Il Capitale Territoriale: scenari quali-quantitativi di superamento della crisi economica e finanziaria per le province italiane

Territorial capital

Relational and human capital

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Abstract

This methodological paper aims at critically summarizing the main steps undertaken in collecting a new data set for the measurement of non-material characteristics of concept of territorial capital, for Italian provinces.

The geographical distribution of non material components of territorial capital show consistent that spatial imbalances, therefore confirming the need for space-specific policies, with the aim of maximizing inherently local returns to specific investments.

1. Introduction

In the late 2000s Italy experienced, as the rest of the world, the effects of an economic and financial crisis. The latter resulted, among other things, in a slowdown in GDP growth and in a sharp increase in unemployment. Even if there is no consensus about the future global scenarios, the fundamental issue which has to be investigated concerns two aspects. The first one involves the distribution of the consequences across Italian regions, whilst the second one refers to the explanation of how provinces could react and eventually engage in exit strategies from such a crisis.

This issue can be faced form two perspectives. Keynesian demand-side approach has for long shown good explanatory capacity, but it is probably not capable to explain and to predict the huge variety of regional development stories. The latter, especially in the long run, do not primarily depend on the internal or even international demand. It is based, instead, on a wide variety of territorial assets, both tangible and intangible, and of private, public or mixed nature. From a theoretical point of view, this supply-side approach has been formalized by a broad literature. Many endogenous sources of economic growth have been identified: examples are the concept of social capital (Putnam, 1993), relational capital (Camagni, 1999; Camagni and Capello, 2002). More recently, Camagni (2008) introduced the new concept of territorial capital. This concept includes all the territorial assets which matter in explaining the patterns of regional growth and basically summarizes all the sources of development suggested by previous literature. The potential of this approach is represented by the provision of a solid, homogeneous theoretical framework through which present regional scenarios can be explained and, as far as possible, future ones can be predicted. On the other hand, the main difficulty in transposing this framework into empirical applications relies on the measurement problems of some intangible assets.

The present work is aimed at investigating the territorial capital endowments across Italian provinces. More in details, we will focus on some of its non material components.

The discussion is organized as follows. In order to better define the object of our analysis, the next section is devoted to a brief review of the concept of territorial capital, substantially based on the taxonomy proposed by Camagni (2008). Hence, we will address the major measurement problems affecting those elements we want to estimate. The third part concerns the sources of our data set, whilst in the fourth paragraph we will present and define the indicators chosen as proxies for the intangible features of territorial capital. Finally, in the last section some evidence is represented through maps, in order to better examine the territorial endowments and the most significant differential across provinces.

2. Description of the territorial capital elements to be analyzed: measurement problems

Territorial capital can be defined as the set of assets of different nature which characterize territories. The complexity of this concept can be overcome through a graphical representation developed by Camagni (2008). This representation consists in a three-by-three matrix, collecting all the potential sources of territorial capital. Table 1 shows the theoretical taxonomy of these elements.

The matrix is built upon two main dimensions: rivalry and materiality. On the rivalry axis we move from pure public goods (in the low part of the table) to private ones, while on the materiality axis we shift from tangible goods (in the left part of the table) to intangible elements. A detailed interpretation of all these combinations is reported in Camagni (2008). Here we will restrict our analysis to some non material features and, in particular, to the so called relational and human capital.

Being partially rivalrous (box *e* in the matrix) relational capital cannot be defined neither as a pure public good nor as a private good. To some extent it is closer to the concept of club good, where the club membership is determined by being an active part (*e.g.* a worker, a student) of a certain community. According to Camagni (2009), relational capital may be interpreted as the sub-set of bilateral/multilateral linkages that local actors have developed, both inside and outside the local territory, facilitated in doing so by an atmosphere of easy interaction, trust, shared behavioral models and values.

Table 1. A theoretical taxonomy of the components of territorial capital

R i v a l r y	**Tangible goods** (hard)	**Mixed goods** (hard + soft)	**Intangible goods** (soft)
High rivalry (private goods)	Private fixed capital stock Pecuniary externalities (hard) Toll goods (excludab.) *c*	Relational private services operating on: - external linkages for firms - transfer of R&D results University spin-offs *i*	Human capital: - entrepreneurship - creativity - private know-how Pecuniary externalities (soft) *f*
(club goods) (impure public goods)	Proprietary networks Collective goods: - landscape - cultural heritage (private "ensembles") *b*	Cooperation networks: - strategic alliances in R&D and knowledge - p/p partnerships in services and schemes Governance on land and cultural resources *h*	Relational capital: - associationism - cooperation capability - collective action capability - collective competencies
(public goods) **Low rivalry**	Resources: - natural - cultural (punctual) Social overhead capital: - infrastructure *a*	Agencies for R&D transcoding Receptivity enhancing tools Connectivity Agglomeration and district economies *q*	Social capital (civicness): - institutions - behavioural models, values - trust, reputation *d*

M a t e r i a l i t y

The cognitive outcomes of relational capital facilitate collective learning and knowledge production in many ways. Capello (2001) identifies three main channels. The first one concerns the reduction of the uncertainty characterizing the production of knowledge, through socialized processes of information transcoding and management of information, as well as through imitation and control among potential competitors. The second source of knowledge spillovers is represented by collective learning, defined (Capello, 2001) as a dynamic and cumulative process of knowledge production, transfer and appropriation, taking place thanks to the interactive mechanism which are typical of an area where a strong sense of belonging and intense relational synergies take place. Finally, the third factor involves ex-ante coordination among economic agents facilitating collective action.

The economic literature positively links relational capital to innovation activity of firms (Capello, 2001) which, in turn, is recognized as one of the main sources of economic growth (Segerstrom, 1991). Then, its

distribution across Italian provinces is a relevant topic, which has to be properly analyzed in order to better interpret past trends and future potentials of growth.

Obviously, the major difficulty in transposing this issue from its theoretical framework into an empirical application concerns the availability of indicators able to correctly act as proxies for these intangible, and as a consequence unobservable, elements. Camagni and Dotti (2009), studying the territorial capital endowment of four Italian urban areas, defined the stock of export as a proxy for relational capital. Rather than on multinational linkages, in its contribution Capello (2001) focused on the relationships between firms located in the same region. More in details, the index used in this work was defined by the knowledge acquired from other local firms via the local labor market (more than 50 per cent of employees recruited by other local firms and trained in other local firms).

Based on these two contributions, we decided to include two dimensions in our analysis. The first one is devoted to the investigation of the relational capital formed by the net of cooperation capabilities and collective competencies linking economic agents within the national borders. On the other hand, the second group of indicators is closer to the definition provided by Camagni and Dotti (2009) and focuses on the connections between Italian firms and foreign markets.

Human capital (box *f* in the matrix) refers to the set of skills, competencies, abilities owned by the individuals. Due to its high rivalry, it can be defined as a private good. A wide literature already focused on the role of human capital on economic development (Benhabib and Spiegel, 2002, Becker *et al*., 1990), showing positive connections between these two variables. Again, being human capital a non material component of territorial capital, it is extremely difficult to provide a complete and fully satisfactory measure of it.

The most intuitive way to approximate these cognitive elements involves formal education. Both the quantity and quality of education appear to represent two key factors in explaining economic growth (Barro, 1998). However, human capital includes many other elements. As pointed out by Becker (1975), workers also learn outside of schools, especially on jobs. More in details, firms may contribute to human capital accumulation in two ways. The first one, more direct, concerns the investments in R&D activities or in training programs for the employees. The second one has a less tangible nature, and it is associated to the knowledge spillovers between firms (Beaudy and Schiffauerova, 2008).

Based on these basic distinctions, our attempt is to provide some evidence about the stock of human capital across Italian provinces. A first group of indicators is devoted to the analysis of schooling rates and other measures of education. Hence, a second set of data will investigate the role of the firms in human capital formation.

3. Data and sources

The data presented in this work have been collected from a variety of sources. In this section we will briefly describe each of them. In general, most of the data analyzed in the next paragraphs refer to 2006, exceptions will be pointed out in the following lines.

The first two indicators involve the diffusion across provinces of forms of associations and collective action capabilities among citizens. The first index is represented by the number of social cooperatives per 100,000 inhabitants. The second one concerns the number of volunteers regularly offering their work and

competencies to nonprofit organizations, weighted for the resident population. The data are supplied, respectively for 2005 and 2003, by the Italian National Statistic Institute (ISTAT).

Still concerning relational capital, one indicator tries to investigate the relationships between firms and banks. The number of bank branches (classified based on their form of governance) over the resident population is provided by the Bank of Italy[1] for 2006.

The flows of export have been collected from the annual reports edited by the Italian Institute for Foreign Trade (ICE). The source of the data about the foreign companies partially or totally owned by Italian firms is represented by the *Reprint* database, managed by the Polytechnic of Milan jointly with ICE.

The number of graduate students in scientific topics is provided by the Italian Ministry of Education, University and Research (MIUR), whilst the other data about education (non-schooling rates and the share of high educated workers) are supplied by the Italian National Institute of Statistics (ISTAT).

The number of patent applications presented at the Italian Patent Office (UBI) has been provided by the UBI data base.

Finally the last indicator, a related variety index, is based on the data from the "*VIII Census on Industry and Services*", conducted by ISTAT in 2001.

4. Indicators and proxies for territorial capital elements

As anticipated in the second chapter, this work mainly focuses on the concepts of relational and human capital. Both of them are investigated from two different perspectives.

Concerning relational capital, in the first place we are interested in analyzing cooperation capabilities and collective competencies between economic agents located in the same country. Secondly, following Camagni and Dotti (2009), we will consider the network of activities and relationships connecting Italian companies to foreign markets.

The section devoted to human capital includes two main groups of indicators. The first one is aimed at analyzing the differences, in terms of formal education and school attendance, across Italian provinces. The second section is dedicated to the contribution of firms to human capital accumulation.

In the following lines we provide a description of our indicators, which are summarized in table 2.

Relational capital.

The first index (*coop*) refers to the diffusion of social cooperatives in our country. Social cooperatives are nonprofit organizations, aimed at pursuing the general interest of the community through the social

[1] Bollettino Statistico, December 2006.

integration of citizens. Established in 1991[2], social cooperatives cover either caring activities, such as health, social and educational services, or training activities as the introduction of disadvantaged people to business activities and employment opportunities (Thomas, 2004). The widespread presence of such organizations represents a proxy for the intensity of associationism and cooperation capabilities in a particular area. More precisely, the indicator presented in the next paragraph is simply equal to the number of social cooperatives per 100,000 inhabitants:

$$Coop = \frac{Number\_of\_social\_cooperatives}{Resident\_population} \cdot 100{,}000$$

Closely related to the first index, the second variable included in our analysis concerns the distribution of volunteering in Italy. Again, the rationale here is that high participation rates to volunteer activities reveal strong collective action capabilities and collective competencies. Hence, the second indicator (*volunt*) is represented by the ratio between those people who are regularly offering their work to nonprofit organizations and the resident population:

$$Volunt = \frac{Regular\_volounteers}{Resident\_population} \cdot 1{,}000$$

The third and the fourth indicators try to shed some light on the accessibility of credit markets and on the relationship between banks and firms. The first index (*banks*) reports the number of bank branches per 100.000 residents:

$$Banks = \frac{Number\_of\_bank\_branches}{Resident\_population} \cdot 100{,}000$$

This indicator gives an idea about the distribution of the credit institutions across Italian regions. In the last twenty years our country has experienced numerous regulatory changes which deeply modified its credit market. Since 1990, Italy has gradually reduced the public intervention in the market: the share of the total assets in the banking system owned by public bodies decreased from 68 per cent in 1992 to 9 per cent in 2003 (Carletti et al., 2005). Moreover the new legislation, by removing substantial entry barriers and exposing national banking markets to potential new entrants, produced pro-competitive effects, such as a decrease in banks' net interest margins (Danthine *et al.*, 1999). As a consequence, the localization of banks is not planned anymore by public bodies but by the private owners. According to some authors (Giannola 2002), this process led to a decrease of credit availability in the less developed areas of the country.

The second index (*coop_banks*) is defined as the number of branches owned by cooperative banks (BCC) over the resident population.

$$Coop\_banks = \frac{Number\_of\_BCC\_branches}{Resident\_population} \cdot 100{,}000$$

[2] Legge 8/11/1991 n° 381.

The *ratio* behind the inclusion of this indicator relies on the relationship between the bank organizational structure and the availability of credit for small business pointed out in the literature (Berger and Udell, 2002). Due to their nature, deeply rooted in local environments, BCC are more likely, compared with other types of financial institutions, to develop strong relationships, based on trust and reliance, with small firms, according to the so called *relationship banking* model (Boot, 2000). Obviously, this issue is particularly relevant for most of the regions of our country, predominantly characterized by small firms.

In the second part of this section we address the concept of relational capital based on the work by Camagni and Dotti (2009). In their contributions, the two authors used the flows of export as a proxy for relational capital. This choice is based on the assumption that exporting firms have to be part of a network of relationships (with other companies and institutions) which enable them to sell their outputs on foreign markets. Following this approach, we selected four indicators.

The first index (*export*) is nothing but the restatement of the indicator used by Camagni and Dotti (2009): the value of the export weighted for the labor units employed in the industrial and agricultural sectors[3]:

$$Export = \frac{Value\_of\_export}{Labor\_units} \cdot 1{,}000$$

If this indicator captures the state of affairs in 2006, the following one provides an idea about its recent trend. The second index (Δ*export*) is defined as the percent change in export between 2003 and 2006:

$$\Delta Export = \frac{export06 - export03}{export03} \cdot 100$$

Finally, still concerning firms' business on foreign markets, we included in our analysis two indicators aimed at investigating companies' internationalization beyond its commercial aspects. The rationale behind this choice is that cooperation capabilities and collective competencies vary according to the nature of the relationships between firms.

The third indicator (*workers_abroad*) is given by the ratio between the number of workers employed by foreign firms partially or totally owned by Italian companies and the labor units employed in the industrial sector:

$$workers\_abroad = \frac{workers\_in\_subsidiary\_companies}{labor\_units} \cdot 100$$

The fourth index (*firms_abroad*) is defined as the number of subsidiary foreign firms over the number of companies operating in each Italian province:

$$firms\_abroad = \frac{number\_of\_subsidiary\_companies}{Italian\_companies} \cdot 100$$

[3] The building sector is excluded.

The comparison between these two indicators provides some information about the overall extent of the intervention of Italian firms on foreign production markets and about the average dimension of the subsidiary companies.

Human capital.

The first part of this section is devoted to the analysis of some indicators about the education of the population across Italian provinces.

The first index (*graduate*) is represented by the number of the students who graduated (in 2006) in a scientific topic.

$$graduate = number\_of\_graduated\_students\_in\_scientific\_topics$$

The territorial distribution is determined by the province where the university is based and not according to the students' territory of residence. Even if some students may decide to come back to their birthplace after the graduation, we can assume that during their studies they get in touch with firms and institutions located in the same region of the university. These companies and agencies may benefit from their connections with local universities, for instance by offering job positions to the best students.

The second indicator (*comp_education*) is defined as the share of resident people who did not complete compulsory education:

$$comp\_education = \frac{people\_who\_did\_not\_complete\_compulsory\_educ.}{resident\_population}$$

The third and last index about education (*high_educ*) is given by the ratio between the number of workers (between 35 and 44 years) holding at least a high school degree and the total number of workers in the same age cohort:

$$high\_educ = \frac{high\_educated\_workers\_(35\text{-}44\_years\_old)}{total\_number\_of\_workers\_(35\text{-}44\_years\_old)}$$

As anticipated in the previous paragraph, human capital can be addressed by many perspectives. The level of education across the population is the result of both public and private investments. Another dimension, predominantly private, concerns firms investments in R&D activities. In order to investigate this feature, we included in our analysis the following indicator (*patents*), defined as the number of patent applications per worker presented, in 2006, at the Italian Patent Office (UBI):

$$patents = \frac{number\_of\_patent\_applications}{total\_number\_of\_workers}$$

Finally, in order to capture the extent of knowledge spillovers between firms, we include a related variety index for Italian provinces.

The theoretical framework behind this approach relies on the basic classifications of the determinants of the clustering of economic activities. Economic literature usually identifies two groups of externalities which are supposed to drive the process of knowledge innovation and diffusion: specialization externalities and diversity externalities. The former operate mainly within a specific industry, whilst the latter work across sectors (Beaudy and Schiffauerova, 2008).

Specialization externalities refer to the concepts developed by Marshall (1890), Arrow (1962) and Romer (1986). In a nutshell, the idea is that the concentration of an industry in a region stimulates knowledge spillovers between firms and supports innovation in that particular industry within that region (Beaudy and Schiffauerova, 2008). On the other hand, the concept of diversity externalities has been formalized by the work of Jacobs (1969). According to this theory, knowledge spillovers between firms do not operate within the same industry, but rather across different sectors. For this reason, cities, which are characterized by a broad variety of activities, are identified as the main source of innovation.

A broad literature tried to empirically verify these theories (Duranton and Puga, 2000). Frenken *et al.* (2007) faced this issue by focusing on the concept of variety. The research question addressed by their work was the following one: since we are dealing with two different kinds of spillovers, both within and across sectors, which is the precise composition of sectors in the economy that creates most spillovers? In order to answer this question they introduced the concept of related and unrelated variety. Related variety involves sectors which are related in terms of shared or complementary competences (Boschma and Iammarino, 2009), while unrelated variety concerns those industries distant to each other in terms of cognitive proximity. Recalling the basic distinction between the two groups of externalities, we can interpret related variety as specialization externalities, whilst unrelated variety is closer to the concept of diversity externalities.

Boschma and Iammarino (2009) applied this method to the Italian regions. Their results show how variety per se apparently does not affect economic growth. On the other hand, related variety seems to be related to regional value-added growth. Following this method, we will try to estimate an index of related variety at the provincial level.

The indicator for related variety used by Boschma and Iammarino (2009) and developed by Frenken et al. (2007) consists of an entropy index defined at different levels of sectorial aggregations. Here we make use of the data from the "*VIII Census on Industry and Services*", which allow telling apart sectors at five-digit level. Hence, the related variety index is measured as follows. Since all the five-digit sectors *i* fall under a two-digit sector S_g, where $g = 1,\ldots,G$, we can derive the two-digit shares P_g by summing all the five-digit shares p_i:

$$P_g = \sum_{i \in S_g} p_i$$

Note that the shares of each sector are estimated in terms of the number of workers employed. Then, related variety is defined as the weighted sum of entropy within each two-digit sector:

$$RELVAR = \sum_{g=1}^{G} P_g H_g$$

where the entropy index is defined by:

$$H_g = \sum_{i \in S_g} \frac{p_i}{P_g} \log_2 \left(\frac{1}{p_i / P_g} \right)$$

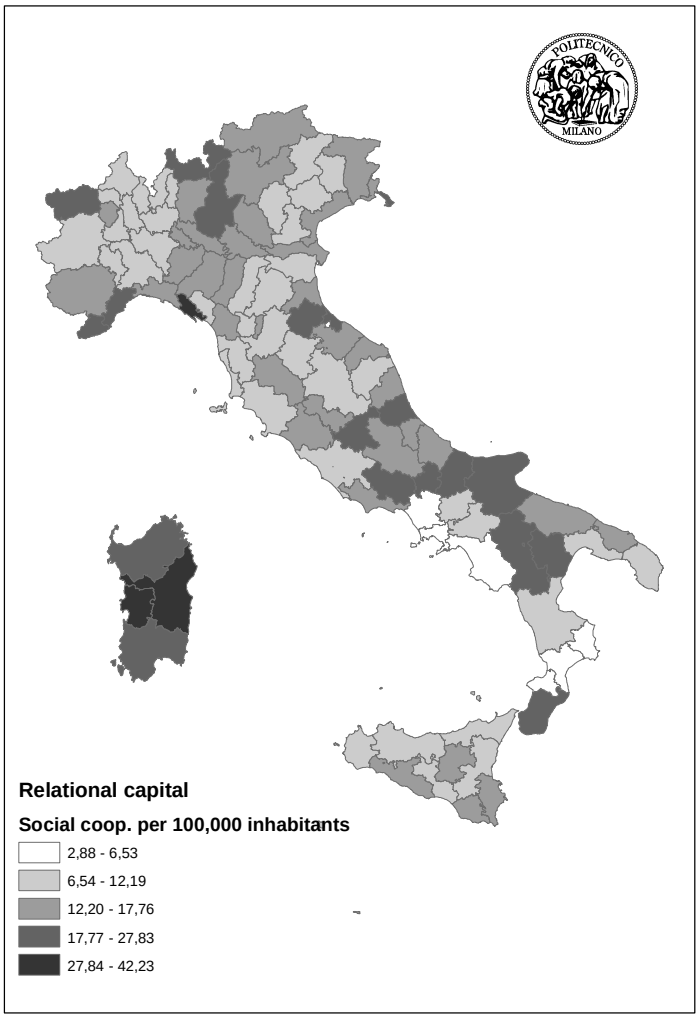
5. Geographical representation of territorial capital indicators: a critical description

The discussion of the results is organized in four paragraphs, each one devoted to a particular category of indicators, as summarized in the previous section.

5.1 Cooperation agreements and networks of firms

This dimension is analyzed through four indicators. The first one concerns the number of social cooperatives per 100,000 inhabitants. Results are mapped in figure 1. First of all, we have to remark some regional peculiarities. Sardinian provinces are all characterized by high values of the index. Oristano (42.23) and Nuoro (32.72) fill the first two places considering the entire peninsula. A similar evidence involves Liguria, Basilicata and Molise.

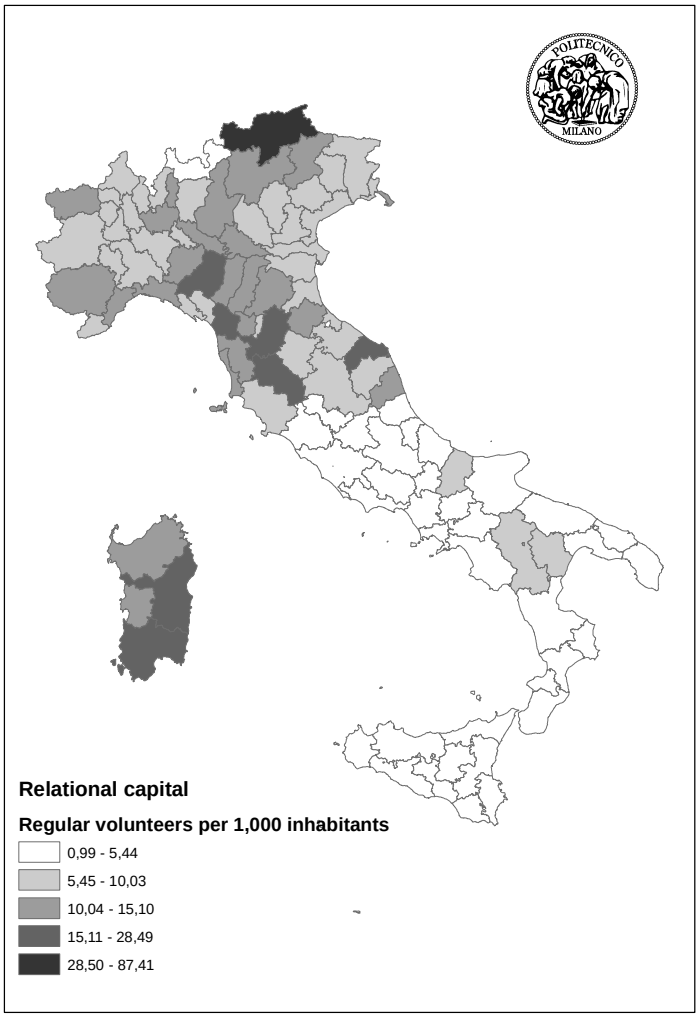
Figure 1. Number of social cooperatives per 100,000 inhabitants.



On the other hand, some regions are marked by a weak presence of social cooperatives. Some examples are represented by Calabria (with the exception of Reggio Calabria), Campania and Sicily, but also Piedmont in North Italy. Finally, a third group of regions alternate different cases: some provinces are well endowed with social cooperatives, whilst in some others this organizational form is less common. In this group are included some regions in the North-East (Veneto, Friuli-Venezia Giulia), Central (Marche, Toscana, Emilia-romagna) and South Italy (Apulia).

The second indicator devoted to relational capital linkages within the national borders is reported in figure 2. It shows the number of regular volunteers, weighted for the resident population.

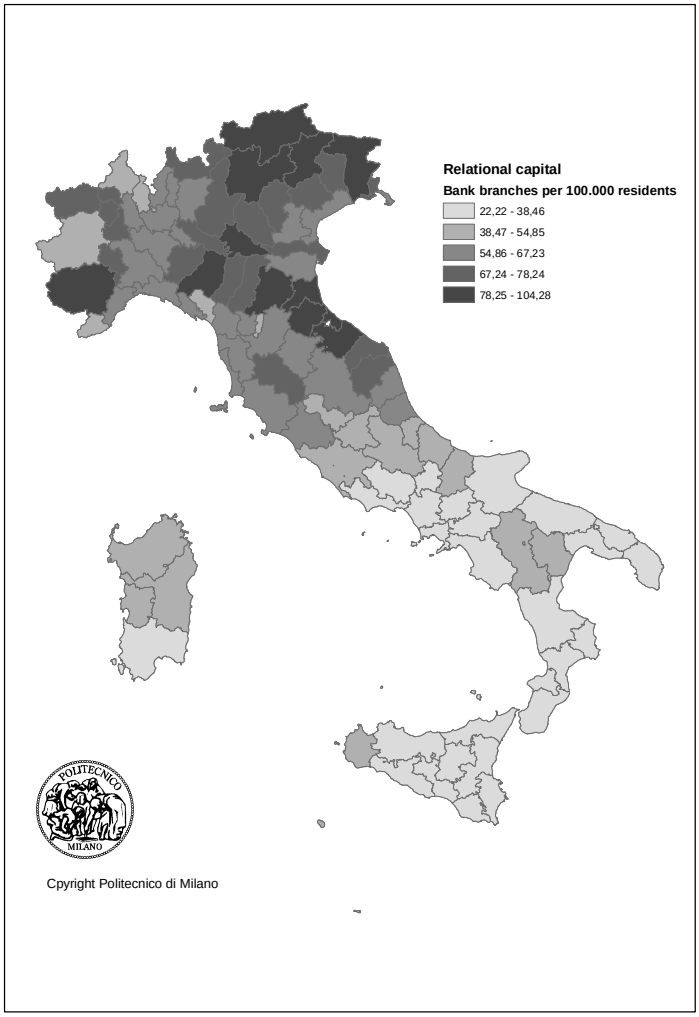
Figure 2. Regular volunteers per 1,000 inhabitants.



This time the results' interpretation is straightforward, since clear territorial patterns are detectable. Excluding some very few exceptions (Matera, Potenza and Campobasso), all Southern provinces are included in the lowest category. The same holds for Lazio and Abruzzo. As in the previous figure, a remarkable case is represented by Sardinia, marked by high rates of both social cooperatives and volunteer workers. Concerning the rest of the country, noteworthy rates denote Trentino-Alto Adige, Emilia-Romagna and Tuscany. The same evidence applies for Lombardy, with the exception of the province of Sondrio.

The third indicator included in this section considers the number of bank branches per 100,000 inhabitants. Territorial scenarios are mapped in figure 3. This time the gap between Northern regions and the rest of the country is relevant: with few exceptions, all the provinces in the South are located in the lowest category. Even if this spread was already observable before the reform of the banking system, the distance between the two macro areas of the country further increased during the last twenty years (Mattesini and Messori, 2004).

Figure 3. Bank branches per 100,000 inhabitants.

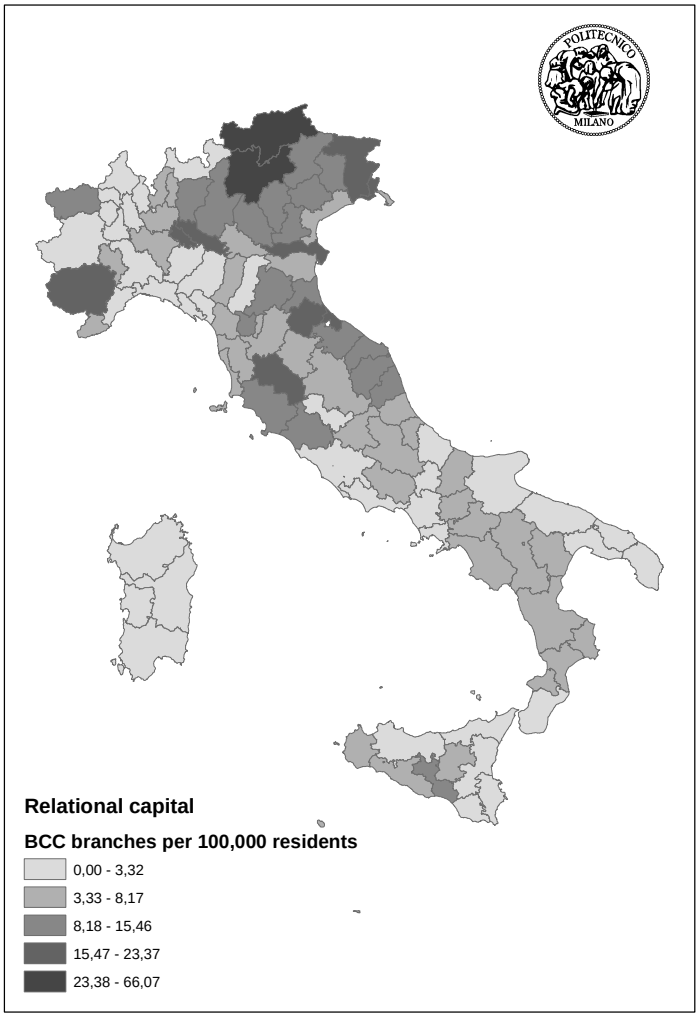


If the distribution of bank branches across Italian provinces clearly highlights a huge gap between the two main parts of the country, the evidence reported in figure 4 provides further information about the relationships between firms and credit intermediaries. In this map the ratio between bank branches and resident population is restricted to cooperative banks (BCC).

Comparing this map with the previous one, the first thing to be noted concerns the distance between North and South. With respect to the whole credit system, the presence of cooperative banks is more homogeneous across the various parts of the country. Southern regions are, in general, still characterized by low values of the index, even if some provinces (such as Caltanissetta and other areas in Calabria, Basilicata, Campania and Sicily) differentiate themselves from the others. The core of the BCC activity is located in the North-

East and in some parts of the central portion of our peninsula (Rimini and Forlì in Emilia-Romagna, Siena and Pistoia in Tuscany).

Figure 4. BCC branches per 100,000 inhabitants.



5.2 Strategy of multinational companies

A multinational company can be defined as a company which manages production or delivers services in at least one foreign country. As we explained more in details in the previous paragraph, this dimension has been investigated using four indicators.

The first one is the value of the export weighted for the total number of labor units employed in the industrial and agricultural sector.

Figure 5. Value of export per 1,000 labor units.

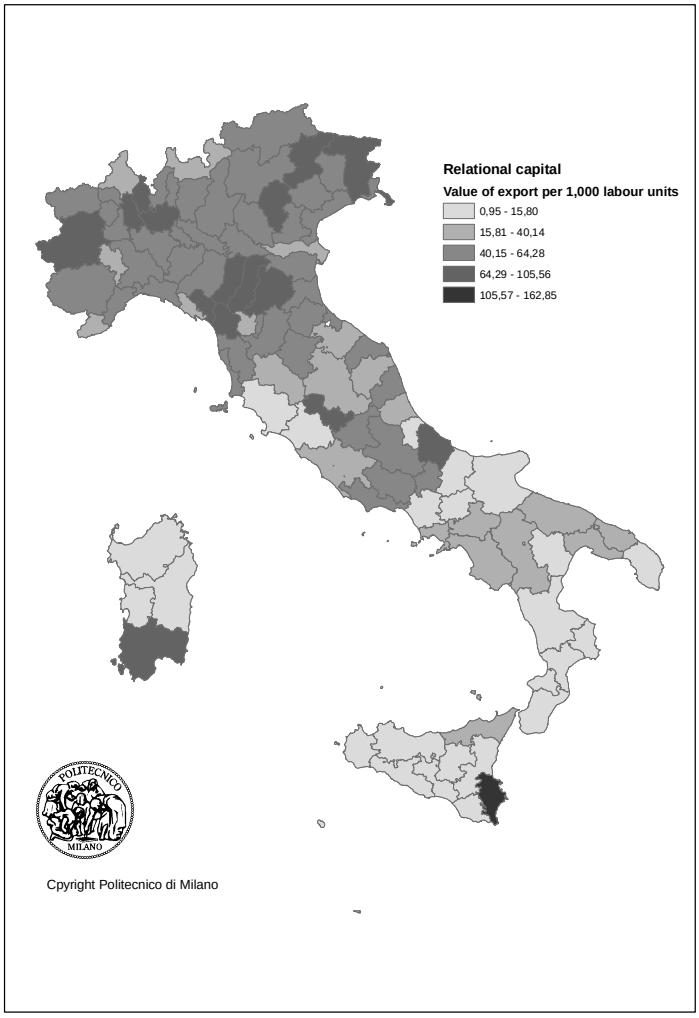
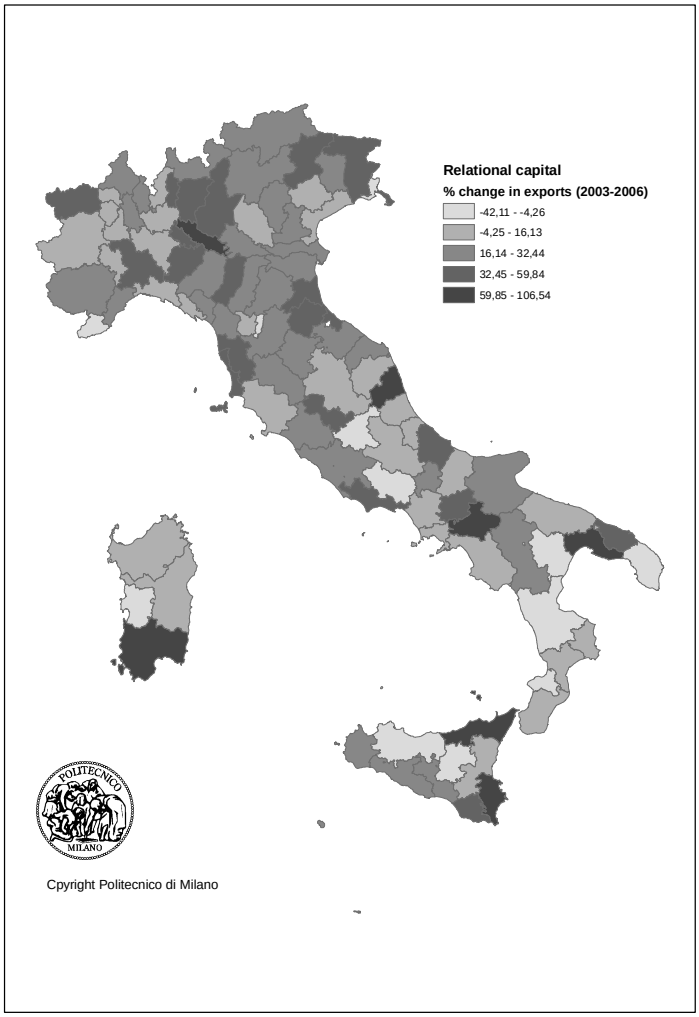


Figure 5 returns the map of Italian provinces. At the first place we find Siracusa (Sicily). Its position is due to the presence in this area of oil refineries, which have a significant weight on the provincial economy. If we exclude this particular case, the map seems to highlight huge differences between North and South. At least to some extent, this evidence can be explained by proximity: Northern areas are closer to foreign markets. Southern provinces, with some exceptions such as Cagliari (84.13), Messina and some areas in Apulia and Campania, are always ranked in the lowest category. Almost all Northern provinces score better than 64.28, whilst central regions alternate some areas characterized by intense flows of export (such as Massa Carrara,

Lucca, Terni, Chieti, Arezzo) with some others less connected to foreign markets (such as Grosseto, Viterbo and Perugia).

If figure 5 provides a still picture of our country in 2006, the recent trends which have generated that representation significantly differ across provinces. Figure 6 reports the percent change in export between 2003 and 2006.

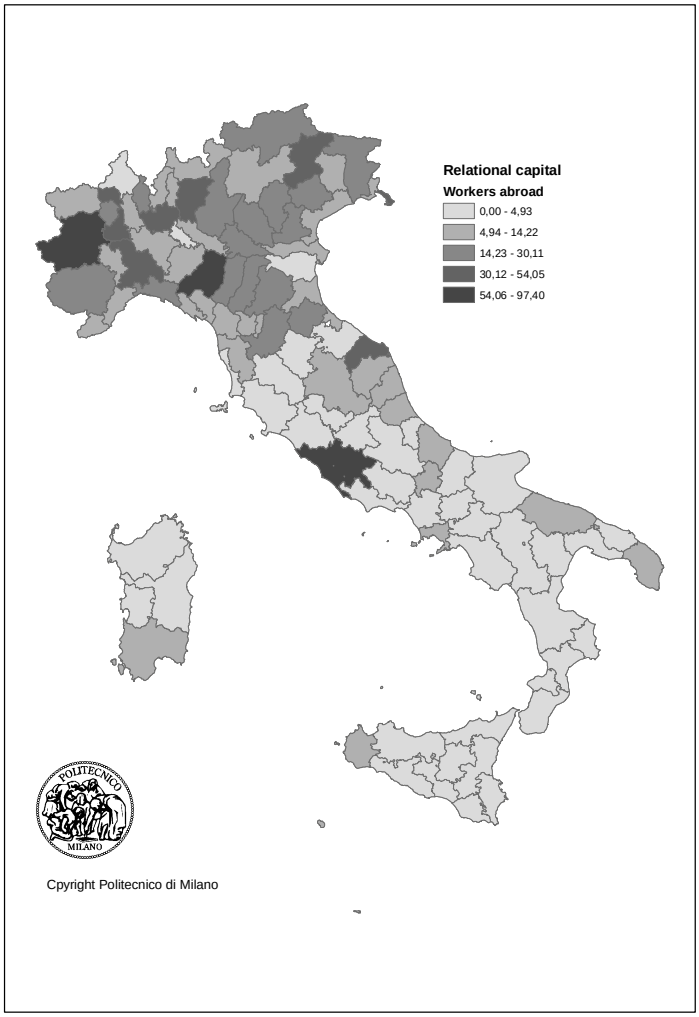
Figure 6. Percent change in export (2003-2006).



This time the gap between the three principal parts of the country is not detectable anymore. Generally speaking, only thirteen provinces reduced their flows of export between 2003 and 2006. Two of them are located in the northern part of the country (Gorizia and Imperia), two are in the central regions (Prato and Rieti), while the others belong to the South. The same applies if we look at those areas which scored best: out of the seven provinces included in this category, the majority (five) are located in Southern regions, whilst only two are placed in the rest of the country (Ascoli and Cremona). Compared with the previous figures, in this case the main differences are not between regions but within regions, especially in the South. A few regions are characterized by homogeneous changes, either positive (Trentino-Alto Adige, Emilia-Romagna) or negative (Basilicata), in export.

Both the indicators depicted in figure 5 and 6 deal with commercial issues. However, firms' internationalization involves production as well. The map represented in figure 7 shows the percent ratio between the number of workers employed by foreign firms partially or totally owned by Italian companies and the labor units employed in the industrial sector.

Figure 7. Workers employed in foreign subsidiary companies and domestic labor units.

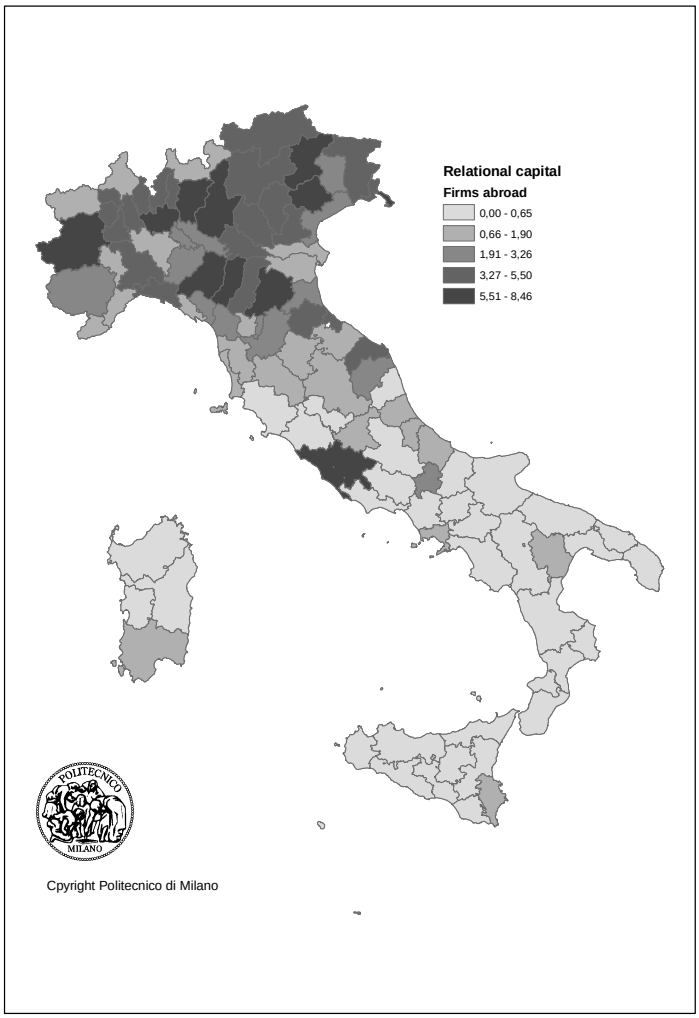


Subsidiary foreign companies are linked to Italian provinces based on the registered office of the holder of the stake. Since many Italian firms have their registered office in Rome, this province is marked by the highest value (97.40 per cent). The other two provinces ranked in the highest class are Turin and Parma. This time, compared with the flows of export (figure 5), the linkages between Italy and foreign markets are more concentrated in a few areas, mainly in the North.

Finally, the last indicator of multinational strategies, depicted in figure 8, considers the ratio between the number of subsidiary companies abroad and the number of manufacturing firms registered in each province.

Compared with the previous map, the main difference concerns the northeastern area of the country. Firms located in these regions apparently own stake in many, small firms, whilst the opposite holds for some Southern provinces such as Bari and Lecce and Trapani.

Figure 8. Subsidiary foreign companies and manufacturing Italian firms.

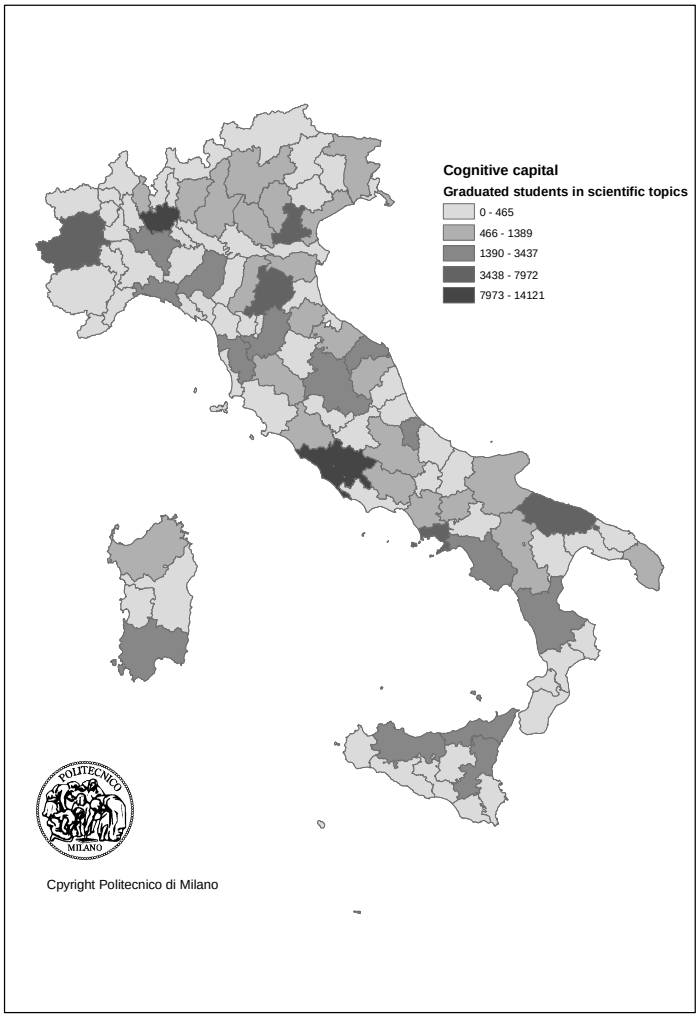


5.3 Human capital

This last paragraph is devoted to the analysis of human capital. A first group of indicators concerns education.

The number of students who graduated in 2006 in a scientific topic is reported in figure 9. As we said in the previous paragraph, in the map students are classified based on the location of the university they attended and not according to their province of residence. For this reason, all the provinces without a university are marked by a value equal to zero. In the top category (more than 7,972 graduated students in 2006) we find Rome and Milan, while in the second class all the other most important universities of our country (Naples, Turin, Bologna, Padova and Bari) are represented.

Figure 9. Number of graduated students in a scientific topic.



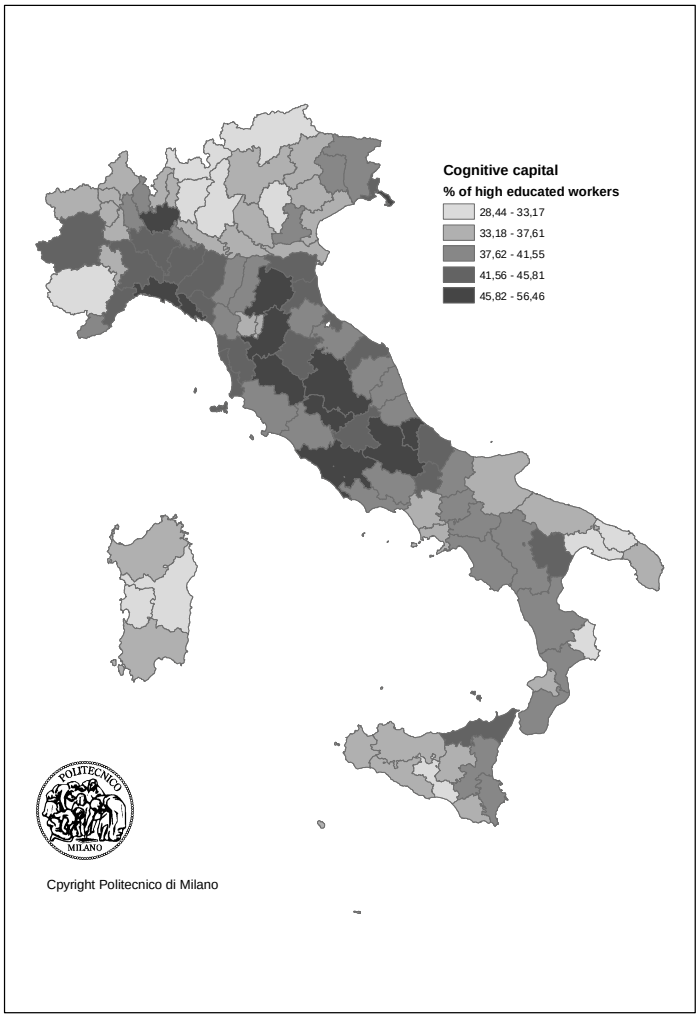
Apparently, the number of graduate students seems to be evenly distributed across the different areas of the country. Obviously here we are not accounting for the quality of the education and we cannot isolate students' mobility between regions. Moreover, we do not have any information about how these students will behave once they have completed their studies: some of them will find a job in the same province of the university, whilst some others will move to other regions or maybe come back home.

Figure 10 tries to shed some light on this issue, as it reports the share of high educated workers between 35 and 44 years old on the total amount of workers in the same age cohort.

The highest class comprehends twelve provinces. Most of them (six) are located in the central part of the country (including the major cities such as Rome, Bologna, Perugia and Florence). Four out of twelve are in the North (Genova, Milan, La Spezia and Trieste), while the last two are in the South (L'Aquila and Pescara). Apparently, the density of high educated workers follows the Apennine chain from Liguria to Lazio. Quite surprisingly, the peripheral areas in the North-East (with the exception of Trieste) and in the North-West (with the exception of Turin) are marked by lower shares of high educated workers.

The same reasoning applies for the South, with the peculiar cases represented by Messina and Matera.

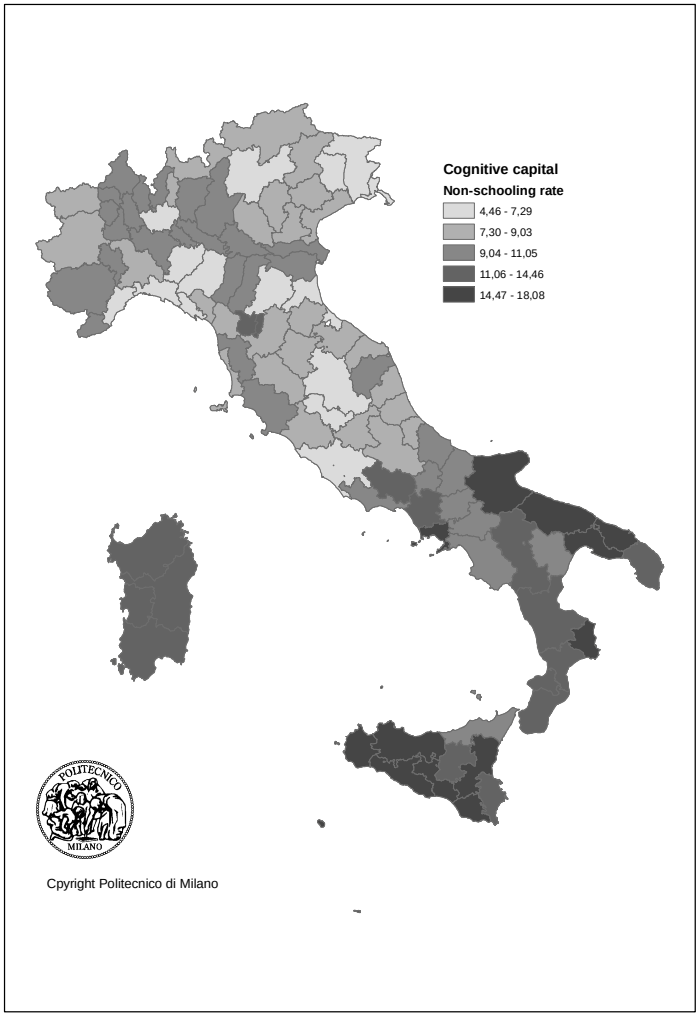
Figure 10. Share of high educated workers over the total (35-44 years old).



The last indicator concerning formal education is represented by the share of residents who did not complete compulsory education. The index is represented in figure 11. Territorial patterns are quite evident and show how Southern provinces are characterized by the highest rates of non-schooling attendance. The share of low educated people is particularly relevant in Sicily (six provinces out of nine are included in the highest

category), Sardinia, Apulia and Calabria. Campania (with the exception of Naples, presenting the highest score among all provinces, 18.08 per cent), Basilicata and Abruzzo score somehow better. Excluding the province of Pistoia (11.46 per cent) all the areas in the northern and central part of the country are included in the three lowest categories. It is worth notice how non-schooling rates do not follow the same territorial distribution highlighted for the high educated workers. A possible explanation involves the hypothesis that non-schooling rates are particularly high among old people, who are outside the labor force and do not compare in the statistic represented in figure 9.

Figure 11. Share of people who did not complete compulsory education.



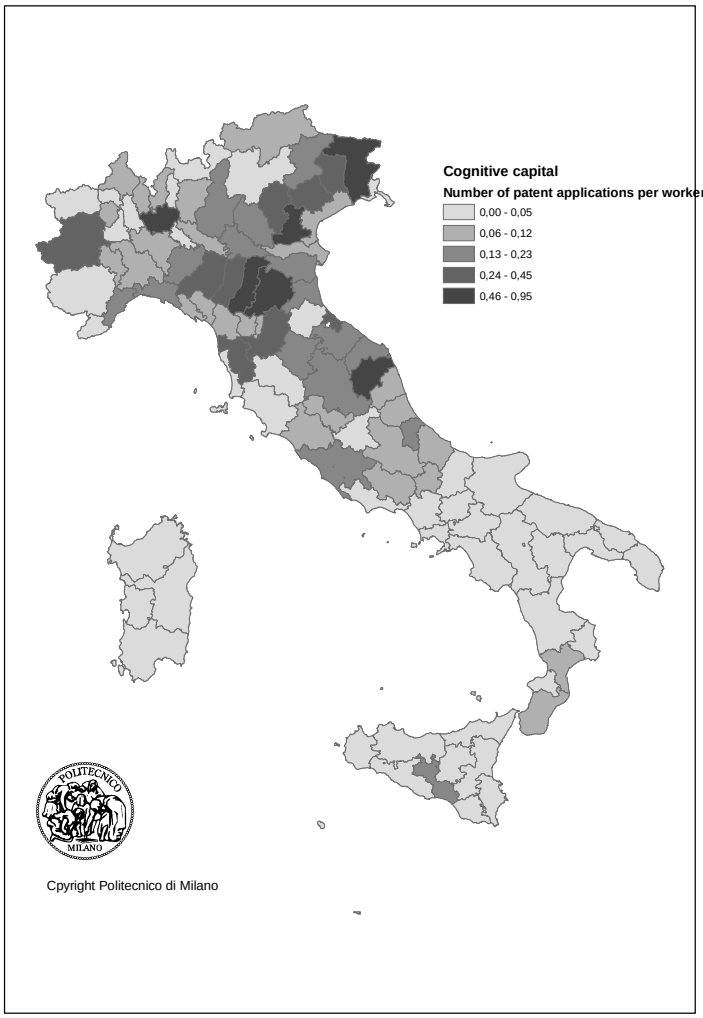
As we anticipated in the previous sections, education is just one aspect of human capital. Other important cognitive elements deal with the firms' activities aimed at increasing the skills of their employees or the productivity of their production and operating procedures. For this reason, every year many companies devote to their R&D programs a consistent share of resources. A measure of accounting for this activity is represented by the number of registered patents, represented in figure 12.

The map reports the number of patent applications resented to the Italian Patent Office (UBI), weighted for the total number of workers employed. Once again, the gap between the South and the rest of the country

clearly appears from the map. With the exception of Abruzzo and a few areas (Catanzaro, Reggio Calabria and Caltanissetta), all Southern provinces are included in the lowest category, marked by rates close to zero.

On the other extreme, the highest class is made up of six provinces, three in the North (Milano, Padova and Udine) and three in the central area of the country (Bologna, Modena and Macerata). More generally, the most intense R&D activity seems to be located in the North-East and in a few other isolated areas (Turin, Milan, Macerata).

Figure 12. Number of patent applications per worker.



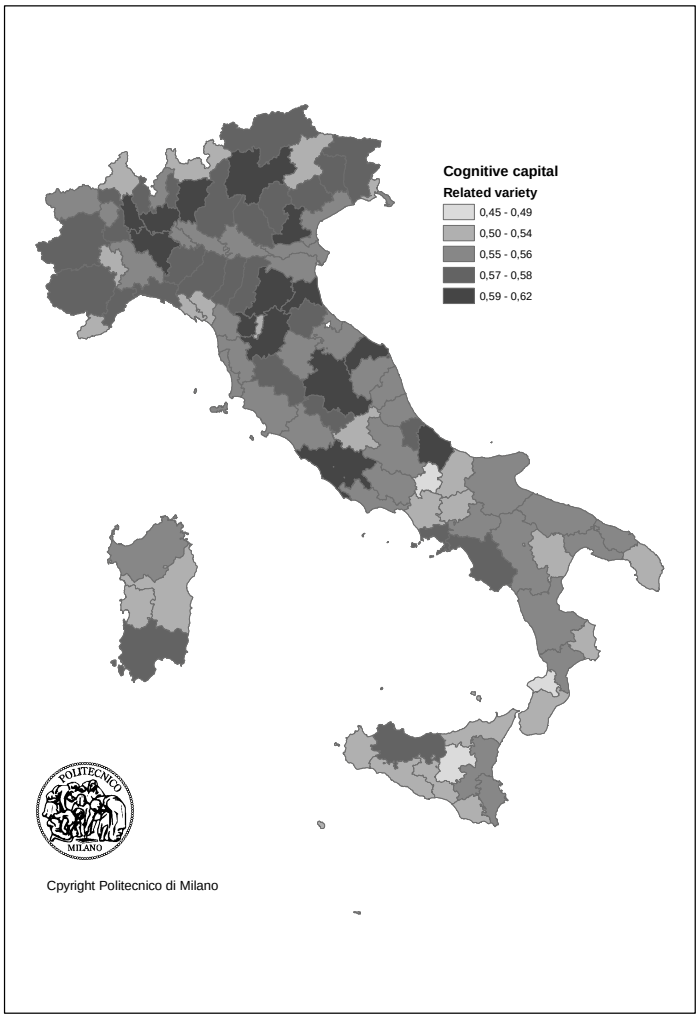
Finally, the last indicator is devoted to the analysis of knowledge spillovers between companies, captured by a related variety index.

As we said in the previous chapter, our analysis follows the work by Boschma and Iammarino (2009). Starting from the dichotomy between specialization externalities and diversity externalities (Beaudry and Schiffauerova, 2009), the two authors analyzed the impact of different types of variety on economic growth, defined at the level of Italian provinces. One of their main findings shows a positive and significant effect of related variety on provincial value-added growth. In other words, having related sectors in a province

positively affected the value-added growth in the period between 1995 and 2003. Given this result, we decided to calculate an updated indicator of related variety for 2001.

The data are represented in figure 13. Fourteen areas are marked by an index higher than 0.58. In this group we find provinces characterized by both large urban centers (Bologna, Rome, Florence) and smaller ones. Four provinces out of fourteen are located in Lombardy, whilst the others are dispersed across all the Northern and Central regions, with the exception of Friuli-Venezia Giulia.

Figure 13. Related variety index.



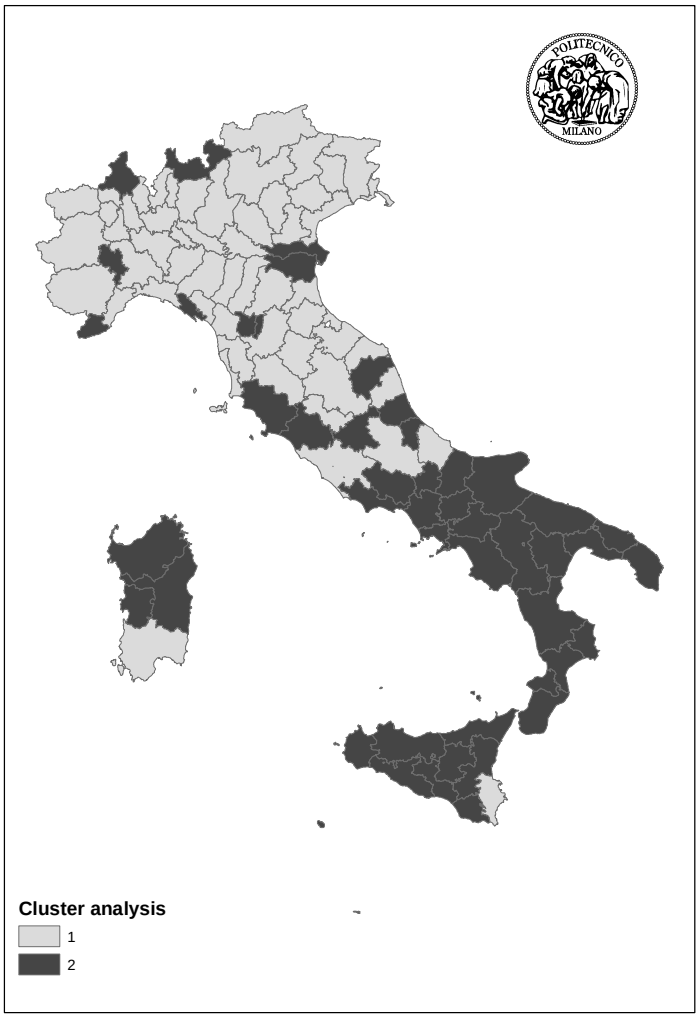
The sole area in the South marked by a related variety index ranked in the top category is Chieti (Abruzzo), even if some other provinces show high scores as well: Naples and Salerno (Campania), Pescara (Abruzzo), Palermo (Siculy) and Cagliari (Sardinia). The gap between the three main parts of the country is evident if we consider the areas included in the lowest class, in which the related variety index is lower than 0.50: none of them is located in Central or Northern regions.

6. Results.

In the last section we described some indicators devoted to the analysis of relational and human capital endowments of Italian provinces. In this paragraph we will try to draw some conclusions from the evidence reported in the previous part.

As a first step, we investigated the geographical distribution of relational and human capital. For this purpose, we run a cluster analysis to our data base, including all the variables presented in the fifth paragraph. The optimal clustering procedure divides our sample into two groups. The results are mapped in figure 14 reported below.

7. Figure 14. Cluster analysis results.



Looking at the map, the gap between North and South seems clearly bound and determined. Southern provinces, jointly with some areas in Central Italy and some territories in the Northern part of the country (Imperia, La Spezia, Verbano-Cusio Ossola, Sondrio, Rovigo and Ferrara) are included in the same cluster.

The sole exceptions are represented by the provinces of Siracusa[4] and Cagliari. This result is not surprising if we recall the evidence reviewed in the previous section. In particular, the province of Siracusa appeared as a remarkable case in the South, due to its intense connections to foreign markets. Similarly, considering our indicators for human capital, Cagliari is characterized by good performances, also because of the presence of a big university.

As a second step of our analysis, we compare some variables (which do not enter the cluster analysis) between the two clusters of provinces. Since the concept of territorial capital (and, as a consequence, its components) is supposed to explain economic growth and wealth, we considered three variables, all defined at provincial level. The first one is per capita GDP in 2006 (source: ISTAT). Starting from these data we calculated the GDP average growth between 2004 and 2006. Finally, the third indicator is an index for the quality of life in Italian provinces, estimated and supplied for 2006 by the financial newspaper "Sole 24 ore". Life quality is ranked between the value of 589, registered in the case of Siena, and 388, characterizing the province of Catania.

As can be easily guessed, the differences in terms of GDP between the two clusters are consistent. In table 3 we tabulate the cluster means for the new three variables. Cluster 1 (associated to Northern regions) has much higher GDP levels than cluster 2. The same evidence applies if we consider the indicator for life quality (517.23 against 451.80), whilst the opposite holds when we analyze the average change in GDP registered between 2003 and 2006. This time the second cluster is associated with a higher average rate.

Table 3. GDP and life quality levels between clusters.

Cluster	Mean (GDP)	Mean (ΔGDP)	Mean (Life quality)
Cluster 1	24,798	2.274	517.23
Cluster 2	16,879	2.649	451.80

More formally, we performed a one-way analysis of variance between each of the three indexes reported in table 3 and our clusters. The results show that the clusters significantly differ in their average GDP levels ($F_{1,101}=148$, $p < 0.001$), as well as in their average life quality levels ($F_{1,101}=76.5$, $p < 0.001$). However, the same is not valid for the change in GDP ($F_{1,101}=4.8$, $p > 0.001$). Then, the results summarized in table 3 are significant only for GDP and life quality. This evidence brings new concerns into our analysis. Until now, the results pointed out the broad differences between the two main parts of our country in terms of stocks of relational and human capital. Apparently, these amounts of intangible elements are positively linked with other material forms of capital, such as GDP. However, focusing on stocks of capital, we said almost nothing about the recent trends of growth and about the process of territorial capital accumulation (or decumulation).

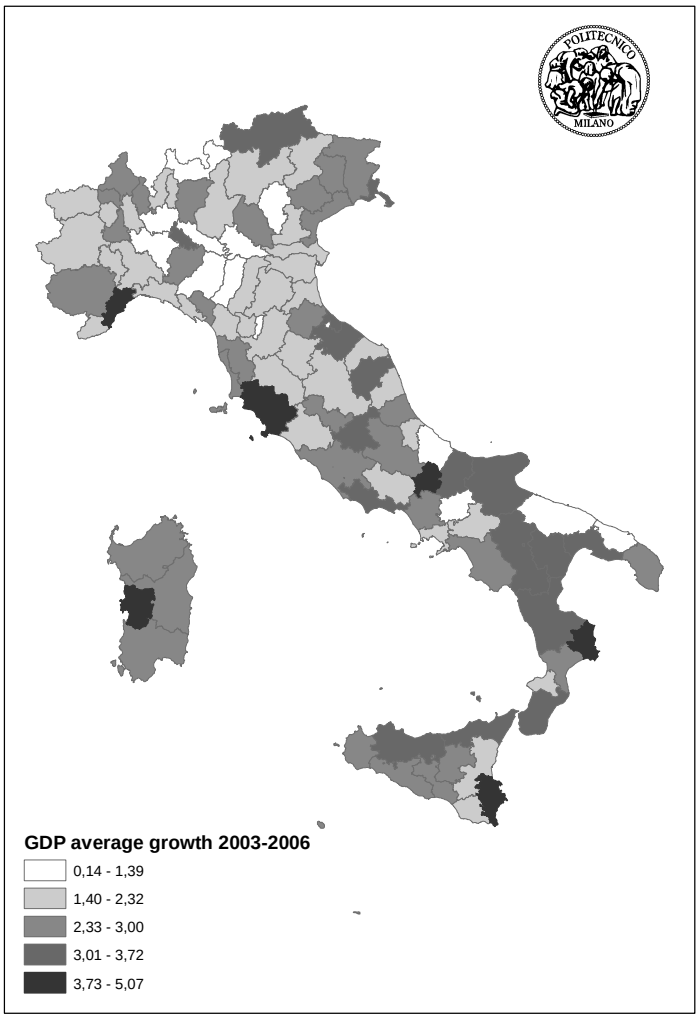
We shed some light on this issue by including (figure 6) the percent change in export between 2003 and 2006. Far from being exhaustive, the evidence reported in table 6 reveals a complexity which cannot be reduced to a simple opposition North-South, at least when we leave a static perspective for a dynamic approach. Figure 6 shows how trends of growth cannot be easily bounded following the usual distinctions

[4] Evidence suggests that indie the province of Siracusa, and in particolar its re-vitalising oil processing plants, are contributing to a recent resurgence in Italian exports. Indeed, it seems that Siracusa province joins a group of selected top performers in this respect and out-performs several Northern provinces. See for instance http://images.newsmercati.com/f/pdf/2011/art_5981.pdf.

between macro areas. Similar conclusions can be drawn if we consider the average rate of change of GDP in the same period. These data are mapped in figure 15.

The evidence reported in the map shows how, in the three years considered, Italian provinces experienced a variety of growth patterns. In general, as we said in the introduction, the effects of the global economic and financial crisis resulted in a generalized slowdown in GDP growth. Such trend is observable for the most developed regions of our country, as Lombardy, Piedmont and some areas in Central Italy. Weak growth rates also characterize some territories in the South, in particular some Apulian provinces. Generally speaking, however, Southern territories seem to be marked by the best performances in terms of GDP growth, especially in regions as Sardinia, Basilicata and Calabria.

Figure 15. GDP growth: 2003-2006.

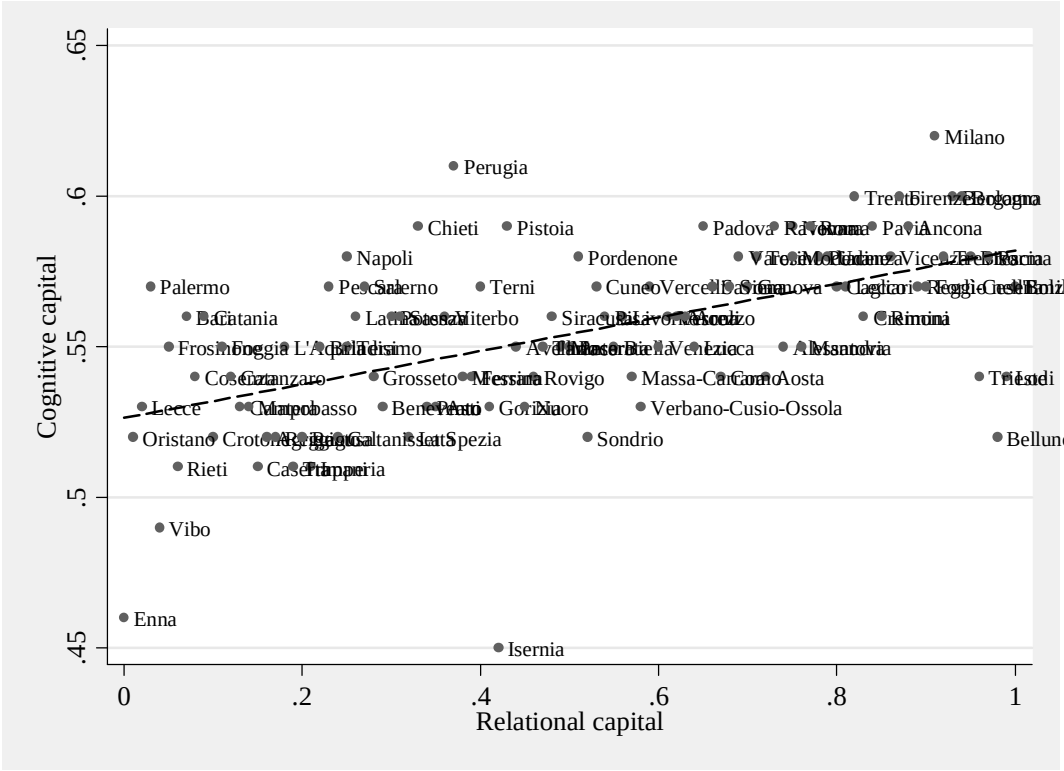


Is this evidence robust enough to assume a convergence between the two macro areas of our country? Unfortunately the answer is negative, since further research is needed in order to clarify some points we did not analyze here.

First of all, as we said a few lines above, in the present work we focused on the stocks of territorial capital. The latter are useful in order to explain the absolute values of some macroeconomic indicators such as GDP, but are less powerful if we want to understand and predict their short term changes. As any other form of capital, territorial capital can be increased or decumulated, and its changes are supposed to have a direct effect on economic growth, at least in the medium-long run. While the concept of territorial capital has been quite largely studied in the literature (Camagni, 2009), the process of accumulation and decumulation are still mainly unknown.

Secondly, we have to better understand how the components of territorial capital interact and how they contribute to territorial capital. This issue is relevant in order to properly link the processes of economic growth to their determinants. Using the data reviewed in the fifth paragraph, we analyze the linkages between relational and cognitive capital.

Figure 16. Cognitive and relational capital.



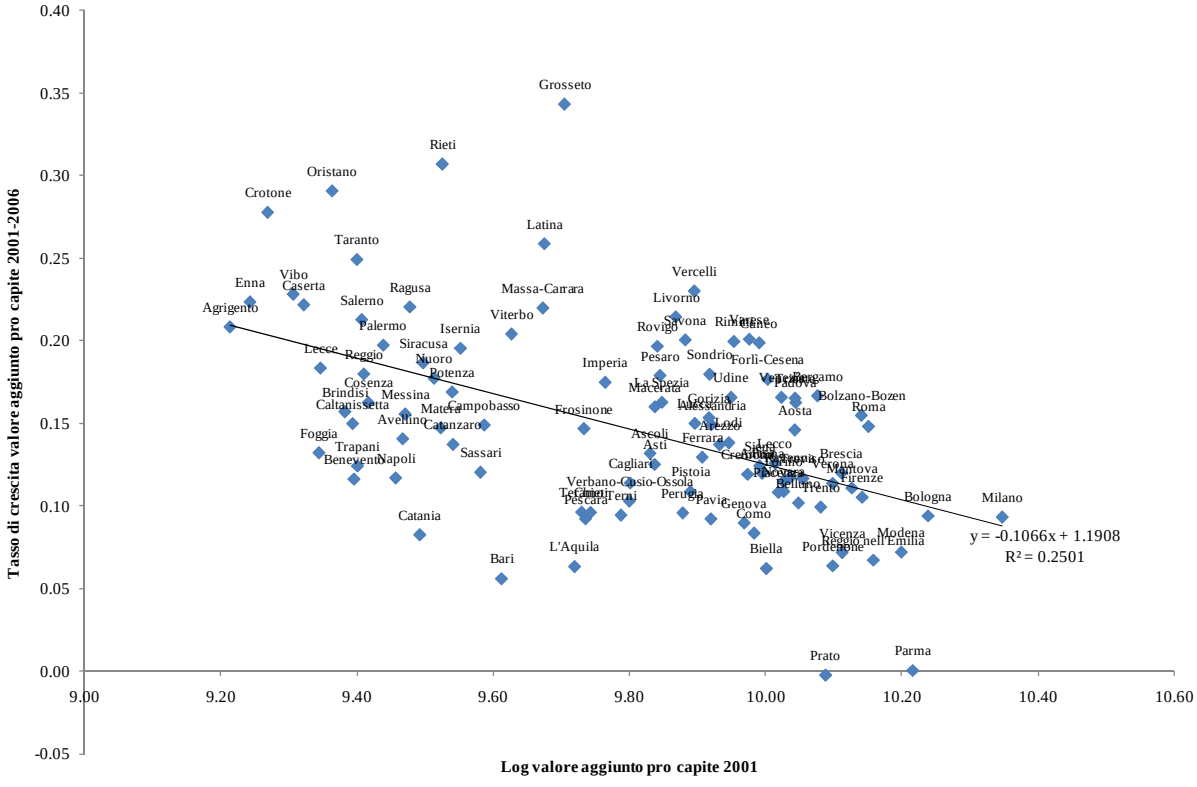
These two variables, although they capture different aspects of the territorial capital domain, are related by strikingly strong linkages. Pearson's R equals .56, significant at all conventional levels. This implies that provinces with a wide access to potential industrial cross-fertilization, are also characterized by a stronger network of business relations, be they with banks, institutions, or competitors/suppliers. Interestingly, despite its very nature (relational capital is assumed to be positively associated with an urban network, i.e., a polycentric structure), relational capital is found to be higher in non-polycentric urban systems, while no significant difference is found between average size provinces and provinces characterized by a metropolised

structure.[5] On the contrary, metropolised cities enjoy significantly higher stocks of both cognitive as well as relational capital, a first finding which is worth being inspect at later stages of the present research.

As a first step needed to interpret the relations among variables, we applied Principal Component Analysis (PCA) to out indicators for relational capital (figure 1-8). In this way we derived a compact index for relational capital, which has been plotted combined with the index of related variety (cognitive capital) in the graph reported in figure 15. As expected, the graph points out a positive relationship between cognitive and relational capital, despite the presence of a few outliers (Enna and Isernia). A similar analysis should be extended to the other components of territorial capital.

In the third place, we should better identify the sources explaining the different patterns of growth depicted in figure 15. In general, according to this map, poorest areas grew more compared with the richest ones. This result is more evident if we look at the data plotted in figure 17. The negative slop of the regression line clearly highlights this phenomenon. The evidence reported in the graph is in favor of the assumption about the convergence between North and South Italy. However, the mechanisms through which this result has been reached have to be carefully identified. For instance, by comparing figure 6 with figure 15, it is worth noting how the change in export and the change in GDP do not follow the same patterns across Italian provinces. In particular, most of the Southern areas characterized by high rates of GDP growth did not experience a similar trend in their export.

Figure 17. GDP (2001) and GDP change (2001-2006).



8.

[5] Metropolised provinces are defined according to the Institut d'Estudis Regionals i Metropolitans de Barcelona definition, available at http://www.raco.cat/index.php/PapersIERMB/article/view/139756/190934. A complete list is available in Appendix 2.

Many explanations can justify this result. For instance, they may have increased the activities connected with the national market, rather than developed the connections to foreign markets. Another interpretation involves the role of the public sector. In a period marked by a slowdown of the economy, the relative weight of the public sector in explaining the overall economic growth increases, and the size of this effect crucially depends on the dimension of the public intervention into the economy.

In order to test the assumption about the convergence between North and South, we tried to include in our analysis the mobility of people between the two macro areas. Traditionally, the direction of mobility followed the South-North axis, due to the huge differences in wealth and job opportunities between the two main parts of the country. From 2001 and 2006, having experienced the average trends in economic growth reported in figures 15 and 17, we could assume a mitigation of the mobility flows. However, this assumption seems not to be confirmed by empirical evidence.

Figure 18. Mobility between South and North Italy (1995-2008).

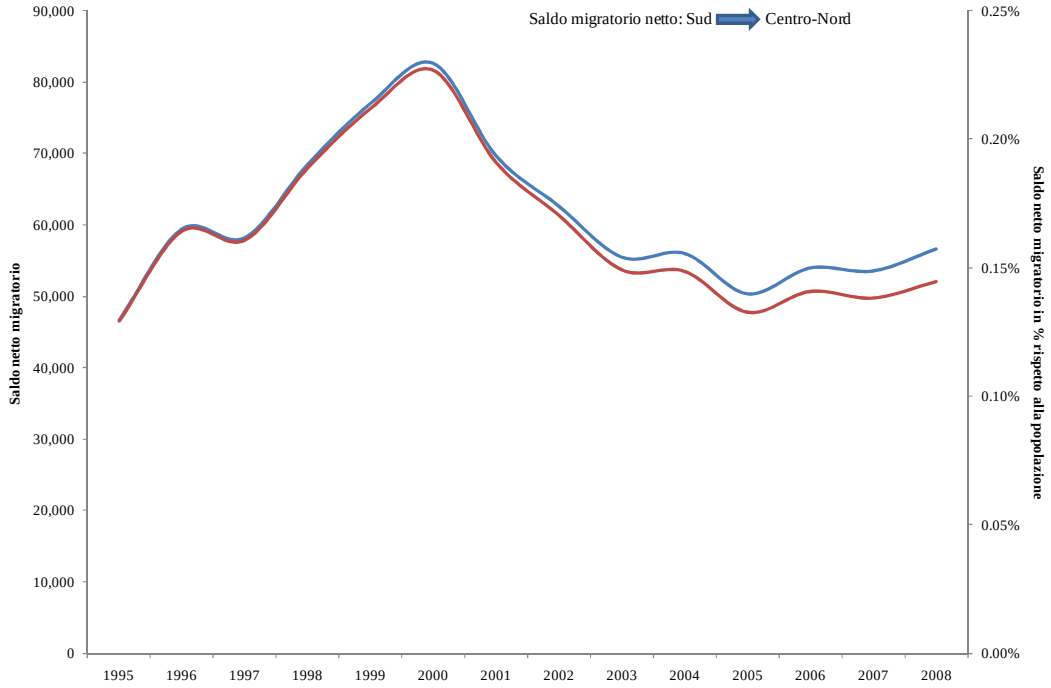


Figure 18 depicts the flows of mobility from Southern regions to Northern areas between 1995 and 2008. Starting from the first year, the volumes of migrants rapidly increased, reaching a peak in 2000, when almost 80,000 people decided to leave their native land. In the following years the flows of mobility significantly decreased (which is coherent with the data reported in figure 17), but are very far from extinguishing the phenomenon. In particular, between 2003 and 2006 (the period considered in figures 15 and 17) the volumes of migrants remained constant, around 55,000 units per year.

Finally, we also run preliminary analyses on the patterns of spatial autocorrelation affecting our variables. Indeed as Table 4 shows, both measures of cognitive and relational capital, as well as two significant performance measures, are all affected – to different degrees – by spatial correlation, which turns out to be significant at all conventional levels. Absolute values are found to be highest for our measure of relational capital, which is significantly more concentrated in space than pure economic performance, demonstrating its "space-specific" nature, and calling for tailor-made policies in different regions.

Table 4. Spatial autocorrelation statistics for relational and cognitive capital and performance measures

Variables	Moran's I	E (I)	sd (I)	z statistic	Pesudo p-value
Relational capital	0.099	-0.01	0.01	23.24	0.00
Cognitive capital	0.023	-0.01	0.01	7.10	0.00
Growth of population (1991-2008)	0.034	-0.01	0.01	9.38	0.00
Growth of value added (2001-2006)	0.012	-0.01	0.01	4.57	0.00

7. Conclusions.

This work tried to investigate the endowment of territorial capital of our country and its distribution across provinces. More in details, starting from the theoretical framework proposed by Camagni (2008), we recalled the concept of territorial capital, underlying its composition of tangible and intangible goods. Our analysis focused on the non-material elements of territorial capital. The latter are made up by several, complex factors, such as relational capabilities, collective competencies, and private know-how. Our work concerned relational and human capital.

We tried to classify relational capital in two main areas, each one depicted by one or more indicators. The first category concerns the network of relationships between economic agents located within the national borders. As economic agents we considered in our analysis both firms (through the cooperation with financial intermediaries) and households (through the rate of participation to volunteering). The second area explores the distribution of multinational companies across the Italian provinces and the nature of their connections (commercial or productive) to foreign markets.

Human capital has been defined by two main components: formal education and firms' innovative activities. The former dimension has been investigated through three indicators (graduated students, high educated workers and low educated inhabitants), while the latter has been analyzed by using a related variety index and a measure for R&D productivity.

The evidence presented in the last paragraph conveys two main messages. The first one deals with the strong differences between North, Central and South Italy. The second message involves some peculiar, remarkable cases within substantially homogeneous regions.

A broad literature has already pointed out the discrepancies between the three Italian macro areas. Our data partially confirms these findings. A conclusion corroborated by other works (Basile et *al*., 2003) applies to the lack of foreign expansion of Southern firms compared with those located in the rest of the peninsula. This gap involves the productive investments abroad as well as the flows of exported output. The same conclusions involve some cognitive elements, such as the number of patent applications and the share of low educated residents.

As we said, a second remark concerns the dispersion of the data within regions. The whole story cannot be reduced to the simple opposition between North and South. Every single area has its own story, which in many cases results to be characterized by peculiar aspects with respect to the surrounding regions. Examples

are provided by some provinces in the central part of our country, marked by high levels of both human and relational capital. The same reasoning holds for some of the Southern areas, which cannot be accounted as a unique and homogeneous body. This is clear, for instance, if we consider the change in export between 2003 and 2006. The picture of the South is composed by a broad variety of cases, and some of them are extremely positive. It will be interesting to analyze how these differed patterns will affect and modify the future local scenarios.

This evidence sheds some light on the endowment of some intangible elements of territorial capital across Italian provinces. The latter concept, however, is extremely complex. In this contribution we focused just on a few pieces of the whole puzzle. Hence, further research is needed in order to better understand the past trends and the future potentials of each territory.

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Table 2: territorial capital elements, data and measures.

Territorial capital category	Datum	Indicator
Cooperation agreements and networks of firms	*Coop*	Number of social cooperatives per 100,000 inhabitants
	Volunt	Number of regular volunteers per 1,00 inhabitants
	Banks	Number of Bank branches over resident population
	Banks	Number of cooperative bank branches over resident population
Strategy of multinational companies	*Export*	Value of export over labor unites
	ΔExport	Percent change in the value of export between 2003 and 2006
	Workers_abroad	Workers employed in subsidiary companies over labor units
	Firms_abroad	Number of subsidiary companies over Italian companies
Human capital: education	*Graduate*	Number of graduate students in scientific topics
	Comp_educ	People who did not complete compulsory education over resident population
	High_educ	High educated workers (35-44 years) over total number of workers (35-44 years)
Human capital: firms contribution	*Patents*	Number of patent applications at UBI over total number of workers
	Relvar	Indicator of related variety