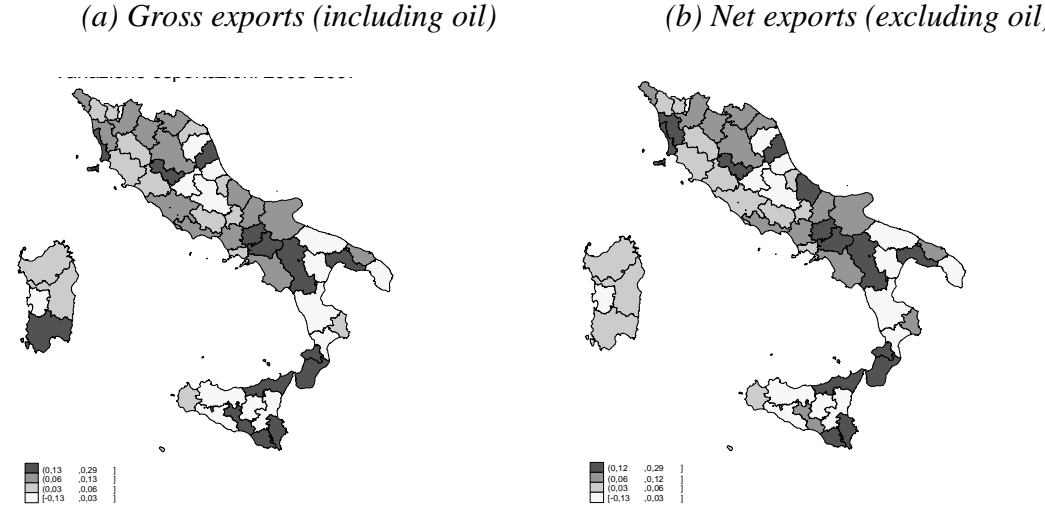
Figure 1 - Dynamics of exports during the period 1999-2002 (average of annual growth rates)



Source: Computations based on ISTAT (Coeweb) data

In the second period (2003-2007), we can observe a relevant increase in the growth rates, especially for the net exports. That component records a significant increase with an average growth rate of 6.5%, whereas the average growth rates including the oil products are quite stable (with an average rate of 7.5%). Compared to the previous period there are a smaller number of provinces exhibiting a positive dynamics in terms of exports, especially in Sicily, Sardinia, Calabria and Apulia for the South.

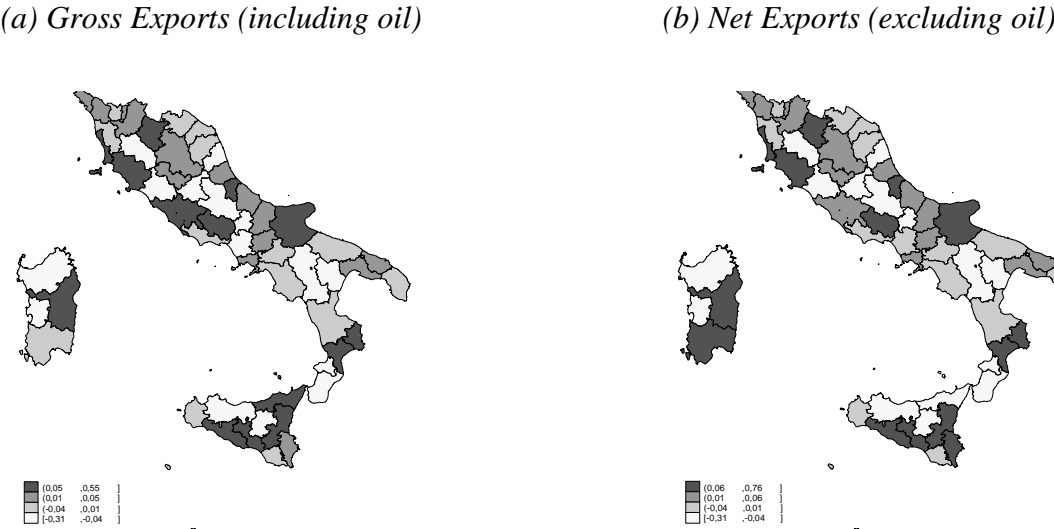
Figure 2 - Dynamics of exports during the period 2003-2007(average of annual growth rates)



Source: Computations based on ISTAT (Coeweb) data

The third period is affected by the international economic crisis which lead to a decrease in the average growth rates, that remain still positive (+3.7% for the net exports and +2% for the total exports) thanks to the recovery of the period 2010-2011; however, the variability in the growth rates has increased, with a variation coefficient of 4.7 (for net exports) and 7.1 (for gross exports). The distribution of the provinces characterized by positive growth rates (see figure 3) is quite scattered. The crisis has not only determined a higher variability in the dynamics of exports but, at the same time, has generated a deeper selectivity of the provincial areas characterized by positive performance. From a macro-regional point of view, there is a reduction in the number of Southern provinces with net export growth rates higher than the average, especially in Campania and Basilicata. As for the Center, all the regions have provinces with a negative performance in terms of average growth rate of exports; the remaining ones (especially in the big urban areas) manage to overcome the negative trend of 2008-2009.

Figure 3 - Dynamics of exports during the period 2008-2011 (average of annual growth rates)

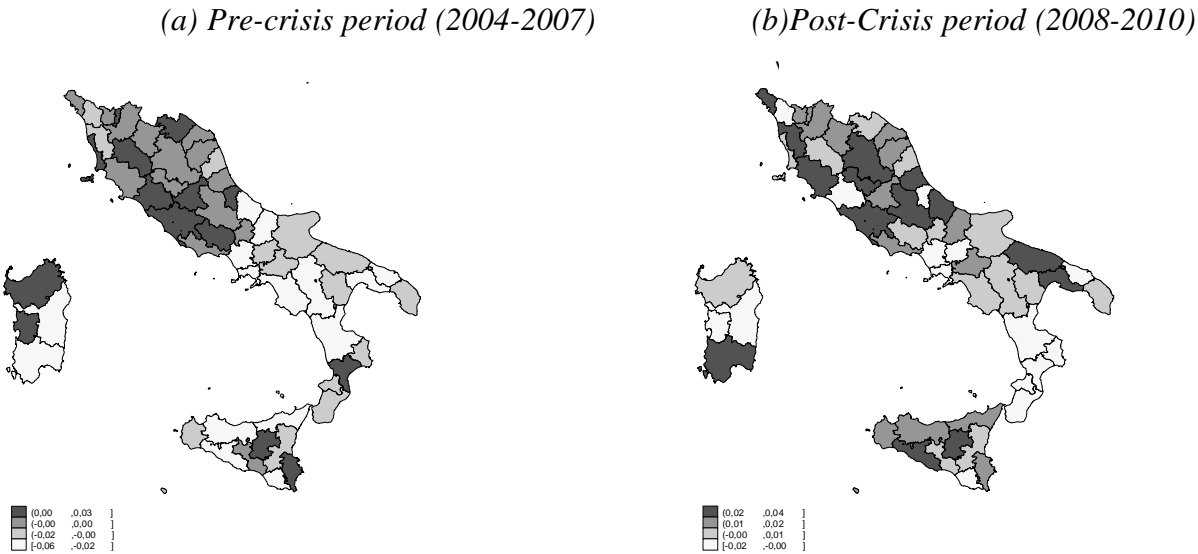


Source: Computations based on ISTAT (Coeweb) data

As far as the employment dynamics is concerned, the effect of the crisis is clear: the average annual change of employment is positive and equal to 0.8% before the crisis, and, becomes negative (-0.6%) after the crisis; also the volatility of the annual rate of change is

60% higher in the second period. Figure 4 highlights two aspects: during the first period there is a positive and widespread dynamics in both macro-regions (except for the provinces of Calabria and, somehow, of Campania, Apulia and Sardinia in the South); by contrast, in the period 2008-2010, the Southern regions suffer more and bear the crisis costs. Most of the Central provinces, although subject to a slowdown with respect to the previous period, do not suffer a lot.

Figure 4 - Dynamics of employment during the period 2004-2010 (average of annual growth rates)



Source: Computations based on ISTAT data

4. The effects of territorial capital on provincial performance: model specification and territorial features of the explanatory variables

We estimated a balanced panel equation linking the performance variable to a set of explanatory variables capturing the different dimensions of the territorial capital. The model specification is:

$$y_{it} = \gamma_i + \beta' x_{it} + \eta_{it} \quad i=1..57; t=1,2,3 \quad (1)$$

where y_{it} is the performance variable (export growth or employment growth), x_{it} is a vector of explanatory variables capturing the different dimensions of territorial capital, γ_i are provincial specific effects. In the case of a random effect model we have:

$$y_{it} = \delta_i + \beta' x_{it} + \eta_{it} \quad i=1..57; t=1,2,3 \quad (2)$$

where $\delta_i = \lambda + \gamma_i$ where γ_i is a stochastic variable with zero mean, constant variance and uncorrelated with the error term in equation (2).

The explanatory variables have been chosen with the intent of considering different dimensions of the territorial capital such as those with high level of materiality (fixed social capital, natural capital and private physical capital), non material components such as human capital, institutional-relational capital and social capital and the dimensions characterized by an intermediate level of materiality, such as entrepreneurial-relational capital, agglomeration economies and public-private capital, The public versus private or material versus non material nature of each dimension is described in Camagni (2009). The variables chosen to represent each dimension are:

- for the fixed social capital, an index capturing the endowment in economic infrastructure, calculated by the Tagliacarne Institute, separately considering the road, rail, maritime and airport infrastructures;
- for the natural capital, an outcome indicator capturing the area potential for attractiveness in terms of natural and cultural resources. The indicator chosen was the per capita average rate of staying in hotels by tourists. We also examined other indicators such as the number of nights spent by visitors and the number of beds in tourist structures and the per capita number of public libraries. The source of these data is ISTAT. The first indicator was considered more appropriate to represent the ability of territories in jointly using public and private resources for the purpose of getting advantages from the exploitation of their cultural and natural endowments;
- for the private physical capital, the provincial total capital stock derived from the series of the provincial gross fixed investments (ISTAT data) by mean of the perpetual inventory method with a depreciation coefficient of 0.2. In order to control for scale effect the variable was normalized by dividing by provincial value added and population;
- for the human capital, the number of graduates divided by the total population of age 20-24. The data of graduates refer to the place of residence of the students and not to the province where the academic program is offered. Data were obtained from the Ministry of Education and University (MIUR);
- for the institutional-relational capital, the number of social cooperatives per inhabitant, calculated by ISTAT through a specific survey. Alternatively, but with not convincing results, the diffusion of bank branches per inhabitant (source Bank of Italy) was considered;

- for the social capital, the total number of crimes per inhabitant (ISTAT source), accounting for all kind of crimes, i.e., against persons, patrimony and territory. Alternatively, in some estimates the number of bank protests per inhabitant (Bank of Italy source) was considered but without nice results;
- for the entrepreneurial-relational capital, the number of patents per inhabitant (EPO source) and the amount of foreign direct investments, both inward and outward (UIC source). The number of patents, however, resulted highly collinear with other variables in the analysis; for that reason, it was discarded in final estimates;
- for the local cognitive capital, the provincial average specialization index in manufacturing constructed from two-digit industries, given by the ratio between the provincial employment in a specific sector and the provincial total employment divided by the corresponding ratio at the national level. This index captures the localization economies. Gross indices of urbanization economies, such as the share of the most populated municipality over total provincial population and the percentage of immigrants over the total number of residents were also used. This indices showed a not significant impact in most models;
- for the public-private capital, the amount of provincial investments in *project financing* with more than three millions of euros divided by the total fixed investment in the province. The data were provided by the Italian Observatory for Project financing.

We chose the above indicators mainly for reasons related to data availability at a provincial level. Some of these indicators have been often considered in the analyses of provincial convergence. In such a way, the presence of the same indicators in a provincial export growth equation captures, somehow, the effect of the level-variable in the growth equation though this effect is decomposed into the different components of the territorial capital. The indicators were considered for each of the three periods under analysis and were referred to the immediately previous year of observation or to the starting year of the period itself. As for the public-private capital, data availability was limited only to the second and third periods. For that reason, this variable was omitted for the analyses including all the three periods. The choice of using only a single indicator for each dimension without performing a principal component analysis rests on the need of simplification and on the different impact on the performance of variables belonging to the same group.

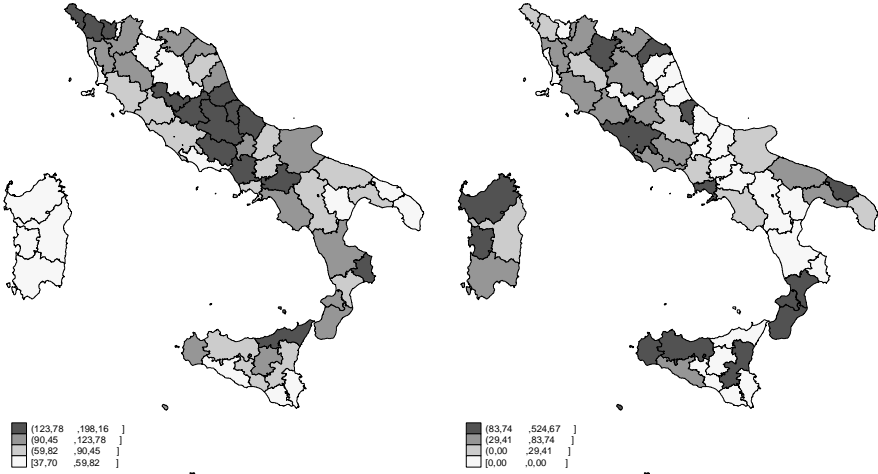
In what follows we give a descriptive analysis of the pre-crisis gap in the endowments of the dimensions of territorial capital across central and southern Italian provinces. For

many components of territorial capital, the macro-region South is less endowed than the Center. However, The South appears heterogeneous as far as the internal geographical distribution is concerned. We can observe, in fact, for some provinces in the South, values higher than the Central averages for specific components.

If we consider social overhead capital (see figure 5), we can observe a gap in terms of road infrastructures especially for Sardinia and some provinces in Sicily, Apulia and Basilicata. On the other side of the spectrum, compared with the Center-North average, there is a higher endowment in some provinces of Abruzzo, Tuscany and Campania. The gap between Center and South is, instead, less evident in the provinces where the main urban areas are localized. By looking at the temporal evolution, we can say that there are not significant changes between the first and the third period for road infrastructures. For the airport component there is a tendency to higher polarization in the higher density provinces.

Figure 5– The endowment of fixed social capital (2007)

(a) road infrastructures (b) airport infrastructures

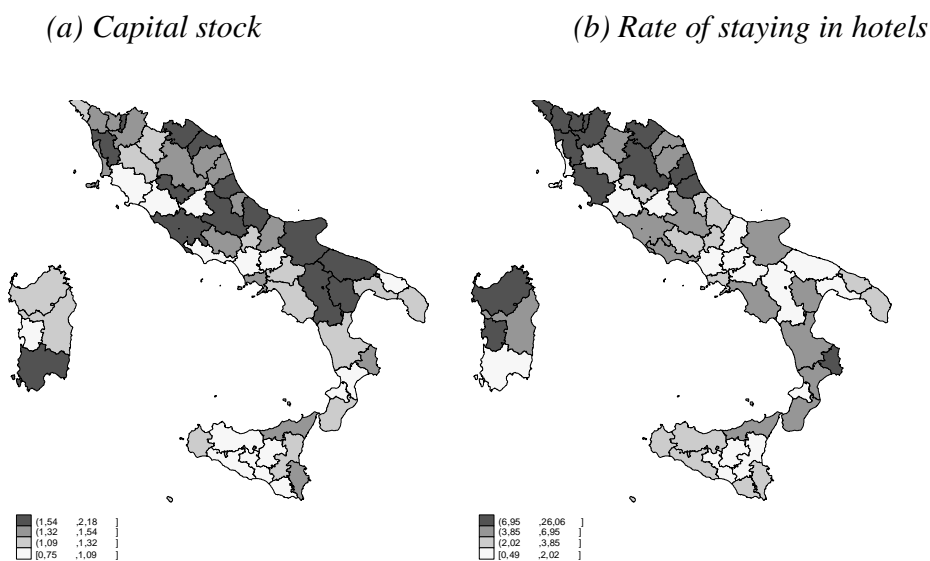


Source: Tagliacarne Institute

Figure 6 shows the large gap between the Center and the South in terms of private capital endowment, even if there are also some provinces of Apulia, Basilicata and Sardinia with values higher than the Center-South average. Another important aspect is the decrease of this type of territorial capital through time. The other component of the material territorial capital is represented by the enhancement of the natural and cultural resources, as measured by the average staying of the tourists in hotels and by the total

number of nights spent in tourist structures. If we refer to the latter of these indicators, we can immediately find a lower enhancing ability of the southern provinces with respect to the central ones. The fact that the indicator is on average lower in the urban provinces should not necessarily be explained with a weak tourists' attractiveness since the indicator is divided by the population. Indeed, if we consider the second of the two indicators, the picture is a bit different; in some cases, especially in the islands and in Calabria, we can observe higher average levels of tourists' staying.

Figure 6 – The endowment of private and semi-private material capital (2006)



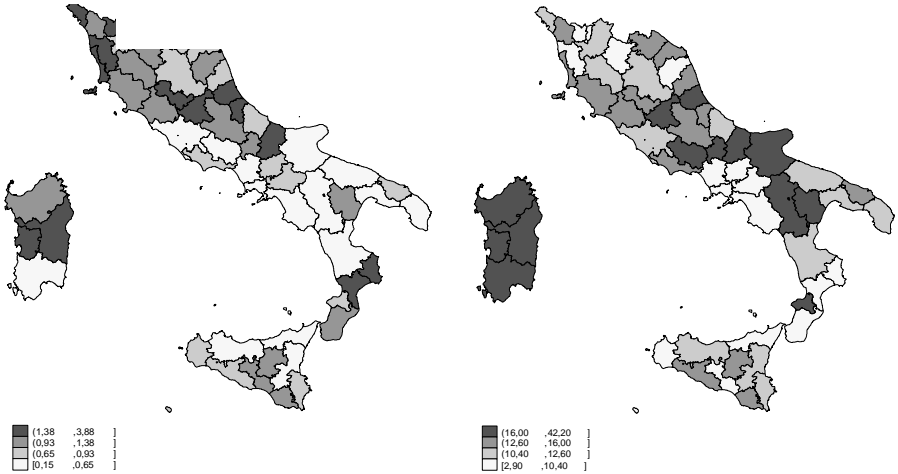
If we turn to non-material components of territorial capital, to capture social capital endowments we have chosen the number of crimes per inhabitant which represents an obstacle to the diffusion of cooperative and trust relationships among the local agents.

The indicator tends to assume lower values in the urban areas (see figure 7) because of the size of the denominator. Moreover, we also need to take into account the fact that in the South, where the crimes are more diffused, declaring crimes is less frequent. Notwithstanding this fact, many southern provinces have on average a higher crime rate with respect to the Central provinces. The indicator is also characterized by an upward trend throughout the decade and by a substantial increase in the average number of crimes between 1999 and 2007. The institutional- relational dimension of territorial capital is depicted by the number of social cooperatives per inhabitant. The South registers a higher number of social cooperatives with respect to the Center. The geographical distribution show a higher degree of concentration in

Sardinia, Molise and Apulia while less endowed are some provinces of Calabria and Campania.

Figura 7 –The endowment of public and semi-private material capital (2007)

(a) Crimes per capita (b) Social cooperatives per capita

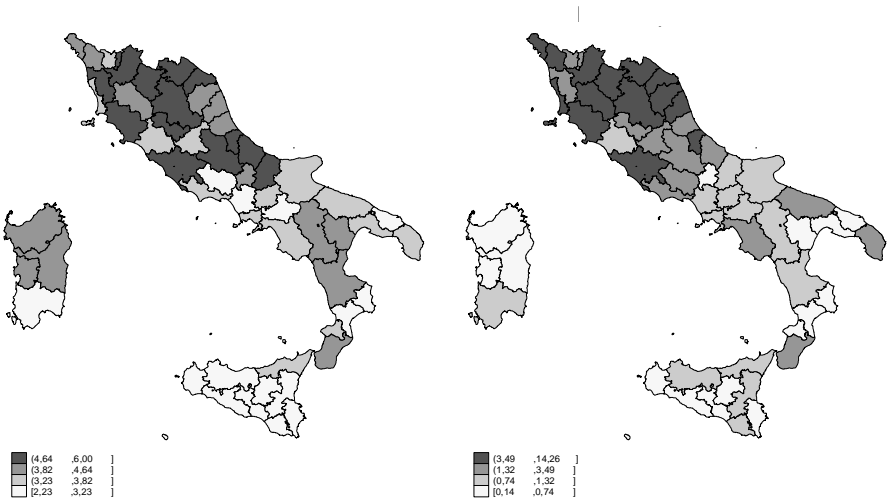


Source: ISTAT. Data for (b) refer to 2005.

Among the private non-material components of territorial capital, human capital deserves a specific analysis. We measured it by the ratio of graduates over the total number of residents in the same age class. From figure 8, we can see that there are strong differences between the southern and the central provinces which become stronger when going further South. The South-Center gap is confirmed also if we look at the entrepreneurial relational capital when measured by the number of patents per inhabitant. Also in that case, there is a higher concentration in Lazio, Tuscany, Umbria and Marche.

Figure 8 – The endowment of non material private capital (2007)

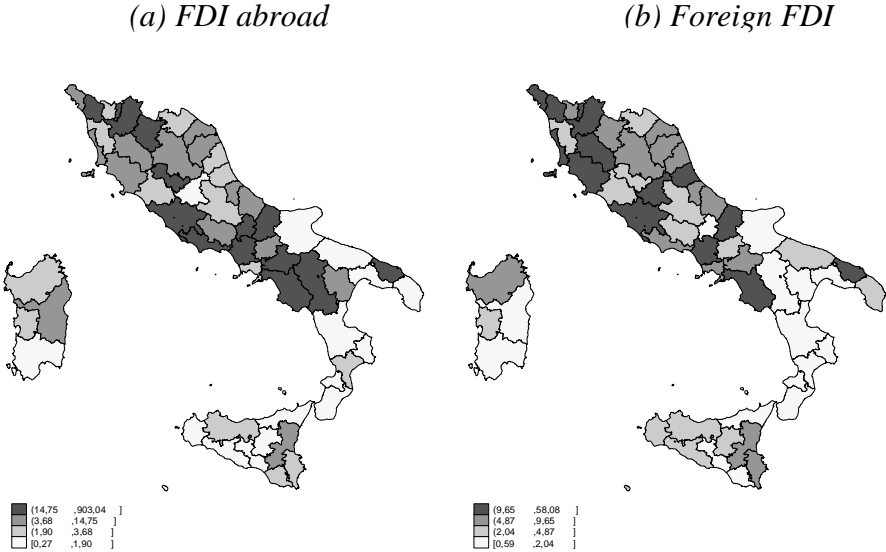
(a) Share of graduates (b) Patents per capita



The entrepreneurial-relational capital can be considered private capital with intermediate degree of materiality. Among this group, we can also look at the foreign direct investments inflows (towards Italy) and outflows (from Italy) which proxy the internationalization process and the inter-firm linkages structures of Italian firms.

Figure 9 shows clear differences between the South and the Center, more pronounced for Sardinia, Calabria and Basilicata provinces, especially in terms of inward flows.

Figure 9 – The endowment of entrepreneurial relational capital (FDI) (2007)



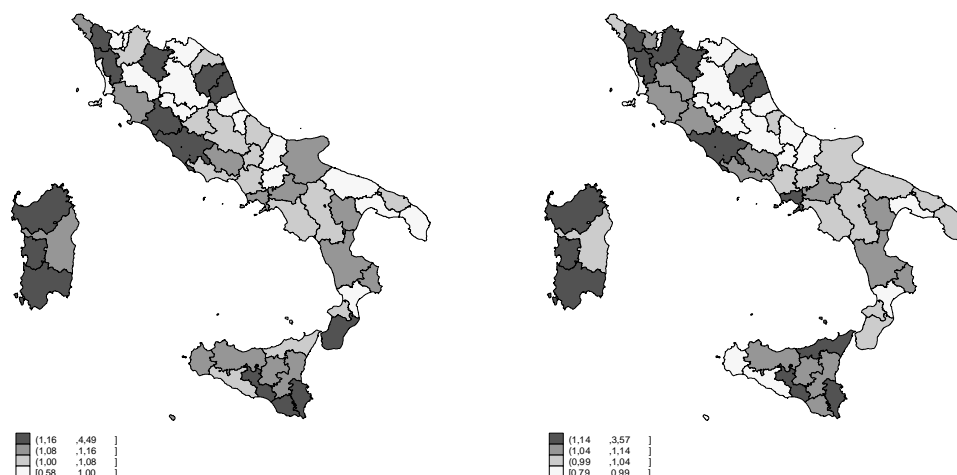
Source:UIC

Finally, a more public component of territorial capital with an intermediate level of materiality is given by localization and urbanization economies. For the first, we looked at the provincial specialization in the manufacturing sector. Figure 10 highlights a quite scattered specialization structure in the manufacturing, with an average rate higher in the large metropolitan areas and in those provinces where the main industrial plants are localized. The provinces of Umbria and Apulia are, instead, characterized by lower average specialization rates. A decrease in the provincial average rates is registered in the last period (2007) and is determined also by a higher number of provinces with lower level of localization economies.

Figure 10 – The endowment of localization economies

(a) 1996

(a) 2007



4 The effects of territorial capital on the provincial performance: the empirical results

4.1. The export growth model

In Table 1 the estimates of equations (1) and (2) of the previous section are presented. In the first two columns the unrestricted specifications for the fixed and the random model respectively are displayed. In columns 3 and 4 we show the models which take into account only the significant variables at 5% in the extended models. In the last two columns we present the differential effects of each of the territorial capital component on the parameters of the restricted model when that model is enriched by including, one by one, the variables that were initially not significant. Some computational problems in the calculation of the Hausman test have made the choice between fixed and random effects model a bit difficult.

Whenever the Hausman test has been calculated, the fixed effect model has been preferred, also for the limited number of observations. However, as it can be seen from the results, the two different methodologies give similar and, in some ways, complementary results. Therefore, for most part of the analysis, we prefer to present the results for both methods.

Preliminary tests for the presence of heteroschedasticity have been made. These tests have proved the presence of variance of errors not constant; as a consequence, all the estimates produced are based on standard errors which have been subject to the White correction by assuming the same variance for each unit.

By looking at the significance of the parameters in models 1 and 3, we can see that, for the entire period 1999-2011, the most traditional components of territorial capital (fixed social capital and human capital) have highly significant coefficients in both models.

Tab 1-The effect of territorial capital on export growth- 1999-2011 (panel with fixed effects and random effects

Variable	Extended Model (FE)	Extended Model (RE)	Restricted Model (FE)	Restricted Model (RE)	Explanatory variable effects (FE)	Explanatory variable effects (RE)
Constant		1,4050 (0,18)		-0,5192 (-0.14)		0,0043 (0,16)
Road Infrastructure	0,1730 (2,24)*	0,0057 (0,22)	0,1809 (2,55)**			
Airport Infrastructure	0,0632 (2,94)**	0,0258 (2,06)*	0,0620 (3,04)**	0,0303 (2,43)**		
Graduates Percentage	1,4693 (2,14)*	1,6963 (3,84)**	1,7287 (3,17)**	1,6157 (3,91)**		
Crimes per inhabitant	2,0524 (0,72)	-1,2907 (-0,80)			1,3139 (0,49)	
Social cooperatives per inhabitant	-0,2611 (-0,86)	-0,3067 (-2,03)*		-0,3185 (-2,08)*	-0,2480 (-0,82)	
Rate of staying in hotels	-0,0648 (-0,03)	0,5476 (0,67)			-0,1025 (-0,005)	
Average specialization index	2,5479 (0,55)	0,3174 (0,07)			2,5716 (0,68)	
Capital stock	3,0602 (0,21)	-3,112 (-1,07)			7,2381 (0,58)	
FDI (inflows)	-0,0892 (-1,34) ^o	-0,1659 (-1,92)*		-0,1997 (-2,43)**	-0,0708 (-1,10)	
FDI (outflows)	.0,0008 (-0,20)	-0,0039 (-0,54)			-0,0007 (-0,25)	
N	171	171	171	171	171	171
R ²	0,43		0,42			
AK	7,614		7,544			
LM		2,91		0,78		

Note: Variance-covariance matrix corrected for heteroschedasticity- (t-statistics in parentheses)***: significant at 1% level, **: significant at 5% level, *: significant at 10% level; ^o: significant between 10 and 20% ; AK: Akaike information criterion; LM: Lagrange multiplier test for the significance of the model with random effects

For the fixed social capital, a preliminary analysis has proved that road and airport infrastructures have a significant impact at the expenses of the other two typologies (rail and port infrastructures). The random model results, however, show that only the presence of airports in a province has positive effects on the exports growth. The impact of human capital is very strong in all the estimated equations no matter the specification employed.

In the random effect model, together with the fixed social and the human capital, two other components are significant: the institutional relational capital, proxied by the number of social cooperatives per inhabitant, and the entrepreneurial relational capital, captured by the foreign direct investments in the province. Whereas for the first of these variables, the unexpected negative sign can be justified by the nature of the data and, as shown later, by the interaction with the economic crisis period, for the second variable, the negative sign can be justified by the peculiar nature of the performance variable that has been chosen (exports): As we shall see, this is not the case when using another performance variable (*i.e.*, employment). Indeed, the negative sign can signify also that those provinces with strong presence of FDI lack both in quantity and in quality of local relations among firms. In other words, the negative sign might be ascribed to a substitution effect generated by FDIs.

If we concentrate on the other components of territorial capital, a positive sign, but only for the random effects models and with not significant coefficient, is found for the natural capital. A not significant but expected negative effect is shown for the social capital. The coefficients attached to the indicator capturing the agglomeration economies and to the foreign indirect investments are also not significant.

As for the capital stock, the significance of the parameters appears to be negatively influenced by the correlation (close to 0.4) with the human capital. The sign of that explanatory variable is ambiguous but never significant. In the fixed effects models the sign is, in facts, positive, meaning that provinces characterized by higher export growth have also higher physical capital endowment; on the other hand, in the random effects models, the negative sign implies a sort of convergence hypothesis in the export growth.

The inclusion of variables with not significant coefficients in the restricted model does not substantially modify the results. To conclude, the dimensions linked to fixed social and human capital seem to explain adequately most part of export growth in the period under study.

4.2 The effects of the crisis on the export performance

As already highlighted, the aim of the paper is to evaluate if and how the crisis period starting at the end of 2007 has changed the relation between territorial capital and growth performance. This is also motivated by the fact that the group of provinces with higher export

growth in the third period are not the same as the group of provinces characterized by the best performance in the two previous periods.

To analyze the differential effect of the crisis on the growth potential for the central and southern provinces we proceeded along different lines. Firstly, a fixed effect model with both individual and time effects has been estimated. In this kind of models, the temporal effect of the third period is significant but at the expenses of the significance of the variables that were previously significant in the base-model. The reason is the limited number of total observations and the limited number of periods considered.

In order to focus on the effect of the post-2007 period, we, then, proceeded by inserting a dummy variable for the third period in the optimal restricted models of the previous section. The results of this exercise are reported in Table 2.

Tab 2- The effect of the crisis on the relation between territorial capital and export growth (panel model with fixed and random effects)

Variable	Modello 2.1 (FE)	Model 2.2 (RE)	Model 2.3 (FE)	Model 2.4 (FE)	Model 2.5 (FE)
Constant		3,4035 (0,79)			3,4429 (0,82)
Road infrastructures	0,1823 (2,58)**	-0,0107 (-0,44)	0,1704 (2,44)*	0,1854 (2,63)**	
Airport infrastructure	0,0616 (3,01)**	0,0243 (2,29)*	0,0519 (2,36)*	0,0640 (3,01)**	0,0237 (1,86) ^{oo}
Share of graduates	1,5099 (1,56) ^o	1,0367 (1,71) ^{oo}	1,1081 (1,71) ^{oo}	1,3748 (2,05)*	0,9956 (1,95)
Dummy crisis	-0,7176 (-0,31)	-2,3883 (-1,23)			
Social cooperatives per inhabitant		-0,2057 (-1,48) ^o			-0,2497 (-1,61) ^o
Foreign FDI		-0,1872 (-2,87)**			-0,1584 (-1,87)
Dummy crisis* Crimes per capita			-2,0511 (-1,68) ^{oo}		-2,6407 (-2,20)*
Dummy crisis*Foreign FDI				-0,1285 (-1,59) ^o	
FDI abroad					
N	171	171	171	171	171
R ²	0,42		0,43	0,42	
AK	7,555		7,544	7,547	
LM		1,40			0,71

Note: see table 1

Even if the dummy for the third period has the expected (negative) sign, its coefficient is not significant nor in the fixed effect neither in the random effect model. It is worth to notice

that the restricted model is anyway sufficiently robust when we insert the dummy for the crisis.

An additional effect of the post-crisis period might be related to changes in the slopes of some variables from one period to another one. For that purpose, we have introduced in the restricted models with fixed and random effects some dummy variables interacting with the variables with not significant coefficients.

In both kind of models, the impact of the crisis is substantial in modifying the value and the significance of the coefficient of the social capital, which is as expected (negative) and significant when the crime per inhabitant variable interacts with a dummy for the third sub-period. In other words, a low level of social capital in a prolonged economic crisis period seems to determine an effect on the estimated export growth at a provincial level.

The joint negative effect of the crisis with the FDI variable is also very interesting, meaning that the likely substitution effect between FDI and entrepreneurial relational capital might have worsened the effects of the first variable during the crisis. For completeness, is worth mentioning that the coefficients of the interaction effects between the crisis dummy and the variables of the restricted model are never significantly different from zero; this proves that the effect of the relevant variables of the model (social fixed capital and human capital) does not change during the crisis.

Tab. 3 – The effect of the territorial capital on the export growth - 1999-2007 (panel model with fixed effects)

Variable	Model 3.1	Model 3.2
Constant		
Road infrastructures	0,1185 (2,17)*	0,1089 (1,97)*
Share of graduates	1,7242 (2,25)*	1,5983 (2,11)*
Specialization index	6,1118 (1,82) ^{oo}	6,1625 (1,87)
Squared capital stock over population		-0,0057 (-1,45)
FDI abroad	0,0037 (2,04)	0,0054 (2,51)*
N	114	114
R ²	0,57	0,57
AK	7,280	7,293

Note: see table 1

The differential effect of the crisis has been analyzed also by estimating again the model for the pre-crisis period only (excluding the third period). In table 3 we show the results of that exercise only for the best models (with variables significant at 5% level).

The results show that the fixed social capital variable maintains its relevance but only for its most traditional component, namely, the road infrastructures. In other words, the importance of the airport infrastructures is limited to the third period. Similarly, also the human capital variable remains important and, therefore, its effect is not particularly linked to the cycle.

Of some interest are the newly statistical significance of some coefficients: the sectoral specialization index, describing the presence of localization economies at least in the pre-crisis period, and the foreign investments of provincial firms, capturing the entrepreneurial relational capital. Both variables have a positive sign, as expected. It must be stressed that the empirical evidence for the first two periods shows a stronger negative impact of the capital stock, although the coefficients are still not significant. That proves that the fixed capital endowment plays an important role for the convergence process but also that that importance has diminished till becoming null with the enduring crisis.

4.3 Regional effects and provincial export performance

Up to now central and southern Italian provinces have been analyzed without discriminating the macro-region (Center or South) in which each province is located. The interpretation of the relation between the provincial performance and the territorial capital might be hidden if some dimensions of the territorial capital are determined at a scale larger than the provincial one. In order to check for that, the model described in the previous sections has been re-estimated after the introduction of some interaction effects between the explanatory variables and a dummy for the South, defined by considering only the regions in the Convergence Objectives (Campania, Apulia, Calabria and Sicily). This strategy was also motivated by the fact that the introduction of a simple intercept dummy for the South does make impossible to estimate a fixed effect model because of the perfect correlation with the dummies capturing the fixed effects of each province. The models in tables 4 and 5 were obtained by augmenting the restricted models in table 1 with the interaction effects between the dummy South and the variables of the model, starting with the ones with not significant coefficients. In order to avoid a multicollinearity problem, we have inserted the interaction

variables one by one. The results obtained are very interesting. In the fixed effects model, three variables whose impact on the export performance was not previously significant, show now a clear significant effect when interacting with the South dummy. In particular, the average staying in hotels shows a positive impact when interacted with the South dummy, whereas the stock of fixed capital has a negative impact. Therefore, both in the fixed and in the random effects models, the efficient utilization of the natural capital endowment appears more important in the South. Moreover, the convergence effect looks particularly relevant in this macro-region because the provinces with the lowest fixed private capital endowment appear to grow more. The effect is of opposite sign in the random effects model and we conclude that the impact of the capital stock is somewhat undetermined because of the high correlation with the human capital variable. As it can be seen from the random effects model, the interaction with the specialization variable is also particularly important for the South.

Tab 4 Interaction effects between territorial capital and Southern location (panel model with fixed effects)

Variable	Model 4.1	Modello 4.2	Modello 4.3	Modello 4.4
Road infrastructure	-0,1827 (-2,58)**	0,1889 (2,62)**	0,1793 (2,42)*	0,1931 (2,73)**
Airport infrastructure	0,0591 (2,89)**	0,0623 (3,04)**	0,0542 (2,96)**	0,0170 (1,22)**
Share of graduates	2,0191 (3,40)**	1,8212 (3,49)**	1,7910 (3,34)**	1,9573 (3,92)**
Dummy South *Crimes per capita		6,8266 (1,56) ^o		
Dummy South*Rate of staying in hotels			8,1220 (2,18)*	
Dummy South *Capital Stock	-34,5687 (-1,44) ^o			
Dummy South *Airport infrastructure	.			0,1465 (4,62)**
N	171	171	171	171
R2	0,42	0,42	0,44	0,47
Akaike	7,547	7,547	7,527	7,454

Note: see table 1

Counterintuitive is the sign for the crime variable whose coefficient is positive when interacting with the dummy South. This phenomenon, which would lead to a conclusion that in the Southern regions a higher crime rate is associated with a better export performance, can be partly justified by the arguments raised previously (the role of the denominator and the meaning of the high level of declared crimes). Lastly, we have also introduced the interaction effect between the South dummy and those variables with significant coefficients in the

restricted model. In both models, the airport infrastructures interacted with the South dummy has a strong impact and determines the lack of significance of the variable considered alone. There is also a positive effect of the institutional relational capital in the South offsetting a general effect of opposite sign. As for the interaction between human capital and the South dummy, the effect is low, of negative sign and significant only at 10% level in the fixed effect model. However, this does not reduce the general impact of the variable on the export growth.

Tab 5- Interaction effects between territorial capital and Southern location (panel models with random effects)

Variable	Model 5.1	Model 5.2	Model 5.3	Model 5.4	Model 5.5	Model 5.6
Airport infrastructure	0,0307 (2,50)*	0,0302 (2,45)*	0,0269 (2,20)*	0,0274 (2,25)*	0,0304 (2,47)*	0,0076 (0,57)
Share of graduates	1,8451 (4,27)**	1,7794 (4,11)**	1,9459 (4,42)**	1,9081 (4,40)**	1,9754 (4,46)**	1,9325 (4,11)**
Social cooperatives by inhabitant	-0,1891 (-1,14)	-0,2280 (-1,35) ^o	.0,1785 (-1,10)	.0,1620 (-0,94)	.0,2434 (-1,60) ^o	.0,1765 (-1,24)
FDI from abroad	-0,1752 (-2,14)*	-0,1780 (-2,13)*	.0,1754 (-2,13)*	.0,1708 (-2,10)*	.0,1770 (-2,16)*	.0,1770 (-2,43)**
Dummy South* Per capita crimes			3,8085 (1,99)*			
Dummy South* Staying in hotels				1,1967 (2,13)*		
Dummy South* Capital stock		2,6203 (1,32) ^{oo}				
Dummy South* Specialization index	3,3493 (1,65) ^{oo}					
Dummy South* Airport infrastructures						00495 (2,60)**
Dummy South* Social cooperatives					0,3993 (2,12)	
N	171	171	171	171	171	171
LM	2,17	1,18	2,48	1,34	1,26	0,38

Note: see table 1

4.4 The effects of territorial capital on the employment growth: pre and post-crisis periods

To conclude, we have analyzed the effects of territorial capital on the provincial performance by using, as dependent variable, the employment growth. As known, the employment dynamics, due to statistical problems caused by the discontinuity of the series, can be considered only for the period 2004-2010, which has been divided into two sub-periods: the pre-crisis (2004-2007) and the post-crisis (2008-2010) periods. The employment

variable, by its nature, besides being mainly related to the production and the added value dynamics, is more stable than the exports and, for that reason, adds a more “structural” character to the relation between provincial performance and territorial capital.

By comparing the results with those of the previous sections one has to take into account of the different sample period (2004-2010). On one hand, half a decade is omitted; on the other the sample period does not cover year 2011, during which there has been a worsening of the effects of the crisis.

Table 6 - The effects of territorial capital on the employment growth- 2004-2010 (panel model with fixed effects)

Variable	Model 6.1	Model 6.2	Model 6.3	Model 6.4	Model 6.5	Model 6.6
Port infrastructures	0,0008 (2,48)*	0,0008 (2,48)*	0,0009 (2,52)*	0,0012 (4,03)**	0,0008 (2,46)*	0,0008 (2,96)**
Share of graduates	0,5463 (5,66)**	0,5726 (5,91)**	0,5636 (5,96)**	0,2673 (1,63) ^o	-0,1773 (-0,69)	-0,3676 (-1,74) ^o
FDI from abroad	0,0487 (2,97)**	0,0519 (3,35)**	0,0480 (2,90)	0,0364 (1,98)*	0,0481 (3,53)**	0,0391 (2,86)**
Total number of nights per capita		0,3290 (1,43) ^o				
Project financing initiatives			0,0006 (0,93)			
Squared Capital stock over population				-0,0069 (-2,45)*		
Dummy crisis					-1,6466 (-3,55)**	
Dummy crisis* capital stock						-1,5382 (-5,44)**
N	171	171	171	171	171	171
R ²	0,61	0,62	0,61	0,63	0,65	0,69
AK	3,844	3,851	3,857	3,817	3,754	3,653

Note: see tab.1

Table 6 reports the main results of the analysis. The first model, which can be defined as the restricted model, contains only variables that are significant at 5% level. The positive effects of the infrastructural variables and the human capital variables are again confirmed. As far as infrastructures are concerned, port infrastructures are the only significant with a positive effect; the road ones display a negative sign and a not significant coefficient. It is worth noticing that the negative effect of the foreign direct investment variable is significant also in the fixed effect model.

In the second model of table 6 the natural capital variable has been added to the base-model as proxied by the per capita nights spent in tourist structures. That variable has a positive sign and is significant only at 15% level. In the third model of table 6, the public-

private capital, proxied by the ratio of the project financing investments over total investments has been introduced. The impact of that variable is in line with our expectations but its coefficient is not significant. As for the private capital stock, its coefficient is significant only if the variable enters the equation in a quadratic form and divided by the population. The dummy variable capturing the impact of the crisis is significant and with expected sign; this holds also for the interaction variable between the crisis dummy and the capital stock which is significant and negative. In general, the estimates of the effects of the territorial capital on employment growth seem to confirm the results for the export growth with some differences explained more by the different and shorter sample period rather than by the choice of the dependent variable. To validate that, the equations of the effects of the territorial capital on the exports for the shorter period (2004-2010) produce results which are analogous to the one presented in this section.

5 Conclusions

This paper aimed at analyzing how central and southern Italian provinces reacted to post-2007 crisis and at testing whether the characteristics of pre-crisis provincial territorial capital have determined a differential impact vis-à-vis the recession. The results that we have obtained, though preliminary, show the persistence of specific dimensions of territorial capital as far as positive effects on performance are concerned. In fact, social overhead capital (infrastructures) and human capital appear to explain provincial performance in terms of export and employment regardless the methodology and the period under consideration. On the other hand, growth equation is often sensible to model specification for the measurement of the endowment of less material and non material goods and services: social capital, relational capital, both institutional and entrepreneurial, even localization economies have a weak effect outside the crisis period and, in any case, the impact is not widespread.. Many models show a differentiated impact on some variables whose coefficients in not significant when the period is extended. In this context, there appears to be a greater importance for some types of infrastructures (the airport ones) and we found also a negative effect of FDI on local relationships among firms. Particularly relevant, especially in policy terms, is the consideration that non material dimensions have a specific effects for provinces localized in southern regions belonging to the Convergence Objective. The conclusions are quite similar when performance is measured by employment growth. In this case, however, both aggregate and specific effects are more remarkable and, therefore, additional dimensions play a significant role. Overall, the paper shows the utility of decomposing capital endowment of an

area in a multidimensional concept such as territorial capital, particularly for determining territorial specific policies to resume the growth process.

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