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Performance of Italian firms and local dynamics

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SOMMARIO

Si è sottoposta a verifica l' ipotesi che l'effetto positivo dell'appartenenza ai distretti sulla performance delle imprese italiane sia diminuito (Di Giacinto et al., 2014) o scomparso (De Marchi e Grandinetti, 2014), applicando i metodi dell'analisi spaziale.
Si è quindi verificato che:

- Il ROI delle imprese in ogni comune/Sistema Locale del Lavoro dipende da quello delle imprese dei comuni limitrofi;
- da tale punto di vista, i distretti identificano gruppi omogenei di comuni.

Si è quindi proceduto a un'analisi Multiway, volta a costruire un indice sintetico del livello di performance dei SLL, sulla base dei dati individuali del Censimento dell'Industria e Servizi 2011, integrati con i dati di Bilancio (Stato Patrimoniale e Conto Economico), raccolti dalle Camere di Commercio, e si è ripetuta l'analisi spaziale sugli outputs di questa analisi.

Si verifica che la componente spaziale che registra l'effetto *spillover* è significativa, e cosi pure la prima componente fattoriale relativa agli anni 2010, 2009 e 2008.
Nel complesso i risultati dell'analisi spaziale svolta sulla prima componente ("Produttività") confermano quelli dell'analisi del ROI su base comunale, rispetto alla quale gli effetti spaziali risultano maggiormente significativi. Tali effetti invece non risultano significativi sulla seconda componente, ("Profittabilità"), sulla quale influiscono soprattutto le mutevoli condizioni finanziarie.

1. Introduction

The global integration of the real and financial markets, the completion of the European Single Market and the introduction of the euro, the reorganization of global value chains resulted in two possible consequences for the Italian productive system: the loss of the local identity, and the negative effects on employment, income and growth resulting from the impairment of the interfirm relations typical of industrial districts.

The "industrial commons" or the "industrial atmosphere", built during the long term growth process, had to face the challenges arising from relocation/internationalization. In some cases the heterogeneity of firms has made the territorial aspects of the ongoing processes almost unrecognizable. In others, the territory of origin has lost its meaning in front of the reorganization of production and the expansion of networks to whom the individual firms participates. Sometimes the sunset of the old winning models also implies the decline of the firms that generated them. Elsewhere the firm's uniqueness in the heterogeneity of the industrial environment allows the permanence of the levels of welfare and development achieved in the past.

In general, the most recent studies point to a decrease (Di Giacinto et al., 2014) or the disappearance (De Marchi and Grandinetti, 2014) of the positive effect of being located in a district upon firm performance.

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In the present study various techniques are applied to individual firm data to explain the profitability of enterprises, taking account of spillovers between contiguous areas, examining the dynamics of municipalities, Local Labour Systems and Industrial Districts (spatial analysis).

The goal of the analysis is to verify if:

- the profitability of the firms in each municipality / Local Labour System depends on the profitability of enterprises of the neighboring municipalities;
- districts identify homogeneous groups of municipalities in terms of corporate profitability[5].

2. Background

Since the early ‘90s, location influence on profitability could be examined on the basis of longitudinal data. It became apparent that profits were persistently heterogeneous, and their level was systematically higher than the one to be realized in competitive markets (Bartelsmann, 2000).

This would not be directly explainable if low performance firms were eliminated from the market selection mechanisms. However a variety of theoretical approaches, from those of classical inspiration, as the productivity function of Sylos Labini (1984), to more complex selection models, which originate from the work of Alchian (1950), or, more recently, adherent to the evolutionary theory of firm (Dosi and Grazzi, 2006; Dosi, 2008, Dosi et al. 2011), allow to analyze the factors that determine firm success over time, and the survival of those who constantlly underperform in comparison with others (Barba Navaretti et al., 2007; Oropallo and Rossetti, 2007 Arrighetti and Traù, 2012, Traù, 2013). It should also be stressed that the same levels of performance are compatible with significant and persistent differences in many characteristics, as company size, location, turnover, productivity, internationalization, level of investment, Research and Development, etc.

The most common indicator of enterprise performance is the level of productivity, which allows to charge lower prices and achieve higher profits, and therefore a greater capacity to finance tangible and intangible investments, and in particular in R and D.

Moreover, in the presence of fixed costs of entry into foreign markets, productivity differentials can explain the self-selection of firms in export markets. Therefore the most productive firms show a greater propensity for internationalization (Melitz, 2003; Melitz and Ottaviano, 2008).

The use of performance measures (such as EBITDA, gross profits, ROI or ROE) can be criticized for the lack of correspondence with the theoretical variable that should be considered (Mueller, 1990). However, also productivity may reflect, rather than efficiency, the market power of companies, that is the ability to impose higher prices due to the lack of competition (Syverson, 2010).

Many analysis of the Italian case take into account various indicators of firm performance, as export (Barba Navaretti et al., 2007; Guelpa et al., 2007), productivity growth (Dosi et al., 2011), turnover and number of hours worked (Accetturo et al., 2011). As far as size is concerned, it seems that small and medium-sized firms (10-250 employees) get a better result than the micro and large ones, according to studies conducted at the national level (Monducci et al., 2010) . However, in foreign markets most firms are of a larger size (Brandolini and Bugamelli, 2009).

Empirical results don’t confirm the link between productivity and growth, which the theory would predict. Although in larger companies added value per employee is consistently greater (Monducci et al., 2010; Istat, 2010), the stagnation of productivity is similar both in large and small Italian firms (Dosi et al., 2011).

[5] Sections 4, 5, 6 reproduce Cardinaleschi, De Santis, Schenkel, Truglia (2016)

The analyses that take into account the relationship between profits and productivity (Dosi, 2008; Secchi and Tamagni, 2009; Bottazzi et al. 2010, Dosi et al., 2011, Schenkel and Cassetta, 2014) confirm the positive link between productivity and profits, but not the one between these variables and the firm's growth. In addition it has been found that the influence of labor costs is always negative (Schenkel and Cassetta, 2014). As for the main "strategic" variables (such as investment, internationalization, vertical integration) the results depend from the measure of profitability and the estimation methods chosen. It should be noted that none of these analysis examines the effect of industrial relations and, in particular, that of decentralized bargaining.

3. Data and descriptive statistics

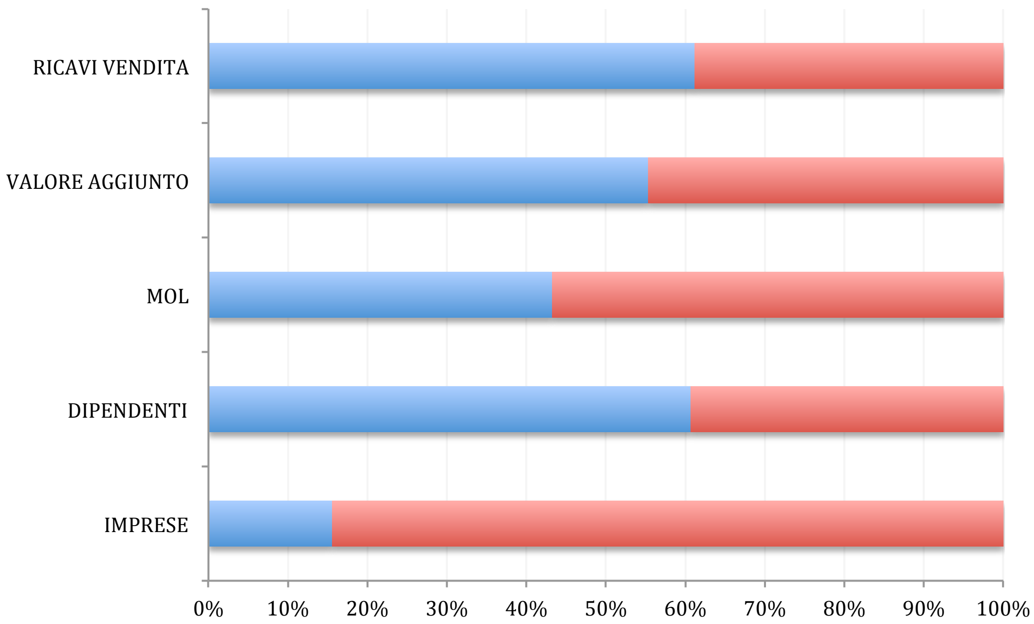
A data-base was created for the purpose of this research, matching various administrative and statistical sources. For spatial analysis the firm budget data collected by the Chamber of Commerce and the Statistical Archive of Active Enterprises Data (Archivio Statistico delle Imprese Attive - ASIA) were used. The 2004-2011 period is included, allowing to map the firms characteristics over a period centered around the beginning of the crisis in 2008. The units of analysis are the companies subject to budget requirement, organized in the form of non-balanced panel

Table 1 - Number of firms subject to budget requirement

Years	N. of firms
2004	589.018
2005	586.297
2006	610.308
2007	603.999
2008	687.787
2009	651.929
2010	739.553
2011	759.649

The data set includes approximately 1,166,129 companies in the period between 2004 and 2011. Although these companies represent the 15.6% of all enterprises, in 2012 they constitute the largest segment of the Italian economy in terms of turnover (61.1%), value added (55.3%), MOL (43, 2%), employment (60.7%).

Figure 1 - Companies subject to fiscal deposit: main variables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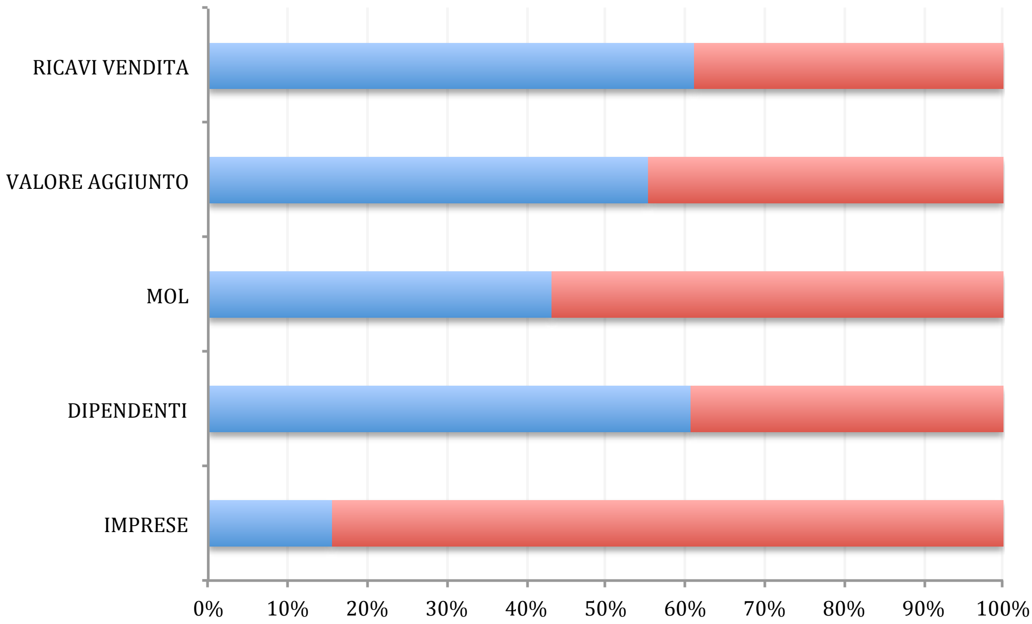
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The creation of the database has involved a complex work of harmonization of the sources, due to:

- The diversity of data structures over time, related to changes in data collection procedures in different years by the Chambers of Commerce
- the territorial changes over time
- the transcoding resulting from changes in the classification of ISTAT territorial unit (detail level NUTS 5) and the transition from the Ateco 2002 to Ateco 2007.

The data have been aggregated on various bases (municipalities, Labor Local Systems/SLL) that constitute the unit of analysis of this research. The sample firms have a turnover and average active respectively equal to 11.48 and 11.74 million. The corresponding values for micro-enterprises are much smaller (600,000 and 800,000 euro). The average age of the firms, even micro-enterprises, is rather high.

4. Spatial analysis methodology

The methodology adopted refers to econometric analysis developed by Anselin (1988, 1990, 2002), and falls within the Exploratory Spatial Data Analysis (ESDA) and the Exploratory Space-Time Data Analysis (ESTDA) of Chasco and Lopez (2004, 2006, 2007). This approach allows to assess the contemporary and lagged dependence jointly, identifying spillovers and spinoffs that determine the spatio-temporal dynamics. Föllmer identifies two elements that characterize the spatial interaction: the stochastic feature of the agents' preferences (in our case the agents are the firms located in different municipalities); ii) the relationship between agents, which varies depending on their proximity. In this case proximity is in geographical terms. Proximity is expressed in the *neighborhood structure*. The variable taken under consideration is ROI $_{ti}$ where t = time (2004-2011) and i =municipality (territorial base 2011)

Procedure involves 4 steps.

1. ROI $_{ti}$ is recoded in binary form:

$$ROE_{ti}\begin{cases}\geq 1 \rightarrow y_{ti}=1\\ al\ contrario \rightarrow y_{ti}=0\end{cases} \qquad [1]$$

2. The elements w_{ij} of spatial contiguity matrix W (which can be calculated for different orders or spatial lags) are coded in the following way (Neighbourhood Spatial Structure):

$$w_{ij} = \begin{cases}1 \rightarrow se\ il\ comune\ i\text{-}esimo\ confina\ con\ il\ comune\ j\text{-}esimo\\ 0 \rightarrow al\ contrario\end{cases} \qquad [2].$$

3. The matrix W is multiplied for the 2011 recoded ROI (y_{11i}). Denoting by J_i the set of municipalities contiguous to ith municipality, and $w_{ij} * y_{11ij}$ the indicator variable, the variable v_i is called *Spatially legend,* while $L^s y = w_{ij} y_{ij}$ is the spatial lag. For the mathematical properties of these two operators see Anselin (1988, chapter 3) and Cliff and Ord (1981, pp. 19-20).

$$v_i = \sum_{j \in J} w_{ij}\, y_{11ij} \qquad [3]$$

is the number of municipalities with recoded ROI value $y_{11ij}=1$ that make up the neighborhood of the ith municipality. While

$$V_{11i} = \frac{\sum_{j \in J} w_{ij} y_{11ij}}{w_j} \qquad [4]$$

is the proportion of municipalities contiguous to the *i*th municipality that have a recoded ROI value = 1.

For the years 2004 to 2010 the proportion of times when y_{ti}=1 is calculated. In this case t = 04,05,06,07,08,09,10, and T is the number of years considered (7).

$$D_i = \frac{\sum_{t=04}^{10} y_{ti}}{T} \quad [5]$$

5. The logistic model

$$p(y_{11i} = 1) = \frac{e^{B_0+B_1V_{11i}+B_2D_i}}{1+e^{B_0+B_1V_{11i}+B_2D_i}} \quad [6]$$

is estimated.

5. Results of Spatial analysis on ROI

Table 2: Descriptive statistics

DROI 2011		
	Frequence	Percentage
ROI≤0	1.866	23,1
ROI>0	6.228	76,9
Total	8.094	100,0

	Minimum	Maximum	Mean	Std. Dev.
V^4_{11i}	0	1	0,7719	0,1166
D_j	0	1	0,7722	0,3051

Table 3. Estimate of the logistic model parameters

			S			
	B	E.S.	Wald	Df	Sig.	Exp(B)
B_0	-2,134	0,204	109,642	1	0,000	0,118
B_1	0,864	0,274	9,942	1	0,002	2,372
B_2	3,808	0,102	1396,111	1	0,000	45,057

Exp (B_{0}): indicates the probability of $y_{11i} = 1$ with respect to the probability $y_{11i} = 0$ for municipalities where ROI <0 in the years 2004-2010.

Exp (B_{1}): measures the spatial effects (spillover: [p $_{(11i}$ y = 1) / p (y $_{11i}$ = 0)] in the *i*th municipality in relation to the values assumed by the ROI in the contiguous municipalities of order *k*.

Exp ($B_{2)}$ measures the temporal effect (persistence / volatility) in the *i*th municipality on the values assumed by the ROI in the years 2004 to 2010.

As it is shown, the probability is significantly greater in the latter case, that is, the temporal effects are greater than the spatial ones. Moreover the spatial effects are greater when the ROI is positive.

The model classifies a large percentage of municipalities (around the '83% of cases) "correctly". Furthermore, the ability to correctly discriminate is larger for "successful" municipalities, that is, with ROI ≥ 0.

This double result can be interpreted as a good new for the District System: "industrial atmosphere" not only has not dissolved, but it is still beneficial for the firms included in a district.

Table 4. Comparison between observed and predicted values.

Observed		Predicted		
		DROI11		% correct
		. ROI≤0	ROI>0	
DROI11	ROI≤0	774	1085	41,6
	ROI>0	309	5895	95,0
% Total				82,7

Remembering the questions asked at the beginning of the paper, according to the analysis carried out so far, the importance of the geographical location, in terms of productivity and profitability of firms, does not seem diminished. Although the temporal effects predominate over the spatial ones, they are significant. Moreover districts largely reproduce the cluster identified in the analysis, especially for the municipalities where firms have a better performance and, conversely, the district municipalities belong largely to the most successful clusters.

6. Further developments of the research

The effect of the firms' performance on the overall income levels is still to be explored, together with the effect, in the longer term, of other geographical and institutional variables. This is the objective for which a Principal Components Analysis was carried on. Subsequently the spatial analysis was applied again on the outputs of PCA. The results are shown in the following two paragraphs.

6.1. Multidimensional analysis of Budget data

The availability of Budget data, arranged in the database described in Section 3, has led to an evolution of the analytical framework, in order to exploit the information potential.

The factorial technique which was chosen is the Principal Components Analysis (PCA), with the aim to identify the underlying trends (the latent variables) that characterize the set of variables considered, reconstructing the main relationships between them in the perspective represented by each common factor.

The analysis is carried out simultaneously on the dual variable space, as on that of the unit. Each of the Local Labour Systems, as a point-unit has a score on each of the multidimensional ratings (synthetic indices). By the positions taken by the SLL on the various multidimensional charts it is possible to get information on the various aspects of the complex phenomenon.

These indices are unrelated either linearly, or with higher polynomial functions, even when linked by mathematical formulas (such as ROI and ROE)

The average value of the correlation (absolute values) of the 11 indices calculated shows a very low value, r = 0.12. It follows that the phenomenon is determined by different underlying trends.

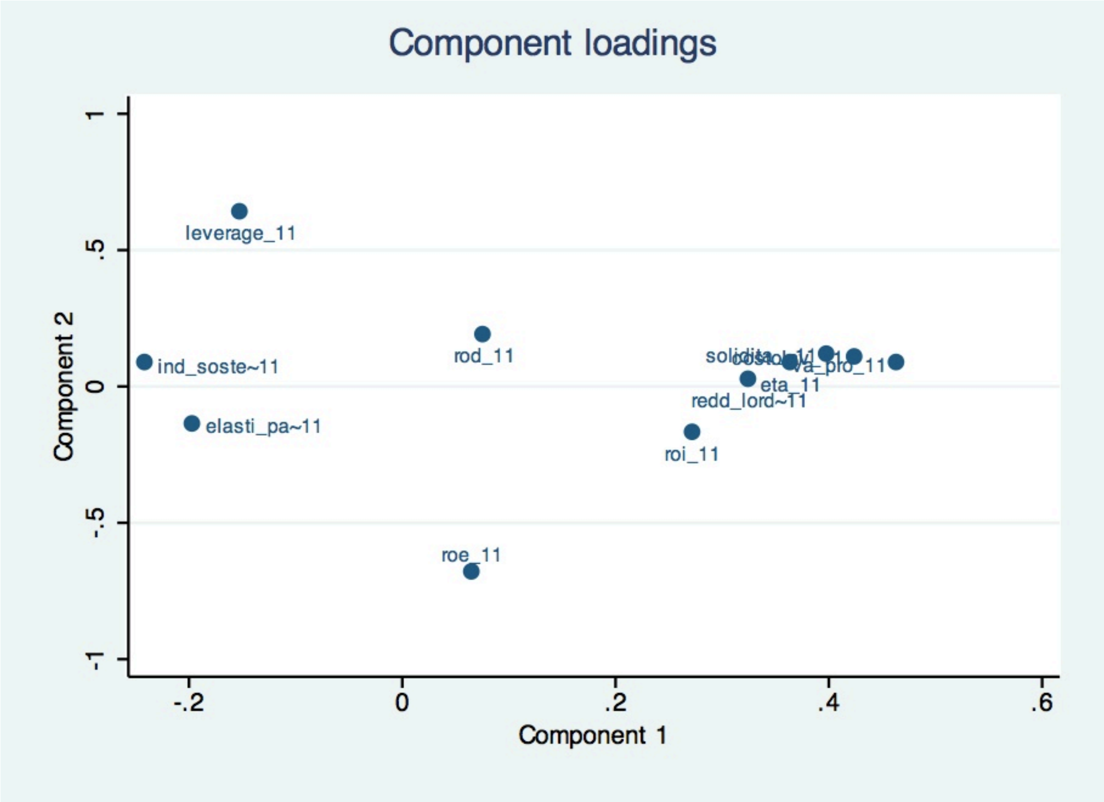
The object of the analysis is a set of 11 variables (financial ratios) for each of the years between 2004 to 2011 (8 occurrences). The analysis for the year 2011 will be presented here, since the pattern of correlations, as well as the explanation of the common factors, remain substantially unchanged in the other years.

Table 5 - Principal Component Analysis: eigenvalues and eigenvectors

Comp1	3.48	1.63	0.32	0.32
Comp2	1.85	0.22	0.17	0.49
Comp3	1.63	0.53	0.15	0.63
Comp4	1.10	0.30	0.10	0.73
Comp5	0.79	0.16	0.07	0.81
Comp6	0.64	0.12	0.06	0.86
Comp7	0.52	0.11	0.05	0.91
Comp8	0.41	0.07	0.04	0.95
Comp9	0.34	0.22	0.03	0.98
Comp10	0.12	0.00	0.01	0.99
Comp11	0.12		0.01	1.00

The different from zero eigenvalues are 11, of which only 4 have an absolute value greater than 1, and therefore are natural candidates for a possible interpretation. The first eigenvalue is worth about 3.48 and is equal to 31.68% of the trace of the diagonalized matrix, while the second explains a further 16.85%. Since each factor space consists of orthogonal, and thus additive, components, the first factorial plan reproduces the 48,53% of the linear variation of the phenomenon. Note how the third and fourth factors, being greater than 1, represent significant synthesis and should be explained in a further development of the research.

Figure 2 - Principal Component Analysis: correlations



The explained variance is not very high, since various strong latent structures constitute the basic trends of the phenomenon, even with a low number of variables.

In the factorial plane, the first factor represents the "industrial" gross productivity. The explanation of the first axis is clear, given the strong correlations and the quality of the representation of virtually all the variables.

The first axis is in fact strongly positively correlated with the following variables: gross profitability (EBITDA/VA), return on investments (ROI), productivity per employee and also average labor cost per employee. The latter relationship is always confirmed by the data, and can be interpreted in two ways: in production processes with high value added margins exist to generously remunerate the labor factor. Alternatively, to achieve a high productivity it is necessary to have - and pay for - high-level skills. These firms tend to be the most "senior". Consistently with these results, at the other polarity of the axis capital elasticity indicator is found, since the less productive firms are characterized generally by a lower endowment of capital per worker (whereby the ratio Current Assets / Fixed Assets turns out to be higher), as well as the solvency indicator, because high values indicate the presence of passive positions larger than the company's gross profitability.

The second factor is interpreted as the net profitability, in terms of financial return. The variables that characterize the Modigliani-Miller formula, ie ROE on one side, ROD and Leverage on the other, are in fact opposed on the axis.

7. Spatial analysis

The two factorial dimensions identified by the PCA for the years 2004-2011 are used as variables of the spatial regression model described in the following section. The goal is to identify whether and to what extent the spatial, i.e. the proximity/distance of the territorial units (SLL), and the temporal aspects influence the dynamics of the 2 first factorial dimensions.

The results of the preliminary analysis, which are not presented in this paper, indicate the *Spatial Lag-the* model that best fits the empirical data.

7.1. Spatial-Lag Model

The model is part of the theoretical and methodological apparatus developed by Anselin (1980, 1988, 1994, 2002) and, in its general form can be written thus:

[1] $$\rho\, y\, W_1 + X\beta + \varepsilon$$
[2] $$\lambda W\, \varepsilon = \varepsilon_2 + u$$

where:

- y is the vector *N* x1 of the observations of the dependent variable *(N* is the number of geographic units);
- W_1 W_2 are *N* x *N* matrices of contiguity attached to the lagged variables and disturbance;
- X is a matrix *N* x *k* of observations of the explanatory variables;
- ρ and λ are the two autoregression coefficients (scalar), respectively associated with the lagged variable Wy and noise factor ε;
- β are *k* x 1 vectors of the regression and autoregression parameters respectively associated with the explanatory variables X;
- u is the error term and is normally distributed with mean 0 and covariance diagonal matrix Ω.

Since in the general model there are three autoregressive terms ($\rho W_1 y$, δW_{1X} and $\lambda W_2 \varepsilon$), the use of the least squares estimation method (*OLS*) produces biased and inconsistent estimates. Therefore maximum likelihood (*ML*) method is applied.

Starting from the general model and setting:

- δ , λ = 0 the model *Spatial Lag* is obtained .

[3] $$y = \rho\, W_1 X\, y + \beta + \varepsilon$$

- δ , ρ = 0 the model *Spatial Error* is obtained .

[4] $$y = X\beta + (I - \lambda W_2)^{-1} u$$

The spatial dependence takes different meanings depending on the model (Doreian, 1980). In fact, the control parameter ρ of the *Spatial Lag* model records the relationship between territorial units through the dependent variable, while the parameter λ of the *Spatial Error* model records the joint effect, in addition to the spatial configuration of the unit, of the variables not included in the model. Finally, Durbin has shown that the *Spatial Error* model can be formulated in terms of the *Spatial Lag* model which includes, in addition to the dependent variable lags, also that of the explanatory variables, and can be written (Anselin, 2002) as:

[5] $$y = \rho W_2 y + X\beta - \delta W_2 X + u$$

The Durbin model incorporates the spatial lag both in the dependent and explanatory variables. The first records the *spillover* effect due to the values that y assumes in contiguous units. The second records the *spinoffs* that can be ascribed to the values taken the explanatory variables in the nearby areas.

9.2. Identification and estimation of the model

To evaluate the space-time effects at the Local Labour System level the following model is used:

$$A1\_11= \rho WA1\_11+ B_1A1\_10+ B_2A1\_09+ B_1A1\_08+\varepsilon \quad [7]$$

Where:

- WA1_11 the first lagged factorial component in space;
- A1_11 identifies the first PCA factorial component in the year 2011;A1_10, A1_09 and A1_08 the first component in the years 2008-2010.

For the other years the parameters are not significant.

Table 4 - Statistics for the model identification

	Test	Value	prob
Lagrange Multiplier (lag)	1	54,36097	0,00000
Robust LM (lag)	1	52,02336	0,00000
Lagrange Multiplier (error)	1	1,89285	0,16888
Robust LM (error)	1	10,35524	0,00129
Lagrange Multiplier (SARMA)	2	64,71621	0,00000

The correct specification of the model is confirmed by the relationship between the Word statistics (*Wd*), the Likelihood Ratio (*LR*) and the Lagrange Multipler (*LM*), that assume the following values respectively:

$$W = 55.2049 > LR = 52.45 > LM = 52.02$$

The spatial component that records the *spillover* effect is significant, as the first factorial component for the years 2010, 2009 and 2008. Among these the largest weight is that of 2010.

As for the goodness of fit, both the *Likelihood* and the *Akaike Spatial-Lag information criterion* are lower than those of the OLS model.

Table 5 - Estimation of parameters and statistics on the goodness of fit

Variable	Coefficient	Std.Error	z-value	Probability
WA1_11	0,2307	0,0310	7,4307	0,0000
CONSTANT	0,0018	0,0364	0,0503	0,9599
A1_10	0,4405	0,0388	11,3408	0,0000
A1_09	0,1039	0,0424	2,4500	0,0143
A1_08	0,2838	0,0342	8,3044	0,0000
Goodness of Fit			OLS	Spatial-Model
Likelihood			- 831,509	- 805,283
Akaike Spatial-Lag info criterion			1671,02	1620,57

Finally, the residuals plots show a random distribution and almost zero values of correlation and spatial autocorrelation.

Overall, the spatial analysis results, performed on the first identified component "Productivity", confirm and strengthen those of the analysis on the ROI of municipalities (Sections 6 and 7), with respect to which the spatial effects are also more significant. These effects however are not significant on the second component, the overall Profitability, on which the changing financial conditions exert the greater influence.

Figure 3 - Distribution of residuals

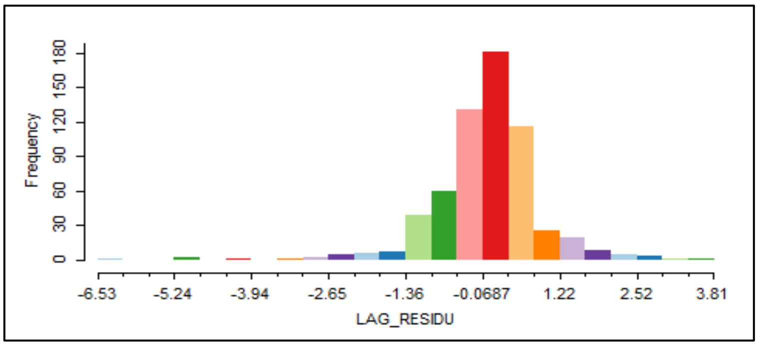


Figure 4 - Correlation and spatial autocorrelation of residuals

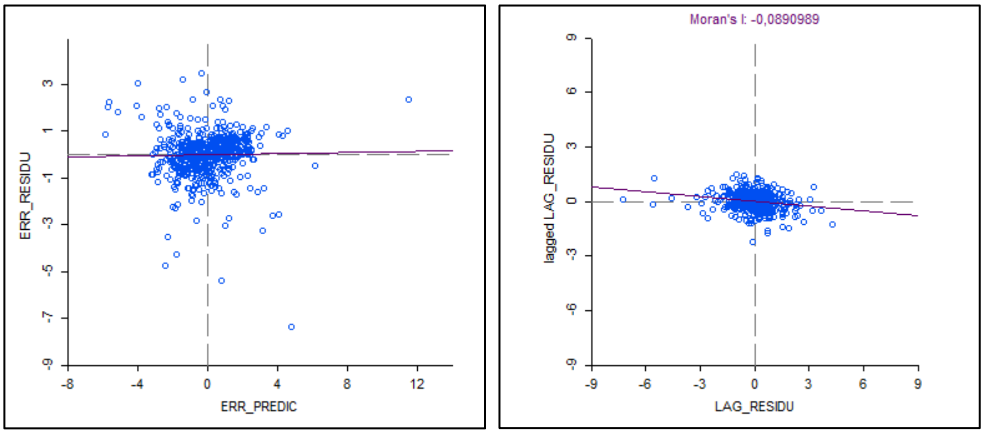
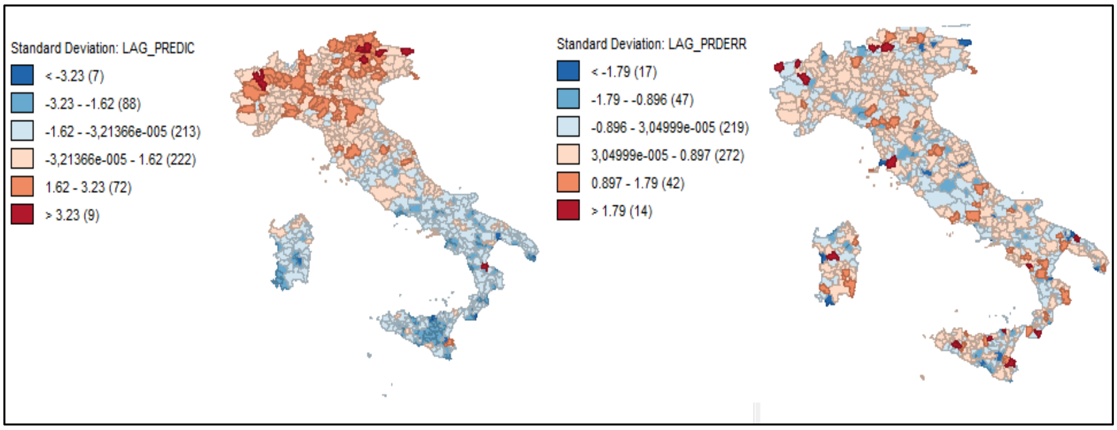


Figure 5 - Map of the theoretical values and the forecast error



The predicted values are represented in the figure below, where the highly dynamic areas are in red (i.e. the areas characterized by positive values both in their own history and in nearby areas), the low dynamic areas (specular to the previous one, i.e. characterized by negative values both in their own and neighboring areas) in blue, the disruption areas (high-low and low-high) in pink and pale blue, and finally not characterized areas in gray.

Figure 6 - Map of predicted values

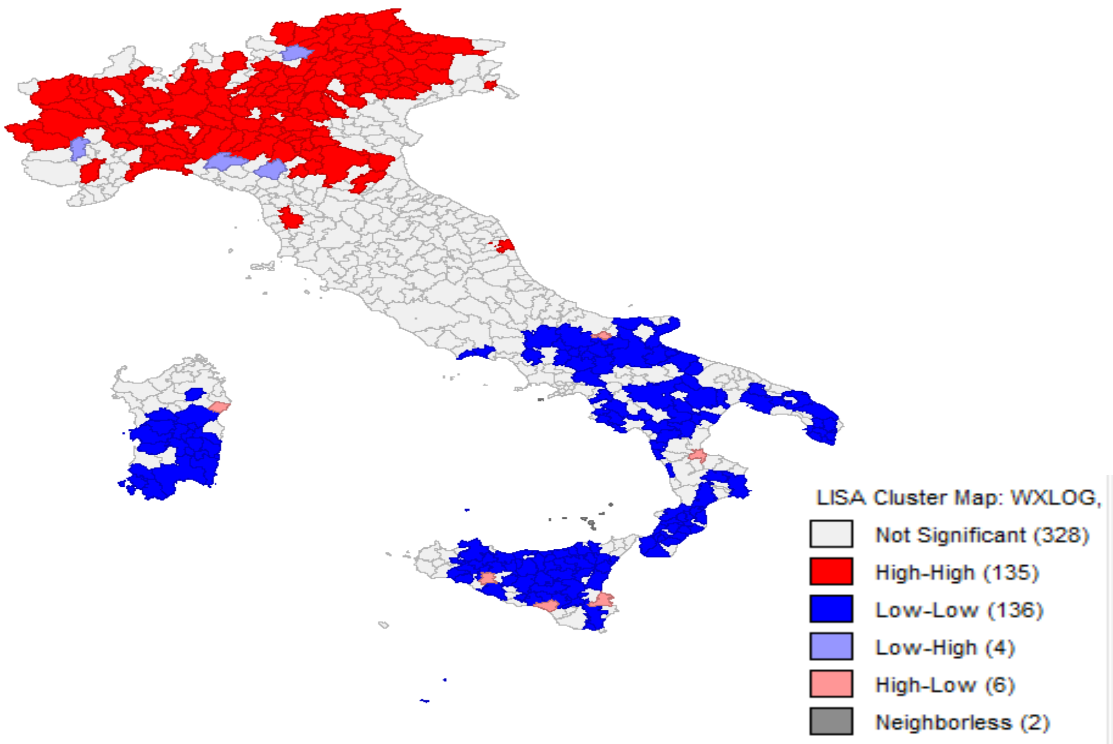


Table 6 - Comparison between LLS and Clusters

Descrizione Specializzazione	moran						
	high-high	high-low	low-high	low-low	no neighb	no significative	Totale
NESSUNA SPECIALIZZAZIONE	81	6	4	134	2	243	470
Industria meccanica	23	0	0	0	0	15	38
Beni per la casa	9	0	0	0	0	15	24
Tessile e abbigliamento	6	0	0	4	0	22	32
Industria metallurgica	3	0	0	0	0	1	4
Industrie alimentari	2	0	0	2	0	11	15
Pelli, cuoio e calzature	2	0	0	1	0	14	17
Industria chimica, petrolchimica	1	0	0	0	0	4	5
Oreficeria, strumenti	1	0	0	0	0	3	4
Industrie cartotecnica	0	0	0	0	0	2	2
Totale	128	6	4	141	2	330	611

The comparison between LLS and the clusters identified by the model shows that among specialized areas (industrial districts), the most dynamic areas belong to the "Made in Italy" sector, and, in particular, to the mechanical and to the household goods industries.

As well highlighted in Table 7, the different areas (by exclusion of the few disrupture areas) have values of the various indexes near to the expected ones. In particular the positive areas (high-high) have higher values of value added per employee and consequently higher wages, greater fixed capital/Labour ratios; higher EBITDA and ROI, greater financial strength; higher average age.

Table 7 - Clusters: Average values of the main indicators

moran	Numero SLL	VA per addetto	costo del lavoro per addetto	VA / MOL	ROI	ROE	ROD	Leverage	Solidità patrimoniale	Elasticità patrimoniale	Indice di sostenibilità	Età dell'impresa
high-high	128	€ 55.966	€ 37.894	35,49%	2,98%	1,59%	1,93%	3,26	32,1%	1,37	4,50	14,80
no significative	330	€ 42.037	€ 31.311	31,16%	2,09%	4,28%	2,01%	3,77	26,0%	1,50	7,04	11,69
low-low	141	€ 33.216	€ 25.495	28,87%	1,80%	-6,92%	1,83%	5,25	21,8%	1,85	8,13	9,77
Totale	599	€ 42.937	€ 31.349	31,55%	2,21%	1,07%	1,95%	4,01	26,3%	1,56	6,75	11,90

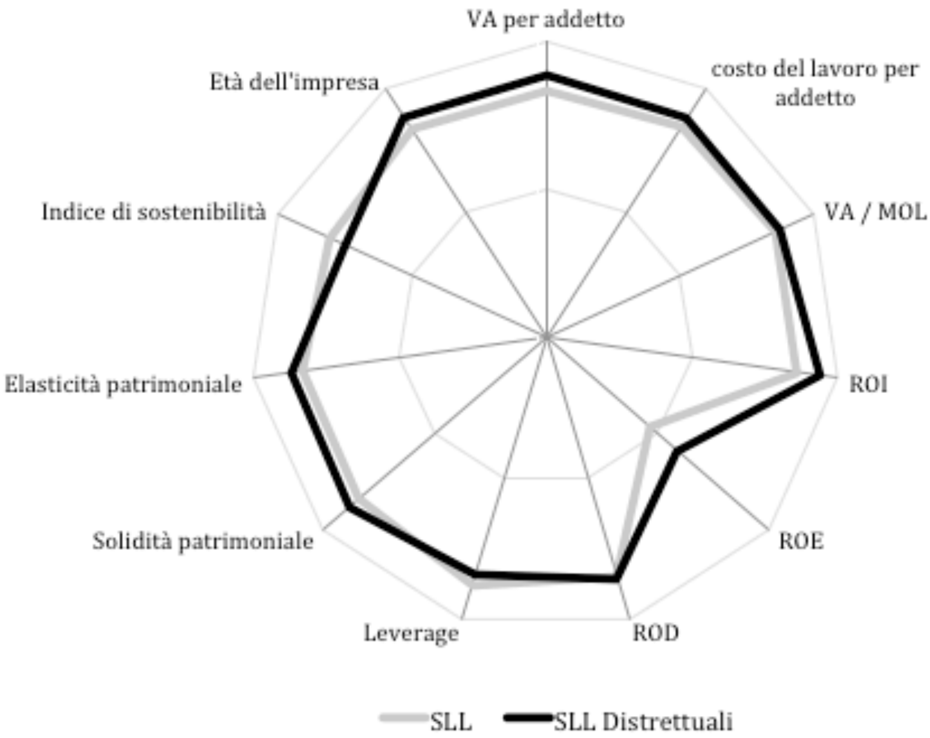
Maybe the most interesting results are obtained adding another classification variable, i.e. if the LLS is an industrial district. The average values of the classified areas (high-high and low-low) are identical, and in fact even the difference of means test leads to accept the null hypothesis of equality.

Table 8 - Average values of the main indicators in district and non-district LLS

	moran	Numero SLL	VA per addetto	costo del lavoro per addetto	VA / MOL	ROI	ROE	ROD	Leverage	Solidità patrimoniale	Elasticità patrimoniale	Indice di sostenibilità	Età dell'impresa
Distretti Industriali	high-high	47	€ 53.795	€ 38.261	33,29%	2,62%	1,43%	1,85%	3,23	31,0%	1,57	4,25	14,2
	no significative	87	€ 45.868	€ 33.572	32,93%	2,57%	1,10%	2,03%	3,58	28,0%	1,57	4,84	12,66
	low-low	7	€ 32.493	€ 25.114	30,53%	2,39%	1,13%	1,66%	4,88	20,5%	1,94	6,10	9,7
NO Distretti Industriali	high-high	81	€ 53.835	€ 37.609	34,61%	2,96%	2,74%	1,91%	3,12	32,0%	1,27	4,11	14,3
	no significative	243	€ 39.220	€ 30.275	31,24%	2,11%	-0,35%	1,96%	4,02	24,8%	1,41	6,06	10,98
	low-low	134	€ 32.945	€ 25.550	29,43%	1,96%	0,13%	1,82%	4,57	21,9%	1,64	6,23	9,7

On the top of that, among non-classified clusters, the industrial districts, territorially concentrated areas, with strong industrial vocation, are significantly stronger than the others, while presenting appreciable differences from the High-High areas.

Figure 7 - Analysis of results: differences between unclassified clusters



This analysis confirms the industrial districts' vitality: industrial districts represent the 37% of high-high areas (47 of 128), while the 87 districts not classified by the model have a significantly better performance than unspecialized areas, and the total for Italy.

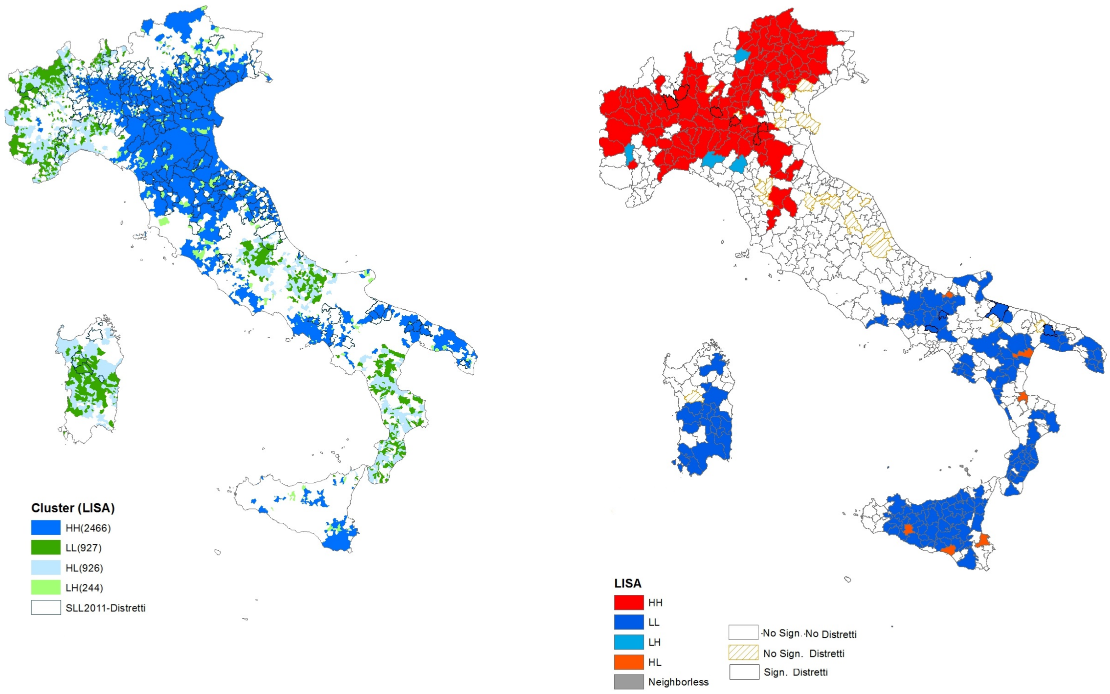
Table 9 - Cluster: unclassified districts

regione	high-high	no signal	low-low	Totale	high-high	no signal	low-low	high-high	no signal	low-low
Abruzzo	0	4	0	4	0%	100%	0%	0%	5%	0%
Campania	0	4	2	6	0%	67%	33%	0%	5%	29%
Emilia-Romagna	8	5	0	13	62%	38%	0%	17%	6%	0%
Friuli-Venezia Giulia	0	2	0	2	0%	100%	0%	0%	2%	0%
Lazio	0	1	0	1	0%	100%	0%	0%	1%	0%
Liguria	0	1	0	1	0%	100%	0%	0%	1%	0%
Lombardia	21	8	0	29	72%	28%	0%	45%	9%	0%
Marche	0	19	0	19	0%	100%	0%	0%	22%	0%
Piemonte	3	4	0	7	43%	57%	0%	6%	5%	0%
Puglia	0	3	4	7	0%	43%	57%	0%	3%	57%
Sardegna	0	3	1	4	0%	75%	25%	0%	3%	14%
Toscana	2	13	0	15	13%	87%	0%	4%	15%	0%
Trentino-Alto Adige	2	0	0	2	100%	0%	0%	4%	0%	0%
Umbria	0	3	0	3	0%	100%	0%	0%	3%	0%
Veneto	11	17	0	28	39%	61%	0%	23%	20%	0%
ITALIA	47	87	7	141	33%	62%	5%	100%	100%	100%

8. Conclusive remarks

The model choice leads to a certain divergence of results, related to the variables included, as well as the spatial aggregation detail. However, the same *core* areas emerge, regardless of the variables included in the analysis, as well as the model choice.

Figure 8 - Comparison between the two models



Summing up the results:

- The time effects predominate over the spatial ones
- However, the spatial effects are significant, especially for areas with better/worse performance
- Districts reproduce the clusters identified in the analysis, and industrial district areas represent about 45% of the most successful clusters.
- To be a district does not discriminate between High-High and Low-Low LLS, but instead discriminate between unclustered LLS.

Both orders of considerations strongly support a postponement of the *De Profundis* expressed by several parties with respect to the vitality of the Italian industrial districts. As mentioned earlier, the industrial vocation and the presence of competitive advantages in location still play a major role in our country's present and future.

It has to be stressed that the period taken into consideration allows to take into account the effects of the Great Recession on the Italian industrial system. On the top of that, the number of firms under consideration gives strength to the above results.

The spatial analysis seem indeed reinforce the view that the fragmentation of supply and distribution chains have not yet eliminated the positive legacy on the firms productivity and profitability of the industrial districts formation and consolidation. These effects' importance grows when the firms efficiency, net of the influence of the financial conditions, is analyzed.

9. Bibliography

1. Accetturo A., Giunta A., Rossi S. (2011), Le imprese italiana tra crisi e nuova globalizzazione, *l'Industria. Rivista di Economia e Politica Industriale*, XXXII, 1: 145-164.

2. Alchian A.A. (1950), Uncertainty, Evolution and Economic Theory, *Journal of Political Economy*, 58: 211–221.

3. Anselin L. (1980), Estimation Methods for Spatial Autoregressive Structures. New York:, Cornell University. *Regional Science Dissertation and Monograph*, n. 8.

4. Anselin L.(1986), Some Further Notes on Spatial models and Regional Science, *Journal of Regional Science*: 799-802.

5. Anselin L.(1988), *Spatial econometrics. models and applications*, Kluwer-Dodrecht.

6. Anselin L.(1994), Local Indicator of spatial association–LISA. WestVirginia University Regional Research Institute.

7. Anselin L.(2002), *Under the Hood. Issues in the Specification and Interpretation of Spatial Regression Models*, Regional Economics Application Laboratory (REAL),University of Illinois

8. Arrighetti A., Traù F.. (2012), Far from the madding crowd. Sviluppo delle competenze e nuovi percorsi evolutivi delle imprese italiane, *l'Industria. Rivista di Economia e Politica Industriale*, XXXIII, 1: 7-59.

9. Atzeni S., Dettori B., Usai S. (2004) «Econometria per le indagini territoriali», Cagliari: CRENoS – Altantis. *Quaderni di Lavoro*, N.1.

10. Barba Navaretti G., Bugamelli M., Faini R., Schivardi F., Tucci A. (2007) Le imprese e la specializzazione produttiva dell'Italia. Dal macrodeclino alla microcrescita?. Rapporto preparato per conto della Fondazione Rodolfo Debenedetti per il Convegno: I vantaggi dell'Italia, Roma 22 marzo.

11. Bartelsman E. J., Domas M. (2000), Understanding Productivity; Lessons from Longitudinal Microdata, *Journal of Economic Literature*, 38: 569-594.

12. Bottazzi G., Dosi G., Jacoby N., Secchi A. Tamagni F. (2010), Corporate performances and market selection: some comparative evidence, *Industrial and Corporate Change*, 19: 1953-1996.

13. Brandolini A., Bugamelli M. (a cura di) (2009), Rapporto sulle tendenze del sistema produttivo italiano. Roma: Banca d'Italia *Questioni di Economia e Finanza (Occasional papers)*, N. 45.

14. Cardinaleschi S., De Santis S., Schenkel M., Truglia F.G. (2016) Performance delle imprese e effetti spaziali, *Eyesreg*, forthcoming.

15. De Marchi V., Grandinetti. R. (2014) Industrial Districts and the Collapse of The Marshallian Model: Looking at the Italian Experience, *Competition and Change*, 18: 70–87.

16. Di Giacinto V., Gomellini M., Micucci G., Pagnin M. (2014), Mapping local productivity advantages in Italy: industrial districts, cities or both?, *Journal of Economic Geography* 14: 365–394.

17. Doreian P.(1980), Linear Model with Spatially Distributed Data. Spatial Disturbance or Spatial Effects, *Sociological Methods & Research*, 9, 1, :29-60.

18. Dosi G. (2008) Regolarità statistiche nell'evoluzione dei settori industriali: l'evidenza empirica e le sfide per la teoria *l'Industria. Rivista di Economia e Politica Industriale*, XXIX: 185-219.

19. Dosi G., Grazzi M. (2006) Technologies as problem-solving procedures and technologies as input-output relations: some perspectives on the theory of production, *Industrial and Corporate Change*, 15: 73-102.

20. Dosi G., Grazzi M., Tomasi C. Zeli A. (2011), L'industria manifatturiera negli ultimi due decenni prima della crisi: le micro-dinamiche sottostanti ai trend aggregati *Economia e Politica Industriale*, 38: 63-95.

21. Foresti G., Guelpa F., Trenti F. (2008), I distretti industriali alla prova della palingenesi. *l'Industria Rivista di economia e politica industriale*, XXIX, 3: 547-570.

22. Istat (2010) *Rapporto Annuale 2009. La situazione economica del paese*, Roma: Istat.

23. Melitz M. J. (2003) The Impact of Trade on Intra-Industry Reallocations and Agggregate Industry Productivity, *Econometrica*, 71: 1695-1725.

24. Melitz M. J., Ottaviano J.I.P. (2008), Market Size, Trade, and Productivity *Review of Economic Studies*, 75: 295-316.

25. Monducci R., Anitori P., Oropallo F. Pascucci C. (2010), Crisi e ripresa del sistema industriale italiano: tendenze aggregate ed eterogeneità delle imprese, *Economia e Politica Industriale*, 37: 93-116.

26. Mueller D. C. 1990. The Dynamics of Company Profits. Cambridge: Cambridge University Press.

27. Oropallo F., Rossetti S. (2007) Entrepreneurs' Behaviour and performance: An Empirical Analysis on Italian Firms, *Rivista di Politica Economica*, 97: 1-18.

28. Schenkel M. Cassetta E. (2014), La performance delle piccole e medie imprese italiane: un'analisi empirica, *Rivista di Statistica Ufficiale*, 3: 21-41.

29. Secchi A. Tamagni F. (2009) Un'analisi empirica delle relazioni tra crescita d'impresa, produttività e profittabilità, in Rondi L., Silva F. (a cura di) *Produttività e cambiamento nell'industria italiana. Indagini quantitative*,Bologna: Il Mulino. 39-65.

30. Sylos Labini P. (1984) *Le forze dello sviluppo e del declino*, Bari-Roma: Laterza.

31. Syverson C. (2010) What determines productivity? *NBER Working Paper*, No. 15712.

32. Traù F. (2013), L'eterogeneità dei risultati economici delle imprese negli anni della globalizzazione e della crisi, *QA-Rivista dell'Associazione Rossi-Doria*: 7-42.

Abstract

Has the positive effect of belonging to an industrial district on the performance of Italian companies decreased (Di Giacinto et al., 2014) or disappeared (De Marchi and Grandinetti, 2014)? This hypothesis is tested, applying the methods of' spatial analysis.
It was found that:
• The ROI in each municipality / Labour Local System depends on the one of the neighboring municipalities;
• from that point of view, industrial districts identify homogeneous groups of municipalities.
Subsequently a Multiway analysis was carried on, on the basis of the individual data of the Census of Industry and Services in 2011, integrated with the annual budget data collected by the Chambers of

Commerce. The spatial analysis was then repeated on the outputs of the Multiway analysis.

The spatial component that records the spillover effect is significant, and so does the first factorial component for the years 2010, 2009 and 2008.
Overall, the results of the Spatial Analysis on the first component ("productivity") confirm those of ROI analysis on a municipal basis, in comparison to which the spatial effects are more significant. These effects however are not significant on the second component ("Profitability"), which is especially affected by the changing financial conditions.