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Measurement and Drivers of Regional Disparities

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Introduction

Rita De Siano and Mariafortuna Pietroluongo

Annals of CRISEI 2018 comprises a selected number of contributions that some scholars of the Centro di Ricerca Interdipartimentale in Sviluppo Economico e Istituzioni (CRISEI) completed during the year 2018. This group of researchers carried out an intense research activity that has covered a variety of issues dealing with the general theme of "Regional disparities". The studies included in this volume focus in particular on the main drivers of regional disparities and on some possible alternative methodologies applicable to the analysis of this issue. The first studies, referring to the single countries contexts present a useful methodology to explore regional disparities and explore the impact of changes in factors that are crucial for regional development and convergence, such as income, total factor productivity, productive specialization and the European Monetary Integration. The last studies, instead, evaluate the effects of economic shocks on convergence process at a European regional level.

The first contribution, "*A Dynamic Multivariate Method for Regional Disparities"* by Caroleo, Coppola and Semerikova, presents an application of a dynamic multivariate factorial analysis to investigate regional disparities in Russia over the period 2007-2013. The statistical method employed, (Structuration des Tableaux A Trois Indeces de la Statistique, STATIS) enables to measure regional gaps both in terms of structural disparities (sectoral, productive or labor supply composition) and labor market performance (participation rate and unemployment), in order to individuate homogeneous cluster of regions. The outcome of this analysis may be used to find regional and national policies or institutional arrangements that could better favor the development of a region. This methodology evidences the factors that mostly contribute to the convergence process either to a single structure or instead to a multiplicity of socio-economic structures. Overall, the results of the analysis confirm the thesis of those who contend that Russian regions have a diversified reality influenced by structural phenomena concerning labour market characteristics, sectoral composition, and localization factors. This makes unlikely that integration processes will give rise to the hope for levelling of economic development in the near future.

The second contribution, "*Stochastic Convergence of Income and Total Factor Productivity: Evidence from the Italian Regions"* by Kounetas, Napolitano and Pietroluongo, tests the convergence hypothesis applying the stochastic Kernel approach to the GDP and the Total Factor Productivity, measured by the Malmuist index. By applying this procedure to a sample including 20 Italian regions, the study suggests that the measure of total factor productivity is a crucial

precondition for the estimation of regional growth. Moreover, the distribution approach reveals that there no convergence trend in both GDP and TFP. In detail, the analysis confirms the strong Italian divide between Center-Nord and Southern regions income levels while the TFP trend show the presence of three different clubs. However, when looking at the long run density, TFP shows a clear unimodal distribution, suggesting a long run convergence process for the regional productivity in Italy.

The Italian regional disparities are further investigated in the third paper "*Too much EMU? An investigation of technology gaps for the Italian regions*" by Kounetas and Napolitano. The analysis follows a model for regional integration. Although the debate on the economic integration and its impact on the countries/ regions is considerably interesting, it remains an open question for a discussion. In particular, little attention has been reserved to the effects of EMU on regional performance. To this end, the main aim of this study is to apply a non-parametric framework to build a common metafrontier to compare regional performance in terms of technological efficiency. Moreover, authors account for the regional heterogeneity between the Italian regions in two distinct periods, the one before and the other after the EMU implementation. Then, they use the values of the technological for each period, to make an estimate that identifies the factors that most influenced regional technological performance. The analysis reveals a significant improvement for the twenty Italian regions after the EMU unification and a surprising unchanged level of efficiency for the Centre-North regions. The inclusion in the empirical model of several control variables enables to verify that trade balance is only of relatively major importance and public expenditures, in the first period, and R&D expenses, in the second, reveal a different pattern of growth for Italian regions before and after the EMU implementation. A further result is the identification of the regions that perform better in terms of technology gap.

The contribute "*Il turismo in Campania, punti di forza e strategie per lo sviluppo del territorio: il caso dei distretti turistici*", by Caroleo and De Iudicibus, focuses on a strategic productive sector for the Italian economy, namely the Tourism which in 2017 was equal to 11.3% of GDP. Despite its importance, only in 2001was introduced a law (law no.135/2001) to fix the competences between State and Regions and reorganize the entire sectorial activity. The study relates to the local tourism systems in Campania (one of the most important region in Italy from a touristic point of view) with two main objectives: to evaluate whether the establishment of territorial aggregations organized in district forms with the national law of 12 July 2011(no.106) may be considered a useful tool for promoting territorial development based on touristic activities; to test if the tourist districts aggregation, following the law no.106/20112, is more efficient than the previous district re-aggregation based on the cluster analysis statistical approach. The results of the survey provide

interesting starting points for more general analytical reflections on the characteristics of Local Tourist Systems.

The contribute "*The school to work transitions failures and the NEETs*", by Caroleo, Mazzocchi, Quintano and Rocca, investigates one of the most crucial aspects of the school to work transition making a comparison across a selected number of European countries. Authors observe the period between the end of education and the attainment of the first regular job, in which young people are usually in the Not in Employment, Education and Training status (NEET). The length of the time experienced as NEETs depends on many factors, such as the individual characteristics, the education system, labour market and institutional factors that may differ across countries. Looking at young people by age and gender, according to their professional status, the study reveals remarkable differences between men and women, especially after the 24 years, and an alarming levels of NEETs, especially in the Mediterranean countries of Italy and Spain.

The paper by Bonasia, Kounetas and Napolitano, "*Modeling European Health Regional Systems through a Directional Distance Function Metafrontier framework*", focus on the efficiency of healthcare systems at regional level across European countries, taking into account undesirable outcomes. The analysis refers to a panel of 185 European regions belonging to 17 European Union countries and covers the period 2000-2013. As in the previous study, the empirical strategy involves the application of a Metafrontier approach in order to investigate whether there is an actual difference in terms of efficiency performance among European regions belonging to three different health system typologies. The main outcome is the absence of a large difference in terms of convergence among the groups, irrespective of the health system type. When the whole sample is considered, there is a convergence toward two levels of efficiency. The distribution of technological gap over time shows a heterogeneous reduction of the technological gaps across regions. Finally, the 2008 crisis appears to have played a crucial role in determining a different process of polarization among groups.

The last contribute in the volume, "*A Review Economic Resilience and Regional disparities: the contribution of spatial analysis*", by De Siano deals with an issue that only recently raised a particular interest in the economic debate on regional disparities: the impact of economic shocks. Up to less than ten years ago, studies on regional imbalances focused mainly on the analysis of per-capita income convergence while understanding the way shocks may affect the long-run growth of different economies received less attention. On the contrary, it may be crucial for macroeconomic and structural policy interventions, to understand whether convergence/divergence paths are affected only by technological and productive changes or if they are also influenced by shocks (Blanchard and Katz, 1992). In the literature debate, the ability to recover from or adjust to the

negative impacts of external economic shocks is defined as “Economic Resilience”. The main aim of this contribution is to review the recent literature on the subject, in order to better understand how the economic resilience to shocks affects growth and development paths, as well as employment dynamics in the case of regional economies. For the European context, in particular, the choice of the regional territorial level is particularly relevant, as regions are acknowledged as the key spatial units in the sustainable and balanced development of the EU as a whole. Besides, the review takes further insights from the spatial analysis theory. Indeed, the last decades showed an increasing consideration of the spatial dimension into applied economic modelling. Spatial analyses were first conducted in the fields of regional economics and economic geography, in line with the idea that “space matters” as stated by Tobler (1970) in the First Law of Geography: “*Everything is related to everything else, but near things are more related than distant things*”. Accounting for the presence of spatial linkages is extremely important, in particular when looking at the implications of policies implemented at any place to detect problems of a specific geographical unit. The effects of these policies may spread beyond geographical boundaries affecting also neighbouring regions. To this end, also for investigations on regional disparities, spatial econometrics represents an alternative set of estimation approaches to use when dealing with spatial data samples (Anselin, 1988).

A Dynamic Multivariate Method for Regional Disparities

Floro E. Caroleo, Gianluigi Coppola and Elena Semerikova

Abstract

The aim of this work is to apply a statistical method to measure regional gaps both in terms of structural disparities (sectoral, productive or labor supply composition) and labor market performance (participation rate and unemployment). To this end, a multivariate analysis method was applied that, starting from the main economic indicators of the Russia, allows estimating the factors that measure structural diversity in regional labor markets, as well as their dynamics over time. In this way it is possible to test the existence of processes of convergence between regions, or the formation of clusters of regions between them progressively divergent.

Keywords: Regional Disparities, Multivariate Method, Labour Market
JEL Classification: C38, R12, R23

1. Introduction

The aim of this paper is to apply a dynamic multivariate factorial analysis method in order to examine the regional imbalance in a country: the Russia. This method, already applied for the European regions (Amendola et al. 2006) and Italian provinces (Amendola et al. 1999), enables Russian regions to be 'read' on the basis of factors that sum up their main socio-economic characteristics, in order to group them into homogeneous clusters. It can therefore be used to estimate whether structural features favour the formation of clusters of regions, and whether they display a tendency to converge either to a single structure, or a multiplicity of socio-economic structures. On this basis, it will then be possible to investigate a number of issues: among them, what criteria could be used in defining regional, or national policies or what institutional arrangement could better favour the development of a region.

Here we present the static results concerning the structure of the regional Russian economy while the dynamic of each regions will be analysed in another paper (Caroleo, Coppola and Semerikova, 2019). The second section provides a brief description of the dynamic factorial method and the data set utilized. In the third section, the method is applied to Russian regions and an analysis is conducted on the characteristics of the main clusters of regions. The concluding section provides a summary of the results.

2. The Method

The disparities among regions (cases) can be analysed on the basis of numerous indicators (variables) like per capita GDP, productivity and the employment rate, and they can also be measured in their

temporal dynamics (time). The multidimensional nature of regional differences, therefore, lends itself well to analysis by means of multivariate analysis methods, and in particular, by dynamic multivariate analysis. We decided to apply the "*Structuration des Tableaux A Trois Indices de la Statistique"* method. This is a dynamic multivariate method which enables the analysis of multidimensional (multiway) phenomena, expressible in the form of three-way matrices: cases *i*, variables *j*, time *t*. The method was developed by Escoufier (1985), and found numerous applications in economics, Rivadeneira et. Al (2016), in Italy as well as (D'Ambra 1985; Fachin and Vichi 1993; Tassinari and Vichi 1994). Moreover, it has already been used to explain the dynamics of disparities among the Italian provinces (Amendola et al. 1999) and European regions (Amendola et al. 2006). This technique of exploratory analysis is based on the study of a three-way data matrix, $X_{I\,JT}$ obtained from the temporal succession of data matrices, ${}_t X_{i,j}$ of the same order, where i is the statistical unit and j the variable. Both of them are relative to the period t (i = 1, 2...I; j = 1, 2...J; t = 1, 2...T). The formula is:

$$X_{I,JT} = \left\| {}_1X \quad {}_2X \quad {}_TX \right\|$$

which can be presented as

$$X_{i,JT} = \begin{Vmatrix} {}_1x_{11} & {}_1x_{12} & \cdot\cdot & {}_1x_{1j} & {}_2x_{11} & {}_2x_{12} & \cdot\cdot & {}_2x_{1j} & {}_tx_{11} & {}_tx_{12} & \cdot\cdot & {}_tx_{1j} \\ {}_1x_{21} & {}_1x_{22} & \cdot\cdot & {}_1x_{2j} & {}_2x_{21} & {}_2x_{22} & \cdot\cdot & {}_2x_{2j} & {}_tx_{21} & {}_tx_{22} & \cdot\cdot & {}_tx_{2j} \\ \cdots & \cdots\cdots & \cdot\cdot & \cdots\cdots & \cdots\cdots & \cdots\cdots & \cdot\cdot & \cdots\cdots & \cdots\cdots & \cdots\cdots & \cdot\cdot & \cdots\cdots \\ {}_1x_{i1} & {}_1x_{i2} & \cdot\cdot & {}_1x_{ij} & {}_2x_{i1} & {}_2x_{i2} & \cdot\cdot & {}_2x_{ij} & {}_tx_{i1} & {}_tx_{i2} & \cdot\cdot & {}_tx_{ij} \end{Vmatrix}.$$

From the three-way matrix, thus constructed, it is possible to derive:

1. the variance-covariance matrix

$$\Sigma_{JT,JT} = \begin{Vmatrix} {}_1\Sigma^2 & {}_{12}\Sigma & \cdots\cdots & {}_{1T}\Sigma \\ {}_{12}\Sigma & {}_2\Sigma^2 & \cdots\cdots & {}_{2T}\Sigma \\ \cdots\cdots & \cdots\cdots & \cdots\cdots & {}_{pq}\Sigma \\ {}_{1T}\Sigma & {}_{2T}\Sigma & {}_{pq}\Sigma & {}_T\Sigma^2 \end{Vmatrix}$$

where ${}_{pq}\Sigma$ is the variance-covariance matrix between *pXi,j* and *qXi,j:*

$${}_{pq}\Sigma = \left({}_p\hat{X}'_{i,j,\,q}\hat{X}_{i,j} \right)\frac{1}{n}$$

where $\hat{X}$ is the deviation matrix and $1^{1 < p < T}$, $1 < q < T$

The matrices on the main diagonal, represent the variance-covariance matrices of the matrix $X_{I,JT}$ at time t, while ${}_{pq}\Sigma$ measures the same relation between the variables relative to time q and time j.

2. The (TxT) square matrix $I_{T,T}$ where each generic element $I_{p,q} = tr(_{pq}\Sigma)$ corresponds to the trace of the relative submatrix $_{pq}\Sigma$ of $\Sigma_{JT,JT}$,

$$I_{T,T} = \begin{Vmatrix} tr(_{11}\Sigma^2) & tr(_{21}\Sigma) & ..... & tr(_{1T}\Sigma) \\ tr(_{12}\Sigma) & tr(_{22}\Sigma^2) & ..... & tr(_{2T}\Sigma) \\ ..... & ..... & ..... & tr(_{pq}\Sigma) \\ tr(_{1T}\Sigma) & tr(_{2T}\Sigma) & tr(_{pq}\Sigma) & tr(_{TT}\Sigma^2) \end{Vmatrix}$$

and is a measure of the dissimilarity between, *pXi,j* and *qXi,j*.. The higher the value assumed by this index, the less the similarity between the structures of *pXi,j* and *qXi,j*

Alternatively, one may assume as the index of similarity Escoufier's (1976) coefficient:

$$I^*_{p,q} = RV(_pX_{i,j},{}_qX_{i,j}) = \frac{tr(_{pq}\Sigma_{pq}\Sigma)}{\sqrt{tr(_p\Sigma^2)tr(_q\Sigma^2)}}$$

obtained by operating with matrices of deviations from the mean. This was used to calculate the matrix of *RV* coefficients (*K* x *K*) called *between matrix cosine*, or simply *RV matrix,* and denoted by C, to analyse the similarities' structure of the matrices. The *RV* coefficients are non-negative, and ranges between 0 and 1, and the closer *RV* is to 1, means the more similar the two data matrices *k* and *k´* are.

The "*Structuration des Tableaux A Trois Indices de la Statistique"* method divides into three phases: *Interstructure, Compromise and Intrastructure*. The purpose of the *Interstructure* phase is to identify a suitable vectorial space smaller than T, where the T occasions can be represented. To this end, examination is made of the matrix $I_{T,T}$ (also called the interstructure matrix), the column vectors of which are assumed as characteristic elements of each of the T occasions. Constructed from this is a factorial subspace, $\Re^s$ con $s < t$ generated by the s eigenvectors, corresponding to the s largest eigenvalues of $I_{T,T}$ con $s < t$.The subspace, thus constructed, yields the best representation of T occasions because it is demonstrated that the matrix Q, of rank s <T – whose elements $Q_{(s)} = \sum_{a=1}^{s} \delta_a u_a u'_a$ are linear combinations of the first δ_a eigenvalues, and u_a eigenvectors of the matrix $I_{T,T}$ – has the characteristic of minimizing the square of the Euclidean norm || *I-Q* ||^2.

A first result is thus obtained. The T occasions with coordinates equal to $\sqrt{\delta_1 u_1}$, $\sqrt{\delta_2 u_2}$, … $\sqrt{\delta_h u_h}$ can be generated in the factorial subspace $\Re^s$ by the first eigenvectors u_a.

It is also possible to calculate indices relative to the quality of the representation, and also relative to the contribution made by each of the T occasions:

− the ratio between the sum of the first s eigenvalues, and the total of all the eigenvalues is a measure of the percentage of total information contained in the space $\Re^s$;

− the ratio between the individual eigenvalue and the overall total, measures the variability captured by the relative eigenvector;

− the square of the cosine of the angle, formed by the factorial axis, with the segment that joins the occasion-point, with the origin, is an index of the representational quality of the individual occasion from that axis;

− the proximity of two occasion-points in the space $\Re^s$ is an indicator of the similarity of the matrices.

In the *compromise* phase, a fictitious structure, or synthesis matrix is identified, which optimally summarizes the information contained in the *T* variance and covariance matrices. This structure, called 'compromise', is given by the matrix *W*, obtained as a linear combination of the elements u_1 of the eigenvector of the matrix $I_{T,T}$ corresponding to the highest eigenvector, and the matrices $\Gamma_t = {}_t\hat{X}_t\hat{X}'$

$$W = \sum_{t=1}^{T} u_t \Gamma_t .$$

In the space plotted by the s eigenvectors corresponding to the first s eigenvalues of the matrix *W*, it is possible to represent both the j variables and the median positions of each individual. The latter are derived from the diagonalization of matrix W, obtained by identifying a matrix M such that W = MM'D (where D is a diagonal matrix defined positive, whose elements are the weights of the individuals, statistical units, $D = \frac{1}{L} I$, with L equal to the number of individuals, and I is an identity matrix.

In other words, matrix W is the best compromise, in the sense defined above, among the various representations that can be associated with each of the T matrices taken separately for each unit of time.

If s = 2, the representation occurs in a two-dimensional space corresponding to the first two factors identified. Obviously, this projection will be better, the greater the incidence of the first two eigenvectors on the trace of W.

In the *intrastructure* phase, it is then possible to represent the trajectories followed in time by each individual in the factorial space thus identified. If only the first two eigenvalues are considered, the representation of the trajectories may occur in a space where the system of the Cartesian axes is constituted by the eigenvectors a_1 and a_2, and where the coordinates on the first axis of each individual are given by $\left(\delta_{1t}\Gamma a_1\right)^{-0.5}$ and on the second axis by $\left(\delta_{2t}\Gamma a_2\right)^{-0.5}$.

3. The static analysis applied to the Russian regions

As case study, we apply the *Structuration des Tableaux A Trois Indices de la Statistique* method to the Russian regions. The variables used for this analysis are listed in Table 1 (the data are collected from the database provided by Federal State Statistics Service). They are indicators characteristic of the labour market and production system (Wishlade and Yuill, 1997). Labour demand was measured by the employment rate (EMR), while the labour supply was measured by the labour-force participation rate (ACR). The Unemployment rate (UNR) was used as a proxy of the gap between labour demand and supply. The percentage of young population (YOU), was used as a measure of the demographic structure of the region.

The production system was represented by three variables corresponding to the percentages of employed persons in agriculture (AGR), industry (MAN), and traditional services (TRA). The other variables considered were Urban density (URB), as a proxy for the agglomeration factors of a region (Fujita et al., 2001; Krugman, 1991), the per capita income (GDP), which is the indicator most frequently used to represent regional disparities, and the share of people with high education (SHE) as an indicator of Human Capital. The time period considered for the analysis was seven years, from 2007 to 2013.

Table 1. Variables used in the *Structuration des Tableaux A Trois Indices de la Statistique* analysis

N	Variable	Measure	Acr.
1	Per capita Gross Domestic Product	GDP per capita in price 2005 Correct for the Consumer' Purchasing Power	GDP
2	Urban density	Share of Urban Population	URB
3	Total activity rate	Active population/population aged over 15	ACR
4	Employment rate	employed/population aged over 15	EMR

5	Unemployment rate	Unemployed/Active population	UNR
6	Share of population below 15 years	Population below 15 years/Population	YOU
7	Percentage employment in agriculture	Employed in agriculture/ total employed	AGR
8	Percentage employment in industry	Employed in industry/total employed	MAN
9	Percentage employment in traditional services	Employed in retail trade, hotels and non-market services /total employed	TRA
10	Share people with high education	Population with tertiary education/population 15-64 aged	SHE

A global comparison between data tables was done using the RV coefficient, (Escufier index) (see appendix D) representing an index of dissimilarity between years. The *RV* coefficients are non-negative and range between 0 and 1. The closer *RV* is to 1 means the more similar the two data matrices *k* and *k´* are.

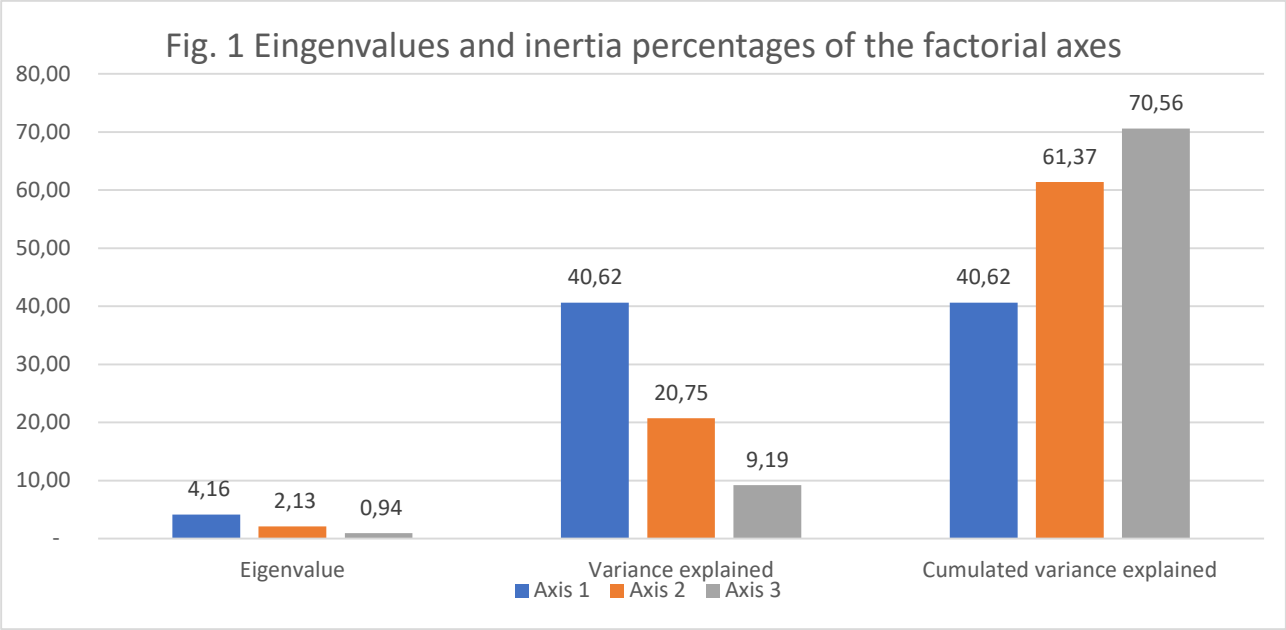
Through an analysis of the coefficients, we can conclude that the contiguous years are the closest ones. The most similar seem to be 2010 - 2011 and 2012.

Table 2. Matrix of the RV coefficients

	2007	2008	2009	2010	2011	2012	2013
2007	1,000						
2008	0,958	1,000					
2009	0,942	0,950	1,000				
2010	0,920	0,931	0,950	1,000			
2011	0,901	0,914	0,940	0,970	1,000		
2012	0,905	0,921	0,937	0,957	0,969	1.000	
2013	0,881	0,890	0,910	0,919	0,938	0.957	1.000

Source: Our calculations on Russian dataset.

Fig. 1 shows the first three highest eigenvalues and the percentage of the total variance explained by the first three factorial axes, in order to evaluate the goodness of the factorial representation yielded by construction of the compromise matrix.



To be noted first is that 40,6% of the variance is explained by the first factor, and 20,8% by the second, for a total of 61,4% of the variance expressed by the set of all the variables. In other words, the first factor alone explains more than a third of the total variability, while the first three factors jointly explain almost 70,6%. Consequently, the reduction of the phenomenon's variability, obtained by representing it in a two or three-dimensional space, is a meaningful synthesis of the information considered.

Figures 2 and 3 show, respectively, on the factorial plane generated by the first two and by the first and third principal components, the positions of the average annual value of each of the ten characteristic indicators considered.

Fig. 2. Position of the characteristic indicators on the first and second factorial plane

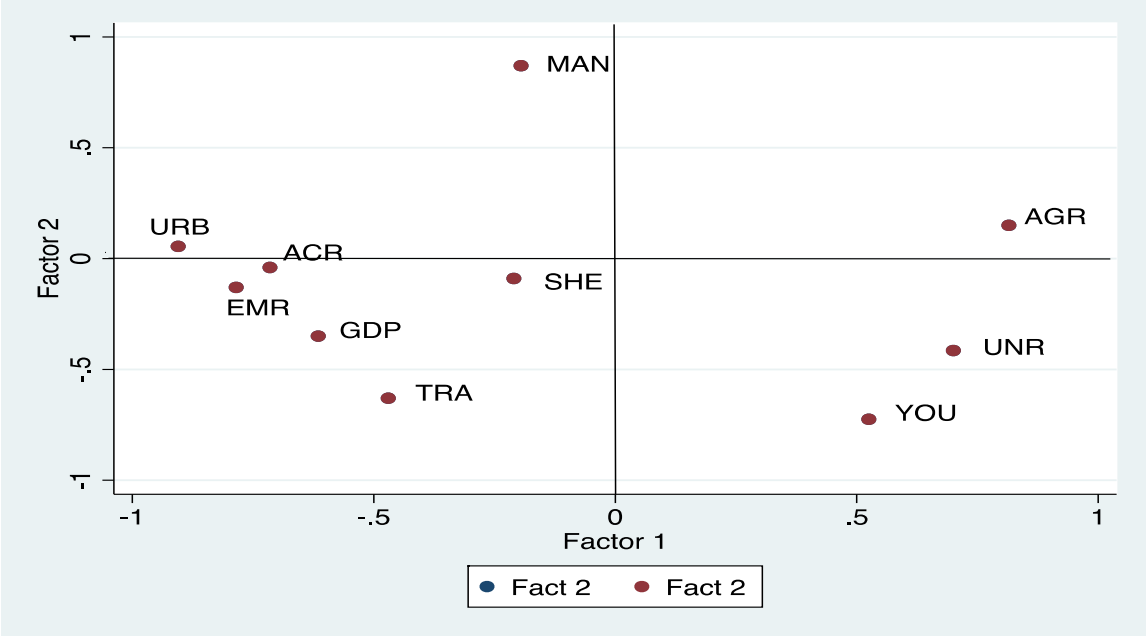
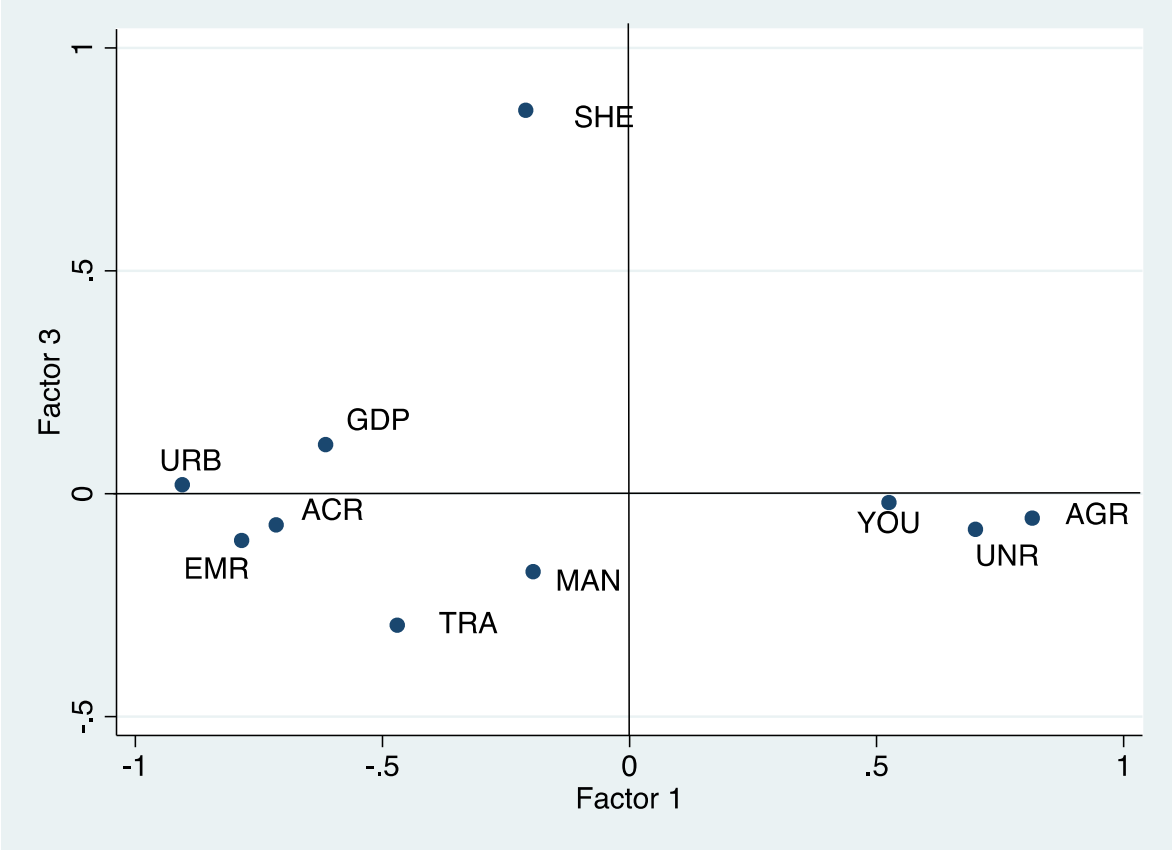


Fig. 3. Position of the characteristic indicators on the first and third factorial plane

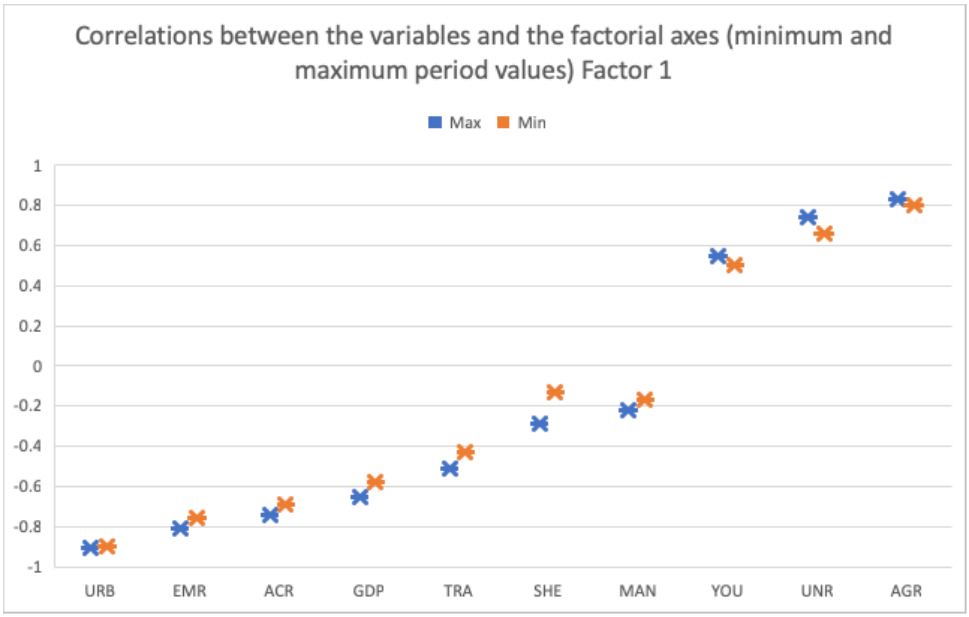


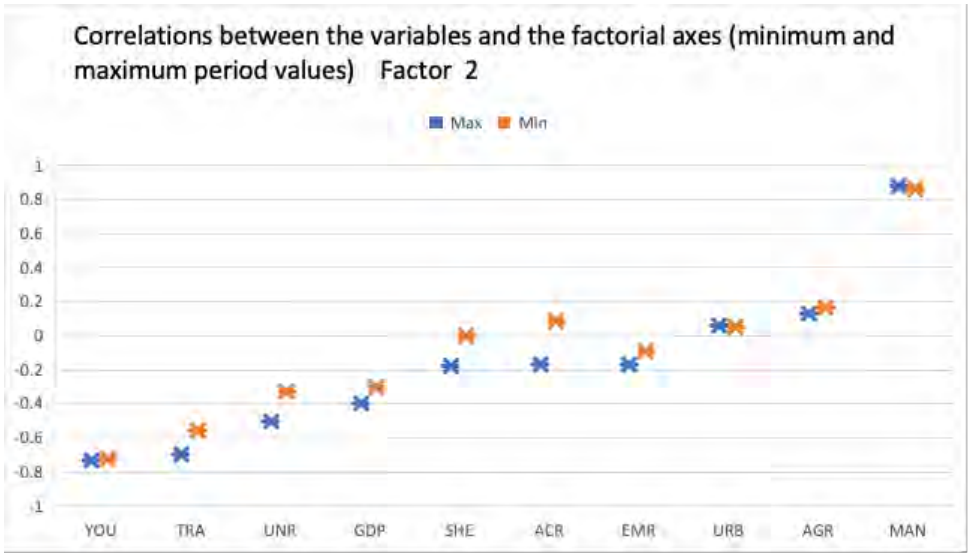
In order to interpret the factors, we may refer to Figure 4.1, 4.2 and 4.3, which shows the minimum and maximum values of the correlations between the variables and the factorial axes. It can be seen that the variables most closely correlated with the first factor are the urbanization rate (URB), the

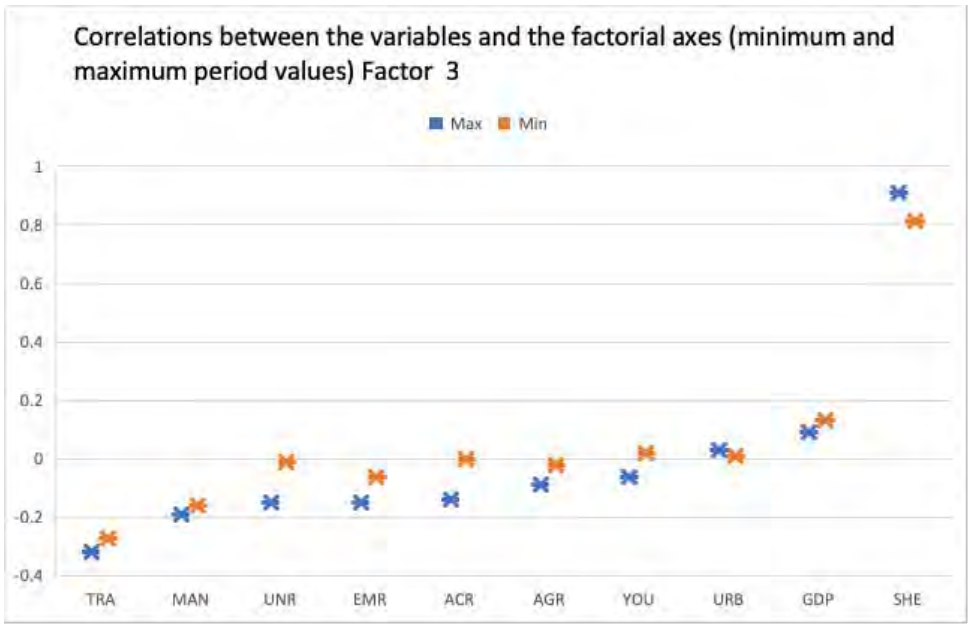
employment rate (EMR), the activity rate (ACR), the per capita income (GDP), and the percentage of employment in traditional services (TRA), on the one hand (negative quadrants), and the unemployment rate (UNR), the percentage of young people (YOU) and the share of employment in the agricultural sector (AGR) on the other (positive quadrants). In other words, along the first axis, one observes a clear polarization between a rich labour market structure, indicators of high urbanization, and those relative to high unemployment, demographic structure, high share of young people, and the presence of agricultural employment.

Along the second axis, one observes a close correlation, on the one hand (positive quadrant), the high percentage of employment in industry (MAN), opposed to a mix of variables which are the percentage of young people (YOU), and the unemployment rate (UNR) positioned in the fourth quadrant, and the percentage of employment in traditional services (TRA), and per capita income (GDP) positioned in the third quadrant. In this case, the second axis identifies, in a marked manner, the phenomena representing variables located in the positive quadrant, namely the industrial structure, and variables linked to the population structure of the less developed areas (quadrant IV), and to the service and high income variables in the richest areas (quadrant III).

The third axis is identified in a manner marked only in the positive quadrant by the indicator of human capital (SHE).







In conclusion, the three factorial axes represent certain characteristics of the labour market and the productive structure. The first factor (**FF**) can be interpreted as being a proxy for the 'bad' performance of the labour market. It should be pointed out that the variable has an opposite sign with respect to the development indicator: the regions that achieve a good performance in terms of activity

rate and employment rate, higher per capita income levels and urbanization have negative values for this factor. By contrast, regions that have high unemployment rates, high percentages of those employed in agriculture and high percentages of youth population, have positive values. The second factor (**SF**) is mainly explained by the industrialisation index in the positive quadrant (first quadrant), and by the transport and gdp indices (third quadrant) and by youth unemployment, and the unemployment rate in the fourth quadrant. The third factor (**TF**) is mainly explained by the Human Capital proxy in the positive quadrant.

The regions associated with the variables characterizing the left part of the first factor that are the dynamic labour markets producing high levels of employment and participation, urbanization, high GDP and presence of transport infrastructure are, among others, Moscow Region, Moscow, Murmansk, Saint-Petersburg, Samara, Tumen, Magadan, and Sakhalin. These regions represent the leading positions of the Russian economy. Richest capital regions (Moscow Region, Moscow and Saint-Petersburg) are the most important industrial centers in Russia. Moscow metropolitan area is a largest consumption market in Russia, whereas Samara and Tumen are also one of the largest industrial and business centers. At the same time Murmansk, Magadan and Sakhalin economies are primarily based on mining, that explains high level of employment and GDP.

The regions associated with the variables characterizing the right side of the first factor, i.e. high unemployment rate, high percentages of employment in agriculture, and strong demographic pressures are Tambow, Rep. of Adygea, the Kabardino-Balkar Republic, Republic of Kalmykia, Republic of Karachevo, Republic of Nothern Osetia, Krasnodar, Stavropol, Astrakhan, Rostov, Republic of Bashkortosan, Kurgan, Republic of Altay, Republic of Buryatia, Republic of Tyva, Altay Territory, and Jewish Autonomos. This is group is basically consisted of regions of the North Caucasian Federal District (the Kabardino-Balkar Republic, Republic of Nothern Osetia, Republic of Karachevo, Stavropol), which are characterized by the highest levels of unemployment in Russia, and regions of a Southern Federal district (regions such as Krasnodar, Astrakhan, Rep. of Adygea) with high share of agriculture employment. The regions associated with the variable characterizing the upper side of the second factor, i.e. the high presence of those employed in industry, are Vladimir, Ivanovo, Kaluga, Tula, and Ulyanovk, while the regions associated with a mix of variables located in the lower side of the second factor are Rep. of Karelia, Rep. of Komi, Murmansk, Rep. of Kabardino, Rep. of Karacjaevo, Tumen, Rep. of Altay, Rep. of Buryatia, Rep. of Tyva, Rep. of Sakha, Amur, Magadan, and Sakhalin). Finally, along the third factor, in particular, on the upper side, we have regions associated with the main variable explicative of the third factor, which is the index of human capital that are Moscow, Saint-Petersburg, and Volgograd.

4. Conclusions

In this paper we have applied a Dynamic Multivariate Method to analyse the regional disparity in Russia. The results of the analysis show that the Russian regions have a diversified reality influenced by structural phenomena concerning labour market characteristics, sectoral composition, and localization factors. The main reason for regional differences still seems to be the composition and structure of the labour market and industry. To be noted in particular, is the marked contrast between the Central and Northern European regions, characterized by more flexible labour markets, and high employment rates, and also the Siberian and Southern East regions characterised by high rates of structural unemployment. However, there are other phenomena responsible for regional disparities in Russia i.e., localization factors (large conurbations, transport hubs, and *tourism*), which foster the development of connected service activities, and the presence of a solid industrial base, accompanied by high levels of income and employment. These factors are associated with regions that are more territorially dispersed, and therefore unlikely to form regional clusters, whilst, by contrast, industrialization phenomena are distributed across a transnational area formed by contiguous regions.

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Appendix

The Russian's Regions

N	Region
1	Belgorod
2	Bryansk
3	Vladimir
4	Voronezh
5	Ivanovo
6	Kaluga
7	Kostroma
8	Kursk
9	Lipetsk
10	Moscow
11	Orel
12	Ryazan
13	Smolensk
14	Tambov
15	Tver
16	Tula
17	Yaroslavl
18	Moscow
19	KARELIA
20	Republic of Komi
21	Arkhangelsk
22	Vologda
23	Kaliningrad
24	Leningrad
25	Murmansk
26	Novgorod
27	Pskov
28	Saint Petersburg Oblast
29	Republic of Adygea
30	Republic of Kabardino-Balkaria
31	Republic of Kalmykia
32	Republic of Karachaevo-Cherkessia
33	Republic of Northen Osetia
34	Krasnodar Territory
35	Stavropol Territory
36	Astrakhan
37	Volgograd region
38	Rostov
39	Bashkortostan
40	Republic of Marii El
41	Mordovia
42	Tatarstan
43	Udmurtia
44	Chuvashia
45	Perm
46	Kirov
47	Nizhny Novgorod
48	Orenburg
49	Penza region
50	Samara
51	Saratov
52	Ulyanovsk
53	Kurgan
54	Sverdlovsk
55	Tumen Territory
56	Chelyabinsk
57	Republic of Altay
58	Republic of Buryatia
59	Republic of Tyva
60	Republic of Khakassia
61	Altai Territory
62	Krasnoyarsk Territory
63	Irkutsk region
64	Kemerovo region
65	Novosibirsk
66	Omsk
67	Tomsk region
68	Sakha
69	Kamchatka
70	Primorsky
71	Khabarovsk
72	Amur
73	Magadan
74	Sakhalin
75	Jewish autonomous Oblast

Stochastic Convergence of Income and Total Factor Productivity: Evidence from the Italian Regions

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Abstract

In this paper, we apply the non-parametric method proposed by Quah to examine convergence hypothesis for Italian regions using GDP and total factor productivity measured by the Malmquist index. Using the stochastic kernel approach, this study suggests that the measure of total factor productivity is a crucial precondition for the estimation of a region's growth. Our results applied to the 20 Italian regions show no convergence for both GDP and TFP variables. For the GDP case, it confirms the Italian divide but for the TFP variable, it reveals the creation of three clubs. However, looking at the long-run density, it reveals that the shape of the ergodic density distribution, for the TFP, is clearly unimodal and it could imply a long-run convergence of regional productivity in Italy.

Key words: Italian Region, Total Factor Productivity, Stochastic Kernel, Convergence

JEL classification codes: D29, O40, R11

1. Introduction

In recent years a growing number of studies have provided that total factor productivity (TFP) is a very crucial precondition for the estimation of region's growth and their development. The latter is generally measured using Gross Domestic Product (GDP), GDP per capita. They attempt to capture the overall output of a given economy from a macro-environmental perspective. TFP is slightly more interesting, attempting to measure technologically driven advancement through noting increases in overall output without increases in inputs.

Our paper complements the study of Griffith et al.(2004), Cameron (2005) and Khan (2006) by assessing the importance of FTP in analyzing the "convergence" among different economic areas. We first estimate the Malmquist index of TFP growth. Moreover, employing the Kernal approach of (Caves et al., 1982) and the influential study of Fare et al., (1994), we apply it to GDP per capita and TFP of the 20 Italian regions. The aim of this study is to explore the differences, if they exist, between GDP and TFP in the convergence-divergence process of Italian regions. We empirically test the classical hypothesis that regions within a country should converge to the same long-run steady-state adding in our analysis TFP. This addition gives us the opportunity to test the convergence hypothesis (Quah, 1993;1997) having in our mind how efficiently and intensely the inputs are utilized in output or in other word measuring the shifts in the production function. For this purpose, we estimate TFP of the twenty Italian regions for the 1993-2013 using ISTAT database. Our results suggest no convergence for both variables but different clubs formation. Possible

explanations could be attributed to organizational and institutional changes, innovation and regional technological capabilities, fluctuations in demand, absortion level of significant spillover effects and changes in the society. TFP plays a critical role on economic fluctuations, economic growth and cross-countryper capita income difference n the next section, we present the data and the empirical analysis and explain our methodology. In the last section, we present some concluding remarks

The next section presents the formal model. Section 3 describes the data and the estimation results. The final section concludes.

2. Data and Methodology

The dataset comprises annual observations and covers all twenty Italian administrative regions and the full sample period under investigation is 1993-2013. Most of the data were obtained from different databases published by ISTAT (National Institute of Statistics). The data used to estimate TFP consist of two inputs and one output. The output factor data (Y) used is the gross regional product (ISTAT source) (Mastromarco et al., 2006). As input factors, we used labor input data (L) (level of employment) drawn from the national labor force survey and the region's gross fixed capital formation in millions of euro were taken from ISTAT (Maudos et al., 2013) as a proxy for the construction of capital (K). However, in order to construct the region's capital we follow the perpetual inventory method (PIM).

In this paper TFP is measured using the Malmquist index (Fare et al., 1994) as follows. Hence, we estimate the Malmquist index of TFP growth using the following formula: $M_o^t\left(x^t, y^t, x^{t+1}, y^{t+1}\right) = \sqrt{\frac{D_o^t\left(x^{t+1}, y^{t+1}\right)}{D_o^t\left(x^t, y^t\right)} \frac{D_o^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D_o^{t+1}\left(x^t, y^t\right)}}$.

Thus we can consider GDP and TFP as continuous-time stochastic process $\{X(t), t \geq 0\}$ and assume that the each stochastic process is a continuous-time Markov chain with distribution function ϕ_t. Each $\boldsymbol{X}$ satisfies the Markovian property $Pr\left(X_{t+\tau} \in A \mid X_j, j \leq t; X_t = x\right) = P^{\tau}(x, A)$, with $A \subseteq E \subseteq \mathbb{R}$ where E is the space state of X, iP^{τ} called "stochastic kernel" and under certain condition (Quah, 1997) satisfies the following equation $\phi_{t+\tau} = \int_E (x, A)\phi_t dx$ that lead to $f_{t+\tau}(y) = \int_E f_{\tau}(y|x) f_t(x) dx$ with $f_t(x)$ and $f_{\tau}(y|x)$ which are respectively the density function of ϕ_t and P^{τ}, if they exist.

The empirical estimate of the marginal pdf of x is given by:

$$\hat{f}(x) = \int_{-\infty}^{+\infty} \hat{f}(x, y) dy = \frac{1}{n} \sum_{i=1}^{n} \frac{1}{h_x \sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x - x_i}{h_x}\right)^2} \int_{-\infty}^{+\infty} \frac{1}{h_y \sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{y - y_i}{h_y}\right)^2} dy$$

$$== \frac{1}{n} \sum_{i=1}^{n} \frac{1}{h_x \sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x - x_i}{h_x}\right)^2}$$

where the joint distribution $f(x, y)$ is obtained using a product of Gaussian kernel K (Fotopoulos, 2006):

$$\hat{f}(x, y) = \frac{1}{n} \sum_{i=1}^{n} \frac{1}{h_x \sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x - x_i}{h_x}\right)^2} \frac{1}{h_y \sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{y - y_i}{h_y}\right)^2}$$

$$= \frac{1}{n} \sum_{i=1}^{n} \frac{1}{h_x} K\left(\frac{x - x_i}{h_x}\right) \frac{1}{h_y} K\left(\frac{y - y_i}{h_y}\right)$$

while $\left(h_x, h_y\right)$ are bandwidths calculated with the direct plug method applied separately in each dimension. In this way, a non parametric estimation of the stochastic kernel[1] is given by:

$$\hat{f}_{\tau}(y|x) = \frac{\hat{f}(y, x)}{\hat{f}(x)}$$

In general, the characteristics of the kernel function and bandwidths influence the quality of the density estimation. Different kernel alternatives may be used (Silverman 1986, Wand and Jones 1995). Since the kernel estimator is not very

sensitive to choice of K, a Gaussian kernel has been used (Magrini 2007). Moreover, the Mean Integrated Squared Error (MISE) is minimized by a multivariate standard normal density over the class of product kernels (Pagan and Ullah 1999).

The stochastic kernel may be interpreted as a transition matrix with a continuum of rows and columns. Take a time interval of length τ, the relationship among two distribution over τ can be written as:

$$f_{t+\tau}(y) = \int_{-\infty}^{+\infty} f_\tau(y|x) f_t(x) dx$$

Following the approach developed by Johnson (2000 and 2005) and Fotopoulos (2006) the long-run ergodic distribution is found as the solution to:

$$f_\infty(y) = \int_{-\infty}^{+\infty} f_\tau(y|x) f_\infty(x) dx$$

One possible way to face this problem is through a discretization of the time interval $[a, b]$ by partitioning it in n non-overlapping subintervals, then is possible to estimate $f_\tau(z_j|x_i)$ with z_j, x_i midpoints of these subintervals. If $p_{ij} = f_\tau(z_j|x_i)\frac{b-a}{n}$ (≥ 0) are defined and n is sufficiently large (which leads to $\sum_{j=1}^{n} f_\tau(z_j|x)\frac{b-a}{n} \approx 1$) then the $n \times n$ matrix $\boldsymbol{P} = \{p_{ij}\}$ has the same structure as a transition probabilities matrix and $\{p_{ij}\}_{j=1}^{n}$ may be seen as the conditional probability mass function. The ergodic density can be evaluated as $f_\infty(y) = \psi \mid \frac{b-a}{n}$, where ψ is the rescaled (unit sum) left eigenvector corresponding to the unity eigenvalue (also the largest one) of the matrix $\boldsymbol{P}$.

The dataset comprises annual observations and covers all twenty Italian administrative regions and the full sample period under investigation is 1993-2013. Most of the data were obtained from different databases published by ISTAT (National Institute of Statistics). The data used to estimate TFP consist of two inputs and one output. The output factor data (Y) used is the gross regional product (ISTAT source) (Mastromarco et al., 2006). As input factors, we used labor input data (L)

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3. Results and Discussion

The present concept of convergence is not identical to the classical idea of β and σ convergence met in the cross-country growth literature (Barro and Sala-i-Martin (1995). The difference is that β convergence, for example, analyzes the mobility of the various regional economies within a given distribution of national income, while in the present study convergence refers to Stochastic Kernel (Quah, 1996, 1997) resulted in the literature from the necessity to substitute discrete transition matrices and provides actually a three dimensional graph that shows how cross sectional distribution of TFP developed over the past 21 years. Figure 1 presents the estimated stochastic kernel with respect to the estimated TFP values for Italian regions.

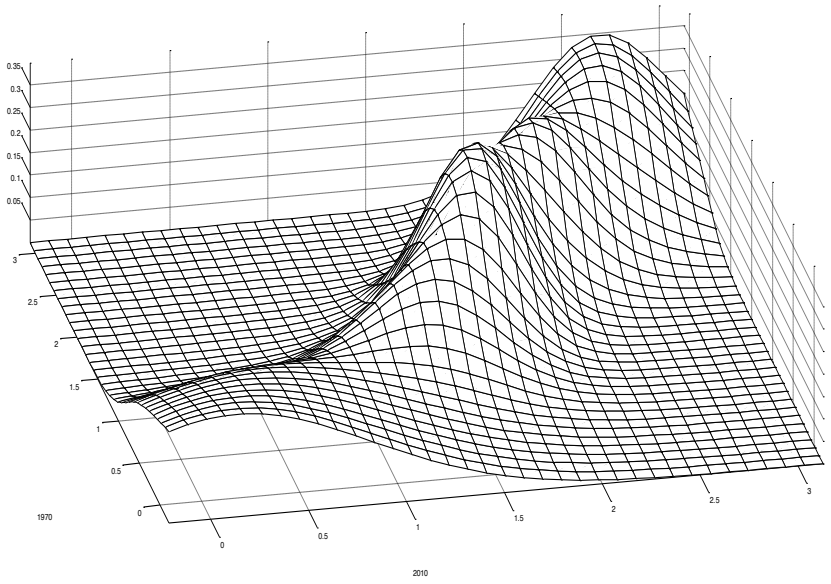

Figure 1. Estimated stochastic Kernel for TFP over the 1993-2013 period

As it can been seen the estimated stochastic kernel reveals the existence of three individual peaks at a lower, middle and upper level. Each specific peak reflects a comparatively large number of observed transitions from a particular part of the distribution to another a finding that contradicts the North-South paradigm. However, while the lower peak seems to be vanishing the middle peak prevails denoting a tendency of Italian regions TFP to congregate there. The specific findings corroborate the idea of no convergence and the formation of three in our case individual clubs. It is also consistent with Calligaris et al, (2016) that show "the increase in misallocation has come mainly from higher dispersion of productivities within different firm size classes and geographical areas rather than between them".

On the other hand, a similar analysis has been done for the GDP. Hence a stochastic kernel of the log of the GDP per capita has been estimated. In Figure 2 the estimated stochastic kernel reveals a twin peaks situation confirming the Italian divide and corresponds to the so-called "basis of attraction" (Durlauf and Johnson, 1995).

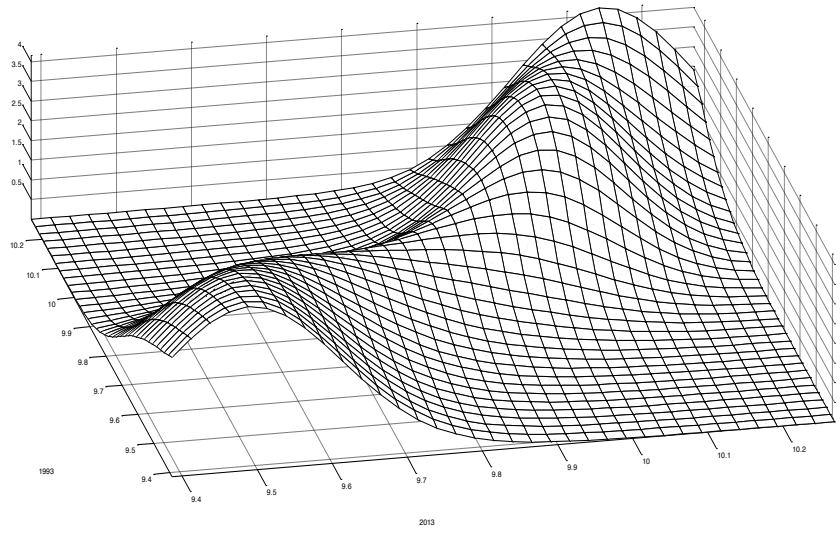

Figure 2. Estimated stochastic Kernel for GDP per capita over the 1993-2013 period

Turning now our attention to contour plots (figures 3 &4), the fact that the probability mass of the TFP and GDP per capita is concentrated to the main diagonal doesn't give us support of the idea that Italian regions situated at both ends of the relative distribution has exchange their relative position over the 1993-2013 period. In other words, the intra-distribution dynamics of the examined variables are

characterized by a high level of persistence for the regions over time and low mobility. Again the manifestation of twin-peaks for GDP per capita case and three peaks for TFP holds. These results are in line with the poor performance of the Italian economy, both at the GDP growth and productivity growth, within the last two decades.

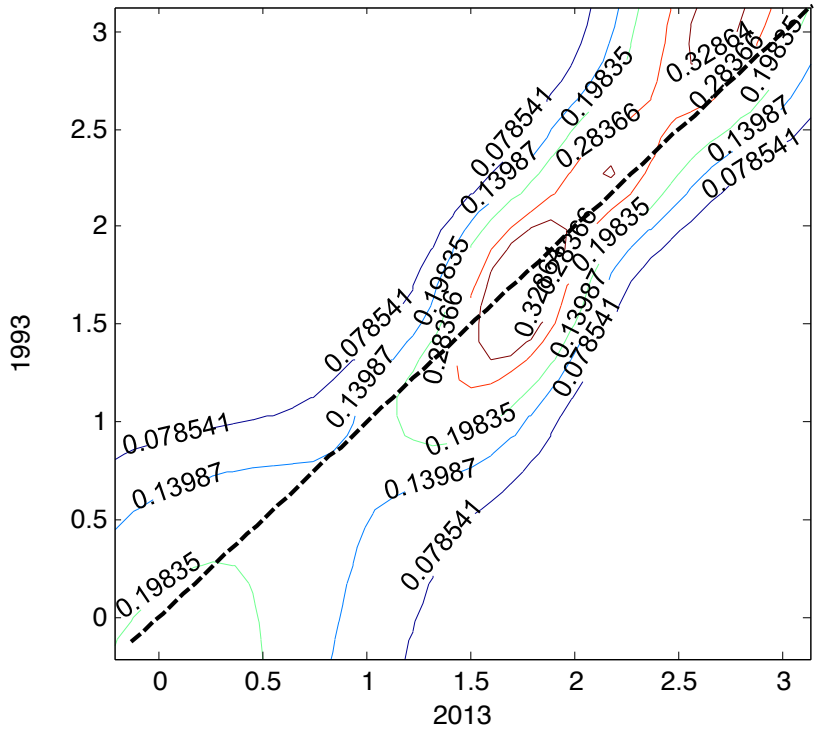

Figure 3. Estimated contour plot for TFP over the 1993-2013 period

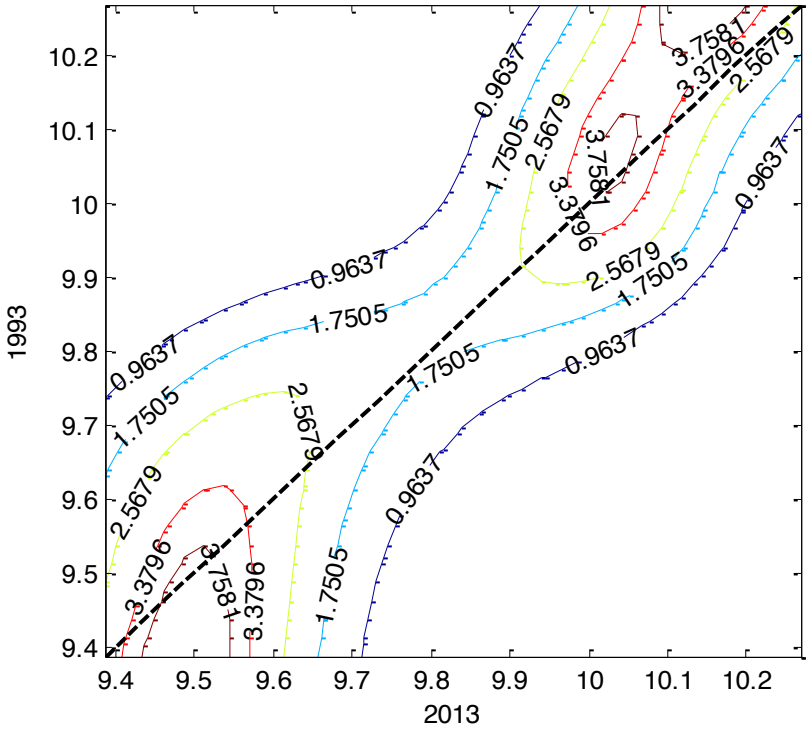

Figure 4. Estimated contour plot for GDP per capita over the 1993-2013 period

Moreover, our results concerning GDP per capita confirm the vast literature on the Italian divide. However, examining the total factor productivity index an additional discretization of the regional performance occurs. Possible reasons to explain the existence of individual convergence clubs and the diverging pattern of Italian regions can be seen under the prism of localized technical change (Antonelli, 2006), level of absorptive capacity (Cohen and Levinthal, 1987) , local effect of knowledge spillovers and technological diffusion (Keller, 2002) and capabilities (Bell and Pavitt, 1995) and processes that includes inadequate learning effects, specific-region market imperfections and externalities (Grossman and Helpman, 1991) that leads to individual steady states and different paths of factor accumulation.

Finally, the long run behavior of Italian region's total factor productivity (TFP) is presented in the following Figure 3 that displays the ergodic density $f_\infty(z) = \int_\infty g(z|x) f_\infty(x) dx$ (have been estimated after 3 iterations) of TFP computed on the basis of $g_{21}(z|x)$. It is clear, that the distribution is unimodal with a mean close to 1.9. Moreover, the shape of the ergodic density distribution provides a clear evidence for long-run convergence of regional productivity in Italy because there are no convergence clubs apparent.

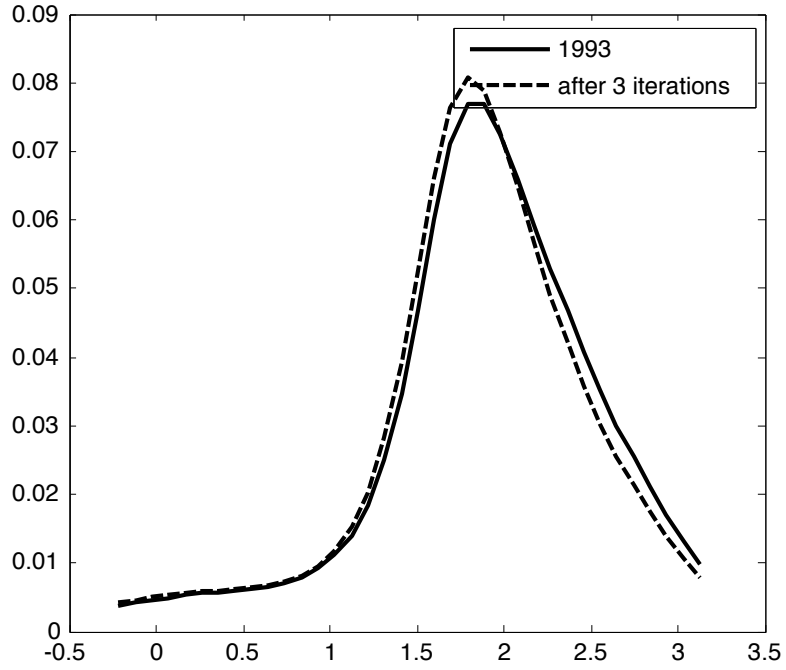

Figure 5. Estimated ergodic density for TFP, $f_{\infty}(y)$

In contrast with TFP variable GDP per capita ergodic density function reveals a strongly bimodal pattern. The shape of the ergodic function provides evidence for regional disparities and the continuation of Italian split into two macro-areas.

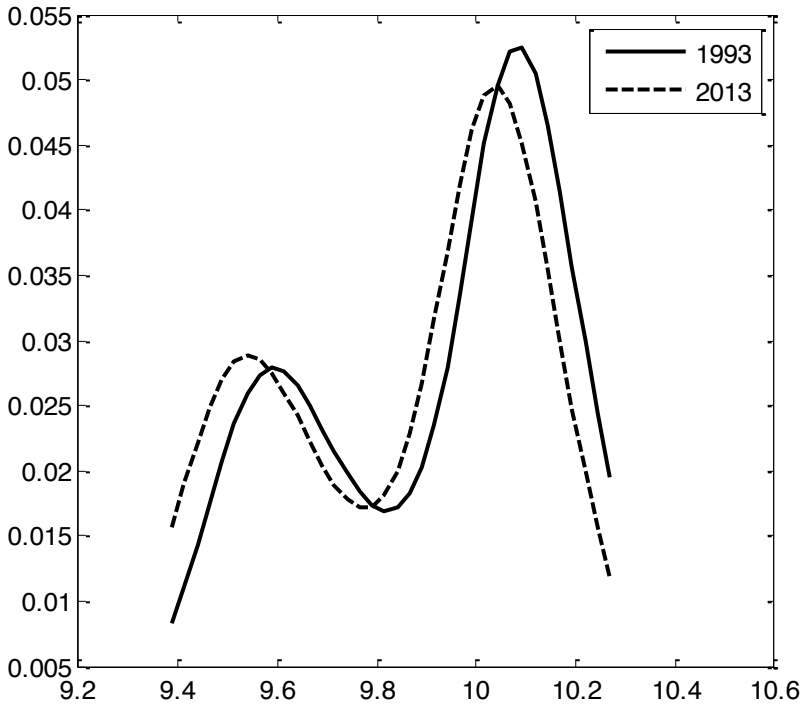

Figure 6. Estimated ergodic density for GDP per capita, $f_{\infty}(y)$

4. Conclusion

This paper contributes to the literature of economic convergence, investigating the role played by total factor productivity in the last two decades for the Italian regions. We found clear evidence that there is no convergence pattern for Italian regions' total factor productivity and GDP per capita over the period 1993-2013. In particular, indicates the formation of three and two correspondingly, individual clubs and question the traditional approach that regions in an country should converge to the long run in a steady state. The Italian experience questions also the specific role of regions' absorptive capacity, technological capabilities, diffusion and knowledge spillovers and argues the role of regional policies and spatial strategies to balance and equalize the disparities due to private capital and public infrastructure investments from rapidly expanding developed to under-developed areas.

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Too much EMU? An investigation of technology gaps for the Italian regions

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Abstract

The last fifteen years of European Monetary Union (EMU) has been widely perceived as a model for regional integration. Although the debate on the economic integration and its impact on the countries' regions is considerably interesting, it still remains an open question for a discussion. Studies in this field are mainly investigating the convergence-divergence issue, while there seem to be no studies concerning the effect of EMU on region's performance. The non-parametric metafrontier framework used in this study, as a first stage of analysis, is exploited to account for the heterogeneity between the Italian regions in two distinct time periods, before and after the EMU implementation. In a second stage, the technology gaps estimating for each period, has been regressed investigating possible factors that may have affected their performance. Our findings reveal a significant improvement for the twenty Italian regions after the EMU unification and a paradoxically unchanged behavior for the Centre-North regions efficiency performance. At the same time, we identify which specific regions perform better in terms of technology gap. The inclusion of variables related with region's trade performance in the model indicates that trade balance is only of relatively major importance. On the other hand, the contribution of public expenditures, in the first period and R&D expenses in the second, reveals a different pattern of growth for Italian regions before and after the euro implementation.

1 Introduction and motivation

In recent research on regional efficiency, not much attention has been given to the issue of the regional degree of openness. The effect of the trend towards trade policy openness on regional growth is one of the most controversial subjects as there could be a propensity to improve imports more than exports leading to trade deficits and thus contributing to low economic growth in the future.

The objective of this study is to determine empirically the technical efficiency of the Italian regional growth taking into account the widest degree of openness of the regions coinciding with the start of the European Monetary Union (EMU) over the period of 1993-2011. In particular, this paper employs the metafrontier framework to measure and compare the efficiency performance of the Italian regions under different technologies before and after the EMU. Moreover, constructing two macro-regions frontiers it is possible to check the efficiency performance of regions that operate in more "homogeneous" areas. In doing so, a set of specific macroeconomic variables like regional trade balance, imports and exports (within the EMU and with the rest of the world), growth rate, employment, and exchange rate is implemented. In addition, variables describing the potential regional productivity efficiency like the registration of patents, R&D expenditures, regional railway system and final expenditure of public sector are employed.The paper at hand contributes to the literature in several ways: firstly, it investigates the effect of monetary union for the Italian regions performance; secondly, employing a bootstrap DEA approach provides technical efficiency and technological gaps scores with high statistical precision and thirdly, attempts to explain technology gaps, before and after the EMU adoption, from the econometric point of view using an exogenous set of variables.

Economic theory has analyzed in-depth the role of the degree of economy's openness and its growth. For the classical economic theory (Hume, Smith, Ricardo), time and space dimensions are almost ignored. The classical model implicitly assumes a world made by a homogeneous area, where transportation costs are null and there are no economies of scale. In a world like this, the economic activities in equilibrium should be evenly distributed on the territory. On the contrary, in the real world, productive resources, as well as productive activities, population and economic wealth, are unequally distributed among and within countries and regions. In the '50s and '60s, economic theories were questioning the economic determinants of the development, that is, the mechanisms that allow a system to grow and reach certain levels in production, lower rates of unemployment and higher levels of wealth. Under these assumptions, the Keynesian view focused on the demand side, where local effect of interdependence mechanisms in the production and consumption, produces increased income and employment in the areas not previously related. The demand is, then, an engine for development. This approach concerns the short-run, as it implicitly assumes a competitive production which may be valid only for a short period. In the long-run, the local system remains competitive only if it is able to maintain or expand its position in the world market (thus, it shows the importance of the role of innovation to foster the growth of total factor productivity). On the other side the neoclassical theory of economic growth started with the model of Solow and Swan, in which they aimed to indicate what the relations are between labor, capital, levels of investment and economic output. In this model, a central role is ascribed to technological progress, which is useful to reduce production costs and to introduce newer

goods..

Despite these different theoretical approaches, Dollar and Kraay (2004) assert that "Openness to international trade accelerates development: this is one of the most widely held beliefs in the economics profession, one of the few things on which Nobel prize winners of both the left and the right agree". There is, however, a non-orthodox view based on the Thirlwall works (1973, 2011) for which regional trade agreements, reduce growth and investment, but generalize trade liberalization in the form of unilateral tariff reductions and thus improve growth performance. This debate, although extremely important, is beyond the scope of this work since we consider the EMU adoption as the widest degree of openness of the Italian regions and we are interested in comparing the efficiency of the regional economies in light of this new degree of openness. Hence, as proposed by Krieger-Boden (2002) it is interesting to analyse the potential effect of the EMU on income of European regions. She started from a reduction of transaction costs that could lead to an increase of trade links and a change of regional centrality. The former can induce an industrial regional specialization while the latter efficiency and growth of regions. The final step of this process could be the increase in regional income. Moreover, as shown by [27], it is important to know how quickly regions adjusts to the EMU process. This is difficult to do it due to the absence of a concrete theoretical background. Finally, the regional economic direction is not certain since the market process tend to generate persistence and leads to convergence-divergence.

In doing so, our approach is consistent with that presented by [**?**] arguing that "while there are serious methodological challenges and disagreements about the strength of the evidence, the most plausible conclusion is that liberalization generally induces a temporary (but possibly long-lived) increase in growth. A major component of this is an increase in productivity".

The last statement, in particular, is strictly related to the methodology we apply in this work. In general, theoretical studies on regional performance have assumed that within a country, efficiency levels are measured in relation to one frontier. In fact, however, it is quite difficult that the estimated frontiers for different regions could be similar to make the use of a single frontier possible. Empirical studies tend to reject the null hypothesis of constancy of the production frontier across different regions denoting significant differences due to available stock of physical, human and financial capital; economic infrastructure; the allocation of resources and all other characteristics of the physical, social and economic environment in which production takes place ([33]; [**?**, 12]) . Therefore, exactly in these cases it is crucial to construct metafrontiers for comparison of performance of different regions. The advantages of the metafrontier are that it allows for the comparison of different technologies, separation of technological measure from efficiency and it is also parsimonious in terms of data requirements**.**

There is no study, to the best of our knowledge, commissioned to investigate the technological gap in productivity related to the degree of openness for the Italian regions. In addition, this study extends the period of study up to the year 2011 as compared to the previous studies, thus taking into account the effect of the latest financial and economic crisis and its effects on the Italian regions' performance.

The analyses of technical efficiency of regions within the same national framework are important and challenging at the same time. From a policy point of view, it is of great interest to distinguish the regional

differences in mean efficiency levels and to determine whether the regions share some characteristics. Centralized fiscal policy, and moreover European monetary policy, can have different impacts on different group of regions.

The rest of the paper is organized as follows: section 2 presents the empirical literature review on this topic. Section 3 details the meanings of group and metafrontiers as well as technology gap ratios. Section 4 presents the empirical model to be used in this study. Section 5 describes the empirical results. Finally, policy implications and the conclusion of this study are detailed in section 6.

2 Literature Review

To our knowledge, no paper exists that applies metafrontiers in order to assess the impact of trade on regional economic performance, which still remains a controversial topic. In this section, we therefore present a brief, non-exhaustive overview of some of the work that has been done on comparing regional growth; trade openness and regional growth; some relevant papers on the methodologies applied in this study.

In the literature, several channels are discussed through which trade can affect economic growth. Grossman and Helpman, (1991), and Sala-i-Martin and Barro, (1997) assert that trade is a vehicle through which technological innovations as well as knowledge are spread among different economic areas. Moreover, higher degree of openness, as Vickers and Yarrow, (1991); Wacziarg, (2001) pointed out, also increases competition in the regional/local market, which in turn increases productive efficiency and economic growth.

The experience of the last three decades seem to strengthen the position in favour of free trade. Since 1982, the size of the trade sector has roughly doubled. Although the protectionist position continues to benefit from extensive credibility among political leaders and in the media, however, it receives little support among economists. Several surveys point out that more than 85 percent of all economists believe that free trade improves economic prosperity. For example, Rodriguez and Rodrik (2000), have highlighted some concerns about the validity of these results since in some cases the findings were affected by the difficulty of measuring openness and the statistically sensitive specifications.

In general, previous empirical studies tend to give contradictory results. Some of them, like Joshi and Little, (1996); Helleiner, (1994); Bleaney, (1999); and Ahmed, (2000), show that the countries which become more open have improved their export performance. On the other hand, other studies have found little evidence of this relationship, in particular, Clarke and Kirkpatrick, (1992); Greenaway and Sapsford, (1994) and Jenkins, (1996).

Another remarkable characteristics of the analysis is whether regional growth level and trade balance are affected by liberalization. The timing of the trade liberalization within a country could also affect this relationship.If closer integration improves the efficiency of different combinations of factors, this process is likely cause even more investment. While all this is in place, countries can experience an effect of growth in the medium term. Moreover, if this investment leads to a rapid accumulation of technical progress and human capital, then long-term growth rates can also be improved. In fact, more importance is now given to the impact of regional integration on production via the effect on trade and diversion. Following the

European Union's experience through its Single Market, there is now greater consciousness of the importance of barriers, which can increase transactions costs in reducing trade, and of the significance to eliminate them.

The economic theory as well as empirical evidence have shown that economies that are more export-oriented tend to grow faster. This allows us to state that income growth depends primarily on the ability of a country to increase its productivity. This productivity, both at the national and at the regional level, is driven by the degree of openness to trade which is the driving force of productivity. In addition, it allows for a more efficient allocation of resources and offers more opportunities to make the most of the economies of scale. This process exposes the national or regional economies to increasing competitive pressures by greater incentives for investment and pushing them to new levels of innovation and use of new technologies. Taken together, these factors mean that openness to trade can play an important role in increasing the long-term sustainable rate of productivity growth in the regional economy.

Hence, does the openness promote economic growth? Significant divergence on this particular question exists. In fact, there are some economists asserting that increased competition from foreign countries may discourage innovations of domestic producers by lowering their expected profits. Lucas (1988), Grossman and Helpman (1991), Young (1991), and Rivera-Batiz and Xie (1993) show that economic integration, while being able to raise the worldwide growth rate, could adversely affect individual countries even if trading partners have considerably different technologies and endowments (Sarkar, 2007; Yanikkaya, 2003).

In the efficiency literature there are two broad methods used for arriving at measures of relative efficiency (Coelli et al. 2005). The data envelopment analysis (DEA) as a non parametric technique and the stochastic frontier analysis (SFA) as a parametric approach that assumes a functional form for the benchmark frontier, have been mostly used in assessing the performance of many decision making units (DMUs). However, in the case that a typical DMU face different production possibilities the recently analytical metafrontier approach ([4][**?**, 12]) inspired by the work of Hayami and Rutan(1970,1971) and developed by O'Donnel et al., (2008) provides an alternative methodological approach to the two approaches DEA or SFA, to evaluate and compare the efficiency of DMUs that belong to different groups. Moreover, the introduction of metatechnology ratio or technology gap indicates the improvement made by its DMU in order to use the best practice technology as has been defined by the technology of all DMUs participating in the sample**.**

The present study extends their work on metafrontiers to a temporal framework linking the measurement of regional efficiency growth over time for 20 Italian regions. In this context, it would be of some interest to examine how the different Italian regions perform with respect to the national technological frontier. It is also worth noting that all the mentioned studies derived their decompositions under the assumption that all the countries/regions in a group operated under a common technology. This study extends previous research by considering groups of Italian regions working under different technologies, thus relaxing the common technology assumption, as well as explicitly accounting for temporal effects, which measures productivity and efficiency changes over the period 1993-2010.

3 Methodology

3.1 Definitions and notation

Let assume that a region employs a vector of inputs $x \in R_+^N$ to produce a vector of output $y \in R_+^M$. Also let $N = \{1, 2, ..., N\}$ and $M = \{1, 2, ..., M\}$ be the input and output sets containing non-negative real values formally stated as $x \in R_+^n$ and $y \in R_+^m$, respectively. The production possibility set is given as $T(x) = \{(y, b) : x \text{ can produce } (y, b)\}$ with the output set defined as $P(x) = \{y \in R_+^M : (x, y) \in T\}$.The output-oriented efficiency of a region with respect to technology T can then be measured with respect to the output set through the direct output distance function, defined as $D_O = \inf\{\delta > 0 : x/\delta \in P(x)\}$. The efficiency score for a given point (x, y) is given as:

$$\widehat{TE(x,y)} \equiv \widehat{\theta(x,y)} = \max\{\theta \mid \theta y \leq \sum_{i=1}^{N} \gamma_i y_i; x \geq \sum_{i=1}^{N} \gamma_i x_i \text{ for } \gamma_i \tag{1}$$

$$\text{such that } \sum_{i=1}^{N} \gamma_i = 1; \gamma_i \geq 0, i = 1, 2, ..., N$$

In the case where multiple technologies become applicable, each region is considered as operating under exactly one of those. Thus, given k distinct technologies $T^1, T^2, ..., T^k$ the metatechnology set, denoted as T^M, is the smallest convex set containing all input–output feasible combinations (e.g. see [**?**, **?**]). Formally, $T^M = conv.hull\ (T^1 T^2, ..., T^k)$ or

$$T^M = \{(x, y) : x \geq 0, y \geq 0,\ x \text{ can}$$
$$\text{produce } y \text{ in at least one of } T^1, T^2, ..., T^k\}.$$

The output set $P^M(x)$ associated with the metatechnology are defined as for a single technology, while the corresponding efficiency of a region with respect to the metafrontier or, in other words, the homogeneous boundary for all heterogeneous regions can be measured by the output-oriented metatechnical efficiency score (MTE) and it is easy to obtain by solving an analogous LP problem as in (1).

The metafrontier analysis is an approach that allows the comparison of different technologies ([4]). The characteristic of the metafrontier as an envelope of all the respective frontiers offers the opportunity to account for all the possible existing heterogeneity between the DMUs participating in a dataset ([**?**, 12] [**?**]). Put it another way, the MF paves the way to estimate the technology differentials between a specific frontier and its respective metafrontier ([4]). To graphically illustrate our definitions, consider the case in which there exist two separate technologies T^1, T^2 that correspond to group frontiers F^1, F^2 (denoting here as *South* and *North*) respectively as shown in Fir.1.

In this context, the metafrontier MF which corresponds to metatechnology T^M is defined as the overall frontier that includes all the Italian regions so that no point of these frontiers can lie above points of the metafrontier[4]. Consider an Italian region denoted by point A using an input vector in order to produce

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Figure 1: Figure 1. Output-Oriented technical efficiency and technology gap.

an output in Fig.1. This region has access to its technological set T^1, as represented by the efficiency South frontier $F^1$and at the same time to the common to all regions technology, the *Italian metatechnology* corresponding to metafrontier MF after.

Thus we can define the distance functions with respect to the South frontier and the metafrontier MF after in order to calculate the technology gap ratio [4] or the reciprocal relationship of metatechnology ratio [33]. Following [33] the metatechnology ratio is defined as

$$MTR(x,y) = \frac{MTE(x,y)}{TE(x,y)} = \frac{\left(\frac{OA}{OB}\right)}{\left(\frac{OA}{OC}\right)} \tag{2}$$

and indentifies technology differentials among the Italian regions due to production structures[1].The estimation of technology gap, thus the distance between the individual frontier and the metafrontier (distance CB in Fig.1) can be defined as

$$MTG(x,y) = 1 - MTR(x,y) \tag{3}$$

3.2 Bootstrapping in DEA

The bootstrap method in efficiency analysis was introduced by ([42][43][44]) and refers to the concept that the bootstrap distribution will mimic the original distribution of the parameter estimates of the efficiency scores of a given dataset of (x,y). It was built upon the idea to overcome the DEA major weaknesses that does not suffice to establish stochastic elements in the production process. Therefore, the statistical noise may distort any kind of efficiency ranking. Statistical noise may captures, among others, single DMU idiosyncrasies, measurement errors, and technology heterogeneity in the sense that a group of DMUs is benchmarked against one that exhibits significantly different production and behavioral characteristics.

Hence, the bootstrap procedure enriches the toolbox of the efficiency literature since it allows for statistical inference and accordingly the hypothesis testing along with the construction of confidence intervals and bias correction for the DEA estimates. This is achieved by employing the Monte Carlo approximation as a consistent estimator of the true, yet unknown, data generating process, the DGP. Briefly, let us assume a data generating process DGP, P that generates random samples $X = \{(x_i, y_i), i = 1, 2, ..., n\}$ and suppose we aspire to estimate the efficiency scores given of the DMUs participating in this sample. However, as the DGP, P is unknown, the bootstrap procedure can be employed in order to determine the $\widehat{DGP, P}$ as a consistent estimator of P .

[1]The output-oriented technical efficiency with repsect to the South frontier is calculated as OA/OB while the corresponding distance with respect to the metafrontier is defined as OA/OC

The efficiency estimates by using the $\widehat{DGP,P}$ can be considered as a "new" population from which we can draw a new dataset $X = \{(x_i, y_i), i = 1, 2, ..., n\}$. The specific "pseudo-sample" can now be used, to define $\widehat{\theta^*(x,y)}$ with respect to $\widehat{\theta(x,y)}$ at the specific point (x, y). Note that it may be difficult to compute the true distribution $\widehat{\theta^*(x,y)}$ of resulting from a sample $X^* = \{(x_i^*, y_i^*), i = 1, 2, ..., n\}$drawn from $\widehat{P}$ and thus the Monte Carlo approximation can be employed to construct the sampling distribution of $\widehat{\theta(x,y)}$.

Denoting by B the number of bootstrap replications it becomes evident that the generation of B pseudo-samples as much as that of the pseudo-estimates of the efficiency scores is not impossible to be achieved. However, this bootstrap procedure (called at this stage "naive") yields inconsistent estimates of θ scores (Simar and Wilson, 1998) and the development of a smoothed procedure to overcome this difficulty is required .

Following closely Simar and Wilson's procedure we are able estimate the bias for the original DEA estimator as:

$$\widehat{bias_i} = \frac{1}{B}\sum_{b=1}^{K} \widehat{\theta^*_{i,B}(x,y)} - \widehat{\theta_i(x,y)} \tag{4}$$

where B represents the number of bootstrap replications. Consequently , a bias corrected estimator of $\widehat{\theta^*_{i,B}(x,y)}$, is given as follows:

$$\widehat{bias_i} = \widehat{\theta^*_{i,B}(x,y)} = 2\widehat{\theta_{iB}(x,y)} - \frac{1}{B}\sum_{b=1}^{K} \widehat{\theta^*_{i,B}(x,y)} \tag{5}$$

3.3 Factors affecting region's technology gaps

Being consistent with the motivation and the scope of this paper we account for the impact of environmental variables on efficiency. Simar and Wilson (2007) [45] considered that the efficiency scores produced by the DEA are strongly dependent on each other in statistical terms. In order to overcome this DEA drawback, they proposed a double bootstrapping algorithm for obtaining confidence intervals and standards errors in the trunceted (usually used) regression estimation[2]. Thus, we can assume that the technology gap scores can be regressed on a vector of environmental variables that affect region's efficiency in each period separately,using a truncated regression described follow:

$$\widehat{TG_i} = z_i\beta + \varepsilon_i \tag{6}$$

where z_i is a vector of environmental parameters affecting the technical efficiency of Italian regions for both periods examined, β denotes a vector of estimated parameters and $\varepsilon_i \neg N(0, \sigma^2)$ is statistical noise. Since many studies in the efficiency literature have adopted the Simar and Wilson (2007) approach, do not provide analytical description of this methodology.

[2]Simar and Wilson (2007, p.41) estimating arises from the violation of the regression assumption for the independency between and creating correlation and dependency problems for the efficiency scores.

4 Data and Variables Definition

In most empirical studies of the metafrontiers, grouping of countries/regions is implicit in the problem under consideration. However, since there are no a priori theoretical prescriptions, when estimating frontiers, on how countries/regions should be allocated to groups, we follow [33] and consider the historical-geographical Italian regions criteria.

The data used to estimate the DEA in this study consist of two inputs and one output that cover 20 Italian regions and the data set is comprised of annual time-series. The data set covers all twenty Italian administrative regions and the full sample period under investigation is 1993–2011, providing nineteen observations per region, with a cross-section of twenty. Most of the data have been obtained from different database published by the ISTAT (National Institute of Statistics). In order to examine our hypothesis concerning the efficiency of euro adoption we created two different periods (1993-1999 and 2000-2011).At the same time we averaged all constructed variables over these periods in order to avoid the well-recorded fluctuations of data due to business cycles [**?**, 12].[3]

The output factor (Y) data used is the gross regional product (ISTAT source)[**?**][29].On the input side, the following variables are utilized as input factors. Labor input(L) data drawn from the national labour force survey and region's gross fixed capital formation in millions of euro has been taken from the ISTAT (year 2011 is based on forecasts made by Prometeo-Bank of Italy)[29];[**?**, 12] as a proxy for the construction of capital (K). However, in order to construct region's capital we follow the perpetual inventory method (PIM) which can be expressed as

$$K_{it} = (1 - \beta_i)K_{it-1} + I_{it}$$

where $K_{it}$is the capital stock of region i in year t, I_{it} is the investment in region i in time t and β is the rate of depreciation.

The additional variables used to capture possible factors affecting technology gaps in this study can be grouped into two broad categories. The first category depicts variables that are correlated with the macroeconomic performance of the participated regions. As such, we have used $TB25$, TBW trade balance generate by imports and exports towards the European Union (25 countries) and towards the rest of the world, respectively and public sector expenditures ($EXPUBL$)[4]expressed in millions of euro taken from the ISTAT. The second group of the technological gap determinants involves variables that express region's knowledge conditions. In this category, we have included R&D expenditures ($RDEXP$) as a measure of the amount of research and development investment made by all productive sectors[5].

[3]Italy has twenty administrative regions; the economic regions reflect the different economic structures across the country. They are defined as North-Centre (LIG-Liguria, PIE– Piemonte, VDA- Valle d'Aosta, LOM- Lombardia, FVG- Friuli Venezia Giulia, TAA- Trentino Alto Adige, VEN- Veneto, EMR-Emilia Romagna, LAZ-Lazio, MAR– Marche, TOS-Toscana, UMB-Umbria), South (ABR-Abruzzo, BAS- Basilicata, CAL-Calabria, CAM-Campania, MOL- Molise, PUG-Puglia, SAR- Sardegna, SIC-Sicilia). In the remainder of the text, the terms economic regions' and macro-regions/areas' will be used according to this classification.

[4]Italy experienced an accelerating growth of government expenditure that began in late 70s and continued till nowadays with different level of growth for each single region.

[5]It should be noted that we also considered a number of additional variables in the context of the previous two categories (e.g imports and exports towards EU and the world, populations density, e.t.c) however their inclusion was not found to improve

The 20 regions are also divided into two macro areas namely North and South, respectively. The first is made up of 12 regions, while the second is made up of 8 regions[6]. The descriptive statistics for inputs and outputs variables is shown in Table 1.

5 Empirical Results and Discussion

As discussed in Sect. 1, our study examines Italian region' efficiency scores and technology gaps before and after the EMU adoption, thus implying the existence of two distinct technology sets. In this section, we present our empirical findings of a two-stage analysis. Firstly, we derive and compare technical efficiency scores for Italian regions between the examined periods, and secondly, we investigate a number of factors that are likely to affect their technology gaps in the time periods under study.

5.1 Results with respect to region-specific frontiers

The results of the bootstrap DEA estimations for both periods with respect to the region specific frontier are shown in Table 2. The technical efficiency scores estimated for the South specific frontier do not exhibit great variations among the regions before the EMU adoption. Similar results are obtained for the second period (after the EMU adoption). However comparing the technical efficiency scores between the same regions in the two periods, it is clear the upward shift of the macroarea specific frontier. It is also worth noting that the ranking of each region in the two periods has changed implying a re-allocation of some of them in terms of technical efficiency along the new frontier.

Surprisingly, technical efficiency scores estimated for the North specific frontier exhibit quite a substantial variations among the regions before and after the EUM adoption. Moreover, the results show a clear downward shift of the North-Center frontier while the ranking of each region in the two periods has not changed implying, in terms of technical efficiency, a relative stable position of each region in both periods (see figure 2). The results show a picture that is consistent with the previous empirical analysis before the EMU, that is, the North-Centre that was more technically efficient but they also show an unexpected economic performance of the South after the EMU adoption. In particular, it is well known that regional disparities, and in particular, the gap between North and South, remain the unsolved problem of the country. It is also known that the theory of monetary unions shows that the consequences of negative external events are never symmetrical affecting more severely the weak regions than the dynamic ones.

It cannot be ignored, however, that paradoxical as it may seem, the process of economic globalization and European monetary unification have produced even a positive impact on the economy of the South. In fact, as the localized spillovers theory predict, a number of companies in the North have relocated stages of

the econometric performance of our model

[6] For the south they are: Abruzzo, Basilicata, Campania, Calabria, Molise, Puglia, Sardina and Sicily. All the other regions belong to the North.

Figure 2: Figure 2.Bootstrap efficiency scores for the South and North Italian regions (NUTS 2) before and after the EMU adoption.

Figure 3: Figure 3. Metatechnology ratios of Italian regions before and after the EMU adoption

production to other countries, where labor costs are lower and other factors like legislation and environmental protection are less stringent (Tartaglione, 2008). Nevertheless, this extreme measure of reorganization at a great distance remains the domain of companies of the size and financial capacity adequate to meet the necessary effort. The smaller companies, also under pressure from the competition, were not able to move to distant countries, and then they outsourced part of their activities in the southern regions. The result was a growing number of small businesses, many of whom work directly or indirectly on the basis of orders from North-Centre.

This evolution of the south industrial sector gives rise to very diverse opinions. Some agree that the increasing number of small businesses can be seen as a turning point in the industrial development of the area. This view consider that the old policy of large systems, implemented in the sixties and seventies at the hands of private and public companies, represented a serious strategic error; conversely, the presence of smaller firms, as the result of spontaneous local initiative, could eventually lead to the reproduction in the South the positive experience of the industrial districts that have made the fortune of many regions of central Italy (Viesti, 2012). For the opposite view, it should be noted that many of the smaller companies of the South live mostly as undeclared businesses dealing with irregular work. However, as an example of development far more promising, it is worth mentioning the presence of a small but significant number of new high-tech companies in the IT sector (Del Monte, 2002).

5.2 Results with respect to metafrontier

The results of the bootstrap DEA estimations, technology gaps and metatechnology ratios for both periods are shown in table 3. The technical efficiency scores estimated for all the regions exhibit a clear shift upward when we move from before to after the EMU adoption. It is worth noting that, in contrast to the results obtained with the regional specific frontiers, the ranking of each region in the two periods has not changed implying a stable allocation of them in terms of technical efficiency along the new frontier (tables 4 and 5). Figure 3 shows the results obtained in table 3 comparing the metafrontier ratio (MTR) before and after the EMU adoption.

From the empirical evidence shown in figure 3, a strong "macro-area stamp" can be observed here. The results reflect a significant spatial autocorrelation. The consequence of this "macro-area stamp" is that regions belonging to the same macro area can be clustered in some specific areas of the plot. For instance, South regions are clustered on the left because they have experienced an MTR clearly below the average

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Figure 4: Figure 4.Bootstrap efficiency scores of all NUTS 2 Italian regions before and after the EMU adoption.

after the EMU. In particular, the regions like Puglia, Campania and Basilicata have been worse off since they had a MTR above the average in the first period. The Centre-North regions are clustered on the right side of the graph all above the average. At the bottom right the graph shows clustered the regions that are better off compared to the MTR of the previous period and all are above the average. Finally, the most dynamic regions are clustered at the top right side. The linking criterion within this latest cluster seems to be the ability of the regions belonging to it to face the pre and post EMU phase, independently from the economic behavior of the area where the specific region was located (North-East, North-West or Centre).

Figure 4 summarize graphically the shifts of each region specific frontier and the metafrontier in the two periods.

5.3 Factor affecting region's technology gap

Table 6 presents the estimation of the determinants of technology gaps for the two periods. The trade balance among the EU25 countries ($TB25$) shows a significant coefficient before and after the EMU adoption. The magnitude of the coefficient increases in the second period enforcing the idea that higher degree of openness gained after the start of the euro led the economies of the Italian regions to reduce the technology gaps. Hence, the empirical results obtained, using the metafrontier framework to measure and compare the productivity growth performance of the Italian regions, are consistent with the assumption that the increase in technical efficiency of the Italian regional growth over the period of 1993-2012 was also pushed by the external sector. The previous empirical analysis of small and medium-sized enterprises (SME) activities among regional exporters in Italy show that they tended to be isolated entrepreneurs who relied primarily on their internal innovation. Often, they did not depend on local networks and clusters as recommended by regional economic theory (Vaessen and Keeble, 1995). Several of these firms were small firms that entered world markets with an original niche product and were helped by the low Euro -Dollar exchange rates prevailing at the beginning of the 2000s. The trade balance with the rest of the world (TBW), even with a righ sign, shows a slight not significant coefficient either before or after the EMU adoption. The intra-EU balance of trade was valued on average about 1.7 times as high as the level recorded for exports from the EU-28 to non-member countries (extra-EU trade). The importance of the EU's internal market was underlined by the fact that intra-EU trade of goods was higher than extra-EU trade in each of the EU Member States.

Investigating the sources of regional technology gaps differentials for the Italian regions before and after the EMU adoption we discover a different behavior for the ($RDEXP$) variable. The magnitude of the specific variable is insignificant for the first period while in the second, the technology gap decreases significantly denoting a different pattern of growth for Italian regions for the two periods. The specific finding, for the second period, is in accordance with several studies that supports the idea that R&D spending would

increase dramatically the innovation performance of the region [**?**], explains regional disparities in growth rate [28], is positively correlated with the external factor of the regional components [**?**, 12] and enhances technology transfer through the ability to assimilate and manage knowledge in order to improve innovation performance and competitive advantage (absorptive capacity) [**?**, 12] and knowledge spillovers[7] that constitutes an important factor in shaping the regional conditions for innovation activities (Krugman, 1999).From a theoretical point of view, investing in R&D constitutes a strategic choice [11] for many regions shaping a sustainable competitive advantage [37] that leads to the so-called "technology push hypothesis[8] [32]. Finally we also have to note that expenditures on R&D, is one of the most commonly proxy of innovation performance depicted the ability of a entity to introduce a product, or a proces or both innovation[34].

In general, an increase in the technological content of public spending could enable development of valuable new products, processes, and services, could raise salary of skilled workforce and also stimulate human capital growth. In this light, the estimation of the public expenditure as a determinant of technology gaps for the first period is significant and with the expected sign[9].

6 Conclusions

The issue of regional performance within the European Union has attracted a great deal of attention in recent years. Given the dynamic transformation of European regions, through economic integration, key questions are generated concerning the technology capacity, competitiveness and their overall performance.There is also a current considerable interest and discussion about the economic integration among EU member countries and the impact of this integration on the countries' regions. Studies on this field are mainly investigating the convergence-divergence issue, while empirical studies concerning the effect of EMU on regions' performance are rare.

All the EMU's countries should share a similar interest in improving productivity growth performance at the regional level in order to maintain their competitiveness in the rapidly changing environment of a more competitive worldwide market. The comparison of productivity analysis of European countries is rare, therefore, this current exercise makes an important contribution to the literature.

It is well known that productivity growth is one of the key elements of success of economic development. Long term productivity growth accompanied by the dominant role of technical progress sustains the country's economic growth. In general, technical efficiency improvement of some regions must be balanced by technical progress performance.

Our study encompassed two decades and we used the non-parametric metafrontier framework to account for the heterogeneity between the Italian regions in two distinct time periods before and after the EMU

[7] Departing from the seminal works of Cohen and Levinthal (Cohen and Levinthal, 1989; Cohen and Levinthal, 1990) and the widespread consensus on the specific role of 'knowledge' for innovative performance, these concepts has been widely employed at regional studies (Jaffe, Traijtenberg, and Henderson, 1993; Maurseth and Verspagen, 2002; Doring and Schnellenbach, 2006).

[8] Mowery and Rosenberg (1979) claimed that is technically complicated to distinguish a demand-pull situation from a technology-push one.

[9] Public expenditure was also considered in the specification after the EMU adoption. However, it turned to be not sisnificant. We dropped it since its inclusion did not improve the goodness of the model

implementation as the first stage of analysis. In the second stage, the technology gaps estimating for each period, has been regressed investigating possible factors that may have affected their performance.

Our findings reveal a significant improvement for the twenty Italian regions after the EMU unification, a paradoxically unchanged behavior for the Centre-North regions efficiency performance,as well as the identification of the specific regions performing better in terms of technology gap. The breakdown of time span in two additional periods,before and after the euro adoption, gave us the opportunity of testing different determinants of technology gaps. The inclusion of variables related to regions' trade performance in the model indicates that trade balance is only of relatively major importance. On the other hand, the contribution of public expenditures in the first period and R&D expenses in the second reveals a different pattern of growth for Italian regions before and after the euro implementation.The main limitations of this work concern the range of the variables used in the first and the second stage of analysis due to data availability. Moreover, the present study points some interesting directions for further research including the application of this analysis to other coutries and/or to the European Union as a whole.

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7 Tables

Table 1: Descriptive statistics of the used variables*

Output and Inputs Variables (Frontier Analysis)

Pre Adoption Period (1993-1999)			Post Adoption period (2000-2011)		
Variable	Mean** (Std.Dev.)	Max (Min)	Variable	Mean (Std.Dev.)	Max (Min)
Y*	48,357 (42,719)	225,436 (2,401)	Y*	63,661 (61,796)	30,6195 (2897)
L	1,049 (889)	3,911 (54)	L	1131 (974)	4351 (55)
K*	100,753 (71,731)	257,321 (10,909)	K	104,683(75321.46958)	277,436 (9100)

Explanatory Variables (Regression Analysis)

Variable	Mean (Std.Dev.)	Max (Min)	Variable	Mean (Std.Dev.)	Max (Min)
EXPUBL	9,290 (6543)	29,723 (638)	EXPUBL	14,582 (10,604)	47,856(843)
TB25	24,939 (40502)	110,781 (-77,704)	TB25	69,435 (58,314)	774,629 (-244,423)
TBW	9,045 (33102)	76,619 (-84,486)	TBW	28,576 (80,139)	1,010,228 (-94,787)
RDEXP	142.30 (100.14)	434.7 (12.4)	RDEXP	233.71(134.02)	534.8 (35.8)

*Y, $K, TB25$ and TBW are reported in Billions Euros

Table 2: Bootstrap DEA estimations for both periods with respect to the region specific frontier

	Pre EMU adoption period						After EMU adoption period					
	DEA	Bootstrap DEA	Bias	Sigma	LB	UB	DEA	Bootstrap DEA	Bias	Sigma	LB	UB
						South frontier						
ABR	0.954	0.934	0.020	0.000	0.906	0.952	0.959	0.949	0.010	0.003	0.928	0.958
BAS	0.955	0.926	0.029	0.000	0.888	0.953	0.967	0.949	0.017	0.000	0.927	0.966
CAL	0.860	0.834	0.026	0.000	0.804	0.859	0.949	0.936	0.012	0.000	0.914	0.948
CAM	1.000	0.944	0.056	0.002	0.879	0.998	1.000	0.970	0.030	0.000	0.940	0.999
MOL	1.000	0.940	0.060	0.002	0.868	0.998	1.000	0.969	0.031	0.000	0.937	0.999
PUG	0.909	0.880	0.029	0.001	0.831	0.908	0.941	0.924	0.016	0.000	0.896	0.940
SAR	0.945	0.917	0.028	0.000	0.885	0.942	0.970	0.953	0.017	0.000	0.928	0.970
SIC	1.000	0.947	0.053	0.001	0.896	0.997	1.000	0.970	0.030	0.000	0.938	0.999
Mean	0.953	0.915	0.038	0.001	0.869	0.951	0.973	0.953	0.021	0.001	0.926	0.972
Std.Dev	0.050	0.039	0.016	0.001	0.035	0.049	0.024	0.017	0.008	0.001	0.015	0.024
Min	0.860	0.834	0.020	0.000	0.804	0.859	0.941	0.924	0.010	0.000	0.896	0.940
Max	1.000	0.947	0.060	0.002	0.906	0.998	1.000	0.970	0.031	0.003	0.940	0.999
						North frontier						
EMR	0.971	0.895	0.076	0.000	0.856	0.919	0.905	0.863	0.042	0.001	0.806	0.901
FNG	0.907	0.888	0.019	0.000	0.862	0.904	0.759	0.720	0.039	0.001	0.684	0.755
LAZ	1.000	0.970	0.030	0.000	0.925	0.998	1.000	0.944	0.056	0.002	0.879	0.995
LIG	0.919	0.896	0.023	0.000	0.865	0.916	0.832	0.787	0.045	0.001	0.746	0.827
LOM	1.000	0.910	0.090	0.005	0.834	0.996	1.000	0.832	0.168	0.015	0.772	0.993
MAR	0.821	0.804	0.018	0.000	0.780	0.819	0.759	0.718	0.041	0.011	0.682	0.754
PIE	0.973	0.909	0.065	0.000	0.869	0.932	0.870	0.834	0.036	0.001	0.780	0.867
TAA	1.000	0.977	0.023	0.000	0.952	0.996	1.000	0.915	0.085	0.002	0.873	0.995
TOS	0.878	0.849	0.029	0.000	0.817	0.876	0.805	0.761	0.044	0.001	0.718	0.801
UMB	0.814	0.796	0.018	0.000	0.775	0.812	0.728	0.691	0.036	0.001	0.655	0.723
VDA	1.000	0.908	0.092	0.005	0.832	0.996	1.000	0.832	0.168	0.015	0.771	0.994
VEN	0.899	0.872	0.027	0.000	0.832	0.897	0.878	0.833	0.045	0.001	0.774	0.876
Mean	0.932	0.889	0.042	0.001	0.850	0.922	0.878	0.811	0.067	0.003	0.762	0.873
Std.Dev	0.069	0.055	0.029	0.002	0.052	0.066	0.104	0.078	0.049	0.005	0.070	0.103
Min	0.814	0.796	0.018	0.000	0.775	0.812	0.728	0.691	0.036	0.001	0.655	0.723
Max	1.000	0.977	0.092	0.005	0.952	0.998	1.000	0.944	0.168	0.015	0.879	0.995

Table 3: Bootstrap DEA estimations, technology gaps and metatechnology ratios for both periods

	Pre EMU adoption period				Post EMU adoption period			
	DEA	Bootstrap DEA	TG	MTR	DEA	Bootstrap DEA	TG	MTR
ABR	0.100	0.085	0.910	0.090	0.672	0.632	0.333	0.667
BAS	0.896	0.662	0.285	0.715	0.707	0.653	0.312	0.688
CAL	0.350	0.301	0.639	0.361	0.679	0.643	0.313	0.687
CAM	0.862	0.563	0.404	0.596	0.678	0.633	0.348	0.652
EMR	0.969	0.676	0.245	0.755	0.905	0.843	0.023	0.977
FVG	0.400	0.336	0.622	0.378	0.759	0.718	0.002	0.998
LAZ	1.000	0.691	0.288	0.712	1.000	0.91	0.032	0.968
LIG	0.500	0.428	0.523	0.477	0.832	0.785	0.002	0.998
LOM	1.000	0.721	0.232	0.768	1.000	0.731	0.121	0.879
MAR	0.450	0.388	0.518	0.482	0.759	0.716	0.002	0.998
MOL	0.150	0.119	0.869	0.131	0.755	0.657	0.322	0.678
PIE	0.971	0.702	0.227	0.773	0.870	0.817	0.020	0.980
PUG	0.901	0.699	0.206	0.794	0.700	0.664	0.281	0.719
SAR	0.300	0.251	0.726	0.274	0.679	0.638	0.331	0.669
SIC	0.963	0.422	0.555	0.445	0.751	0.708	0.270	0.730
TAA	0.250	0.209	0.786	0.214	1.000	0.906	0.010	0.990
TOS	0.861	0.710	0.164	0.836	0.805	0.754	0.010	0.990
UMB	0.050	0.040	0.949	0.051	0.728	0.689	0.003	0.997
VDA	0.308	0.122	0.866	0.134	1.000	0.733	0.119	0.881
VEN	0.888	0.694	0.204	0.796	0.878	0.808	0.030	0.970
Mean	0.608	0.441	0.511	0.489	0.808	0.732	0.144	0.856
Std.Dev	0.349	0.246	0.272	0.272	0.120	0.088	0.147	0.147
Min	0.050	0.040	0.164	0.051	0.672	0.632	0.002	0.652
Max	1.000	0.721	0.949	0.836	1.000	0.913	0348	0.998

Table 4: Results of Friedman tests concerning the rank of TE, TG between the regions specific technologies and the metatechnology

Hypothesis Tested (H_0)	Criterion Value (p-value)	Decision with respect to H_0
TE rank for the North region is equal before and after EMU	19.692 (0.049)	Not accepted
TE rank for the South region is equal before and after EMU	13.01 (0.072)	Not accepted
MTE ranking didn't change before and after EMU	10.457 (0.275)	Not rejected
MTR ranking didn't change before and after EMU	20.171 (0.384)	Not rejected

Table 5: Results of Mann Whitney tests concerning on the differences of TE, TG between the regions specific technologies and the metatechnology

Hypothesis Tested (H_0)	Criterion Value (p-value)	Decision with respect to H_0
TE scores for the North region is equal before and after EMU	2.367 (0.017)	Not accepted
TE scores for the South region is equal before and after EMU	-2.521 (0.011)	Not accepted
MTE scores are equal before and after EMU	-3.92 (0.000)	Not accepted
MTR scores are equal before and after EMU	-3.621 (0.000)	Not accepted

Table 6: Determinants of Technology gaps for the two periods

		Pre EMU adoption period			Post EMU adoption period		
Explanatory Variables	Variable	Coefficient (Asymptotic t-ratio)	95% Confidence Interval		Coefficient (Asymptotic t-ratio)	95% Confidence Interval	
			LB	UB		LB	UB
	Constant	0.772 (6.71)*	0.546	0.997	0.541 (4.86)*	0.327	0.758
Knowledge Conditions	RDEXP	-0.001 (-0.22)	-0.014	0.011	-0.024 (-3.00)*	-0.041	-0.008
Macroeconomic Characteristics	TB25	-0.006(-3.09)	-0.016	0.004	-0.015 (-2.06)*	-0.079	-0.004
	TBW	-0.006 (-0.19)	-0.014	0.001	-0.001 (-1.29)	-0.031	-0.001
	EXPPUBL	-0.025(-2.36)*	-0.046	0.004	-	-	-
Wald X^2		10.72			9.95		
Log-Likelihood		4.446			32.004		

** One asterisk denote statistical significance at 5% .*

IL TURISMO IN CAMPANIA, PUNTI DI FORZA E STRATEGIE PER LO SVILUPPO DEL TERRITORIO: "IL CASO DEI DISTRETTI TURISTICI"

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Abstract

Il focus del lavoro è sui sistemi turistici locali in Campania. L'interesse per un tale tipo di analisi è duplice: l'istituzione di aggregazioni territoriali organizzate in forme distrettuali è considerata un utile strumento di promozione di sviluppo territoriale dal punto di vista turistico. Dall'altro lato la Regione Campania rappresenta un interessante terreno di verifica per un tale modello di sviluppo. Infatti ben 24 su 49 distretti turistici italiani instituiti grazie alla legge nazionale 12 luglio 2011, n. 106 sono campani. Lo scopo del lavoro è di confrontare i distretti turistici nati grazie alla legge, con un'altra forma di riaggregazione distrettuale scaturita dall'applicazione di una metodologia di natura statistica (cluster analysis), al fine di verificare quanto i primi possano considerarsi una aggregazione efficiente dal punto di vista del potenziale turistico. Al fine di raggruppare comuni omogenei, si è proceduto infatti alla loro classificazione sulla base del potenziale turistico scaturente dalla sintesi di indici di turisticità. I risultati dell'indagine forniscono interessanti spunti di riflessione analitica sui caratteri dei Sistemi Turistici Locali.

***JEL Classification**: O38, R58, 018*

***Keywords**: Regional Policy, Tourist Districts, Tourist Index, Principal Component Analysis, Cluster Analysis, Gis*

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Introduzione

Il settore turistico da sempre contribuisce fortemente alla crescita del sistema economico locale. Secondo recenti stime del World Travel & Tourism Council, nel 2017 il contributo diretto al PIL mondiale del settore "Viaggi e Turismo" è stato molto rilevante (pari al 3,8%). Anche in termini di posti di lavoro si riscontra un impatto positivo, infatti il contributo diretto dei lavoratori del settore nel 2017 è pari al 4% dell'occupazione totale. Considerando inoltre il contributo totale - e quindi anche la quota di posti di lavoro generati in modo indiretto ed indotto dal settore turistico, i posti di lavoro nel 2016 sono stati pari al 9,6% dell'occupazione totale, con una crescita in valore assoluto nel 2017 dell'1,9%.

Se analizziamo il contesto nazionale il trend non sembra distaccarsi da quello mondiale. Infatti, nel 2016 il contributo diretto del segmento "Viaggi e Turismo" al PIL nazionale è stato pari a 77,3 miliardi di euro (il 4,6% del PIL) con una crescita nel 2017 del 2,6%. Anche in questo caso, se consideriamo il contributo indiretto e indotto, notiamo che l'impatto economico totale del turismo, è stato nel 2017 pari all'11,3% del PIL

Molte sono le strategie implementate dalle regioni per sfruttare i vantaggi e le potenzialità di tale settore. Basti pensare che la crescente integrazione del mercato turistico internazionale ha aperto nuove opportunità di sviluppo in settori e aree che erano rimaste sino ad oggi estranee ai flussi turistici. Fattori come le tecnologie digitali, o la nascita di nuove forme di turismo contribuiscono e contribuiranno sempre più ad influenzare le scelte dei turisti-consumatori e le direttrici dei flussi turistici. Oggi, infatti, non ci troviamo più di fronte ad un turismo, dove l'esigenza del turista era quella di ricevere un pacchetto completo e già predisposto, ma si assiste a nuove forme di turismo culturale/esperienziale. Si è alla ricerca di prodotti nuovi, mete particolari, insomma, un'offerta turistica che offra la possibilità di vivere un'esperienza unica, diversa, irripetibile, mai vissuta prima e sempre meno standardizzata. Pertanto la forte differenziazione di domanda, si traduce in una molteplicità di turismi, che per essere soddisfatti non possono prescindere da un sistema locale turistico ben organizzato ed integrato, in quanto "non è più l'offerta che fa il mercato ma la domanda" (Dallari, 2008 pp.3).

Le Regioni, ma ancora di più i Comuni, non possono più, quindi, non tener conto di tale fenomeno, e dovranno sempre più attivare nuove politiche e strategie di promozione della propria offerta turistica, in modo da cogliere le esigenze di tutti gli attori coinvolti nella filiera e sfruttare le loro potenzialità. In virtù di ciò si va diffondendo il concetto di sistema turistico locale (STL). Infatti, la globalizzazione del mercato non rappresenta più un contrasto rispetto alla dimensione locale, al contrario, quanto più "robusti" ed interconnessi sono tali sistemi, tanto più possono essere interpretati come aree-sistema, distretti specializzati, al pari di quanto accaduto nell'esperienza dei distretti industriali e contribuire allo sviluppo economico complessivo di un paese. Mentre, aree geografiche frammentate

dal punto di vista economico e sociale divengono sempre più marginali e povere (Dallari, 2007).

Da qui, ne consegue, la necessità per gli Enti locali, di utilizzare l'esperienza positiva italiana dei distretti industriali[3] e riportarla nel contesto turistico, attuando, così come scrive Dallari (2007), quei processi di integrazione e di collaborazione sociale e politica. Infatti soltanto rafforzando quei legami spaziali tra territori sarà possibile soddisfare la sempre più crescente e diversificata domanda di turismo. Pertanto per soddisfare la moltitudine di bisogni del turista non si può non ricorrere ad un sistema integrato, basato su aggregazioni e forme di partenariato pubblico-privato: una di queste è rappresentato dai "Distretti turistici".

In Italia l'istituzione dei "distretti turistici" è abbastanza recente, il d. l. 13 maggio 2011 n. 70 modificato con legge 12 luglio 2011, n. 106, ne ha istituito ad oggi 49 e il primo (SELECOAST "Sele Picentini"[4]) è nato nel mese di gennaio del 2014.

Considerata la recente costituzione dei distretti, risulterebbe alquanto inefficace provare a stimare l'impatto di tali forme di aggregazione sul sistema economico regionale. Con il presente lavoro ci poniamo piuttosto un duplice obiettivo: a) analizzare la struttura dei distretti turistici nati nella regione Campania; b) definire un apposito *score* di potenzialità turistica per ciascun singolo comune della regione che permetterà fornire, attraverso una cluster analysis, un criterio "oggettivo" di aggregazione per distretti basato sul loro effettiva vocazione turistica. L'indice di potenzialità turistica è il frutto di una sintesi, tramite l'utilizzo della ACP (Analisi delle Componenti Principali), di una serie di indicatori di turisticità calcolati su un set di variabili provenienti da più fonti statistiche (ISTAT, Banca d'Italia, Eurostat, WTTC, dati ministeriali, siti web dei singoli distretti, ed altre fonti di cui si fornirà ampia descrizione nei prossimi paragrafi). La struttura del lavoro prevede una prima parte in cui si mostrano alcuni fatti stilizzati dell'evoluzione del settore turistico in Italia ed in Campania. In seguito si analizzeranno la governance del sistema turistico e la sua normativa, e si approfondiranno le tematiche relative alle forme di concentrazione spaziale nel settore turistico. Infine si svilupperà un modello di aggregazione dei comuni della Campania su base distrettuale partendo dalla costruzione di un indice di potenzialità turistica ricavato dalla aggregazione di indici di turisticità.

1.1 Alcuni fatti stilizzati dell'evoluzione del settore turistico in Italia e Campano

Sia in Italia che in Campania il trend degli arrivi turistici negli ultimi anni è stato complessivamente positivo. Di seguito si riportano due grafici combinati (Fig.1 e Fig.2) a doppia scala, sul trend degli arrivi e sulle presenze turistiche, in cui si confronta con un unico grafico la realtà Campana rispetto all'andamento nazionale.

3 Concentrazioni territoriale di piccole e medie imprese specializzate, in grado di competere in modo efficiente sul mercato (Marshall, 1975)

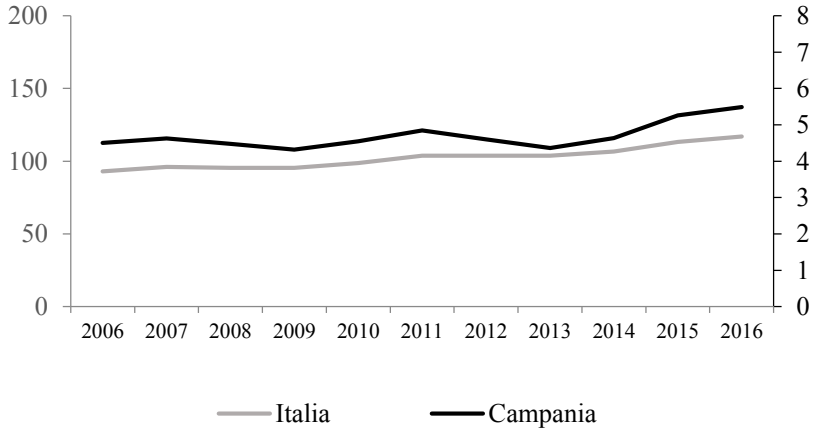
4 Istituito con un decreto del 10 gennaio del 2014 del Ministero dei beni e delle attività culturali e del turismo in applicazione dell'art. 3 comma 4 del D.L. 13 maggio 2011, n. 70

In Italia, dal 2006 al 2016 si è registrato infatti un incremento degli arrivi del 25,6%, passando da 93 a 116,9 milioni (Fig. 1) In Campania il trend complessivo è stato analogamente favorevole. Dal 2006 al 2016 gli arrivi sono cresciuti del 21,9%, ad un ritmo quindi leggermente inferiore rispetto al valore nazionale (Fig. 1)

Analizzando l'andamento dei flussi turistici in entrata per singolo anno, notiamo nel dettaglio una maggiore variabilità. In particolare, tra il 2007 e il 2008 riscontriamo un calo del -3,1%; dal 2009 al 2011 si registra una crescita sostenuta; dal 2011 al 2013 si è verificata una nuova e rilevante flessione; dal 2013 al 2016 gli arrivi hanno ripreso a crescere raggiungendo i 5,5 milioni, un valore superiore al picco raggiunto nell'anno precedente (5,3 milioni) (Fig.1). Oltre agli arrivi, anche il trend generale delle presenze turistiche è stato positivo nell'intervallo considerato (

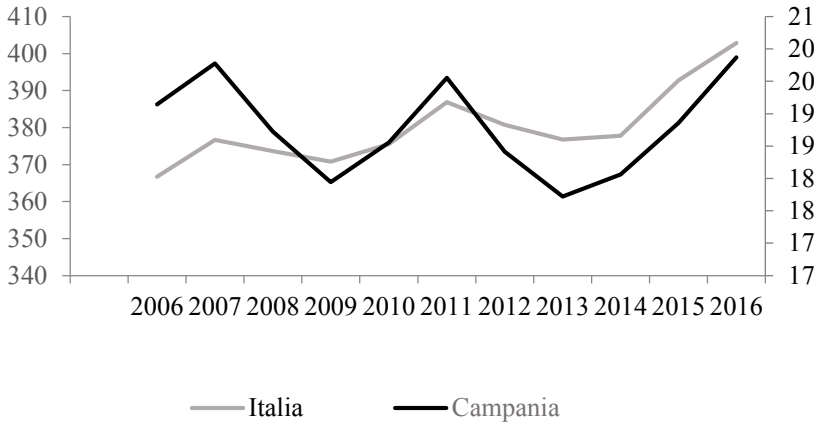
Figura 2). Dal 2006 al 2016, infatti, le presenze sono cresciute del 9,8% in Italia e dell'8,8% in Campania. La crescita è stata minore di quella messa a segno dagli arrivi nonostante i valori del 2016 sono al massimo livello toccato dal 2006, rispettivamente per Italia e Campania. Sull'Italia hanno pesato le flessioni del 2012 e del 2013, compensate dalla ripresa degli ultimi anni. Per la Campania invece si è avuta una notevole riduzione di presenze dal 2012 al 2013 compensata dalla ripresa del 2014/2016 che ha fatto recuperare i livelli precedenti.

Figura 1 Trend degli arrivi totali in Italia e Campania, 2006-2016 (valori in mln)



Fonte: dati Eurostat

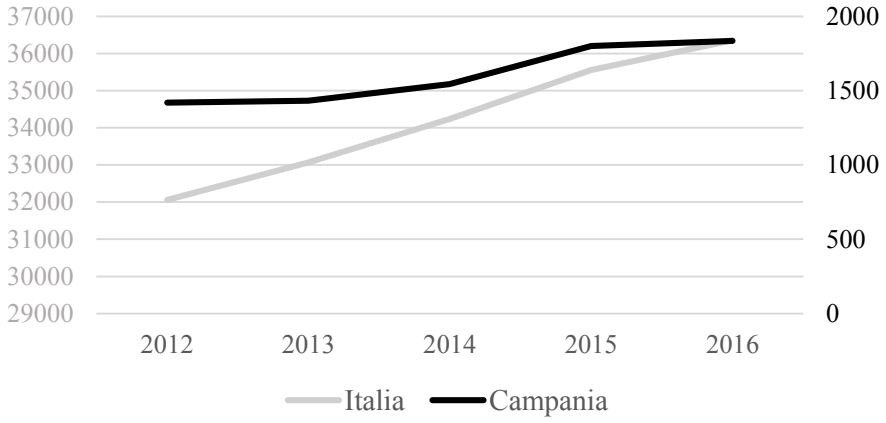
Figura 2 Trend delle presenze turistiche totali in Italia e Campania, 2006-2016 (valori in mln)



Fonte: dati Eurostat

Anche in termini di spesa dei viaggiatori stranieri, emerge che rispetto al 2012 la spesa in Campania è aumentata del 29,2%, passando da 1.419 a 1.834 milioni di euro. La performance del turismo campano è stata migliore di quella nazionale, dove l'incremento è stato più contenuto (+13,4%). (*Fig.3*).

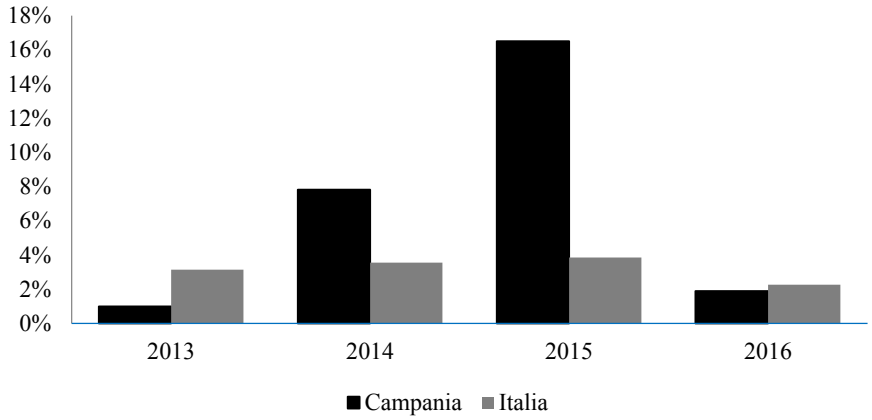
Figura 3 Trend della spesa dei viaggiatori stranieri, 2012-2016 (valori in mln di euro)



Fonte: dati Banca d'Italia

Guardando i singoli anni si nota per la Campania un forte incremento nel biennio 2014-2015. In quest'ultimo anno i viaggiatori stranieri hanno speso circa 1.800 milioni di euro. Nell'ultimo anno però si è assistito ad un calo della crescita della spesa straniera di quasi 15 punti percentuali (*Fig. 4*).

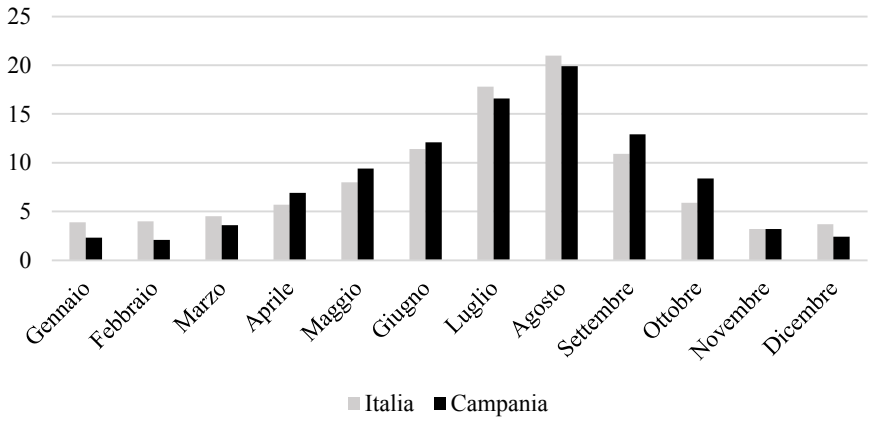
Figura 4 Tasso di crescita annuale della spesa dei viaggiatori stranieri, 2012-2016 (valori %)



Fonte: dati Banca d'Italia

Se poi analizziamo la stagionalità dei flussi turistici in Campania (Fig. *6)*, constatiamo una maggiore concentrazione di turisti nei mesi estivi in linea con i valori italiani. Le presenze totali nella regione raggiungono un minimo nei mesi che vanno da novembre a marzo, ed iniziano ad aumentare da aprile in poi. La maggior parte delle presenze è concentrata pertanto, nel periodo giugno-settembre, dove nel 2015 si è raggiunto il 61,5% delle presenze di tutto l'anno, valore in linea con quello italiano che nello stesso periodo è stato pari al 61,1%. Sia in Campania e sia nell'intero territorio nazionale, quindi, i mesi con il maggior numero di presenze totali sono agosto e luglio, seguiti da giugno e settembre.

Figura 5 Distribuzione percentuale mensile delle presenze totali in Campania- 2015



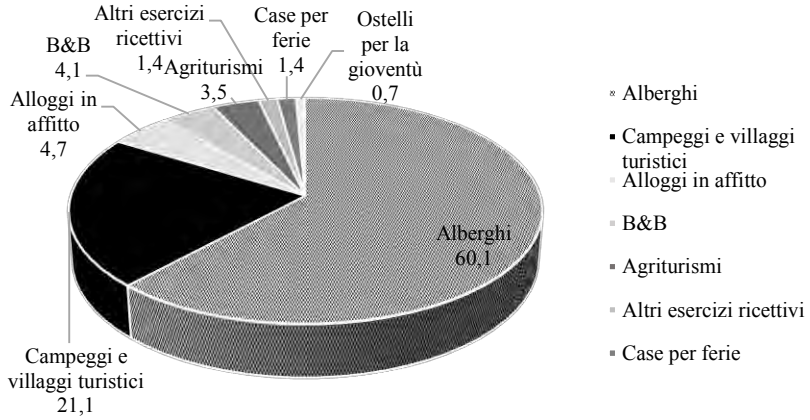
*Fonte: dati Banca d'Itali***a**

Nel complesso, i turisti che viaggiano nella regione preferiscono gli esercizi alberghieri agli esercizi complementari[5]. Questo vale sia per i residenti e sia per i non residenti.

[5] Il termine "esercizi complementari" è utilizzato come sinonimo di esercizi extra-alberghieri e comprende i campeggi e le aree attrezzate per camper e roulotte, i villaggi turistici, le forme miste di campeggi e villaggi

Analizzando gli arrivi del 2015, infatti, circa il 60% dei turisti ha alloggiato in esercizi alberghieri, mentre solo il 21,1% dei turisti hanno preferito i Campeggi e i villaggi turistici. Inoltre, come tipologia di struttura ricettiva gli "Alloggi in affitto" e i "B&B" hanno rispettivamente ricoperto una percentuale di 4,7 e 4,1. Gli ostelli della gioventù, invece, sono in coda alla classifica delle preferenze circa le strutture ricettive rappresentando solamente lo 0,7% del totale (*Fig.6*).

Figura 6 Distribuzione percentuale dei posti letto regionali per tipologia di struttura ricettiva 2015



Fonte: dati Banca d'Italia

Pertanto, la Campania, come risulta dai dati messi a disposizione dall'ISTAT, si colloca tra i primi posti tra le regioni italiane per numero di presenze negli esercizi ricettivi. Se poi ci soffermiamo solo sulle regioni meridionali, la Campania si posiziona al primo posto ed il primato si rafforza se osserviamo il dato dal punto di vista della regione meridionale che accoglie più turisti stranieri.

1.2 Le strategie di governance del settore turistico della Regione Campania

Nonostante i dati incoraggianti c'è da dire che la Campania ancora non ha sviluppato tutto il suo potenziale di attrattività turistica, anzi potremmo dire che è in una fase embrionale. Eppure la regione con il suo patrimonio artistico, culturale oltre che ambientale, possiede potenzialità tali da posizionarsi ai vertici europei in termini di

turistici, gli alloggi in affitto gestiti in forma imprenditoriale, gli agriturismi, le case per ferie, gli ostelli per la gioventù, i rifugi di montagna, gli altri esercizi ricettivi non altrove classificati e i bed and breakfast.

attrattività turistica, proprio per la sua capacità di offrire forme di turismo diverse. Pertanto le strategie di sviluppo del comparto turistico non possono non rispondere a una logica di programmazione, che prevede che le risorse territoriali vengano potenziate, collegate e gestite in funzione delle esigenze dei flussi turistici e delle caratteristiche naturali e antropiche del territorio, così da garantire uno sviluppo socio-economico e culturale assicurando la contemporanea preservazione delle risorse presenti. A tal fine è fondamentale che esista una stretta correlazione tra comparto turistico e sviluppo territoriale integrato, in cui le strategie elaborate a livello istituzionale, si traducono in interventi attuati attraverso indicazioni programmatiche rivolte a tutti coloro che operano nel settore. A ragione di tutto ciò, sembra ovvio, che il sistema turistico debba essere regolamentato con una visione sistematica e di lungo periodo. Fino ad oggi la "governance" della Regione Campania, in tema di turismo, è apparsa estremamente frammentata. Gli operatori del settore, si sono dovuti pertanto scontrare con un sistema normativo altamente ingarbugliato e macchinoso, che ha prodotto fasi di stallo in ambito operativo. Pertanto era necessario da parte dei policy maker, prevedere un disegno di riordino e di riorganizzazione della governance del "sistema turistico" della Campania, attraverso la definizione di ruoli, funzioni e competenze attribuite alle istituzioni e agli attori locali coinvolti. Dopo molti anni di "deficit normativo" è stata emanata la legge n. 18 dell'8 agosto 2014 sul turismo, denominata "*Organizzazione del sistema turistico in Campania*". La legge si propone come uno strumento agile, in grado di favorire l'innovazione e la competitività del "Sistema turismo", così da favorire le plurime esigenze del mercato turistico. La normativa ha introdotto tutta una serie di novità abolendo gli enti provinciali per il turismo e riorganizzando tutto il sistema turistico campano basandolo sui Poli Turistici Locali (PTL). Soprattutto trasferisce ai comuni tutta una serie di responsabilità che vanno dall'attivazione dei SIAT (servizi di informazione e accoglienza turistica) a livello locale insieme con l'organizzazione di servizi turistici di base, trasmissione di dati relativi all'offerta. Istituisce il tavolo per le politiche turistiche a cui partecipano anche i privati e rappresentanti dei PTL, l'Agenzia Regionale per la Promozione del Turismo e dei Beni Culturali della Campania, le carte dei servizi del turista e la carte dei diritti del turista[6], nonché il riconoscimento del «Turismo rurale» con il quale s'intende valorizzare le aree interne, tutelare le tradizioni popolari, l'identità storica e le vocazioni produttive delle piccole comunità locali, al fine di «rianimare» i centri storici e garantire uno sviluppo eco-sostenibile. Esaminando la legge 18 dell'8 agosto 2014, in particolare all'art. 1, non si può non rilevare come il legislatore abbia attribuito il ruolo primario del turismo sulla crescita economica, civile, culturale, sociale della regione. Inoltre, per il comparto privato, crea consistente valore economico e costituisce fattore produttivo, stimolo ed opportunità di iniziativa imprenditoriale. Inoltre la normativa, obbliga, gli enti preposti alla politica del turismo regionale di operare nel rispetto di determinati principi, ossia di:

a) cooperazione e partenariato tra ambito pubblico ed ambito privato;

[6] E. Donatiello. https://iohounsogno.wordpress.com/2014/08/30/lanalisi-nasce-la-nuova-legge-sul-turismo-quali-vantaggi/

b) sussidiarietà, differenziazione e adeguatezza, ai sensi dell'art. 118 della Costituzione;

c) integrazione delle funzioni tra i diversi livelli di governo, garantendo le necessarie forme di cooperazione e le procedure di raccordo e di concertazione.

La Regione proprio in virtù delle mutate esigenze della domanda turistica, con l'introduzione della legge n. 18 del 2014 insieme alla legge 106/2011, ha puntato fortemente sulle forme di cooperazione e procedure di raccordo e di concertazione in ossequio al principio di sussidiarietà verticale, nonché nello sviluppo della cooperazione e del partenariato tra soggetti pubblici e privati, nel rispetto del principio di sussidiarietà orizzontale, così da garantire lo sviluppo dell'economia turistica. Proprio in virtù di quanto sopra descritto, la Campania negli ultimi anni ha promosso e incentivato la nascita di forme collaborazione tra imprese pubbliche e private, con l'obiettivo comune di pubblicizzare e valorizzare il territorio nel quale operano. Tali forme di collaborazione possono essere identificate nella forma dei "Distretti Turistici". Basti pensare che al 31 dicembre 2017, termine ultimo per le Regioni "per la delimitazione dei distretti" da comunicare al MIBACT, in Campania assistiamo alla nascita di ben 24 distretti su un totale di 49 costituiti su tutto il territorio nazionale (circa il 49%). I distretti turistici sono forme agglomerative tra imprese pubbliche e private istituiti con decreto del Ministro dei Beni e delle Attività Culturali e del Turismo, su richiesta delle imprese del settore che operano nei territori interessati, previa intesa con le Regioni coinvolte, con l'obiettivo di valorizzare il territorio nel quale si trova il distretto.

1.3 I modelli distrettuali del settore turistico in Campania

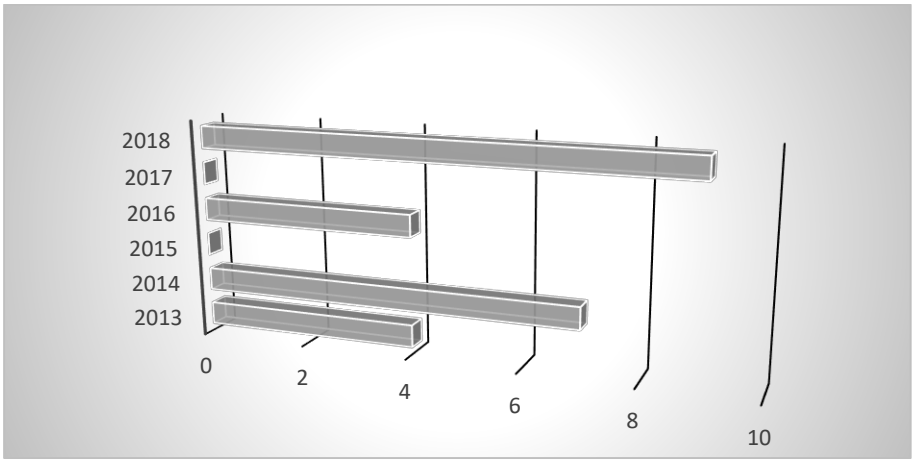
Come abbiamo visto, la Campania è la regione che maggiormente ha puntato sulla costituzione di fenomeni agglomerativi nel settore turistico. Infatti nella regione, nel quinquennio 2013-18, assistiamo alla nascita di 24 Distretti Turistici diventando così, la regione con il maggior numero di distretti sul territorio nazionale. Di seguito in (*Fig. 7)* si riporta una sintesi del numero dei distretti turistici raggruppati per anno di costituzione. Dal grafico, senza considerare gli anni di vuoto del 2015 e 2017, si riscontra una nascita alquanto costante di nuovi distretti turistici, con una forte impennata soprattutto nel 2017[7]. Nel presente lavoro abbiamo mappato tutti i 24 distretti, con tecniche di geo localizzazione (Fig.9), così da avere una visione d'insieme e territoriale dei distretti turistici.

La strategia di sviluppo economico della Regione Campania ha nel turismo uno dei suoi punti di forza. L'obiettivo di incentivare la nascita dei distretti turistici nasce proprio dall'esigenza di soddisfare una domanda sempre più diversificata. Infatti soltanto con l'unione di più forze è possibile soddisfare l'intera offerta turistica, promuovendo in Italia e all'estero l'intero panorama caratteristico della regione. Gli enti locali hanno recepito i vantaggi di aggregarsi in forme di rete, con l'obiettivo comune di riqualificare l'offerta turistica, accrescere lo sviluppo delle aree e dei settori del distretto, migliorare l'efficienza

7 Al 31 dicembre 2017 scadevano i termini per le Regioni "per la delimitazione dei distretti" che andavano poi comunicati al Mibact per la ratifica.

nell'organizzazione e nella produzione dei servizi secondo i principi di sussidiarietà verticale e orizzontale e assicurare garanzie e certezze giuridiche alle imprese che vi operano, con particolare riferimento alle opportunità di investimento, di accesso al credito, di semplificazione e celerità nei rapporti con le pubbliche amministrazioni. Quanto sopra, senza dimenticare importanti vantaggi anche in termini di agevolazione e semplificazione in materia fiscale[8], amministrativa e finanziaria.

Figura 7 N. Distretti turistici per anno di costituzione

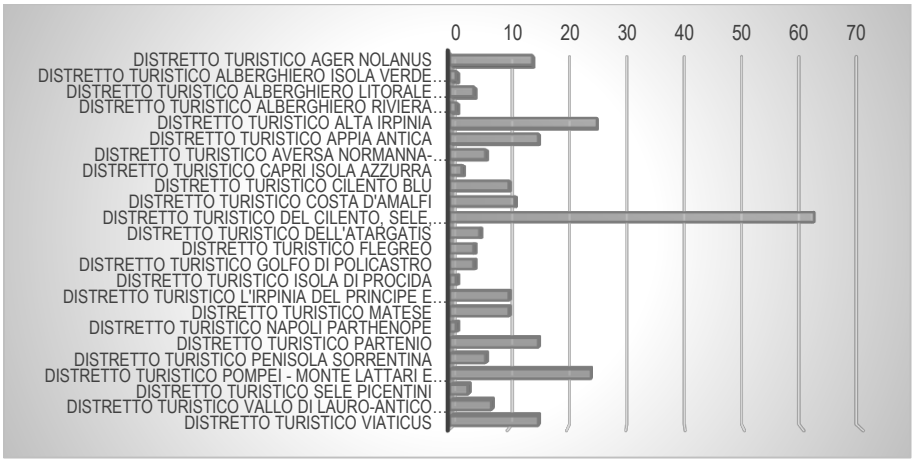


Fonte: Ns. elaborazione su dati ISTAT e MiBACT

Figura 8 N. di Comuni appartenenti ai Distretti turistici Campania

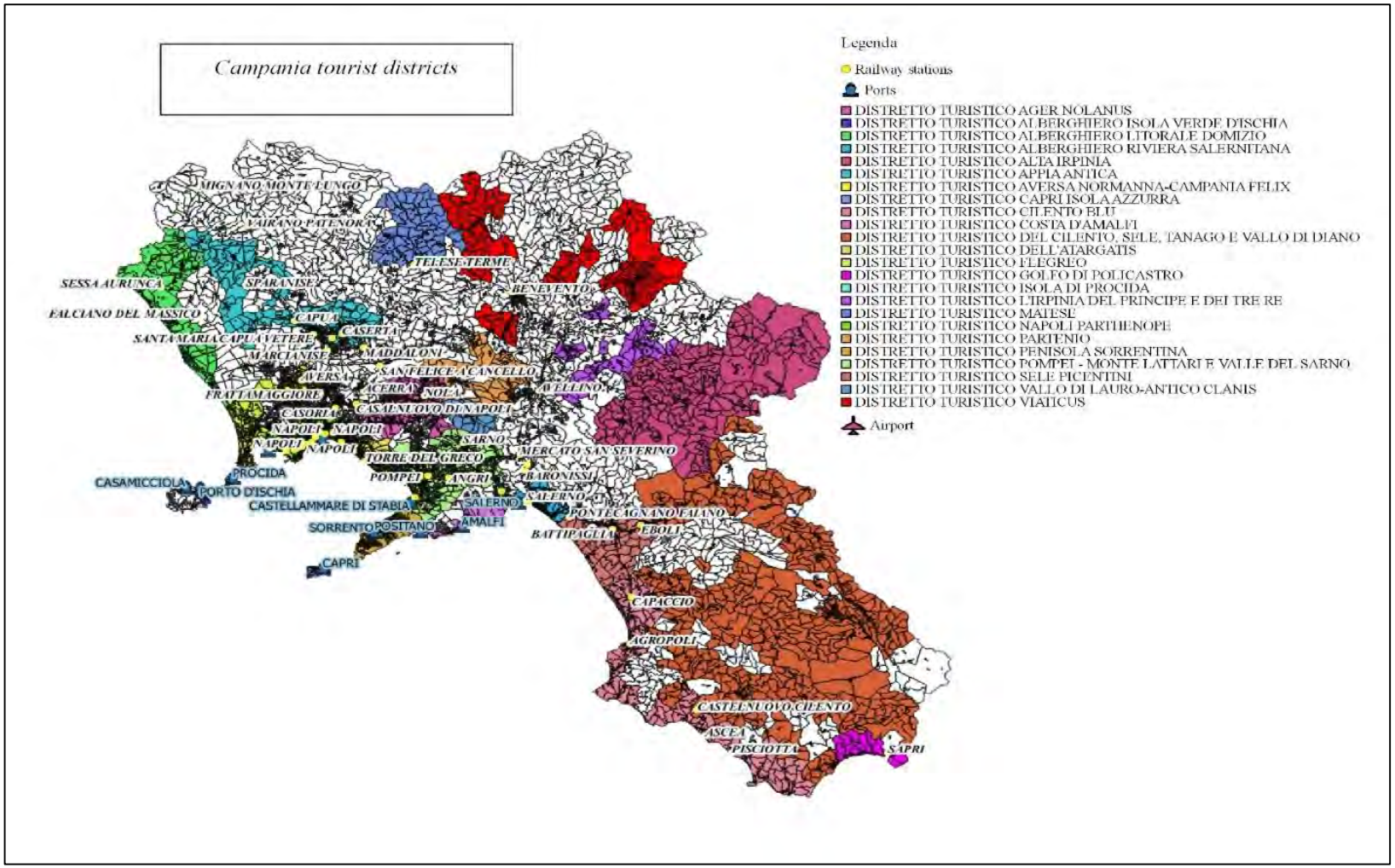
[8] Le imprese dei distretti turistico-alberghieri, ancorché non costituite in rete, si applicano – su richiesta – le disposizioni agevolative in materia fiscale del comma 368, lettera a), articolo 1, della Legge Finanziaria 2006:

- i distretti vengono ricompresi tra i soggetti passivi dell'IRES;
- le imprese appartenenti ai distretti possono congiuntamente esercitare l'opzione per la tassazione di distretto ai fini dell'applicazione dell'IRES;
- tassazione di gruppo ai sensi dell'art. 117 e segg. Testo Unico Imposte Dirette, ove applicabile;
- il reddito imponibile del distretto comprende quello delle imprese che vi appartengono, che hanno contestualmente optato per la tassazione unitaria;
- la determinazione del reddito unitario imponibile, nonché dei tributi, contributi e altre somme dovute agli enti locali, viene operata su base concordataria per almeno un triennio;
- i distretti possono concordare IN VIA PREVENTIVA E VINCOLANTE con l'Agenzia delle Entrate per la durata di almeno un triennio il volume delle imposte dirette di competenza delle imprese appartenenti da versare in ciascun esercizio; la stessa operazione vale con gli enti locali per i tributi di loro competenza;
- la ripartizione del carico tributario tra le imprese interessate è rimessa al distretto che vi provvede in base a criteri di trasparenza e parità di trattamento, sulla base di principi di mutualità;
- non formano base imponibile le somme percepite o versate tra le imprese appartenenti al distretto in contropartita dei vantaggi fiscali ricevuti o attribuiti



Fonte: Ns. elaborazione su dati ISTAT e MiBACT

Figura 9 Distretti turistici della Regione Campania



Fonte: Ns elaborazione su dati MIBACT

1.4 Dal distretto industriale al distretto turistico.

In letteratura sono presenti una pluralità di contributi ed approcci che hanno ad oggetto gli aspetti costitutivi ed evolutivi di insiemi di imprese caratterizzati da un'elevata prossimità geografica.

In generale, la specificità dei contesti locali è ricondotta, nei diversi contributi teorici, ad alcuni fattori economici, strutturali, infrastrutturali, culturali e sociali, ritenuti in grado di incidere sullo sviluppo dei contesti medesimi e su quello delle imprese ivi localizzate (Becattini, 1989; Becattini e Rullani, 1993; Rullani, 1996; Porter, 1990; 1998). Per confrontare la nozione di distretto industriale con quella di polo di sviluppo e di cluster, ci rifaremo alla nozione di distretto nell'approccio interpretativo che ha guidato le riflessioni teoriche degli economisti e dei sociologi definiti come neo-marshalliani (Becattini, 1979, 1989; Bellandi, 1982, 1992; Dei Ottati, 1987, 1994a, 1994b, 1995: Sforzi, 1989, 1990; Brusco, 1982, 1989; Trigilia, 1986, 1990;) che hanno analizzato il concetto di distretto come nuova unità di indagine dell'analisi economica a cavallo tra il concetto di settore e quello di impresa. L'aggregazione spaziale di numerose imprese - ciascuna di esse operante in condizioni di efficienza tecnica e organizzativa e compenetrate tra di loro sul piano dei processi manifatturieri e commerciali - determina una particolare condizione di efficienza a livello di sistema produttivo complessivo. Nella definizione marshalliana, il distretto non è considerato solo un modo per organizzare la produzione, ma un ambiente in cui le relazioni tra gli attori sono peculiari e rappresentative di un aggregato sociale storicamente e geograficamente determinato (Marshall, 1975).

Il tema dei distretti industriali porta, in modo sequenziale, a quello più nuovo e tipicamente anglosassone, dei cluster (grappoli).

In letteratura è aperto il dibattito sulle differenze tra distretto e cluster. La differenza tra i due concetti, secondo alcuni, è da riconoscersi nel paradigma teorico che ne costituisce la base (Sforzi, 1990): mentre il distretto nasce come superamento sul piano teorico del concetto d'impresa e settore industriale (Becattini, 1979), il concetto di "cluster" deriva proprio dal settore industriale come unità elementare di analisi, rappresentando una modalità d'espressione geografica definibile a varie scale territoriali (Porter, 1998a e 1998b). Un cluster industriale è definito da Porter come un insieme di imprese interconnesse e geograficamente concentrate le quali cooperano, e allo stesso tempo, competono per ottenere dei vantaggi competitivi. Per individuare un cluster e i suoi confini Porter suggerisce di partire da una grande impresa o da un insieme di imprese simili per poi cercare i legami orizzontali e verticali, a monte e a valle, con imprese e istituzioni.

In generale, quando si parla di cluster si fa riferimento a sistemi ad alta concentrazione di imprese e di istituzioni che sono fortemente interdipendenti; il cluster secondo Porter può essere definito come: un gruppo di imprese interconnesse e di istituzioni associate operanti in un particolare campo, territorialmente contigue e collegate da elementi di comunanza e complementarità; un sistema che nel suo insieme ha un valore maggiore della somma delle singole part*i* (Porter, 1998a;1998b).

Alla teoria del cluster si ricollega fortemente il concetto di distretto turistico. Infatti l'industria del turismo è concepita come un insieme di attori (enti locali, piccole e medie imprese) che offrono prodotti complementari. Si rilevano forti similitudini sia dal punto di vista spaziale che strutturale tra un distretto industriale e quello turistico. In tale contesto si vanno a posizionare i "Distretti turistici", infatti in un quadro in cui l'offerta turistica oramai deve risultare altamente diversificata per soddisfare le diverse esigenze dei fruitori del mercato turistico, appare necessario, se non fondamentale creare dei modelli di politica

territoriale di sviluppo turistico basati sulla cooperazione tra soggetti pubblici e privati. Nel lavoro di Porter (1998b) vi è un esplicito riferimento dell'applicazione del cluster o distretto nel settore turistico. Nel lavoro l'autore rileva l'importanza degli elementi che appartengono al cluster turistico, sottolineando che la soddisfazione dei turisti non dipende soltanto dall'attrattività principale del luogo, ma anche dalle qualità e dall'efficienza dei servizi connessi (alberghi, ristoranti, centri commerciali, servizi di trasporto, attrattività culturali, paesaggistiche, ambientali, ecc.). Lo scopo dei distretti turistici è quello di portare le imprese di piccole e medie dimensioni a collaborare con istituzioni per costruire un prodotto turistico di successo per la regione (Novelli et al.,2006). Il distretto turistico così risulta essere una concentrazione geografica di imprese ed istituzioni interconnesse in attività turistiche (Estevão e Ferreira, 2009).

Al concetto di distretto turistico non può non collegarsi il concetto di *destinazione turistica*. La destinazione turistica indica la meta finale del visitatore, il suo obiettivo di viaggio, il luogo fisico in cui si trovano i prodotti che il consumatore acquisterà. Nella definizione di Candela, si parla di: *insieme di attività e fattori attrattivi che, situati in uno spazio definito (sito, località, area), sono in grado di proporre un'offerta turistica articolata e integrata, ossia rappresentino un sistema di ospitalità turistica specifica e distintiva che valorizza le risorse e la cultura* (Candela et al. 2010, pp. 69-70).

Essa rappresenta il territorio nel quale si incontrano i bisogni della domanda e la scelta dell'offerta. Nell'offerta si incontrano tutti gli elementi del prodotto turistico, vi sono localizzate tutte le imprese che si occupano di ricettività e accoglienza, le attrazioni primarie e tutte le strutture di cui il visitatore ha bisogno, vi si esprime gran parte della domanda turistica. In altre parole, la destinazione risulta il perno su cui convergono tutti gli elementi sistemici del turismo.

Quindi gli elementi caratterizzanti la destinazione sono:

a) uno spazio geografico ben definito;

b) il riferimento ad un'offerta (un prodotto) che nasce dalla messa a sistema di un insieme di risorse, strutture, attività e operatori pubblici e privati esistenti e operanti sul territorio della destinazione;

c) un mercato (segmenti di domanda) e, quindi, alla gestione di flussi turistici verso il luogo considerato.

Partendo proprio dal concetto di destinazione turistica si arriva al modello del distretto. Il distretto è qualcosa di spontaneo, voluto dalle popolazioni, sia pure opportunamente sollecitate e sensibilizzate, è qualcosa non burocratico e a geografia variabile, è l'evoluzione del sistema turistico locale o meglio l'applicazione sul campo in maniera spontanea e libera dell'art 5 della legge 135 del 2001 che definisce i sistemi turistici locali come "*contesti turistici omogenei o integrati, comprendenti ambiti territoriali appartenenti anche a regioni diverse, caratterizzati dall'offerta integrata di beni culturali, ambientali e di attrazioni turistiche, compresi i prodotti tipici dell'agricoltura e dell'artigianato locale, o dalla presenza diffusa di imprese turistiche singole o associate*". È fondamentale che tutti gli attori coinvolti nel distretto si sforzino nel mantenere tutti gli impegni presi per il miglioramento del prodotto turistico, e che se uno solo dei nodi del sistema non funziona si rischia di incrinare tutto il sistema di una destinazione turistica. Alla luce della definizione di "Sistema turistico locale", nel presente lavoro, abbiamo provato ad identificare aree omogenee secondo un modello di aggregazione statistico. Per applicare il modello è stata necessaria la preventiva elaborazione di un indicatore, in grado di valorizzare quantitativamente la turisticità di tutti i Comuni della Regione Campania. Tale indicatore, generalizzabile a qualsiasi comune della provincia italiana, permette di valorizzare non solo realtà situate in aree turisticamente rilevanti ma anche, e soprattutto, quelle con minore rilevanza turistica. Nel prossimo paragrafo si presenterà la metodologia di costruzione di tale indice.

2. Una metodologia statistica di costruzione di distretto turistico

2.1 Il data set utilizzato e gli indici di turisticità

La seconda parte del lavoro riguarda la ricostruzione di un sistema distrettuale dei comuni della Campania effettuata attraverso l'applicazione una metodologia statistica. La base di partenza è consistita nell'acquisizione di un data set su base comunale. organizzato secondo un modello relazionale[9]. Sono state utilizzate informazioni provenienti da diverse banche dati ISTAT, Eurostat, OCSE, UNWTO, Banca d'Italia, Osservatorio nazionale del turismo, siti web. I dati così raccolti sono stati importati in un singolo database con linguaggio MySql.

La metodologia applicata si rifà al contributo di Gismondi (2006), nel quale viene individuato un metodo d'indagine generalizzabile, in grado di valorizzare quantitativamente la turisticità, non solo dei comuni situati in aree turisticamente rilevanti, ma anche e soprattutto dei siti minori.

L'apporto innovativo del presente lavoro è costituito dall'impiego congiunto di variabili tradizionali negli studi di georeferenziazione turistica, con variabili legate a fenomeni culturali locali, nonché variabili relative alle caratteristiche morfologiche del territorio. In totale parliamo di circa 70 variabili, raggruppate in sottoinsiemi omogenei secondo il profilo di analisi dell'attrattività turistica locale (v.d. Tavola nr.1 in appendice).

Ciascun gruppo di variabili è stato raggruppato, ad un primo livello di specificità, in tre categorie:

1. Attrattività turistica potenziale (**TA- Tourist attactiveness**) che rappresenta la dotazione del territorio di tipo strutturale, ambientale, storico-artistico;
2. Disponibilità di posti letto per fini turistici (**TB- Tourist bed places**);
3. L'impatto turistico derivante dalla domanda turistica (**TI- Tourist impact**).

Ad un secondo livello, i tre gruppi di variabili sono stati disaggregati in altri sotto gruppi. In particolare:

1. TA- Tourist attactiveness in 4 sottogruppi (*TAI_1*, *TAI_2*, *TAI_3*, *TAI_4*)
2. TB- Tourist bed places (non è stato suddiviso)
3. TI- Tourist impact in 3 sottogruppi (*TII_1*, *TII_2*, *TII_3*)

I gruppi di variabili così costruiti hanno permesso di realizzare opportuni indici di turisticità per ciascun Comune. In definitiva gli indicatori costruiti sono 12: uno generale (***TI – Tourist index***), 3 (ad un primo livello di specificità ***TAI, TBI, TII***) e 8 ad un secondo livello di disaggregazione (*TAI_1*, *TAI_2*, *TAI_3*, *TAI_4*, *TBI*, *TII_1*, *TII_2*, *TII_3*).

In appendice si riporta uno schema delle variabili utilizzate, nonché la loro posizione all'interno dei 2 livelli di aggregazione, sia per il primo livello di specificità che per il secondo. Tutte le variabili sono quantitative ad eccezione di alcune variabili dicotomiche contrassegnate dal simbolo *(d)*. In definitiva per le analisi sono state utilizzate circa 60 variabili quantitative e 8 variabili dicotomiche.

2.2 L'analisi delle componenti principali

Dovendo individuare un indice sintetico di turisticità di un territorio ci si è avvalsi dell'indicatore proposto da Gismondi (Gismondi, 2006). Visto la moltitudine di variabili raccolte, il primo problema che ci si pone di risolvere è quello della riduzione della

[9] L'informazione è rappresentata dal concetto di relazione, implementato con strutture tabulari

multidimensionalità delle informazioni raccolte. Tra le tecniche statistiche maggiormente utilizzate è quella dell'ACP (Analisi delle componenti principali).

L'analisi delle componenti principali con riferimento a p variabili, X_1, X_2, X_3…. X_p con i= 1, 2,….p (vettore casuale multivariato), consente di individuare altrettante p variabili (diverse dalle prime), Y_1, Y_2,Y_3,……,Yp con i =1,2,...,p (vettore multivariato), ognuna combinazione lineare delle p variabili di partenza. L'obiettivo della PCA consiste nell'individuare opportune trasformazioni lineari Yi delle variabili osservate facilmente interpretabili e capaci di evidenziare e sintetizzare l'informazione insita nella matrice iniziale X. Tale strumento risulta utile soprattutto allorquando si ha a che fare con un numero di variabili considerevole da cui si vogliono estrarre le maggiori informazioni possibili pur lavorando con un set più ristretto di variabili. L'analisi in componenti principali porta alla creazione di nuove variabili, dette Componenti Principali, che sono combinazioni lineari delle originarie e che godono delle due seguenti proprietà:

1. sono tra loro incorrelate (ortogonali),
2. sono elencate in ordine decrescente della loro varianza
3. la varianza totale (somma delle varianze) si conserva nel passaggio dalle variabili osservate alle componenti principali

Tale tecnica ha il pregio di descrivere il fenomeno oggetto di studio mediante dimensioni fra loro non correlate e ordinate in termini della loro importanza nella spiegazione. Questo permette di:

- ridurre il numero di variabili da considerare, scartando le ultime componenti principali (laddove si ritenga trascurabile il loro contributo alla spiegazione della variabilità osservata)
- interpretare il fenomeno oggetto di studio, mediante un'opportuna interpretazione delle componenti principali che non sono state scartate.

La metodologia utilizzata per calcolare un indice sintetico generale di turisticità è la seguente:

1. Tutte le variabili vengono standardizzate, in modo da essere confrontabili in termini di valore medio e variabilità. Le nuove variabili così trasformate sono indicate con z_{vi};

2. Tutte le variabili sono espresse in modo che assumano valori crescenti al crescere della componente attrattiva. Quindi ad alcune variabili come "sismicità" e "piovosità" sono stati attribuiti valori negativi lì dove la componente di attrattività è molto bassa. Esempio un comune molto piovoso avrà il valore della piovosità media in valore negativo, così pure per il comune altamente sismico.

3. Per ogni sottogruppo è stata effettuata una ACP considerando tutte le variabili attive e sono state considerate le sole componenti con un "*Eigenvalue*" > di 1. Così è stato costruito uno *score* per ciascun comune *i* come media aritmetica ponderata dei contributi relativi che le V variabili forniscono con riferimento alle prime componenti principali (a_{Iv} con *Eigenvalue* > di 1) pesate per le corrispondenti quote di varianza "spiegata" da tali componenti (φ). Di seguito si riporta la formula utilizzata per calcolare gli *score*, nel caso generale di due sole componenti. In realtà nella nostra analisi per l'indice TAI_1 abbiamo 3 componenti, TAI_2 ancora 3 componenti, TAI_3 ne abbiamo 2. Per l'indice TBI si ritrovano 5 componenti e per gli indici TII_1, TII_2, TII_3 1 solo componente. Per ciascun sottogruppo è stata applicata la formula sottostante (1)

$$S_i = \left\{ \frac{(\varphi_I \sum_{v=1}^{V} z_{vi} a_{Iv} + \varphi_{II} \sum_{v=1}^{V} z_{vi} a_{IIv})}{(\varphi_I + \varphi_{II})} \right\} \quad (1)$$

φ_I e $\varphi_{II} =$ *Sono le varianze delle prime componenti principali*
a_{Iv} e a_{IIv} = *Rappresentano la le* $v -$ *ma coordinate degli assi fattoriali*
$z_{vi} =$ *Rappresentano la le variabili standardizzate*

4. Per ogni comune, ogni indice del primo livello sarà dato dalla media aritmetica semplice dei sotto-indici. Così l'indice **TAI** sarà dato dalla media aritmetica semplice dei 4 indici *TAI_1, TAI_2, TAI_3, TAI_4*; **TBI** non ha nessuna sintesi non essendo scomposto in sotto-componenti e **TII** sarà dato dalla media di TII_1 e TII_2.

5. Infine l'indice generale di turisticità **TI** si desumerà dalla media aritmetica semplice dei tre indici.

2.3 I risultati dell'analisi delle componenti principali

Dall'applicazione della formula (1), scaturiscono, per ogni comune della regione Campania, una serie di punteggi assegnati ad ognuno dei 12 indicatori (4 principali e 8 di secondo livello).

In tabella 1 si riporta la classifica dei primi venti Comuni con l'indice di turisticità (TI) più elevato e si rappresentano tutti gli altri indicatori ottenuti con il metodo dell'ACP. Va premesso che il primo Comune nel ranking è Napoli, ma dati i suoi valori estremamente distanti dalla media, ai fini dello studio non è stato considerato, così da evitare possibili effetti distorsivi nell'analisi. La tabella la si può leggere in duplice ottica: da un lato osservando gli indici di primo livello (quelli in grassetto) costruiti in forma più aggregata, dall'altro osservando gli indici di secondo livello (non in grassetto) più disaggregati. Quindi se per esempio osserviamo il primo Comune con l'indice di turisticità più elevato ossia Sorrento, notiamo che tale *score* ad un primo livello, è influenzato fortemente dall'indice TBI (infrastruttura) circa *11,74* e seppure in maniera minore dall' indice TII (impatto turistico) *5,37*. Se poi ci soffermiamo su un livello di disaggregazione più elevato (indici di secondo livello), capiamo che il valore elevato dell'indice d'impatto turistico è dovuto per il valore elevato del sotto indice TII_2 *14,25*, ossia della domanda turistica.

Dunque il valore elevato di turisticità del comune di Sorrento è dovuto per le dotazioni di infrastrutture recettizie e dalla forte domanda turistica.

Osservando il secondo comune della graduatoria (Forio), notiamo che il valore del TI è funzione soprattutto dell'elevato valore dell'indice TBI (infrastruttura) con un valore di 8,52 se ci soffermiamo ad osservare gli indici di primo livello, mentre se scendiamo di livello notiamo che il valore deriva sia dal contesto territoriale (TAI_1), dalla domanda turistica (TII_2), ma anche dall'indice TAI_3 ossia gli attrattori storici naturali[10]. I 20 comuni così selezionati rappresentano circa 55% dell'intera presenza turistica campana[11]. Osservando i risultati, notiamo che Comuni con una forte presenza turistica, hanno anche un elevato valore dell'indice di attrattività turistica potenziale, ciò a dimostrazione del ruolo trainante di tali Comuni nel comparto turistico campano. Un'ulteriore passo infine, è stato quello di confrontare il punteggio dell'indice TI assegnato al singolo comune, con il rispettivo valore mediano dei 550 comuni della regione, così da capire il posizionamento del singolo comune rispetto al valore aggregato regionale. Si è scelto il valore mediano, a differenza della media, essendo un indice robusto e quindi non influenzato dai valori eccezionali. Ciò permette di evitare la soggettività insita nel fissare arbitrariamente un valore di soglia al di sopra del quale una data unità possa dirsi a vocazione turistica. Dal confronto, vedi (Tab. nr.1), si nota

[10] Forio è ricca di risorse termali un po' su tutto il suo territorio ma la maggiore concentrazione si ha nella baia di Citara, dove sorge il più grande parco termale dell'isola, ovvero i Giardini di Poseidon.

[11] Dalla graduatoria è stata esclusa la città di Napoli. Considerando anche la città metropolitana di Napoli la percentuale di presenza turistica aumenterebbe al 75%.

che i primi venti comuni della nostra classifica si discostano fortemente dal valore mediano, ciò a conferma del loro ruolo trainante rispetto ai restanti comuni campani. In conclusione possiamo dire che con l'utilizzo del metodo ACP, riusciamo ad identificare 12 indicatori (4 principali e 8 di secondo livello), per ciascuno dei 550 comuni della regione Campania. Dei 550 Comuni ne ritracciamo 275 con valore dell'indice TI superiore al valore mediano. In particolare una ventina (eliminando Napoli) risultano avere un ruolo primario in termini di attrattori turistici.

Tabella 1 Ranking dei primi 20 Comuni in funzione dell'indice di turisticità (ordinate dal più grande al più piccolo)

		TAI_1	TAI_2	TAI_3	TAI_4	TII_1	TII_2	TII_3	**TAI**	**TBI**	**TII**	**TI**
	% di presenza turistica sul totale delle presenze	Territorio e ambiente	Infrastrutture	Attrattori storici e naturali	Altri attrattori	Profilo ec.	Domanda turistica	Investi-menti turistici	**INDICE DI ATTRAT-TIVITA'**	**INDICE DI INFR. ALBERGH.**	**INDICE D'IMPATTO TURISTICO**	**INDICE DI TURISTI-CITA'**
Napoli	17%	3,27	43,84	43,86	1	32,23	20,17	-0,10	**22,99**	**17,03**	**17,43**	**12,57**
Sorrento	12%	1,24	2,47	2,07	0,00	1,83	14,25	0,03	**1,44**	**11,74**	**5,37**	**6,12**
Forio	7%	3,14	1,89	2,45	0,00	0,32	6,53	-0,09	**1,87**	**8,52**	**2,26**	**4,64**
Capri	2%	2,36	1,01	0,99	0,00	0,30	2,98	0,13	**1,09**	**7,40**	**1,14**	**3,63**
Capaccio	3%	3,46	0,85	1,80	1,00	0,35	2,78	-0,07	**1,78**	**5,87**	**1,02**	**3,45**
Ischia	7%	1,88	1,40	3,29	0,00	0,72	6,52	-0,03	**1,64**	**5,64**	**2,40**	**3,31**
Massa Lubrense	2%	5,31	0,33	2,26	1,00	0,11	1,97	-0,09	**2,22**	**3,93**	**0,66**	**3,30**
Camerota	4%	5,31	1,46	1,86	0,00	0,01	3,73	-0,01	**2,16**	**2,75**	**1,24**	**3,10**
Centola	2%	3,32	0,74	0,77	0,00	-0,03	2,28	0,10	**1,21**	**4,03**	**0,79**	**2,71**
Salerno	3%	0,84	13,48	6,46	0,00	3,89	2,80	-0,09	**5,19**	**4,67**	**2,20**	**2,57**
Positano	2%	1,15	0,10	0,56	1,00	0,11	2,08	0,14	**0,70**	**4,58**	**0,78**	**2,17**
Castellabate	1%	3,61	0,65	2,90	1,00	0,06	1,19	-0,01	**2,04**	**2,29**	**0,41**	**2,10**
Anacapri	1%	2,47	0,34	1,07	0,00	0,03	0,91	-0,02	**0,97**	**3,07**	**0,31**	**1,95**
Sessa Aurunca	1%	3,35	1,31	1,28	0,00	0,04	0,89	-0,10	**1,48**	**1,77**	**0,28**	**1,80**
Sant'Agnello	2%	0,46	0,11	0,07	0,00	0,04	2,45	-0,03	**0,16**	**3,94**	**0,82**	**1,74**
Casamicciola Terme	2%	0,35	0,33	1,60	0,00	-0,02	2,17	-0,06	**0,57**	**4,12**	**0,69**	**1,72**

Castel Volturno	1%	4,05	1,84	0,11	0,00	0,21	0,73	-0,10	**1,50**	**0,82**	**0,28**	**1,72**
Pozzuoli	1%	1,80	3,55	6,09	1,00	1,32	2,24	-0,11	**3,11**	**1,96**	**1,15**	**1,64**
Amalfi	1%	0,47	0,34	0,95	1,00	0,24	1,96	0,03	**0,69**	**3,05**	**0,75**	**1,42**
Vico Equense	1%	0,81	0,30	2,27	0,00	0,25	1,37	-0,08	**0,84**	**2,78**	**0,51**	**1,37**
Castellammare di Stabia	1%	0,37	2,54	3,48	1,00	1,11	1,63	-0,10	**1,85**	**2,70**	**0,88**	**1,32**

Fonte: Elaborazione degli autori

3. La costruzione dei distretti turistici attraverso l'applicazione della cluster analysis

Uno dei problemi più importanti negli studi statistici applicati al territorio riguarda la regionalizzazione, ossia la suddivisione di un dato numero di unità, che costituiscono un certo territorio di riferimento, in gruppi omogenei, sulla base di determinate caratteristiche quantitative (Coccorese et all., 2005). Dall'osservazione di gruppi omogenei è più facile trarre indicazioni in termini di implementazioni di politiche, atte a promuovere i territori e a sviluppare le economie locali. Proprio alla luce di tali osservazioni si diffonde sempre più la funzione dei distretti turistici, come modello di sistema turistico locale basato sull' offerta, in grado di intercettare nuovi segmenti di domanda. Il presente lavoro trae ispirazione dalle parole del legislatore nazionale che all'art. 5 della legge 135 del 29 marzo 2001 "Riforma sulla legislazione nazionale del turismo", in cui definisce i sistemi turistici locali come «*contesti turistici omogenei o integrati, comprendenti ambiti territoriali appartenenti anche a regioni diverse, caratterizzati dall'offerta integrata di beni culturali, ambientali e di attrazioni turistiche, compresi i prodotti tipici dell'agricoltura e dell'artigianato locale, o dalla presenza diffusa di imprese turistiche singole o associate*». Partendo proprio da tale definizione, il lavoro cerca di generare una tipologia di Comuni per gruppi distinti e non sovrapponibili che costituiscano un sistema turistico locale, basato sull'effettivo potenziale turistico di ciascun comune e non soltanto bastato su un sistema di aggregazione frutto di accordi normativi (così come nei distretti turistici).

Non conoscendo a priori né il numero né la struttura dei gruppi, la stessa definizione di "gruppo" o di "cluster" è molto labile: le entità (I Comuni) formano un cluster quando si addensano (con o senza vincolo di contiguità) intorno ad un polo per cui quelle interne al cluster sono più vicine o simili tra di loro di quanto non lo siano rispetto ad entità esterne. Pertanto dovendo individuare gruppi omogenei di unità, la tecnica statistica generalmente utilizzata allo scopo è la *cluster analysis*. Nella vastissima bibliografia sull'argomento si ritrova molto spesso ripetuta la citazione di Goodall, che nel 1954 affermò:" *la tendenza a classificare si sviluppa sin dalla prima infanzia e permane come forma abituale di pensiero nell'età adulta"* (Goodall, 1954; pp.304-324). Tra le tante motivazioni che spingono a tale inclinazione alla classificazione, riscontriamo:

a) Riduzione dei dati, con lo scopo di divulgare meglio le idee oggetto di analisi. Il raggruppamento o clustering può essere visto come una procedura che cerca divisioni interne plausibili di un dataset ritenuto troppo grande per essere trattato come unico;
b) Scoprire nuovi soggetti di ricerca (outliers o gruppi particolari)
c) Zoning territoriale[12]

[12] La zonizzazione è tecnica utilizzata in urbanistica consistente con lo scopo di suddividere il territorio di ciascun comune in aree omogenee secondo determinate caratteristiche.

d) Capire se esiste una struttura di gruppo
e) Delineare aree omogenee
f) Prevedere il comportamento di indicatori sulle entità in base alla loro appartenenza ad un dato gruppo.

I punti che maggiormente riflettono la nostra analisi sono sicuramente il punto *a), d)* e *f)*. Essendo in una fase esplorativa dell'analisi, capire chi sono i gruppi principali o la struttura degli stessi, nonché soggetti *outliers*, permette di avere una visione completa e sistemica del contesto oggetto di analisi. Meno rilevanti, ai fini della nostra analisi, sono gli altri punti, addirittura quasi è da escludere il punto *c)*, infatti le entità entrano nelle nostre elaborazioni senza alcun riferimento alle loro coordinate geografiche. L'unica variabile che tiene conto delle coordinate geografiche dei comuni è quella della distanza in termini di tempo con capoluoghi di Napoli e Salerno. Ma tale variabile può essere considerata più come una *proxy* della qualità della logistica e viabilità.

Nel presente lavoro è stata utilizzata una tecnica di cluster analysis gerarchica con approccio di *Ward* e come misura della distanza la formula di *Gower*[13] . Il metodo di Ward (1963) considera tutte le possibili coppie di gruppi ad ogni stadio e procede alla fusione dei due gruppi che minimizzano l'incremento della devianza totale dal centroide del nuovo gruppo. All'inizio del processo, quando ogni cluster è formato da un solo elemento, la devianza interna è zero. Quando due entità si fondono in un singolo cluster si introduce un grado di variabilità destinato a crescere in funzione della numerosità del gruppo stesso. Questo criterio cerca di minimizzare la varianza totale all'interno del cluster.

Ossia Dev(Totale)=Dev(tra)+Dev(entro)

$$\sum_{s=1}^{p}\sum_{i=1}^{n}(x_{is}-\bar{x}_s)^2=\sum_{s=1}^{p}\sum_{i=1}^{g}(\overline{x_{sk}}-\bar{x}_s)^2\cdot n_k+\sum_{s=1}^{p}\sum_{k=1}^{g}\sum_{i=1}^{n}(x_{is}-\overline{x_{sk}})^2$$

Una volta terminato il processo iterativo di agglomerazione, è necessario scegliere il livello di taglio della gerarchia per la identificazione della partizione finale e del numero di gruppi che la comporranno. Pertanto la scelta del numero di *cluster* risulta essere essenziale per costruire cluster significativi. Per la scelta del numero ottimale dei cluster, si è scelto di utilizzare due indicatori**:** l'indice *pseudo F* (Calinski Harabasz 1974*)* e *pseudo* T^2 (Duda and Hart. 1974). In genere i due indici vengono utilizzati in maniera combinata.

3.1. I risultati della cluster analysis

[13] L'utilizzo dell'indice di somiglianza Gower permette di calcolare la distanza sia con variabili continue, che dicotomiche. In particolare tale indice utilizza la distanza di Manahattan per calcolare la distanza tra variabili continue e Dice per quelle binarie.

La cluster analysis è stata applicata al caso dei 550 Comuni campani in base alla loro attrattività turistica. Come abbiamo già anticipato in precedenza con la cluster si cerca di considerare un gran numero di unità statistiche e creare un certo numero di gruppi distinti che contengono unità simili. Pertanto avendo a disposizione un numero di variabili elevato, abbiamo proceduto ad effettuare un'analisi cluster sui punteggi fattoriali ottenuti dall' ACP. Infatti, quando il numero di variabili è troppo grande per applicare una tecnica di raggruppamento, e in generale, quando si desideri eliminare in modo mirato la ridondanza nei dati osservati, si procede con tecniche di raggruppamento dopo aver fatto ricordo ad un'analisi delle componenti principali. L'obiettivo è di segmentare i Comuni in base al loro livello di attrattività turistica ed analizzare il rapporto tra i gruppi emersi dall'analisi. Come variabili di raggruppamento sono stati utilizzati tutti gli indicatori prodotti dalla ACP, in particolare l'indice TAI_1, TAI_2, TAI_3, TAI_4, TAI, TBI, TII_1, TII_2 e TII. Mentre è stata esclusa la variabile TI per evitare un effetto di ridondanza essendo conseguenza della media di tutti gli indici. Come algoritmo di cluster è stato utilizzato quello che utilizza il metodo *Ward* e come misura della distanza la formula di *Gower*. Dall'analisi è stato escluso il Comune di Napoli[14] e considerate ai fini della *cluster analysis*, le sole città con indice TI (Indice di turisticità) maggiore o uguale del suo valore mediano. L'indice di pseudo T di *Duda and Hart* (1974), ci ha permesso di scegliere il numero ottimale di cluster, da cui sono emersi 5 gruppi, con una numerosità tra i gruppi poco omogenea, ma con un livello complessivo di presenze turistiche quasi dell'80%. Nel primo cluster ritroviamo 21 Comuni, nel secondo 131, nel terzo 60, nel quarto 8 e nel ultimo 5. In sintesi ritroviamo 248 Comuni raggruppati in 5 cluster. I risultati così ottenuti, sono stati schematizzati e mappati con tecniche di georeferenziazione (Fig.10), ed infine abbiamo confrontato i 5 cluster ottenuti rispetto ai 12 indici: uno generale (TI –Tourist index), 3 di primo livello (TAI, TBI, TII) e 8 di secondo livello (TAI_1, TAI_2, TAI_3, TAI_4, TBI, TII_1, TII_2, TII_3). In tabella 2 si riporta il valore delle presenze turistiche e valori medi degli indici di turisticità nei 5 cluster. Il cluster 1, rappresentato dal colore viola nella Fig.11, rappresenta il gruppo di Comuni con la più alta percentuale di presenze turistiche (41%) rispetto a tutte le presenze della Regione, nonostante la bassa numerosità dei comuni (21 comuni). A tale gruppo appartengono quei comuni con l'indice di turisticità più elevato (TIs = 1,744) e la maggiore attrattività turistica sia per ciò che concerne l'indice TBI (ossia quello delle infrastrutture recettizie), sia in termini d'impatto turistico TII (domanda turistica e profilo economico). Bassi invece risultano essere gli investimenti nel settore. Il cluster 2, rappresentato dal colore verde nella Fig.11, è quello che ha al suo interno il maggior numero di comuni (131 comuni), ma con l'indice di turisticità più basso addirittura negativo (TIs = -0,099). In tale raggruppamento tutti gli indici sono negativi ad eccezione del TII (Indice d'impatto turistico) con un valore di 0,902. Interessante notare è che se ci soffermiamo al

[14] Il Comune di Napoli, non è stato considerato ai fini dell'analisi, in quanto i dati dimensionali risultano essere troppo distanti rispetto al valore medio degli altri Comuni della Regione, pertanto si avrebbero potuto avere effetti distorsivi.

primo livello di disaggregazione dell'indice TII non si riesce a capire quale variabile risulta trainante, mentre se scendiamo di livello riusciamo a capire che il valore positivo dell'indice TII è causa del valore positivo dell'indice TII_3 ossia quello degli investimenti nel settore turistico (TII_3=0,632). Pertanto si può concludere che nel gruppo 2 ci sono molti comuni con indici di turisticità bassi addirittura negativi, ma con il maggior valore dell'indice sugli investimenti rispetto a tutti e 5 i gruppi. E siccome la rilevazione sugli investimenti si ferma al 2016, probabilmente noteremo nel prossimo futuro un incremento di tali indicatori.

Nel gruppo 3, rappresentato dal colore verde acqua nella Fig.11, appartengono 60 comuni con il 18% di presenze turistiche. Rileviamo indici quasi sempre positivi se non per quello sugli investimenti e del territorio e l'ambiente TAI_1. In realtà se osserviamo la Fig. 16 notiamo che la posizione dei comuni appartenenti al cluster nr. 3 risulta essere collocata nella parte interna della regione in contesti montani e quasi montani e poche zone litoranee. Interessante risulta osservare l'isola di Ischia, spaccata in tre parti: nella zona est e ovest comuni con indice di attrattività elevato e al centro caratterizzato da comuni con indice medio basso. Il cluster 4, rappresentato dal colore giallo nella Fig.11, mostra pochissimi comuni con un indice TI elevato, ma una bassa percentuale di presenze turistiche (9%). Sono comuni molto diversi sotto l'aspetto morfologico, ma simili in termini di domanda turistica, di infrastrutture recettizie, ma soprattutto per ciò che concerne gli attrattori storici e naturali. Infine l'ultimo cluster, con i suoi 28 comuni, rappresentato dal colore rosso nella Fig.11, rileva interessanti caratteristiche. Infatti il cluster 5 risulta avere un indice di turisticità molto simile al cluster 3, ma se analizziamo gli indici di primo e secondo livello notiamo caratteristiche molto diverse tra di loro. In primis va detto che nel gruppo 5 appartengono molti comuni (Positano, Amalfi, Capaccio, ecc.) con un indice di turisticità del singolo comune molto alto, al punto da essere collocati nel ranking proposto precedentemente (vedi tab.1) tra i primi 10. Pertanto ci saremmo aspettati di trovarli collocati nel cluster 1. In realtà se ci soffermiamo ad analizzare i singoli indicatori, notiamo che tali comuni risultano avere valori di infrastrutture recettizie (TBI) e profilo economico[15] (TII_1) molto bassi, pertanto nonostante la loro grande vocazione turistica, si aggregano con quelli con potenziali turistici più bassi.

In conclusione possiamo affermare che in Campania, secondo il nostro modello di aggregazione, abbiamo 248 comuni a vocazione turistica. Di questi abbiamo un gruppo di 21 comuni con un ruolo trainante (41% di presenze turistiche) rispetto agli altri comuni campani, con un indice di potenzialità turistica molto elevato. Poi abbiamo un gruppo numeroso di comuni (131) con un indice di turisticità negativo, ma con una grande prospettiva di crescita turistica visto l'elevato tasso d'investimenti prodotti nel settore. Il gruppo 3 e 5 hanno indici di turisticità simili, ma caratteristiche diverse, ed infine il gruppo 4 con un TI molto elevato dovuto alla qualità delle infrastrutture e degli attrattori storici e

[15] Per profilo economico si intende il numero di imprese e addetti nel settore turistico

naturali.

4. Il cluster ed il distretto turistico a confronto

Ai distretti turistici, come abbiamo visto, il legislatore ha attribuito la denominazione di Sistemi Turistici Locali (STL), dandone ampio riconoscimento nei piani di sviluppo territoriali. Il problema dei Sistemi turistici locali, da parte del legislatore, è quello di definire sotto l'aspetto teorico e metodologico un STL in chiave di distretto produttivo. Nella definizione legislativa dei STL e nei diversi tentativi compiuti a livello regionale di individuare i distretti, sebbene un forte peso venga assegnato alla componente ricettiva, grande importanza è stato attribuito anche ai beni naturali e culturali come componenti necessari per l'individuazione di un distretto. Pur se nella difficoltà, concreta ed oggettiva, di individuare un metodo di "misura" di questi elementi qualitativi, si è comunque riconosciuta alla componente naturale e culturale la valenza di elemento fondante l'offerta turistica.

L'obiettivo del legislatore, già con la legge n.135/2001, fu quello di proporre una riorganizzazione turistica basata sul pieno utilizzo delle ricchezze presenti nei contesti locali, incoraggiando l'utilizzo dell'approccio sistemico nell'analisi e gestione del territorio. Alla luce di tale legge e ancor di più con l'emanazione della legge n. 106 in materia di istituzione dei distretti turistici, si intravede l'idea del legislatore di introdurre anche in ambito turistico il successo dei distretti industriali (De Angelis, 2004), ribadendo l'importanza di una visione sistemica territoriale basata sulla cooperazione pubblico e privato. Con l'introduzione di tale modello aggregativo il legislatore ha voluto creare un sistema integrato in cui la gestione unitaria dell'offerta turistica possa valorizzare il patrimonio naturale e culturale attraendo nuovi flussi turistici, garantendo alle imprese di quel territorio, o di quelle che decidono di insediarsi in quell'area, servizi efficienti e di qualità. Ma siccome la teoria dei distretti turistici si basa fortemente sulle logiche di quelli industriali, risulta abbastanza complicato far collimare i parametri specifici di un settore industriale con quelli tipici del settore turistico. Nel primo caso infatti la chiave di successo per lo sviluppo dei processi produttivi risiede nelle risorse economiche e sociali e culturali in ambiti geografici ben delimitati e in aree caratterizzate da elevati standard di concentrazione e specializzazione. Dall'altro lato, il distretto turistico lo si può intendere come una tipologia di sistema turistico locale dove «*l'ispessimento delle relazioni economiche e sociali è particolarmente forte ed esistono tutti gli elementi tipici della comunità sociale relativi alla fiducia ed al capitale sociale*» (Capone, 2005; pp.33).

Proprio alla luce di questa visione sistemica, il presente lavoro propone un STL basato su realtà territoriali il più possibile omogenee o molto differenti, al fine di rappresentare il reale potenziale turistico campano, distaccandosi dai sistemi di aggregazione puramente formali o opportunistici, così come oggi si mostrano i distretti turistici. Con la costruzione di indicatori di turisticità e con l'aggregazione di comuni basati su tali indici, si cerca di fornire strumenti di riflessione ai policy maker, soprattutto in un'ottica di creazione di

modelli di aggregazione sistemica delle singole realtà comunali. Di seguito in tabella 3 si fornisce la stessa struttura tabellare già proposta in tabella 2, riferita ai *distretti turistici* Campani. Ovviamente l'idea non è assolutamente quella di confrontare il potenziale turistico dei distretti turistici con quello dei comuni aggregati a seguito della cluster analysis. Infatti tali realtà risultano diverse sia in termini di aggregazione che di caratteristiche, ma l'intento è quello di fornire strumenti analitici atti ad analizzare forme organizzative di STL diverse, utilizzando gli indici di turisticità proposti in questo lavoro.

In Tabella nr.3 si riporta l'elenco dei distretti turistici in ordine decrescente per livello di indice di turisticità, da cui emerge immediatamente che il totale delle presenze turistiche dei comuni appartenenti ai DT risulta essere inferiore rispetto ai comuni raggruppati nei 5 cluster (vedi Tabella nr.2) , rispettivamente il 67% e 80%. Per il resto si evince chiaramente che pochi sono i distretti turistici con un buon livello di turisticità potenziale (TI), in particolare ritroviamo 7 distretti con un buon livello di potenziale turistico (vedi Tabella 3)[16]. In realtà tolti i primi sette distretti riscontriamo valori dei punteggi negativi, in particolare se osserviamo gli indicatori sulla domanda turistica (TII_2), quello inerente il profilo economico (TII_1) e quello sugli investimenti nel settore turistico (TII_3). Per molti distretti riscontriamo anche forti criticità in termini di infrastrutture di trasporto e di servizi.

In conclusione si può dire, che ad ora i distretti turistici, risultano essere ancora un potenziale inespresso e che ancora non sembrano rappresentare lo strumento migliore per stimolare il sistema turistico campano, soprattutto se analizziamo i valori aggregati dell'intero comparto distrettuale. Ovviamente non possiamo dimenticarci che, parliamo di realtà di recentissima attivazione, che probabilmente ancora non hanno potuto esprimere il loro reale potenziale, infatti la maggior parte dei distretti turistici campani risultano avviati nel dicembre 2017 (Fig.7). Pertanto in questo lavoro l'obiettivo non è quello di valutare l'impatto di tali forme di agglomerazione sul comparto turistico campano, perché sarebbe estremamente prematuro e impreciso, ma fornire una base metodologica di natura statistica, con lo scopo misurare tipologie diverse di aggregazione di *Sistemi Turistici Locali* dal punto di vista del reale potenziale turistico.

[16] Anche in questo caso è stato eliminato il distretto di Napoli (Parthenope), con valori estremamente sopra la media rispetto agli altri distretti e pertanto fuorviante ai fini del confronto.

Tabella 2 Presenze turistiche e valori medi degli indici di turisticità nei 5 gruppi di comuni

			TAI_1	TAI_2	TAI_3	TAI_4	TII_1	TII_2	TII_3	**TAI**	**TBI**	**TII**	**TI**
Cluster	Comune	Pres. 2016 (%)	Territorio e ambiente	Infrastrutture	Attrattori storici e naturali	Altri attrattori	Profilo economico	Domanda turistica	Investimenti turistici	**INDICE DI ATTRATTIVITA'**	**INFRASTRUTTURA**	**INDICE D'IMPATTO TURISTICO**	**INDICE DI TURISTICITA'**
1	21	41	1,729	1,732	2,108	0,000	0,477	2,194	0,034	**1,392**	**2,600**	**0,902**	**1,744**
2	131	4	-0,196	-0,315	-0,326	0,000	-0,126	-0,124	0,632	**-0,209**	**-0,253**	**0,151**	**-0,099**
3	60	18	-0,082	0,421	0,313	0,000	0,115	0,200	-0,121	**0,163**	**0,407**	**0,064**	**0,130**
4	8	9	1,959	2,072	2,439	1,000	0,790	1,332	-0,054	**1,868**	**2,248**	**0,689**	**1,632**
5	28	7	-0,056	0,078	0,091	1,000	0,063	0,176	0,173	**0,278**	**0,299**	**0,145**	**0,130**
Tot	248	80%	0,080	0,158	0,171	0,145	0,034	0,280	0,325	**0,138**	**0,291**	**0,210**	**0,194**

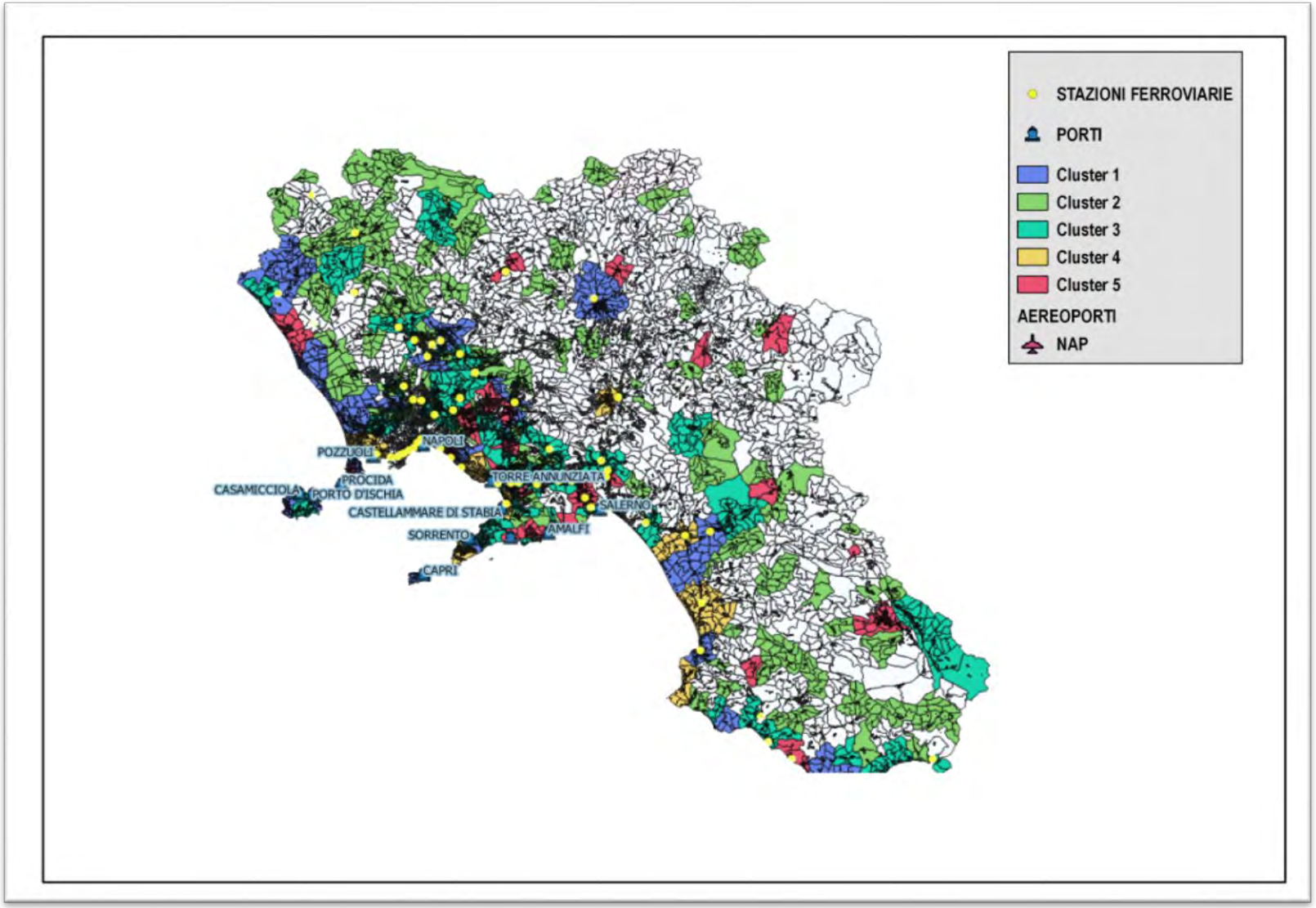
Tabella 3 *Presenze turistiche e valori medi degli indici di turisticità nei distretti turistici campani*

			TAI_1	TAI_2	TAI_3	TAI_4	TII_1	TII_2	TII_3	**TAI**	**TBI**	**TII**	**TI**
DT *	Comune	% Pres. 2016	Territorio e ambiente	Infrastrutture	Attrattori storici e naturali	Altri attrattori	Profilo economico	Domanda turistica	Investimenti turistici	**INDICE DI ATTRATTIVITA'**	**INFRASTRUTTURA**	**INDICE D'IMPATTO TURISTICO**	**INDICE DI TURISTICITA'**
15_DT	1	7%	1,88	1,40	3,29	0,00	0,72	6,52	0,07	**1,64**	**5,64**	**2,44**	**3,32**
2_DT	2	3%	2,41	0,67	1,03	0,00	0,17	1,94	0,46	**1,03**	**5,23**	**0,86**	**2,83**
11_DT	1	3%	0,84	13,48	6,46	0,00	3,89	2,80	-0,24	**5,19**	**4,67**	**2,15**	**2,55**
18_DT	6	20%	1,39	0,62	1,27	0,17	0,38	3,66	-0,07	**0,86**	**4,29**	**1,32**	**2,33**
3_DT	10	14%	2,39	0,70	1,24	0,30	0,01	1,34	0,87	**1,16**	**2,36**	**0,74**	**1,83**
16_DT	4	2%	2,43	1,08	0,56	0,25	0,09	0,44	-0,02	**1,08**	**0,65**	**0,17**	**1,08**
10_DT	1	0%	2,75	1,86	1,87	0,00	0,00	0,20	0,00	**1,62**	**0,28**	**0,07**	**1,03**
7_DT	4	3%	1,06	1,86	4,51	0,50	0,78	0,92	-0,26	**1,98**	**0,86**	**0,48**	**0,80**
14_DT	3	1%	1,14	1,51	0,55	0,33	0,56	0,50	-0,25	**0,88**	**0,68**	**0,27**	**0,70**
17_DT	4	1%	0,58	0,69	0,41	0,00	-0,11	0,16	3,78	**0,42**	**0,14**	**1,27**	**0,66**
4_DT	11	8%	0,24	-0,19	0,44	0,27	-0,04	0,62	0,26	**0,19**	**1,19**	**0,28**	**0,57**
1_DT	5	2%	0,08	1,44	2,57	0,60	0,62	0,44	-0,27	**1,17**	**0,65**	**0,26**	**0,33**
20_DT	25	0%	0,62	-0,10	-0,21	0,20	-0,15	-0,66	0,18	**0,13**	**-0,40**	**-0,11**	**0,04**

32_DT	62	1%	0,27	-0,15	-0,17	0,13	-0,15	-0,24	0,09	**0,02**	**-0,12**	**-0,09**	**0,02**
45_DT	10	0%	0,21	-0,43	-0,44	0,10	-0,17	-0,67	0,20	**-0,14**	**-0,46**	**-0,07**	**-0,11**
47_DT	15	1%	-0,14	0,10	0,02	0,07	0,04	0,12	-0,03	**0,01**	**-0,20**	**0,01**	**-0,11**
44_DT	15	0%	0,13	-0,13	-0,20	0,13	-0,14	-0,46	-0,10	**-0,02**	**-0,26**	**-0,23**	**-0,12**
48_DT	10	0%	-0,08	-0,26	-0,32	0,40	-0,15	-0,46	-0,01	**-0,07**	**-0,19**	**-0,16**	**-0,14**
40_DT	15	0%	-0,25	-0,44	-0,19	0,20	-0,14	-0,46	-0,22	**-0,17**	**-0,41**	**-0,22**	**-0,30**
30_DT	24	2%	-0,88	-0,13	0,01	0,04	0,11	-0,03	-0,29	**-0,24**	**-0,10**	**-0,08**	**-0,35**
41_DT	14	1%	-0,73	-0,11	-0,25	0,43	0,01	0,06	-0,30	**-0,17**	**-0,31**	**-0,11**	**-0,38**
43_DT	7	0%	-0,68	-0,55	-0,41	0,29	-0,18	-0,67	-0,30	**-0,34**	**-0,58**	**-0,26**	**-0,50**
42_DT	6	0%	-1,06	-0,08	-0,34	0,00	0,00	0,04	-0,30	**-0,37**	**-0,35**	**-0,14**	**-0,52**
	255	67%	0,21	0,07	0,15	0,19	-0,01	0,12	0,06	**0,15**	**0,18**	**0,05**	**0,14**

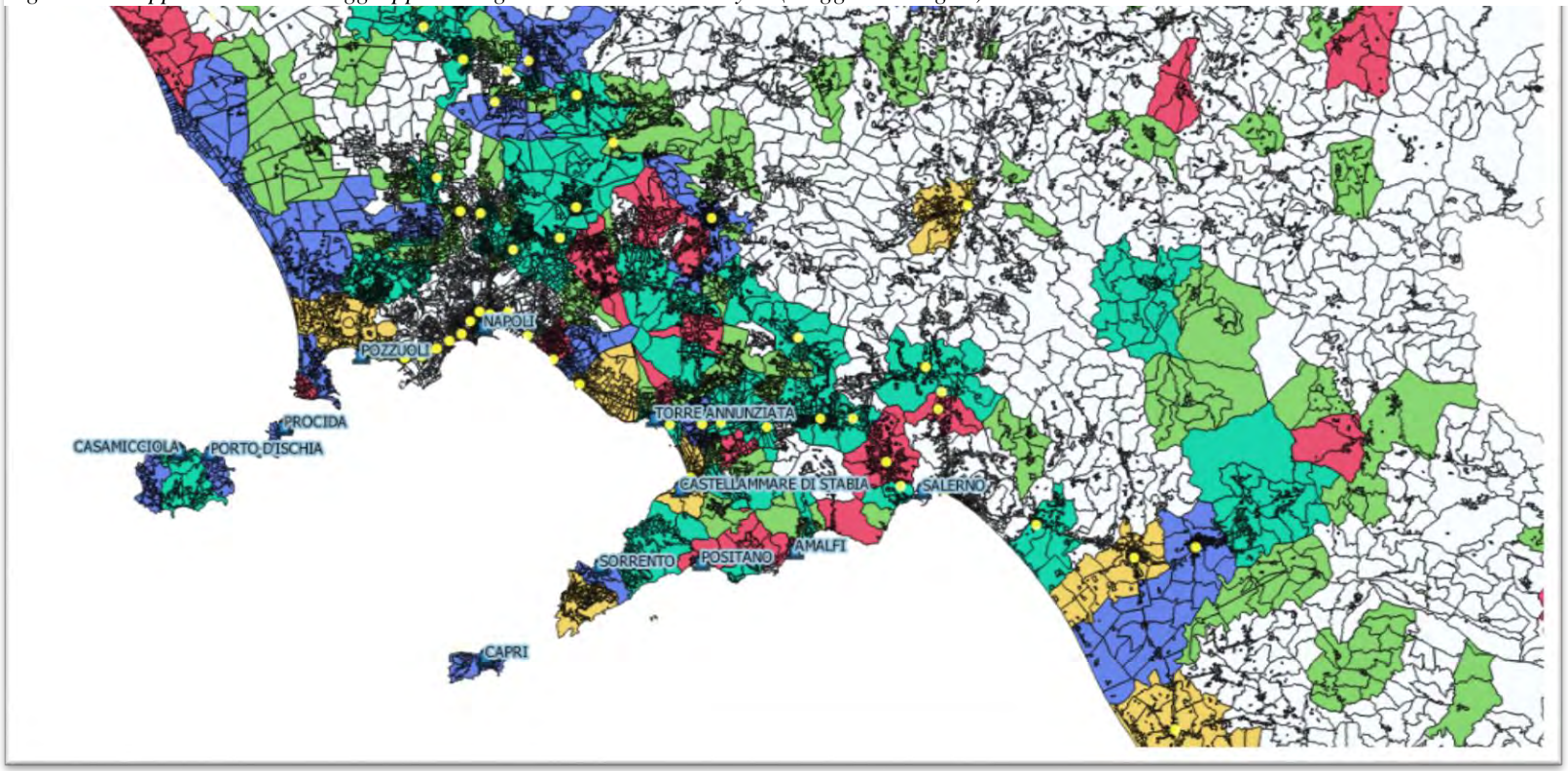
- In appendice si riporta la descrizione dei Distretti

Figura 10 Mappa dei Comuni raggruppati a seguito della cluster analysis


STAZIONI FERROVIARIE
PORTI
Cluster 1
Cluster 2
Cluster 3
Cluster 4
Cluster 5
AEREOPORTI
NAP
POZZUOLI
NAPOLI
PROCIDA
CASAMICCIOLA
PORTO D'ISCHIA
TORRE ANNUNZIATA
SALERNO
CASTELLAMMARE DI STABIA
AMALFI
SORRENTO
CAPRI

onte: Elaborazione degli autori

Figura 12 Mappa dei Comuni raggruppati a seguito della cluster analysis (maggior dettaglio)



Fonte:Elaborazione degli autori

Conclusioni

L'Italia è sicuramente tra i paesi di più antica vocazione turistica e vanta un patrimonio artistico e di risorse naturali con pochi eguali al mondo: con 54 dei 1.092 siti Unesco, è il primo paese per luoghi riconosciuti come patrimonio dell'umanità. Se consideriamo il contributo indiretto e indotto del settore, constatiamo che l'impatto economico totale del turismo, è stato nel 2017 pari all'11,3% del PIL (Fonte: World Travel & Tourism Council). In passato, tuttavia le politiche per il turismo sono state poco coerenti e non strutturali, mancando di un disegno di lungo periodo delle effettive competenze tra Stato e Regioni. Soltanto con legge n.135/2001 si è avuta una prima riorganizzazione dell'intero comparto turistico. A seguito di questa sono state emanate una serie di norme che hanno disciplinato il settore a livello centrale, regionale e comunitario che tuttavia, sono risultate spesso mal coordinate e in contrasto tra loro, tali da determinare disomogeneità, frammentazione e conflitti istituzionali, comportando un non trascurabile disorientamento operativo per gli addetti della filiera turistica.

Nonostante ciò, i flussi turistici mostrano dati confortanti, rappresentando una grande opportunità di crescita per quei territori che presentano ancora forti differenziali di sviluppo rispetto alle aree economicamente più avanzate, con margini di crescita ancora molto ampi. Il presente lavoro, ha avuto come suo obiettivo principale, quello di analizzare modelli differenti di Sistemi Turisitici Locali (STL), alla luce della recente introduzione del modello distrettuale applicato al settore turistico come fattore di sviluppo territoriale, con particolare riguardo al contesto della regione Campania. L'obiettivo principale ha riguardato la costruzione di una metodologia statistica che permettesse di raggruppare i comuni Campani secondo un modello basato sulla reale potenzialità turistica.

La prima fase ha riguardato la raccolta di dati su base comunale, al fine di cogliere le opportune e profonde differenze territoriali. L'applicazione di un metodo per Componenti Principali a permesso di sintetizzare e ridurre le variabili per caratteristiche di turisticità (3 indici di primo livello e 8 di secondo livello). Gli indicatori così costruiti hanno permesso di individuare:

- ✓ L'importanza dal punto di vista turistico della singola unità territoriale (Comune);
- ✓ La possibilità di riclassificare i comuni rispetto all'effettivo potenziale turistico
- ✓ Rintracciare realtà locali ancora poco toccate dalla domanda turistica, ma potenzialmente sviluppabili.

Alla luce degli indicatori costruiti, abbiamo identificato, attraverso una cluster analysis, 5 gruppi di comuni omogenei giungendo così a definire i punti di forza e debolezza nonché la vocazione turistica di ciascun contesto. I Comuni così raggruppati, risultano essere 248, caratterizzati da un gruppo di 21e un altro di 8 Comuni con un alto valore dell'indice di turisticità, mentre gli altri tre gruppi si presentano con un basso potenziale turistico. In particolare il *cluster* più grande, caratterizzato da 131 Comuni localizzati soprattutto nella parte interna della Regione, mostra un valore di turisticità negativo, ma un indice d' investimento nel settore turistico (TII_3) più alto rispetto agli altri *cluster*. Pertanto l'idea è che la gran parte di tali Comuni si sta attrezzando ad organizzare un'offerta turistica adeguata. Dalle analisi sono emersi interessanti spunti di riflessione e di analisi sulla distribuzione dei comuni campani in base alle loro effettive potenzialità turistiche, da cui emerge che molti Comuni con un alto potenziale turistico mancano di infrastrutture, mentre

altri con un basso potenziale turistico godono della presenza di attrattori culturali e naturali scarsamente valorizzati.

Infine abbiamo analizzato una forma di STL, di recente attuazione, ossia quello dei distretti turistici, contestualizzandoli anch'essi in funzione degli indicatori di turisticità. Anche in questo caso individuiamo interessanti spunti di riflessione, da cui si evince chiaramente che ad ora, il potenziale turistico dei distretti risulta essere alquanto rilevante soltanto per pochi distretti, parliamo di realtà già ampiamente conosciute dal comparto turistico, ossia il distretto *dell'Isola verde d'Ischia*, quello *dell'Isola azzurra di Capri*, quello alberghiero *Riva Salernitana* e quello della *penisola Sorrentina* (Fig. 9 e Tab. 3). Molte realtà minori, ma con un potenziale turistico molto importante, stentano ancora a decollare e a contribuire allo sviluppo economico del settore, a causa di inefficienze organizzative e strutturali.

Soltanto con lo sviluppo e l'applicazione di un modello organizzativo del territorio basato su STL efficienti, sarà possibile valorizzare le risorse esistenti e realizzare progetti innovativi di sviluppo dell'offerta turistica.

Sistemi Turistici Locali opportunamente organizzati e strutturati, possono rappresentare un'importante opportunità per l'economia locale, contribuendo all'aumento delle entrate economiche di tutto il territorio circostante grazie alla loro stretta relazione con altri settori quali quelli della ristorazione, dell'immobiliare, dell'arredamento, del commercio, dei trasporti e via discorrendo.

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APPENDICE

ELENCO VARIABILI

TAVOLA 1
Lista delle variabili relative ai comuni

TOURIST ATTRACTIVENESS INDEX (TAI)	
1) Territorio ed ambiente (TAI1) (1) Superficie del territorio Posizione del Comune rispetto al livello del mare Metri di costa Metri di costa balneabile Classificazione sismica (1) Livello di urbanizzazione Media delle temperature dal 2014 al 2016 per ciascun Comune Media delle precipitazioni dal 2014 al 2016 per ciascun Comune	**2) Infrastrutture (TAI2)** Numero di sportelli bancari Stazioni di servizio carburante Numero di cinema Numero di teatri Numero di esercizi della grande distribuzione Numero di ristoranti Numero di approdi e porti Presenza di stazioni ferroviarie (d) Strutture di balneazione (d) Numero agenzie turistiche Numero di uffici della pro loco Numero di strutture sanitarie Distanza sotto forma di tempo da Napoli ai restanti comuni campani Distanza sotto forma di KM da Napoli ai restanti comuni campani Distanza sotto forma di tempo da Salerno ai restanti comuni campani Distanza sotto forma di Km da Salerno ai restanti comuni campani
3) Attrattori storici e naturali (TAI3) Appartenenza del comune ad aree marine protette (d) Conferimento al Comune della bandiera blu (d) Appartenenza del Comune a parchi naturali (d) Presenze di terme (d) Grandi attrattori culturali (Pompei, Ercolano….) Numero di strutture ecclesiastiche per tipologia Musei Archeologia Strutture culturali Oasi (d)	**4) Altri attrattori (TAI4)** Eventi religiosi, fiere, mercati, mostre, Feste e sagre (d)
TOURIST BED-PLACES INDEX (TBI)	
1) Infrastrutture turistiche	
Numero di posti letti 5 stelle Numero di posti letti 4 stelle Numero di posti letti 3 stelle	Numero di posti letti agriturismo Numero di posti letti ostello Numero di posti letti case ferie

Numero di posti letti 2 stelle	Numero di posti letti rifugi alpino
Numero di posti letti 1 stelle	Numero di posti letti altri esercizi ricettivi
Numero di posti letti Residenze Turistico Alberghiere	Numero di posti letti B&B
Numero di posti letti case affitto	media dei prezzi delle strutture ricettive alberghiere
	media dei prezzi delle strutture ricettivee non alberghiere
TOURIST IMPACT INDEX (TII)	
1) Profilo economico turistico (TII1)	**2) Domanda turistica (TII2)**
Numero imprese codici ATECO totalmente pertinenti con il settore turistico	ll numero di clienti, italiani e stranieri, ospitati negli esercizi ricettivi (alberghieri o complementari)
Numero imprese codici ATECO non totalmente pertinenti con il settore turistico	Il numero delle notti trascorse dai clienti negli esercizi ricettivi (alberghieri o complementari).
Numero di addetti per Comune	Spesa dei turisti negli esercizi ricettivi
Numero di addetti codici ATECO totalmente pertinenti con il settore turistico	Tipologie di località turistica
Numero di addetti codici ATECO non totalmente pertinenti con il settore turistico	
3) Investimenti turistici (TII3)	
Media della spesa pro capite dei comuni nel settore turistico.	

(1) Ecco l'elenco di tutti i comuni italiani (raggruppati per regione e provincia) e la relativa classificazione sismica.

(2) Si utilizza per la distanza tra i territori la variabile temporale (in termini di raggiungibilità) e non soltanto quella chilometrica

(3) (d) Variabili dummy

(*) Variabili non misurabili

ELENCO DISTRETTI TURISTICI CAMPANI

DT	Nome Distertto Turistico	Nr. Comuni
1_DT	DISTRETTO TURISTICO DELL'ATARGATIS	5
2_DT	DISTRETTO TURISTICO CAPRI ISOLA AZZURRA	2
3_DT	DISTRETTO TURISTICO CILENTO BLU	10
4_DT	DISTRETTO TURISTICO COSTA D'AMALFI	11
7_DT	DISTRETTO TURISTICO FLEGREO	4
10_DT	DISTRETTO TURISTICO ISOLA DI PROCIDA	1
11_DT	DISTRETTO TURISTICO ALBERGHIERO RIVIERA SALERNITANA	1
14_DT	DISTRETTO TURISTICO SELE PICENTINI	3
15_DT	DISTRETTO TURISTICO ALBERGHIERO ISOLA VERDE D'ISCHIA	1
16_DT	DISTRETTO TURISTICO ALBERGHIERO LITORALE DOMIZIO	4
17_DT	DISTRETTO TURISTICO GOLFO DI POLICASTRO	4
18_DT	DISTRETTO TURISTICO PENISOLA SORRENTINA	6
20_DT	DISTRETTO TURISTICO ALTA IRPINIA	25
30_DT	DISTRETTO TURISTICO POMPEI - MONTE LATTARI E VALLE DEL SARNO	24
32_DT	DISTRETTO TURISTICO DEL CILENTO, SELE, TANAGO E VALLO DI DIANO	62
40_DT	DISTRETTO TURISTICO PARTENIO	15
41_DT	DISTRETTO TURISTICO AGER NOLANUS	14
42_DT	DISTRETTO TURISTICO AVERSA NORMANNA-CAMPANIA FELIX	6
43_DT	DISTRETTO TURISTICO VALLO DI LAURO-ANTICO CLANIS	7
44_DT	DISTRETTO TURISTICO VIATICUS	15
45_DT	DISTRETTO TURISTICO L'IRPINIA DEL PRINCIPE E DEI TRE RE	10
47_DT	DISTRETTO TURISTICO APPIA ANTICA	15
48_DT	DISTRETTO TURISTICO MATESE	10

49_DT DISTRETTO TURISTICO DI NAPOLI ”PARTHENOPE” 1

The school to work transitions failures and the NEETs

Floro Ernesto Caroleo, Paolo Mazzocchi, Claudio Quintano, Antonella Rocca[1]

Abstract

This paper investigates on the most significant aspects of the school to work transition that is the period from the end of education to the attainment of the first regular job. During this period, young people are usually in the NEET status that is Not in Employment, Education and Training. The length of this period and therefore the time experienced as NEETs depends on many factors, such as the individual characteristics and the aspects connected with the education system, Institutions and labour market. In order to better understand these dynamics, in this study we analyze young people by age and gender according to their professional status in a selection of European countries. Results highlight remarkable differences in the patterns concerning men and women, especially after the 24 years, and the structural nature of the NEET phenomenon in the Mediterranean countries of Italy and Spain.

Keywords: Youth Labour Market, NEET, School to Work Transition
JEL Classification: J24, J21, J64

1. Introduction

The school to work transition consists in the period between the attainment of the highest level of individual's education and his (or her) first regular job. Typically, in this time young people assume the NEET status, because they are Not in Employment, Education or Training. It is a crucial step in the life cycle of an individual because a failure in this process can generate long-term unemployment, discouragement and a spiral of underpaid work and occupational mismatch and these experiences can have repercussions on the whole working life of an individual. The length of the transition from school (or University) to work and the connected difficulties met by young people in the labour market are strictly connected to the individual characteristics, but also to the labour market and institutional factors acting on it.

In this paper, we analyze – in a selection of 7 European countries – young people cohorts identified by age – from 17 to 29 years – and gender, according to their status of students, workers and NEETs.

[1] "The present work shows the first results of a wider study on which the authors are actually working".

Furthermore, in order to investigate the causes of the NEET status, we study the share of inactive on NEETs, classified in relation to the main causes of inactivity. The contextual analysis of the characteristics of these countries in terms of education system, school to work transition aspects, labour market and institutional factors allows identifying the main determinants of the failures in this process. Results highlight that the alarming levels of NEETs, especially in the Mediterranean countries analyzed, are the outcome of complex and different aspects – leading to the condition of prolonged unemployment or inactivity – difficult to manage but strictly connected each others.

The paper is organized as follows. Section 2 describes the most significant aspects producing the NEETs status, mainly connected to the labour market, the characteristics of the education systems and some Institutional factors. Section 3 shows some relevant aspects of the empirical analysis and section 4 presents the concluding remarks.

2. Ways youth might become NEETs

2.1 Young people on the labour market

Young people represent one of the most vulnerable category of workers, since they are in a vulnerable phase of their working life, that is the first entry in the labour force and so in the labour market. They represent a very heterogeneous category of individuals because their approach to the labour market is strongly affected by their level of education and other personal characteristics, such as gender and social background, and by the general socio-economic context in which they live (levels of unemployment, labour market structure, and so on), as well.

Also the demographic structure of population affects young people employability, because on the one side the size of younger cohorts determines young people's labour supply; on the other side, it can affect the social and cultural approach of a country towards young people. According to this aspect, it is important to highlight that in the developed European countries the aging population and the increasing life expectancy makes the economic contribution of young people to the economic growth crucial for the national social security system. Therefore, in order to stimulate the economic growth, it is crucial to valorize the young people contribution. Indeed, even if the relationship between productivity and age of employees is a complex problem (Serban, 2012), it is evident that albeit the income continues to grow in the second part of active life on the labour market, productivity can be reduced (Skirbekk, 2003). Consequently, a discrepancy between wages and productivity is created, so that young workers are paid less and older more than their individual productivity. Furthermore, in an era of push digitalization and globalization, it is well recognized that an older labour force is

less adaptable than the younger labour force. Therefore, the young people entrance on the labour market should be encouraged also because, according to the well known "cohort crowding hypothesis", smaller youth cohorts face major job opportunities in the presence of imperfect substitutability between workers of different ages and wage rigidities (Korenman and Neumark, 1997; Bassanini and Duval, 2006; Zimmermann et al., 2013; Caroleo et al., 2017). However, it is well recognized that younger workers tend to be more severely affected by economic fluctuations (Clark and Summers, 1982; Verick, 2011; Manfredi et. al., 2010; Bell and Blanchflower, 2011; Bernal-Verdugo et al., 2012; O'Higgins, 2012; Choudry et al., 2012b; Zimmermann et al., 2013; Ghoshray et al. 2016) and that young people on the labour market play a role of "buffer" to absorb macroeconomic shocks, through wider fluctuations in their unemployment rates. This is reflected in the very significant impact of cyclically related variables on the relative youth unemployment rates (Caroleo et al., 2017), because in case of dismissals, employers tend to apply the so-called 'LIFO (last-in-first-out) principle' (Pastore, 2017). Furthermore, young people experience major instability in entering the labour market due to higher in- and outflows of unemployment than those experienced by adults. After all, young people tend to seek the most suitable, if not ideal, jobs for them; at times, especially if they are poorly skilled, for periods they pursue higher education or training after employment or unemployment (Clarck and Summers, 1982). Failures in that process are more likely when solutions are more poorly adapted to reduce asymmetries of information, and/or when inefficient intermediaries operate on their behalf (Bagues and Sylos Labini, 2008). Finally, they can also become victims of the so-called "scarring effects", by which the experience of unemployment jeopardises their likelihood of future employment and their prospects of higher earnings later in life (Manfredi et al., 2010). Gregg and Tominey (2005) have identified that those two consequences can even last for an individual's entire working lifetime.

2.2. The role of the education system

Evolution of population in terms of age structure, area of residence, level of education is an important factor of labour market. In particular, human capital represents one of the main wage determinants, as well as the base for future society development. Indeed, from a macroeconomic perspective, the most important requirement for fostering workers with a high potential for human capital is a high-quality education system and high shares of young people who attain higher education from it (Eichhorst et al., 2015).

Despite, nowadays, young people are on average more educated than the older ones everywhere, they experience great difficulties in entering the labour market and worst work conditions and are less paid

than the older labour force. In an era of great changes in the skills and competences required on the labour market, driven by the push globalization and digitalization, the potential contribution that young people can give to the labour market is huge, although it strongly depends on the capacity of the education system to create these skills and competences. According to the education systems, European countries show great differences, even in a framework oriented to the convergence, on the thrust of Bologna process. Indeed, a more standardized education system across European countries should stimulate a greater students and workers' mobility across European countries. According to the education systems, following the classification proposed by OECD (2013) and Pohl and Walter (2007), we can distinguish between a group of countries where a model of single structure education – from the beginning to the end of compulsory schooling – is characterized by no transition between primary and lower secondary education and with general education provided in common for all pupils. This is the model acting in the Northern European countries of Iceland, Norway, Sweden, Denmark, Finland, Estonia and in the most of Eastern European countries. In particular, Northern European countries show high investments and high transitions to tertiary education, while the Vocational Education and Training (VET) content of education assumes only a secondary role. In contrast, in other Eastern European countries such as Poland and Romania, in the Mediterranean countries, in Belgium, in the United Kindgom and Ireland a common core curriculum provision is in force. Within this group of countries, a further distinction can be made between the liberal regime of the United Kingdom and Ireland, where a general common core curriculum for students prevails and there is a limited employer involvement, and the sub-protective Mediterranean countries regime, where only a low level of VET and weak linkages between the education system and the labour market still prevail, with a high rates of early school leavers, that is those who leave education and training without attaining upper secondary qualification or equivalent. Finally, Germany, Austria, Luxembourg, the Netherlands and Lithuania show differentiated lower secondary education patterns. In these countries, after the completion of primary education, students are required to follow distinct educational pathways or specific types of schooling, either at the beginning or during lower secondary education (European Commission, 2012). In this latter group of countries, in particular in Germany, there is a dual-track vocational education system, including pre-vocational training and apprenticeships, in which employers are actively involved. This fact guarantees a fast, stable transitional process as well, even despite high levels of temporary employment. It is important to underline that a vocational education transmits the skills directly applicable on the labour market, but usually it translates into fewer options for further post-compulsory education and it does not stimulate flexible competencies adaptable to changes in the labour market as general education programs do. Indeed, general programs of education are the basis of higher education and demonstrate more useful

in accommodating transformations in the labour market, population demographics, technology and globalization.

Another important aspect of the educational background of an individual consists in the compliance of the field of studies with that required by the labour market and employers. The lack of correspondence produces skill mismatch that translates in increased unemployment levels. In contrast, an efficient matching reduces frictional and structural unemployment and ensures that vacancies are matched to workers with appropriate qualifications and skills (Petrolongo and Pissarides, 2001; Bartlett, 2013). Indeed, skill levels of the workforce are an important driver of economic development. In particular, high-tech employment – broadly defined as all workers in high-tech sectors but also workers with STEM degrees in low-tech sectors – can produce a local high-tech job multiplier (Goos et al., 2015).

2.3 Institutions and the school to work transition

Besides the education system and the personal characteristics, macro-economic and institutional factors strongly affect the individual school to work transition length and his or her job conditions at the end of the transition. We refer mainly to the levels of unemployment and in particular of long term unemployment, the diffusion of temporary and part-time contracts and the labour market structure, that is the levels of unionization, the degree of rigidity of labour market, the levels of tax wedge and the presence of passive and active labour market policies.

The effects of these factors are not all obvious. Indeed, while it is strongly demonstrated that the tax wedge strongly penalizes the labour demand and, consequently, the labour supply, the rigidity of the labour market, especially the aspects linked to the levels of protection against individual and collective dismissals, on the one side, reduces the labour demand, but, on the other side, it protects workers from dismissals, and therefore it interests above all young people, more at risk of dismissals for the mentioned LIFO principle. The role of union density is uncertain, as well. Furthermore, with reference to temporary employment, even if it increases the levels of labour market precariousness, it stimulates employers to assume especially young people. Temporary contracts represent in fact a way to accumulate work experience, even if at the price of a lower stability, avoiding, consequently, that young people spend time in unemployment and inactivity with the subsequent increased likelihood of future unemployment and prospects of lower earnings later in life due to the current experience of unemployment (Manfredi et al., 2010). The different combinations of these institutional factors in the labour market stimulated various European countries' connotations and classifications. However, in order to understand the current different characteristics of labour markets of European countries, it is important to recall the most recent transformations they went through. Briefly, the

reunification of the communist 'Eastern bloc' and the capitalist 'West', due to the fall of the Iron Curtain in 1989, strongly increased the interactions between European countries with diverging wage levels, social standards and productivity levels. This led to a variety of players in different markets, resulting in growing competition between them. The consequent strong internationalization of markets implied a decline of national borders and the onset of new problems. In fact, on one hand countries started worldwide cooperation and agreed on developing common laws, institutions or practices (de Lange et al., 2014). On the other hand, the high levels of competitiveness put the weaker economies in greater difficulty, increasing the already evident economic disparities. In order to overcome them, the most European countries adopted labour market reforms oriented to flexicurity, that is a combination of flexibility and deregulation, that led to lose some degrees of employment protection legislation (EPL), generous unemployment benefits and strong efforts on active labour market policies (Wilthagen, 2008). Recently, the economic crisis of early 2000s, even if further increasing the economic disparities across countries, did not changed substantially the European countries' connotation.

According to Blanchard et al. (2013), we can distinguish the Nordic model of medium to high degree of employment protection, a generous, but conditional, unemployment insurance and strong active labour policies. Continental countries show instead high levels of employment protection, a generous system of unemployment insurance and a limited degree of active market policies. Almost in contraposition to this latter, the Anglo-Saxon model based on a labour market approach, characterized by low levels of employment protection and unemployment insurance. Finally, Mediterranean countries show a combination of social insurance welfare schemes with universalistic programs, with a strong support of families as main providers of services across a whole range of fields, such as childcare, unemployment and precarious incorporation into the labour market (Moreno Fuentes and Mari-Klose, 2014; Koster et al., 2011).

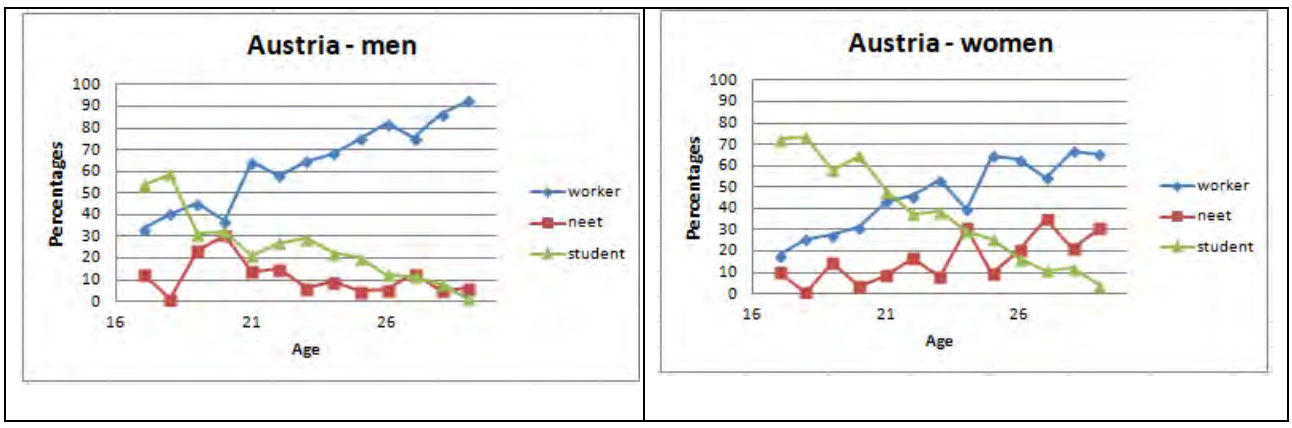
There is strong evidence of a positive correlation between unemployment levels and generous unemployment benefits, high tax wedge, and high union coverage. The relationship between the unemployment rates with the active labour market policies, high levels of co-ordination of bargaining and the economic growth is instead negative. However, a large part of the change in structural unemployment remained still unexplained (Arpaia, 2010).

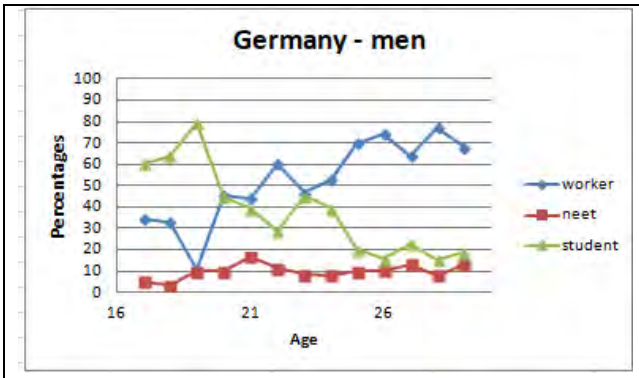
3. Data and results

In order to analyze the transition from school to work, we chose a selection of European countries sharing several similarities in terms of cultural and socio-economic aspects. The cluster of countries includes the Mediterranean countries of Italy and Spain, the Continental countries of Austria, Germany, the Scandinavian countries of Denmark and Norway, and the liberal country of the United Kingdom.

The elaborations are based on different data sources. We used EU-SILC data for the analysis year by year of the young cohorts in the condition of NEET, student and worker. EU-SILC is currently the main European reference source for comparable and multidimensional socio-economic statistics at both the household and individual levels. Other indicators finalized to describe the youth condition on the labour market are based on Labour Force Survey, the major reference at the European level for trends in employment and unemployment.

In most of countries, especially for men, the NEET share decreases as an individual gets older and tends to assume values near to zero as age tends to 30 (Fig.1). However, in Italy NEET assumes the nature of a structural phenomenon, because percentages remain higher than 20% also when the age tends to 30. Almost different the result for women, where, despite a permanence in the student status for more years, in many countries the share of NEETs tends to settle permanently around percentages even higher than 20%. An exception is made for the Northern European countries, and in particular for Norway, where the female and male patterns do not show significant differences.

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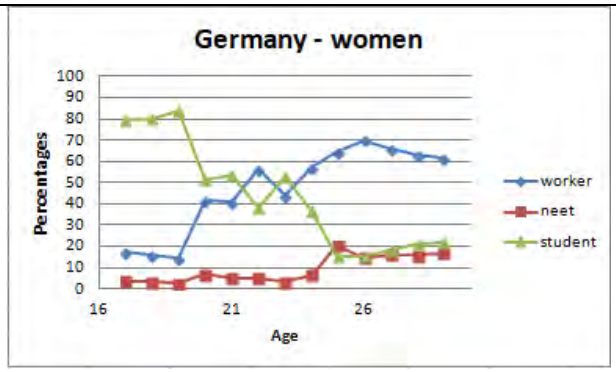
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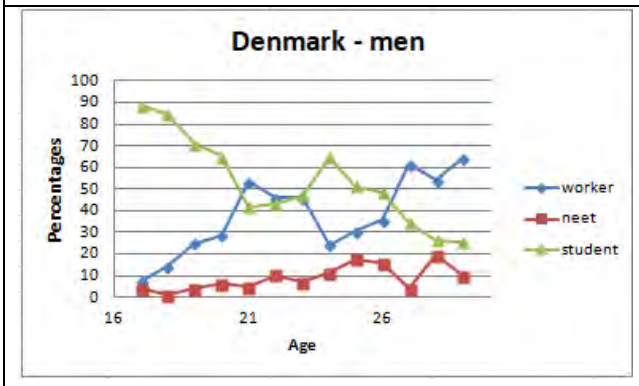
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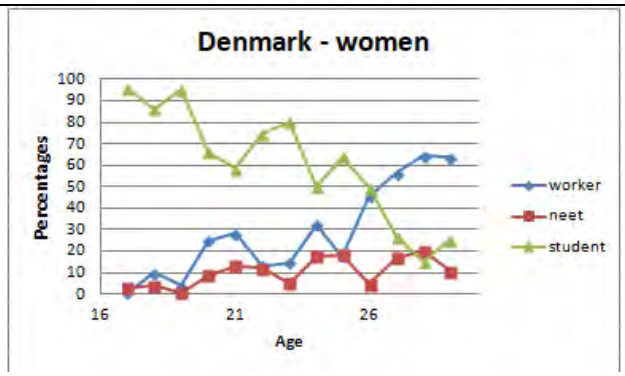
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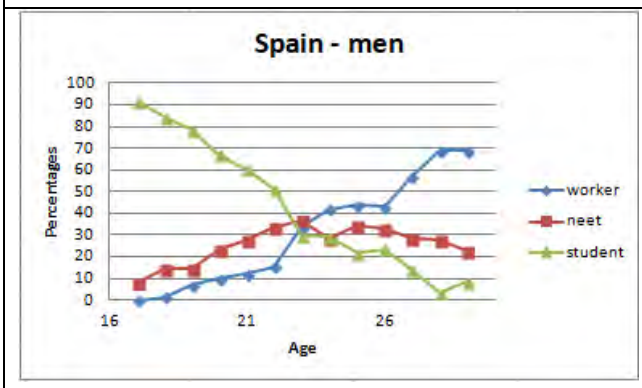
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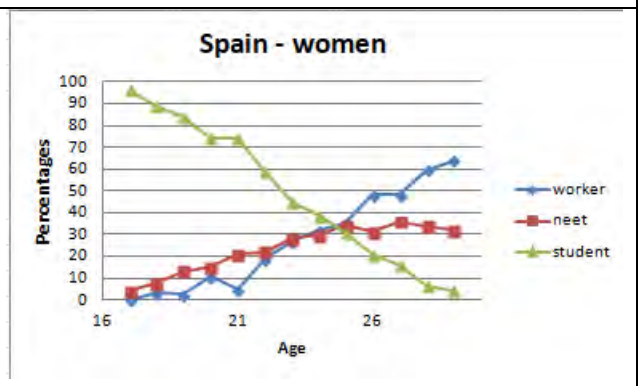
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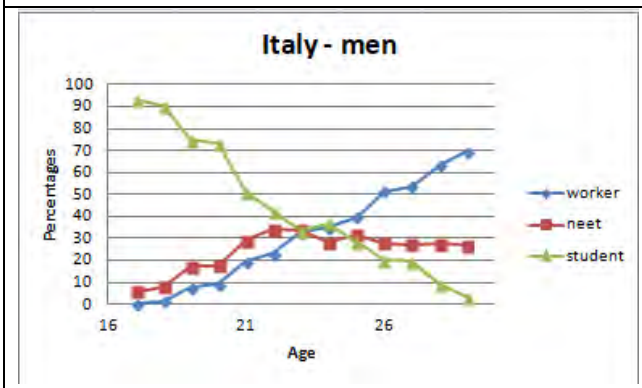
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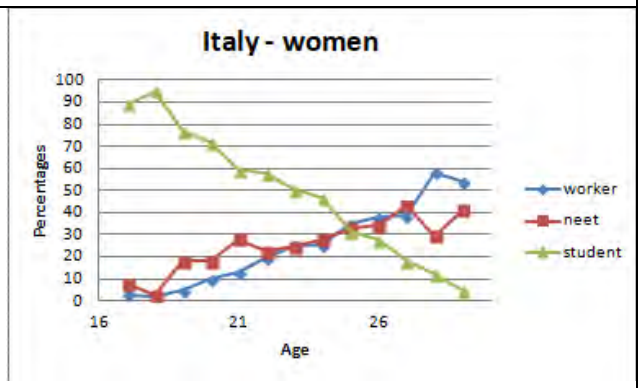
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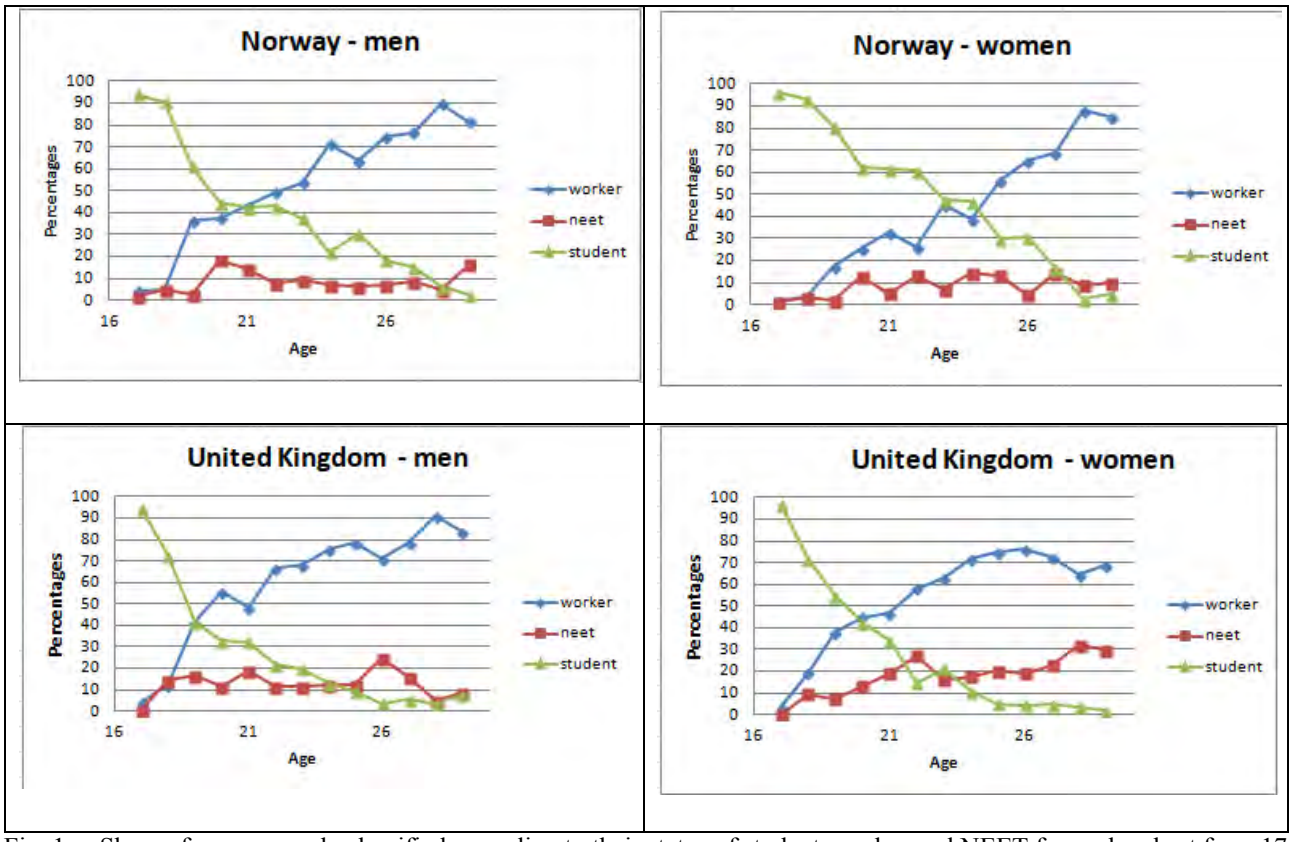

Fig. 1. – Share of young people classified according to their status of student, worker and NEET for each cohort from 17 to 29 years and by gender in a selection of European countries.

Source: Ad hoc elaborations on EU-SILC data (2015).

These different results by gender are due to the major penalization paid by women on the labour market, but also to their minor propensity to work. Indeed, even if it is well recognized the higher barriers met by women in entering the labour market, despite they are on average more educated than their male counterparts, it is also evident that there is a self-selection effect due to the fact that women sometimes still renounce to work in order to provide to family duties. Tab. 1 shows the different male and female activity, employment and unemployment rates.

Tab. 1 – Main labour market indicators by gender in 2016.

	Men					Women				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Austria	12,1	5,6	84	78,7	2,2	10,2	4,9	74,8	70,9	1,7
Germany	7,8	4,1	86,5	82,7	1,9	6,1	3,5	77,3	74,5	1,4
Denmark	13,1	4,5	85,2	80,7	1,3	10,9	5,8	79	74	1,4
Spain	44	16,3	84,6	69,6	8,4	44,9	19,8	73,7	58,1	10,8
Italy	36,5	9,2	80,3	71,1	6,2	39,6	11,1	59	51,6	7,4
Norway	12,8	4,4	84,6	80,4	1,4	9,7	3,1	79,4	76,7	0,9
United Kingdom	14,8	3,5	86,9	83,1	1,5	11,1	3,7	75,3	72,1	1,1

Source: Eurostat on line database on Labour Force Survey data.
Legend:
(1) Unemployment rate for less than 25 years population

(2) Unemployment rate for 25-74 years population
(3) Activity rate for 20-64 years population
(4) Employment rate for 20-64 years population
(5) Long-Term unemployment rate for 15-74 years population

Activity rates are everywhere lower for women, but the gender gap in the activity rates in Italy even exceeds the 20 percentage points. Italy and Spain show the highest unemployment rates, both for the youth population and for the whole population. However, only in these two countries the gender gap penalizes women. Indeed, in the other countries the levels of youth unemployment rates are systematically higher for men in comparison to women. The same results concern the gap in the unemployment rates for the 25-74 years population. Furthermore, in the Mediterranean countries of Italy and Spain, the highest unemployment rates and the gender gap favoring men determines the lowest female employment rates too, although the female propensity to work in these countries is the lowest one. Finally, the severity of unemployment in Italy and Spain is confirmed by the levels of the long-term unemployment rates that is around the 7% in Spain and around the 10% in Italy, while in the other countries it results always lower than 2%.

Data on the share of NEETs in the 24-30 years population are in accordance with these results (Tab.2). The choice of this specific age class responds to the need of verifying the consistence of the phenomenon when individuals have typically completed their studies and therefore the incidence of the share of students is negligible. In this way, it is possible to identify countries where the school to work transition length is higher. NEETs are indeed a consistent share of the whole cohort of young people in Italy and Spain. They are the 22% and the 25.8% respectively of the male and female populations in Spain, while in Italy the share reaches the 26.53% for men and the 38% for women. In the other countries, the share of male NEETs is less than 10% while for women the percentages are systematically higher, even if they overcome the 20% only in the United Kingdom.

Tab. 2 – Main labour market indicators measured on young people aged from 24 to 29 years in 2016.

	Men					Women				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
AT	9,24	9,43	35,45	4,70	1,41	12,76	9,62	74,84	69,79	0,00
DE	8,72	11,85	50,46	3,53	2,45	16,27	10,84	82,28	62,77	1,04
DK	8,49	12,23	54,49	9,46	0,71	12,86	8,80	63,98	27,33	0,00
ES	22,09	33,62	21,20	15,95	9,79	25,80	23,05	39,40	57,57	3,31
IT	26,53	25,01	48,13	4,89	32,09	38,01	19,60	65,32	46,25	18,84
NO	9,42	16,09	49,48	3,57	4,94	10,50	11,80	68,33	27,86	1,71
UK	8,76	16,96	55,50	17,63	0,00	21,89	14,54	84,71	69,16	0,35

Source: Ad hoc elaborations on Labour Force Survey data (2016).
Legend:
(1) Share of NEETs on total young people 24-29 years
(2) Share of early school leavers on total young people 24-29 years

(3) Share of inactive NEETs on total NEETs 24-29 years
(4) Share of inactive declaring as cause of their inactivity family responsibilities on total inactive 24-29 years
(5) Share of discouraged inactive on total inactive 24-29 years.

However, the NEET phenomenon is not only connected with unemployment. Comparing data for Italy and Spain, Spain shows the highest youth unemployment rates, while Italy highlights the highest share of NEETs, both for men and women. In order to explain this apparent contradiction, it is useful to analyze data on the share of inactive on total NEETs. In Italy, they are very high if compared to the Spanish ones. Very different the analogous results for countries like Germany and Denmark, where the majority of NEETs are inactive because the youth unemployment rates are very low.
Finally, in order to verify the main causes of inactivity, indicators (4) and (5) in Tab. 2 show the share of inactive that declared as cause of their status respectively the need to attending to family responsibilities and discouragement (the opinion that no work is available). While discouragement seems to be almost exclusively an Italian phenomenon – where the incidence on the total inactive for men reaches the 32.9% and is due to the high levels of unemployment rates – the need to assist elderly or children represents the main cause of inactivity for women everywhere. The Nordic countries of Norway and Denmark represent the only exception. Indeed, in these countries gender disparities on the patterns of inactivity are not so evident and gender equality is not far to reach.

4. Conclusions

Despite the European efforts to create a single European labour market, remarkable disparities still persist across European countries. In recent years, they have been increased too, as a consequence of the global financial and economic crisis. These disparities appear in the characteristics of the process of transition from school to work that, especially in the Mediterranean countries, consists sometimes in a very long time, increasing consequently the scarring effect of producing permanent damage in the working life of an individual. In fact, experiencing a long time as unemployed may translate in discouragement and therefore in inactivity. It may also induce to fall into a trap of underpayment and job mismatch. The results of this study highlight that, especially in Italy, NEET is a structural phenomenon because it manifests with high rates in correspondence of each age from the end of compulsory schooling until 30 years. Previous studies highlighted how youth unemployment rates are more affected by the economic cycle (Bruno et al., 2014), but also the persistence of the NEET phenomenon in periods of economic growth, underlying the existence of a social emergence. Indeed, prolonged periods in the NEET status can lead to social exclusion and poverty (e.g. Arulampalam,

2000; Mroz and Savage, 2006), which can pose psychological, material and behavioral consequences (e.g. self-destructive behavior).

The causes of the NEET status are manifold and arise mainly by the education system. There are several links among the education system and the labour market and the institutional factors. However, besides the analysis of the causes, it is important to distinguish between the unemployed and the inactivity status. While the unemployed status refers to a structural issue involving the whole population, inactivity represents the condition of who have renounced to fight in order to change his or her condition.

Analyzing the youth unemployment rates in comparison to the unemployment rates of the whole population, we can see how young people suffer everywhere a penalization. It results particular high in Norway, in the United Kingdom, but above all in Italy while for both men and women the youth unemployment rates are four times the corresponding ones for the whole population. Inactivity reaches high levels especially for women in Mediterranean countries, where it is still frequent that a woman renounces to search a job for the lack or the scarcity of the welfare instruments which allow the reconciliation between work and family life. High inactivity represents a brake to economic growth and to the welfare of population. In this context, education assumes a crucial role. In fact, if on one hand an inefficient education system represents one of the causes of high share of NEETs, on the other hand, an efficient and efficacious education system is the only instrument able to increase the skill levels of the workforce, which represent important drivers of economic development.

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Modeling European Health Regional Systems through a Directional Distance Function Metafrontier framework.

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Abstract

The current and future performance of regional health systems is responsible for increasing health costs and it depends on a wide range of contextual factors. Studies on regional health productive performance and on different health systems are scarce. This paper focuses on the efficiency of European healthcare systems at regional level across Europe, taking into account undesirable outcomes. Our analysis is based on data for a 14-year period (2000- 2013) from a unique balanced panel comprising 185 European regions in 17 EU countries. Adopting a metafrontier directional distance function we investigate whether there is an actual difference in terms of efficiency performance among European regions considering the health system under which they operate. It is found that there are no great differences in terms of convergence among the groups, irrespective of the health system types. When the whole sample is considered, there is a convergence toward two levels of efficiency. Focusing on the distribution of technological gap over time, we found that the three systems did not allow its reduction homogeneously among the regions. The 2008 crisis may have played a crucial role in determining a different process of polarization among groups.

Keywords: European regions, Health system, Directional distance function, Metafrontier, Technological spillover

1 Introduction and motivation

As documented in the Aging Report (2012) of the European Commission, during most of the second half of the 20th century healthcare spending grew faster than national income.Moving ahead to the 21st century, in the EU27, total expenditure on healthcare amounted to 10.2% of GDP in 2009 and a substantial part of it (7.8%) is public expenditure.The ever-increasing proportion of health spending in government expenditure across Europe makes this topic crucial in the policy debate on how to ensure the long-term sustainability of public finance.The growth of public expenditure on healthcare can be attributed to a series of factors that affect both the demand for and the supply of healthcare goods and services [1].The determinants of demand are held to be the aging population, national income and the rules that govern access to goods and services.On the supply side, the availability of services and technological and medical innovation are seen as key determinants.

Beyond these factors, inefficiency in the process of transforming into health outcomes the resources made available by the public sector for the healthcare system is a factor contributing to the sharp increase in health spending.Indeed, there is evidence that countries which spend most are not necessarily those with the best health indicators or quality of healthcare services.This suggests that there is a problem of efficiency or allocation of resources in the healthcare systems of many countries and that policy reforms should boost efficiency.

The differences among countries are mainly due to different political approaches.As underlined by the OECD (2010), the way in which the system is managed could be much more important than the type of system itself.Strengths and weaknesses may be found both in market-based and more centralized command-and-control systems.The equity across individuals can also be achieved without sacrificing efficiency.In a nutshell, there is no "one-size-fits-all" approach to reforming healthcare systems.With respect to the many existing healthcare systems, the aim of policymakers should be to adopt the best practices from them and adapt them to suit actual circumstances (Smith, 2009).The efficiency question can be assessed from both the micro and macroeconomic perspective.Micro level analysis concerns the behavior and functioning of healthcare providers, while the macroeconomic perspective focuses on the overall performance of the healthcare sector.However, the efficiency concept applied to the healthcare sector seeks to capture the relation

[1]The demand for healthcare services is influenced also by other important determinants such as education,the sociocultural context of the health system and the degree of dissemination of information concerning the availability of such services (Grossman, 2000).

between inputs, outputs and health outcomes [2].Analysis of this relation is very complex due to lack of data availability, the different measures dimensions used for input and output, such as quantity or quality measures, and the different determinants of outcome that are often not under the control of healthcare system such as lifestyle behavior or environmental factors.Moreover, the existence of different health systems, denoting heterogeneous technological production functions, with completely dissimilar initiatives, objectives and goals reinforces the existing complexity.For the above reasons, finding a suitable yardstick for measuring public sector efficiency in a European context is a thorny empirical issue.In this regard, some progress have been made at the research level, with more attention being attached costs of public goods and services through an increase in tax burdens whilst investigating the composition of public expenditure.Academics and economists have recently focused on the amount of resources devoted by government to social policies but also on the outcomes achieved (OECD, 2003; Afonso et al. 2005).[3].

This paper focuses on the efficiency of European healthcare systems based on outcomes resulting from policy choices that maximize health outcomes (or simultaneously minimize them if the outcome is undesirable) obtained from the resources available and allocated to healthcare.Any failure to attain that maximum is an indication of inefficiency (Jacobs et al. 2006).In other words, efficiency can be achieved through technological progress that allows a more efficient allocation of resources. Moreover, our analysis incorporates the idea of relaxing the "technological isolation" assumption (Tsekouras et al. 2016)[4] introducing the idea of a metafrontier.The metafrontier approach used in this study allows technological heterogeneity to be incorporated in productive efficiency

[2]Inputs can be measured in physical terms (number of physicians, hospital, beds, etc.) and in financial terms (healthcare expenditure).Outputs can be measured in terms of the number of patients treated, hospital discharges etc. (Hollingsworth,2008).The outcomes are measured by an increase in the quality and length of life or considering equity in access or health status (Joumard et al. 2010).

[3]Two kinds of healthcare efficiency orientations can be identified.The output oriented approach concerns the relation between resource inputs (costs, in the form of labor, capital, or equipment) and intermediate outputs (numbers treated, waiting time, etc.).The outcome efficiency is concerned with the relation between the same inputs and the final health outcomes (lives saved, life years gained, and quality adjusted life years).In the output orientation approach, individual medical outputs may be produced efficiently even if they might only have a very slight impact on the health status of society if they are not allocated suitably (Joumard et al. 2010).

[4]Technological isolation may be defined as the situation where even closely neighboring, in technological terms, production units are considered as completely distinct and no technological flows, so-called technological spillovers, between them are taken into account (Tsekouras et al. 2016)

analysis revealing interesting patterns of productive performance with respect to the three individual health systems which were not detected by previous seminal papers on health efficiency (Greene, 2004).The purpose of this paper is twofold.First, we use the directional distance function (hereafter DDF) that acts as a representation of a multi-input, multi-output distance function to investigate whether there is an actual difference in terms of healthcare system's efficiency and efficiency performance among European regions considering the technological frontiers (individual health systems) under which they operate.The second involves the introduction of the metafrontier framework in this study, providing the opportunity to estimate the associated technological gaps relative to the metatechnology available in European countries and examining for possible spillover effects (Tsekouras et al. 2016).Under this logic, we assume that the estimation of technology gaps for each region is interrelated with the relevant distance from their health systems.It is therefore worth noting that the constitution of group frontier is an essential factor, which needs to be taken into account.

Our analysis is carried out on a unique balanced panel comprising 185 European regions in seventeen EU countries [5] over a fourteen-year period from 2000 to 2013.It is worth noting that the basic unit of analysis is the European region according to the health system to which each region belongs.For this purpose, the healthcare systems of countries considered are clustered according to a typology recently developed by Bohm et al. (2012 and 2013).

Such healthcare systems analysis at regional level, as carried out in this study, is crucial because in the European Union (EU) such systems are managed in very different ways.A very important role in these systems is played by local and regional authorities in terms of powers and responsibilities, from the adoption of legislation to policy making, implementation and funding.This role often reflects the constitutional structure of the specific country.However, many factors add complexity to this simple relationship, such as the prevalent type of hospital governance or the competence of local and regional authorities to find local financial resources to invest in the healthcare sector.This can certainly affect the efficiency of systems at national and regional level.Although there are difficulties in applying efficiency concepts to health systems, there is an extensive empirical literature on the pervasiveness of ineffi-

[5]Austria, Bulgaria, Czech Republic, Finland, France, Germany, Greece, Hungary, Italy, The Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain and Sweden

ciency in the health sector at both macro and micro levels [6].With regard to the most common methods used to estimate the efficiency of health services, it is possible to distinguish Data Envelopment Analysis (hereafter DEA) and Stochastic Frontier Analysis (SFA) [7].Many studies used DEA (e.g. Joumard et al. 2010; Ozcan, 2008) an increasing number of studies have recently employed Stochastic Frontier Analysis (Hollingsworth and Street, 2006; Hollingsworth, 2008; Hollingsworth and Peacock, 2008; Afonso and St.Aubyn, 2010).Furthermore, there is also a considerable literature comparing the results of both methods (Hjalmarsson et al., 1996; De Cos and Moral-Benito, 2011; Medeiros and Schwierz, 2015).However, for the specific purpose of our research (188 regions, 18 countries and 3 different health systems) we use DEA since it reveals unit-specific data type of returns to scale and changes in productive performance assuming that each period consists of a separate technology production case.

The results of Joumard et al. (2010) for healthcare spending efficiency were obtained by using both panel data regressions and DEA.They presents comparative data on healthcare policies and institutions for OECD countries arguing that institutional characteristics can be very important determinants of efficiency.To improve the overall efficiency of the healthcare sector, they suggest a reconfiguration of current policies, together with appropriate institutional reform.The results of the study show that in the OECD countries higher healthcare expenditures do not necessarily mean better health status.For each country's health system, the authors give recommendations for improvements according to their results.By contrast, Medeiros and Schwierz (2015), estimate relative efficiency of healthcare systems across all EU countries.In order to assess (relative) technical efficiency they mainly uses non-parametric frontier methods based on DEA and in addition use SFA as sensitivity analysis.They find sample evidence of widespread inefficiency in the healthcare systems of EU countries.DEA shows that average healthy life expectancy in the European Union could be increased by 6.1 years at birth by moving to the efficiency frontier.Afonso and St.Aubyn (2010) use a semi-parametric analysis, computing Malmquist productivity indexes,

[6]For a more extensive overview of the empirical evidence on health efficiency see Hollingsworth (2008) and Medeiros and Schwierz (2015)

[7]DEA is a non-parametric technique, where all deviations between observed values and an estimated production possibility frontier are attributed to inefficiency.SFA is a parametric approach and is used as sensitivity analysis.SFA methodology is an extension of simple regression analysis and is used to estimate the frontier of a set of functions with different underlying levels of efficiency.It requires a particular functional form for the production function, which allows for the presence of both stochastic errors and inefficiency.

and resorting to SFA.They highlight that inefficiency in health-care expenditure is strongly influenced by some elements that are controlled by the government policy action such as GDP per capita, adult educational attainment, obesity and smoking habits.Their results also support the idea that better governance helps countries to achieve a better performance and to operate closer to the production possibility frontier.

Our study is structured as follows: Section two summarizes the classification method used in the analysis; Section three describes the methodological underpinnings with two subsections devoted to DDF and the calculation of the corresponding measure under a metatechnology framework; Section four describes data and variables; Section five presents the results and the last Section concludes.

2 Classification of European Health Systems

Our analysis is carried out at European regional level for 17 countries.Their healthcare systems are clustered according to a typology recently developed by Bohm et al. (2012 and 2013)[8].The typology by Rothgang and Wendt (RW-typology) distinguishes three dimensions, which define healthcare systems: regulation (or governance), financing and service provision.With respect to the above dimensions, for regulation it is difficult to distinguish between state, societal and private insurance in determining who is predominantly controlling coverage, remuneration of providers, system of financing, access to healthcare markets, patient access to providers and benefit packages.For these reasons, a careful qualitative judgment is required. The second dimension, namely financing has always played an important role in classifying and distinguishing welfare systems, especially since such a characteristic proves to be easily observable. A system mainly financed by general taxation is termed a Beveridge system, in which the role of the state is predominant; the Bismarck system is based mostly on social insurance contributions and, lastly, a system could be financed by private insurance related to individual health risk.To measure the service provision dimension and to distinguish the role played by public, societal and private providers Rothgang et al. (2010) used a trichotomous index, allocating weights to the main health sectors, namely pharmaceutical, inpatient care, outpatient and dental care. The construction of this index facilitates the estimation of the role of different providers.The respective system type is better

[8]The study by Bohm et al. (2012 and 2013) was the first attempt to classify 30 OECD healthcare systems, according to their most recent institutional setting, following a typology developed by Rothgang et al. (2005) and elaborated by Wendt, Frisina and Rothgang (2009), the so-called RW-typology.

described not by the level or degree of these dimensions alone but by the answer to the question: who is regulating, financing and providing healthcare services? In healthcare systems the responsibility for these tasks is not only the state's but also that of societal-based and/or private actors.The state, society and private actors can dominate each of these dimensions, yielding 27 distinct combinations, three of which can be identified as ideal types.The ideal type should be the one in which the entire dimension is governed by the same actor, thus identifying three main unequivocal clusters of healthcare systems. According to Wendt, Frisina and Rothgang (2009), these clusters comprise the National Healthcare Service (NHS), in which state actors and institutions carry out regulation, financing and service provision; Societal Healthcare Insurance (SHI), in which societal actors take the responsibility for healthcare dimensions; and finally, Private Healthcare Systems (PHS), in which all three dimensions are governed by market actors.The other health systems are classified according to their specific combination of state, society and private in governing their regulation, provision and financing.For each ideal-type, there are six mixed combinations in which state, societal or private actors dominate two dimensions.Six further combinations do not approach any of the three ideal-types (Marmor and Wendt, 2012).Bohm et al. (2012 and 213) argue that even if Wendt, Frisina and Rothgang (2009) recognize that some of their combination are more likely than others, they do not offer any rule to exclude unlikely type.For this reasons in their recent study they add to the original RW-typology the theoretical argument of a hierarchical relationship between the three dimensions, led by regulation, followed by financing and finally service provision, where the superior dimension restricts the nature of the subordinate dimensions (Bohm et al., 2013). By applying this hierarchy rule, the number of theoretically plausible types of healthcare systems shrinks to ten as shown in figure 1.Thirty OECD healthcare systems are classified into five different types.

Among the types defined by Bohm et al. (2012), the 17 European countries covered by our analysis are grouped as follows.Bulgaria, Czech Republic, Denmark, Greece, Italy, Norway, Portugal, Romania, Spain and Sweden are clustered in the National Health Service (NHS) healthcare system typology, characterized by state dominance in all three dimensions. Austria, Germany and Switzerland belong to the Social Health Insurance (SHI) type whose regulatory dimension is dominated by societal actors.Belgium,France, Hungary, the Netherland and Poland are grouped in the Etatist Social Health Insurance (ESI) type, the largest in terms of member countries.

3 Methodological Underpinnings and Hypotheses Tested

Our methodological framework is developed in two interconnected stages.In the first stage, we present the theoretical and methodological underpinnings regarding the estimation of the directional distance function.In the second stage, we discuss expansion in a metafrontier framework presenting the theoretical basis for its inclusion.

3.1 Directional Technology Distance Function

To present our methodology we follow closely the works of Chambers et al.(1996), Chung et al. (1997) and Fare and Grosskopf (2000).We assume that the production technology T models the transformation of a vector of inputs $x \in R_+^N$ that each region can employ to produce a vector of outputs $y^* \in R_+^M$.However, we can define two kinds of outputs namely the good output (desirable) $y = (y_1, y_2, ..., y_k) \in R_+^K$ and $b = (b_1, b_2, ..., b_m) \in R_+^L$ the bad output respectively.In this study we treat life expectancy as the desirable output and crude death rate and infant mortality as the undesirable outputs.The underlying production process for each individual region that belong to a specific health system is constrained by the technology set T defined as $T(x)=\{(y, b):x$ can produce $(y, b)\}$.The technology set provides a description of all technologically feasible relationships between inputs and outputs and satisfies a set of axioms discussed in Shepard (1953; 1970) and Luenberger (1992; 1995) referring that i) inactivity is allowed, ii)"free lunch" is not allowed (Kumar, 2006) iii) technology is convex, bounded and closed (Chambers et al. 1996), iv)null-jointly of good and bad outputs and v) free availability of inputs and outputs.In this case, costlier undesirable outputs have been created the output characterized as weakly disposable.

The directional distance function (hereafter DDF) acts as a representation of an multi-input, multi-output distance function.Following Chambers et al. (1998) and Picazo-Tadeo et al. (2005) we define directional distance function (Eq.1) as:

$$\overrightarrow{D_T^F}(x, y, b; g_x, g_y) = \{max\beta* : (x, y + \beta * g_x, b - \beta * g_y) \in T(x, y, b)\}$$

Indeed, the DDF projects the input-output vector (x, y) onto the technology frontier in the $(g_y, -g_b)$ direction (see fig.2) and allows for desirable outputs to be proportionally increased, and bad output to be proportionally decreased.More precisely, it seeks the maximum attainable expansion of desirable outputs in direction g_y and the largest feasible contraction of the undesirable outputs in direction g_b.

For the estimation of the production technology, parametric and non-parametric methodologies are available.Of the latter, DEA was used to perform our measures instead of SFA.DEA is considered an appropriate approach for measuring performance of decision making units (hereafter DMUs) since establishing "production standards" and measuring absolute efficiency in this setting is hard due to the limited time available.The specific measure proposed in Eq.(1) allows us to estimate the productive efficiency of each industry located at its own country-frontier suggesting a common frontier or benchmark for their productive performance scores.The following linear programming problem, after defining a particular directional vector, is used to calculate DDF (Eq.2):

$$\begin{aligned} \overrightarrow{D_T}(x_o, y_o, b_o; y, -b) &= max\beta \\ s.t \qquad x_o &\geq \mathbf{X}\mathbf{z} \\ (1+\beta)y_o &\leq \mathbf{Y}\mathbf{z} \\ (1-\beta)b_o &\doteq \mathbf{B}\mathbf{z} \\ z \geq 0, \beta &\geq 0 \end{aligned}$$

where given $\mathbf{L}$ is the number of regions examined for each specific technological set, $\mathbf{X}$ is the $N \times K$ matrix of inputs; $\mathbf{Y}$ is the $M \times K$ matrix of outputs and $\mathbf{J}$ is the $J \times K$ matrix of bad outputs.

3.2 Directional Technology Distance Function under a metatechnology framework

In a European Union with $\mathbf{S}$ regions each having their specific state of technology that belongs to a specific health system and their own environmental factors, a metafrontier is defined as the boundary of the unrestricted technology set.In this case, if technology is freely interchangeable and the S-regions have potential access to the same European technology we can apply the same DDF to the metafrontier [9].Indeed, it is not possible to compare regions belonging to different health systems taking into account the case where multiple technologies are possible and available.Moreover, the reality is that this is not the case and regions

[9]Hayami (1969) and Hayami and Ruttan (1971) were the first to propose the concept of meta-production distance function "... as the envelope of commonly conceived neoclassical production functions".The basic thinking behind meta-production is to emphasize the heterogeneity of production technology with different decision-making units (DMUs) to reflect region, type, scale and other inherent attributes.All DMUs are then divided into groups according to the different sources of technological heterogeneity.Each group can form a production frontier, i.e. a group frontier

experience some heterogeneity.Relaxing this hypothesis, the notion of the metafrontier comes into play providing a benchmark for all the participating regions irrespective of the frontier to which each belongs.

Hence, given S technologies $T^1, T^2, ...T^S$ the metatechnology set, denoted as T^M, can be defined as the convex hull of the jointure of all technology sets represented as can produce in at least one of (Rao et al., 2003) [10] denoting as $T^M(x)=\{(y,b)$ x can produce $(y,b)\}$ in at least one of $T^1, T^2, ...T^S$.The output set P^M associated with the metatechnology is defined in the same way as for a single technology, while the corresponding efficiency of each region with respect to the homogeneous boundary for all heterogeneous regions can be measured by the output-oriented metatechnical directional distance function defined as (Eq.3):

$$\overrightarrow{D_M^F}(x,y,b;g_x,g_y) = \{max\beta * : (x, y+\beta * g_x, b-\beta * g_y) \in T(x,y,b)\}$$

The corresponding efficiency score is easily obtained by solving an analogous LP problem as in Eq.(2).The boundary of the metafrontier is used in order that each regional efficiency performance ma be estimated under the hypothesis that technology is freely exchangeable and all regions have potential access to the same level of the European metatechnology (Casu et al., 2016).

The introduction of metafrontier analysis as an approach that allows the investigation of the interrelationships between different technologies (Battese et al. 2004) can be used in order to explain differences in production opportunities that can be attributed to available resource endowments, economic infrastructure, and other characteristics of the physical, social and economic environment in which production takes place (O'Donnell et al. 2008; Kontolaimou et al. 2012).Moreover, it accounts for structure of national markets, national regulations and policies, cultural profiles and legal and institutional frameworks (Halkos and Tzeremes, 2011), different ownership types (Casu et al. 2013) and different rate of access and acceptance of General Purpose Technologies-GPT (Kounetas et al. 2009).O'Donnell et al. (2008) extended the Battese et al. (2004) framework using conventional Shepard distance functions to estimate technical efficiency with respect to the same metatechnology and several individual technology sets.

Each productive efficiency score obtained from the estimation with respect to the common technology can be used to define the so-called metatechnology ratio which is considered a measure of proximity of

[10] A global frontier that envelopes each of the individual country frontiers or in other words a "basket" of available technologies for all industries irrespective of the country to which each belongs

the k-th group individual frontier to its metafrontier or in other words how close a health system frontier is to the European metatechnology (metafrontier).Thus, we can define the following ratio (O'Donnell et al.2008):

$$MTR(x, y, b) = \frac{MTE(x, y, b)}{TE(x, y, b)}$$

and identify the technology differential among the European health systems.

Rearranging the previous relationship the metafrontier ratio clearly implies that efficiency performance with respect to the metafrontier can be decomposed into the product of efficiency performance and the metatechnology ratio.In particular, efficiency performance with respect to the metafrontier analyze the characteristics of the group and its state of knowledge and how close, relatively,the health system frontier is to the European metatechnology.In light og above,the technology gap of the i-th region in the s-th group frontier is defined as the distance of the group frontier to the metafrontier, weighted with the minimum inputs which are attainable by employing the group-specific technology,that is:

$$TG(x, y, b) = 1 - MTR(x, y, b) \tag{1}$$

For a region exhibiting a value equal to zero, it is evident that the group frontier, at the input level of the specific industry, is tangential to the metafrontier and hence no efficiency losses are due to inferiority of the group technology compared to the metatechnology.However productive inefficiency with respect to the group frontier is still a possible situation.Comparing with other approaches that considers technology gap as a partially factor of growth measured as the technological distance from the frontier (Castellaci, 2011) in our case technology gap is calculated as the distance of the specific region to the European metatechnology taking explicitly into account the distance of the corresponding country's frontier from the European technology.

We present a graphical analysis (see Fig.2) of the EU metafrontier and the three individual frontiers for the output-oriented framework.At a given input and output level, say x_1 and y_1 the observed region A under the NHS technology consists of three components:first, the regional technical inefficiency (DDF relative to the frontier) between points A and B, the regional metatechnical inefficiency between points A and C (MDDF relative to the metafrontier) and the technology gap difference denoting as $TG(x, y, b) = \overrightarrow{D_T^M}(x, y, b; g_x, g_y) - \overrightarrow{D_T^F}(x, y, b; g_x, g_y)$.

The presentation of our methodology gives rise to the following hy-

pothesis which will be tested within the framework discussed further above:

H_1:Productive performance with respect to the health system specific frontier exerts, over time, no indiosyncratic behavior between the individual systems.

H_2:Productive performance with respect to the overall health technology exerts, over time, no indiosyncratic behavior.

4 Data and variables

In order to test our hypotheses we employ a dataset that allows (i) the introduction of some apparent regional heterogeneity and (ii) examination of different technology health systems without involving any micro-level idiosyncrasies but in conjunction with regional-specific heterogeneity.In this direction, we devised, the dataset employed in this paper combining information provided by key statistics on monetary and non-monetary aspects of healthcare in the European Union (EU) (Health-Care statistics of Eurostat).Thus, we construct a unique balanced panel comprising 185 European regions in 17 EU countries[11] over a fourteen-year period from 2000 to 2013.Importantly the basic unit of analysis is the European region according to the heath system to which each belongs.The dataset used to estimate the productive performance via the corresponding production frontiers embraces three outputs and three input variables.

The inputs and outputs employed in this study are in line with the empirical literature for measuring healthcare performance using the DEA (see indicatively Ferrier et al. 2006, Ozcan,2008, O'Neill et al. 2008, Mitropoulos et al. 2016, De Nicola et al. 2012).As inputs,we selected the number of staffed beds, the number of full-time equivalency (FTE) doctors and the number of FTE nurses and midwives[12].These available variables can be used as proxy for size and labor accordingly.

On the output side life expectancy, crude death rate per hundred thousand inhabitants and infant mortality were used.Life expectancy was used as a crucial output in many empirical analyses on the efficiency of regional or country health systems using DEA (Cheng and Zervopoulos, 2014; Afonso and St Aubyn, 2005; Grosskopf et al., 2006; Zaim et al., 2001).It can be considered an indicator for the measurement

[11]France with 26 regions, Italy with 19, Spain with 18, Germany and Poland with 16, Greece with 13,The Netherlands with 11 regions, Austria with 9 regions, Hungary, Romania, Sweden and Czech Republic with 8, Norway,Hungary, and Portugal with 7 regions, Bulgaria with 6, Slovakia with 4 and final Finland with 2 regions.Table 1 provide a detailed picture of the regions comprising our sample.

[12]There variables are calculated per hundred thousand inhabitants.

of population health but also a vital component in the evaluation of socioeconomic conditions (Lantz and Ubel, 2005; Weinstein and Appadoo 2001; Wilson et al. 2004).By contrast, we consider crude death rate and infant mortality as undesirable (bad) outputs.The above variables are used extensively elsewhere in evaluating regional or country-specific health systems and human development (see Hegyvary et al. 2008; Kao et al. 1997; Loudon, 1992; Mauldin, 1994; Rajaratnam et al. 2010; Rutherford et al. 2010).Table 2 contains the summary statistics of the variables employed in computating the DDF according to the health system to which each belongs.

5 Results and discussion

The presentation and discussion of the empirical results follows the two stage structure of the analysis.The regional-specific efficiency scores with respect to the three different health systems are first presented and discussed.The metatechnology efficiency scores and the associated technology gaps which arises in the context of the metafrontier are then used to examine technological spillovers.

5.1 Efficiency estimates for the individual health systems

The productive efficiency scores with respect to the specific health technology and the European metatechnology, the associated metatechnology ratios and the technological gaps are estimated for the 185 regions in each of the 14 years.R programme with the associated packages ("nonparaeff" and "benchmarking") is used to solve the linear problem of the directional distance function employed with respect to specific technologies and the metatechnology.At this point, it is crucial to note that the estimates are grounded on a cross-section basis, estimated separately for each year in the sample denoting an individual production set.Therefore, the values of the estimated productive efficiency and technology gap for each country encompass two dynamic factors.The first is the change in distance from the metafrontier, while the second is the outward (technical change) or inward (technical regress) movement of the metafrontier itself.Under this logic, the estimated time-series for efficiency and technology gaps reflect the diachronic evolution of productive performance of the examined country, taking into direct account any technological developments either in the industry-specific frontier or in the metatechnology.

Mean values of productive efficiency for each frontier, the metafrontier and the associated technology gaps are calculated in Table 3.Interestingly there is little difference between SHI, NHS and ESTAT regions regarding their efficiency performance (0.974, 0.989 and 0.976 respectively) with respect to their frontier but also the difference in their performance with respect to their metafrontier is barely distinguishable (0.871, 0.87 and 0.864 respectively).Furthermore, a Kruskal-Wallis test was applied to examine the technology frontier differences between the three health systems.The results show that, the three groups have distinct technology frontiers, with respect to their meta-efficiency productive performance[13].

The estimated values of (i) the productive efficiency with respect to the specific technology and (ii) the technology gap with respect to the European metatechnology for each technology between 2000-2013 are shown in Table 4.

We begin by looking at the estimated productive efficiency for the individual frontiers.It may be concluded that a very high aggregate percentage of 41.4% appears to have the best performance for the SHI health system.The picture is not the same for the other two technologies with the total aggregate average for the efficient performers being 23.7% and 22.5% for ESTAT and NHS respectively.Indicatively, the efficient regions with the highest occurrence (more than 75%) with respect to their performance in their own frontier are Alentejo, Bayern, Baden-Wurttemberg, Castilla y León, Cataluña,Del-Alfold,France Metropolitan,Gelderland, Île de France,Kozep-Marayrorszag, Liguria, Limousin, Lombardia, Nordrhein-Westfalen, Nord-Est, Saarland, Saachen, Vorarlberg, Zeeland, Western Greece and Zuid-Holland.

One way to study the features of efficiency of different health systems is by estimating health productivity densities with kernels distribution and by analyzing their evolution over time.Figure 3 presents the estimated kernel density with respect to the estimated efficiency values for European regions.As can been seen, the estimated kernel density reveals the existence of a unimodal distribution.The peak reflects a comparatively large number of observed transitions from one particular part of the distribution to another.When we consider the whole sample there is a convergence toward a single club in each frontier, that is, regions that belong to a specific system converge to a single club.In other words, in terms of efficiency, there are no great differences, in terms of convergence, among the three groups (SHI, NHS and ESTAT).

To examine how the distribution of European regional health systems develop over time, we compare the estimated kernel density functions for the years 2000, 2003, 2008 and the last year 2013, as shown in Figure

[13]The corresponding values are .....

4.This plot indirectly confirms the results obtained in figure 3. That is, when considering the whole regions in the entire countries for each single year we found similar behavior in terms of efficiency but with a clear higher level of density year by year reaching the highest peak in 2013.Moreover, analysis of the efficiency of the European health systems at regional level at almost four year intervals demonstrates a general trend toward unimodal convergence club over 14 years.All four densities have a single-peak distribution with the majority of regions located close to one, although the distribution is narrower and more concentrated around the peak in 2013 than in 2000.

5.2 Technology gap estimates

A similar analysis was performed with respect to the metafrontier that enables calculation of comparable technical efficiencies for health systems operating under different technologies.The sample average of metatechnical efficiency is 0.869.This implies that regions operate at average values of outputs and inputs have the potential to increase their life expectancy and simultaneously, reduce the crude death rate and infant mortality by about 13.1%.The same picture may be drawn for technology gaps with the corresponding values being 0.109, 0.122 and 0.117 for the NHS,SHI and ESTAT respectively.

Shifting our attention now to the best European performers we seek the regions which define the metafrontier.However, we should note that the corresponding aggregate percentages for the regions that construct the metafrontier are 8.92% for the ESTAT health system, 14.81% for the NHS and 8.01% for the SHI accordingly.On closer inspection, more we can,once again extract regions with the highest occurrence (more than 75%), namely Alentejo, Castilla y León, Communidad Foral de Navarra, Cataluña, France[14],Gelderland, Île de France, Liguria, Lombardia, Nord-Est, Saarland, Saachen, Zeeland and Zuid-Holland.

Figure 5 shows the kernel density for the metafrontier calculated for all European regions no matter the health system they belong to.It reveals the existence of a bi-modal distribution.The two peaks reflect a comparatively large number of observed transitions from one particular part of the distribution to another.When considering the whole sample without distinguishing the three classified health systems, there is a convergence toward two clubs.That is, European regions converge toward different groups with different levels of efficiency.In other words, in terms of meta-efficiency and assuming that all regions have access to the same level of technology irrespective of the health system that they follow,

[14]Metropolitan.

there are differences, in terms of convergence, among the three health groups.

Since this study measures efficiency and productivity performance growth and further identifies technological gaps in the three different health systems, figure 6 shows the kernel density for the metafrontier of the European regions over time.The results give rise to the assumption of the existence of two distinct convergence clubs.That said, the second convergence club, around a mean of 0.76, would be much less important than the main one with a mean of 0.98.The results in figure 6 allow us to explain temporal shifts in the distribution and to see whether the presence of a second convergence club holds.We observe that the kernel density for the metafrontier calculated in different periods experienced efficiency and productivity improvements mainly due to progress in technology along with improvements in their efficiency that led to the highest productivity upgrade among the three groups.

We also found that European metatechnology constructed as the envelope of the three health systems showed improvements in quality, shifting from a mean of 0.8 in 2000 to a mean of 0.98 in 2013.However, it is worth mentioning the dramatic change in the distribution after the financial crisis:we can see clear two clubs formation around the two different means.A possible explanation of these results could lie in a different process of convergence generated by different fiscal policies and cuts in public expenditures.Part of these cuts affected the health systems in the European regions with different impacts on efficiency.Hence, the financial crisis might have generated a different process of polarization among the three European heath systems, ending up in the different shape of the 2013 kernel distribution.Indeed, it becomes obvious that the presence of a second convergence club as seen in the left part of Figure 4 (year 2000) is most likely a statistical artifact generated by a rightward shift of the general density function while the year 2013 it shows its fat tails in the left part of the distribution plot.However, the results for 2013 suggest that, following the global financial crisis, a second clear low growth convergence club began to form.

Summarizing the results from this figure, for most of the considered periods,only one clearly defined single convergence club is reported for the European regions.Thus, convergence occurred almost uniformly across the regions according to the dynamics shown in Figures 3 and 4.It also shows that over the two decades analyzed herein a general rightward shift of the density function took place, which translates into overall higher efficiency over the years.Only the most recent results suggest the rise of a clear second convergence club and thus a split in overall efficiency dynamics.This might explain the increase in efficiency witnessed

for the years 2000 and 2013.However, this development undoubtedly requires analysis in greater depth, especially regarding the recent economic developments in the European regions.

Furthermore, employing the metafrontier approach we are able to utilize a method to compute of an 'inefficiency-free' measure of technology gap, known as the technology gap ratio, for the sample of regions.The method offers improvements over conventional approaches.First, it does not assume a common technology for all the regions and health systems in the sample.Instead, only relatively homogeneous regions are grouped together and assumed to share a common technological frontier within the group.Secondly, the metafrontier approach offers a separate, time-dependent technology gap measure for each country in the sample.Figure 5 shows the plot of the estimated TG for the whole sample.

The two main peaks around point 0.9 and 1 reflect a comparatively large number of observed transitions from one particular part of the distribution to another.However, the plot also shows an additional small peak around point 0.76.This finding indicates that when we consider the whole sample without distinguishing the three classified health systems, the TG converges toward two clubs, that is, European regions converge to different groups with different levels of technical efficiency of the region with respect to the metafrontier.This specific finding enhances the idea of significant knowledge incoming spillover barriers from metatechnology (Tsekouras et al. 2016).Possible explanations may lie in the role of appropriability conditions (Castellaci, 2007), the degree of openness, mainly via globalization, the asymetric effect of technological opportunities and the size of the market (Los and Verspagen, 2006).

To examine how the distribution of TG of the European regional health system develops over time, we compare the estimated kernel density TGs for the years 2000, 2003, 2008 and 2013, as displayed in Figure 8.This plot straightaway confirms the outcomes obtained in figure 9, that is, when considering the whole regions in the entire countries for each single year we found different behavior in terms of TGs but with a clear lower level of TG year by year reaching the lowest peak in 2013.Moreover, analysis of the TGs of the European health system at regional level at almost four-year intervals demonstrates a general trend toward unimodal convergence club over 14 years but with a wider flat right tail.All the pre-crisis functions show a distribution of small multi-peaks with the majority of regions located close to the mean, while after the crisis, in 2013, the distribution is wider and less concentrated around the peak.The most important result emerging from this figure is that the three health systems work inefficiently since they do not allow the reduction of the TGs homogeneously among regions (see for example the

kernel distribution of figure 1 and compare it with the TG distribution of figure 5).

Lastly, the behavior of the TGs of the European regions with respect to the health system they belong to are presented in Figure 7.The distribution is clearly multi-modal with a mean close to 0.15.The main result illustrated in fig. 7 is that there is no noteworthy difference among the three health systems in terms of distance from the metafrontier.

Although it is not so large in magnitude, the multi-modal distribution of European regions can be viewed from the perspective of localized technical change.Such change may include, the level of absorptive capacity, the local effect of cuts in public expenditures (due to the financial crises), the complexity of managing the public health sector in some countries, the efficiency of the institutional system at country and regional levels and technological diffusion which include inefficient learning effects, specific-region market imperfections and externalities.Although not exhaustive, these could be considered the main causes of the diverse technical changes within the three health systems at regional level in Europe after the crisis.

Since this study measures efficiency and productivity growth and further identifies technological gaps in the three different health systems, figure 4 shows the kernel density for the metafrontier of the European regions over time.The results give rise to the assumption of the existence of two distinct convergence clubs.However, the second convergence club, around a mean of 0.76, would be much less important than the main one with a mean of 0.98.The results in figure 4 allow us to explain temporal shifts in the distribution and to see whether the presence of a second convergence club holds steady.

6 Conclusions

The current literature on the productive performance of health systems generally use data from individual countries or groups of countries with same or different health systems imposing a technological homogeneous environment.This specific assumption creates severe risks on the benchmarking process when technology heterogeneity issues are not handled appropriately Furthermore, the assumption of common factors can be restrictive and sometimes unrealistic, leading to misleading inferences.Therefore, empirical and theoretical studies should consider the probability that health productive performance can be subject to changes at country as well as regional level.In this paper, we used the directional distance function approach to describe and analyze directly the efficiency of the European healthcare systems based on outcomes

implying that policymakers should make choices, simultaneously, that maximize the good health outcomes and minimizes the bad ones.

A number of important conclusions follow from the empirical estimates obtained in the paper.First of all, it is shown that at the estimated productive efficiency for the individual frontiers a very high aggregated percentage of 41.4% of the regions appears to have the best performance for the SHI health system.The picture is not the same for the other two technologies with the total aggregate average for the efficient performers being 23.7% and 22.5% for ESTAT and NHS respectively.

Another interesting feature of the results is that, at first glance, it appears that when we consider the whole sample there is convergence toward a single club in each frontier, that is, regions that belong to a specific system converge to a single club.Hence, in terms of efficiency, there are no great differences, as regards convergence, among the three groups (SHI,NHS and ESTAT).Shifting to the best European performers, we sought the regions that define the metafrontier.The corresponding aggregate percentages for the regions that construct the metafrontier are 8.92% for the ESTAT health system, 14.81% for the NHS and 8.01% for the SHI accordingly.Moreover, a bi-modal distribution seems to prevail for technology gaps no matter which health system the regions belong to.When we consider the whole sample without distinguishing the three classified health systems, there is a convergence toward two clubs.In other words, European regions converge to different groups with different levels of efficiency.

From a modeling perspective, our findings contribute to the literature given the need to model the European metatechnology constructed as the envelope of the three health systems showed improvements in quality shifting from a mean of 0.8 in year 2000 to a mean of 0.98 in 2013. However, it is worth mentioning the dramatic change in the distribution after the financial crisis with a clear dual clubs around the two different means. A possible explanation of these results could lie in a different process of convergence generated by different fiscal policies and cut in public expenditures.Part of these cuts affected the health systems in the European regions with different impacts on efficiency.Hence, it could be possible that the financial crises has generated a different process of polarization among the three European heath systems ended up in the different shape of the 2013 kernel distribution.

Finally, we examined how the distribution of TGs of the European regional health system develops over time.Comparing the estimated kernel density TGs for the years 2000, 2003, 2008 and 2013 in relation to all the regions in the entire countries for each single year we found different behavior in terms of TGs but with a clear lower level of TG year by

year reaching the lowest peack in 2013.Moreover, analysis of the TGs of the European health system at regional level at almost 4 years intervals demonstrating a general trend toward unimodal convergence club over 14 years but with a wider flat right tail.All the pre-crisis functions show a distribition of small multi-peaks with the majority of regions located close to the mean, while after the crisis, in 2013, the distribution is wider and less concentrated around the peak.The main important results is that the three health systems work inefficiently since they do not allow the reduction of the TGs homogeneously among the regions.

Finally, it should be noted that the results of our study are dependent on the countries included and the variables used.Further research may be carried out to extend this study by covering a greater number of countries with a wider period of examination.Moreover,it would be interesting to examine the possible drivers responsible for the behavior of different groups with respect to their productive performance and technology gap characteristics.

Acknowledgements

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APPENDIX A

Table 1. Countries and regions comprising the sample under consideration.

Names of countries and regions.	
Country	**Region**
Austria	Burgenland Wien Tirol Niederõsterreich Salzburg Steiermark Vorarlberg Oberösterreich Kärnten
Bulgaria	Severozapaden Yugoiztochen Severoiztochen Yugozapaden Yuzhen Tsentralen Severen Tsentralen
Czech Republic	Jihovýchod Praha Strední Cechy Jihozápad Moravskoslezsko Severovýchod Strední Morava Severozápad
Finland	Pohjois-ja-Itä Suomi-Åland
France	Alsace Lorraine Basse Normandie Bourgogne Pays de la Loire Languedoc Roussillon Provence Alpes Côte d'Azur Auvergne Franche Comté Champagne Ardenne Picardie Centre-Poitou Charentes Nord Pas-de-Calais France (metropolitan) Guadeloupe Bretagne Haute Normandie Alpes Réunion Limousin Île de France Midi Pyrénées Aquitaine Guyane Rhône
Germany	Nordrhein Westfalen Niedersachsen Sachsen Schleswig Holstein Berlin Sachsen Anhalt Saarland Rheinl Pfalz Baden Württemberg Hessen Brandenburg Bayern Mecklenburg Vorpommern Hamburg Thüringen-Bremen
Greece	Crete Centre Ellada ThessalyCentral Macedonia Western Macedonia East Macedonia Peloponnese Ionia Islands Epiros Western Greece Thrace South Agean North Aegean Attica
Hungary	Közép Magyarország Észak Magyarország Nyugat Dunántúl Közép Dunántúl Észak Alföld Dél Dunántúl-Dél-Alföld
Italy	Valle d'Aosta Provincia Autonoma di Bolzano/Bozen Abruzzo Sardegna Lombardia Veneto Emilia Romagna Lazio Molise Liguria Sicilia Marche Calabria Basilicata Campania Piemonte Toscana Puglia Provincia Autonoma di Trento

The Netherlands	Flevoland Zuid-Holland Limburg Noord-Holland Friesland (NL) Utrecht Drenthe Gelderland Groningen Overijssel Zeeland
Norway	Sørostlandet Vestlandet Oslo og Akershus Agder og Rogaland Nord Norge Hedmark og Oppland Trøndelag
Poland	Dolnoslaskie Wielkopolskie Podlaskie Slaskie Lódzkie Kujawsko-Pomorskie Warminsko-Mazurskie Opolskie Zachodniopomorskie Mazowieckie Lubelskie Swietokrzyskie Podkarpackie Malopolskie Pomorskie
Portugal	Centro Algarve Alentejo Área Metropolitana de Lisboa Norte Região Autónoma dos Açores Região Autónoma da Madeira
Romania	Nord-Vest Centru Bucuresti–Ilfov Nord-Est Sud-Est Sud–Muntenia Sud-Vest Oltenia Vest
Slovakia	Stredné Slovensko Východné Slovensko Západné Slovensko Bratislavský kraj
Spain	Castilla la Mancha Andalucía Galicia Ciudad Autónoma de Melill Cantabria Canarias Principado de Asturias-Castilla y eón Comunidad Foral de Navarra Región de Murcia Comunidad de Madrid Cataluña La Rioja Aragón-Illes Balears Extremadura País Vasco-Comunidad Valenciana
Sweden	Östra-Mellansverige Norra Mellansverige-Västsverige-Småland med Öarna-Mellersta Norrland-Sydsverige-Övre Norrland Stockholm

Table 2. Average descriptive statistics of the variables used per health system and total for the period 2000-2013.

	Health System			
Variables	**Total**	**NHS**	**SHI**	**ESTAT**
Beds	569.342 (215.213)	579.187 (211.214)	548.925 (218.663)	566.3633 (218.402)
Doctors	421.412 (386.667)	343.558 (114.188)	787.9461 (519.274)	331.568 (108.196)
Nurses	748.561 (428.682)	768.191 (380.747)	728.833 (347.749)	730.986 (523.622)
Life Expectancy	78.817 (2.991)	78.768 (3.028)	79.391 (2.958)	78.571 (2.918)
Crude death rate	999.321 (193.791)	1040.273 (198.319)	1015.082 (121.403)	931.167 (201.198)
Infant Mortality	104.892 (132.5789)	100.4804 (125.145)	87.921 (114.691)	104.954 (132.528)
Obs	2.590	1.251	477	862

Note: Numbers indicate the mean value while parentheses correspond to the standard deviation.

Table 3. Average descriptive statistics for technical, metatechnical efficiency and technology gaps for the individual groups.

Productive performance scores			
Health type	**Technical Efficiency**	**Metatechnical Efficiency**	**Technology gap**
NHS	0.974 (0.034)	0.871 (0.034)	0.109 (0.086)
SHI	0.989 (0.020)	0.87 (0.064)	0.122 (0.061)
ESTAT	0.976 (0.026)	0.865 (0.071)	0.117 (0.064)
Total	0.977 (0.030)	0.869 (0.083)	0.114 (0.076)

Note: Numbers indicate the mean value while parentheses correspond to the standard deviation.

Table 4. Productive Efficiency scores and Technology gap values for the each health system for 1995-2011.

Technical Efficiency-Technology Gaps Scores									
Year	**Scores**	**ESTAT**	**NHS**	**SHI**	**Year**	**Scores**	**ESTAT**	**NHS**	**SHI**
2000	TE	0.981	0.955	0.979	**2007**	TE	0.963	0.978	0.981
	TG	(0.019)	(0.028)	(0.034)		TG	(0.032)	(0.025)	(0.011)
		0.092	0.071	0.088			0.115	0.110	0.131
		(0.048)	(0.055)	(0.035)			(0.093)	(0.108)	(0.095)
2001	TE	0.960	0.978	0.984	**2008**	TE	0.982	0.980	0.995
	TG	(0.027)	(0.021)	(0.029)		TG	(0.019)	(0.021)	(0.005)
		0.112	0.121	0.092			0.169	0.151	0.189
		(0.051)	(0.018)	(0.038)			(0.052)	(0.061)	(0.026)
2002	TE	0.975	0.978	0.995	**2009**	TE	0.982	0.978	0.995
	TG	(0.029)	(0.026)	(0.006)		TG	(0.017)	(0.023)	(0.004)
		0.102	0.077	0.111			0.127	0.082	0.116
		(0.058)	(0.048)	(0.023)			(0.037)	(0.038)	(0.005)
2003	TE	0.978	0.978	0.985	**2010**	TE	0.982	0.982	0.989
	TG	(0.029)	(0.021)	(0.006)		TG	(0.019)	(0.022)	(0.017)
		0.102	0.077	0.111			0.159	0.147	0.173
		(0.037)	(0.048)	(0.023)			(0.054)	(0.071)	(0.017)
2004	TE	0.978	0.973	0.981	**2011**	TE	0.978	0.981	0.990
	TG	(0.024)	(0.029)	(0.021)		TG	(0.021)	(0.020)	(0.014)
		0.124	0.114	0.132			0.093	0.089	0.122
		(0.042)	(0.066)	(0.031)			(0.0434)	(0.056)	(0.052)
2005	TE	0.975	0.975	0.981	**2012**	TE	0.969	0.975	0.995
	TG	(0.026)	(0.031)	(0.019)		TG	(0.035)	(0.025)	(0.005)
		0.143	0.147	0.092			0.103	0.096	0.104
		(0.046)	(0.034)	(0.048)			(0.056)	(0.064)	(0.004)

2006	TE	0.978	0.979	0.994	**2013**	TE	0.984	0.977	0.985
	TG	(0.022)	(0.023)	(0.006)		TG	(0.016)	(0.024)	(0.004)
		0.126	0.108	0.138			0.070	0.071	0.078
		(0.102)	(0.100)	(0.101)			(0.061)	(0.073)	(0.066)

Note: Numbers indicate the mean value while parentheses correspond to the standard deviation.

APPENDIX B

Figure 1: Bohm et al

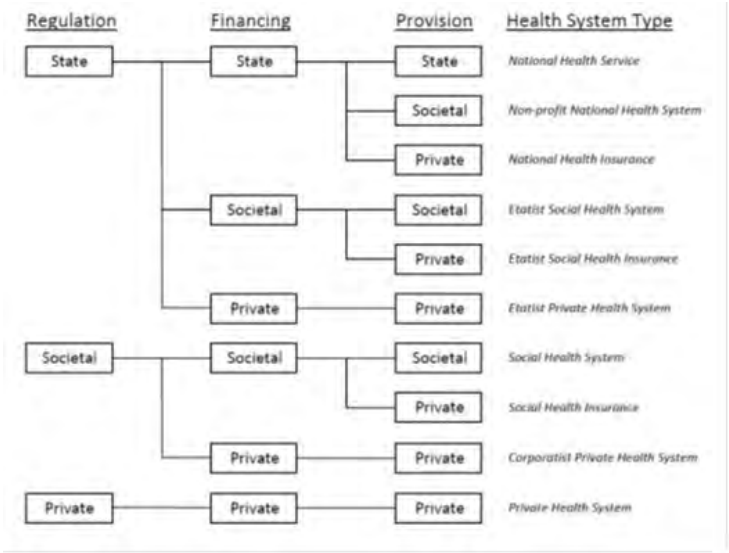


Figure 2: Directional metafrontier, individual frontiers, for the single output-single input case.

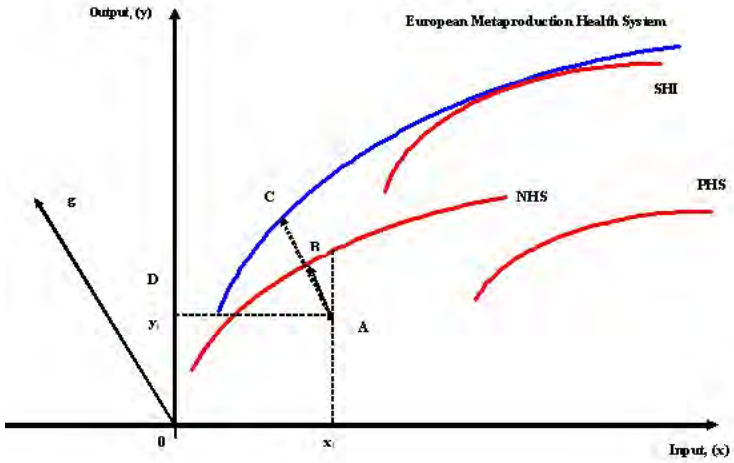


Figure 3: Estimated Kernel density for European health regions over the 2000-2013 period

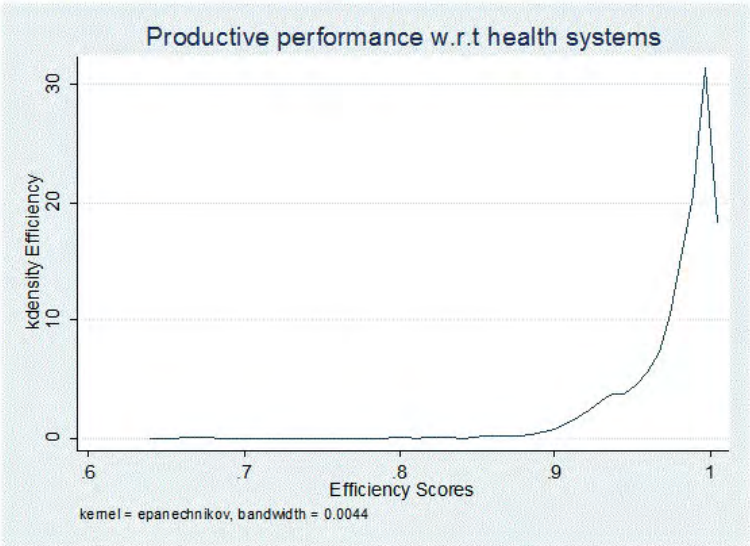


Figure 4: Estimated Kernel density for European health regions for the periods 2000, 2003, 2008 and 2013.

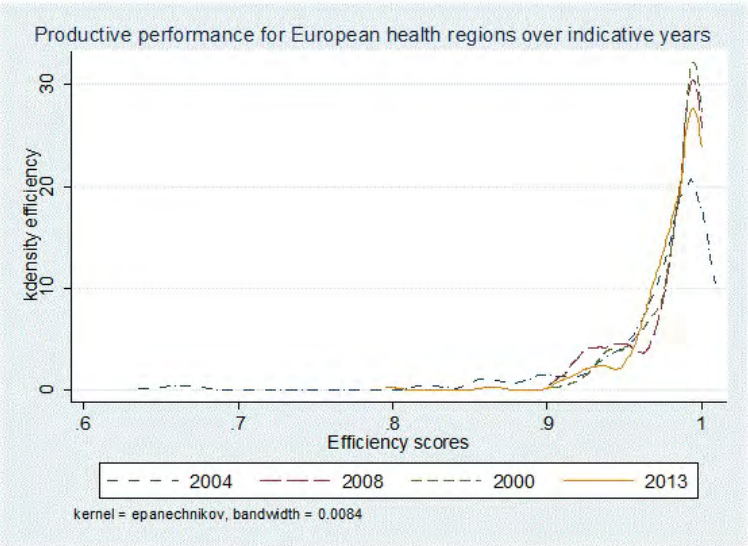


Figure 5: Estimated Kernel density for Metafrontier over the 2000-2013 period

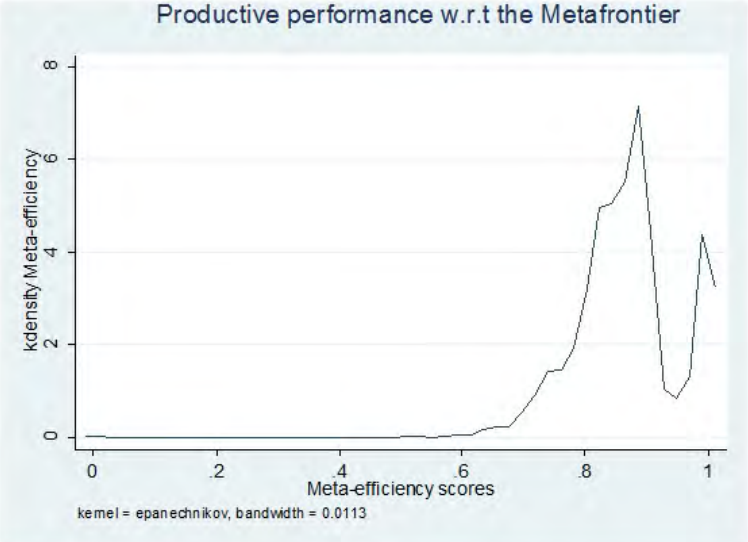
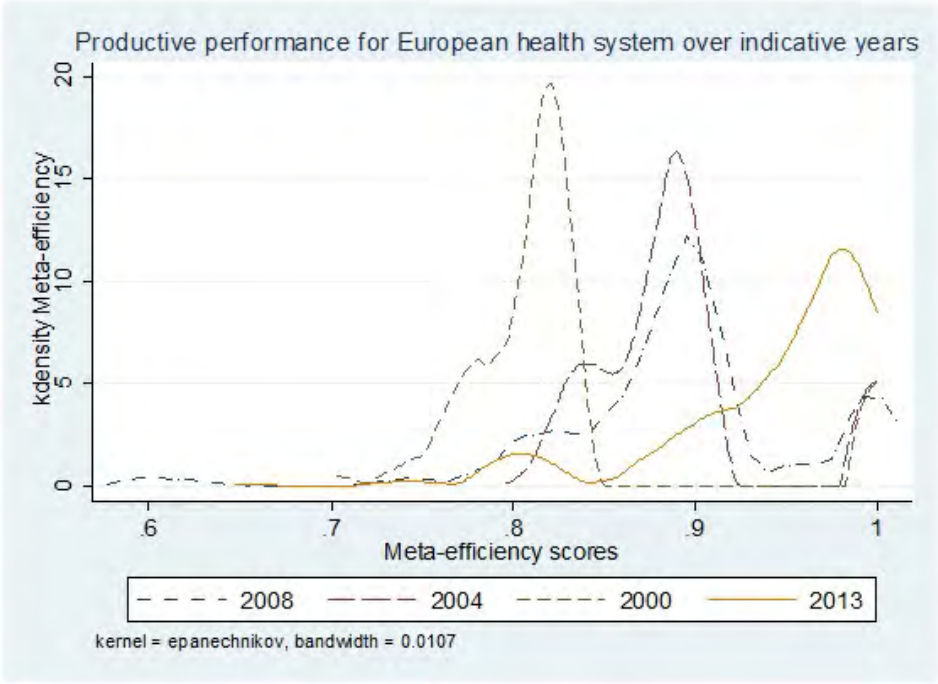
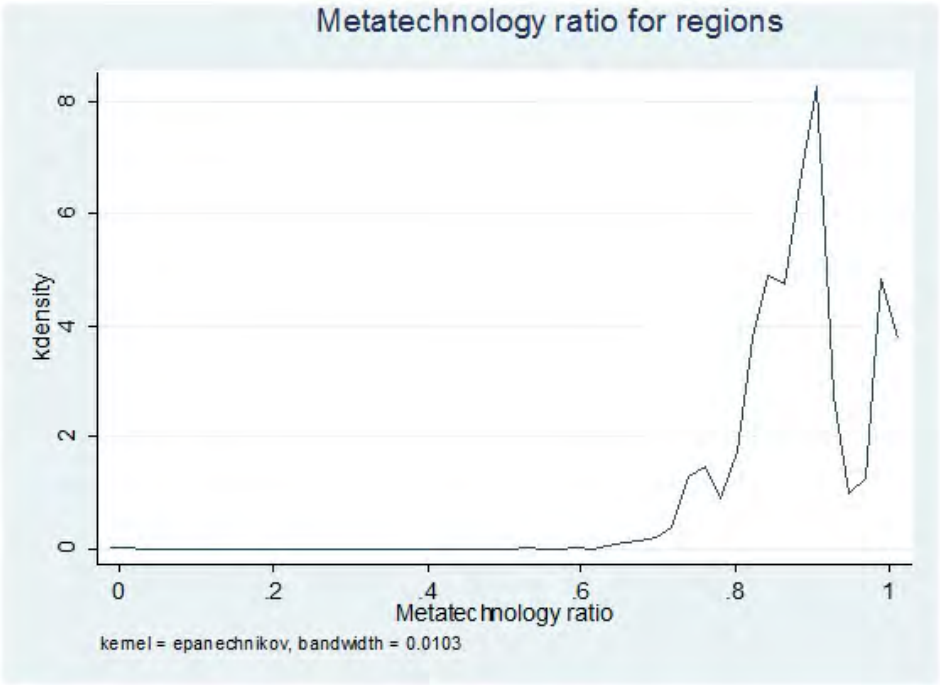


Figure 6: Estimated Kernel density for Metafrontier for the periods 2000, 2004, 2009 and 2013.



Note:The rationale behind the selection of the years 2000, 2004, 2009 and 2013 is that they represent the initial period, two middle periods and the end of our sample.

Figure 7: Estimated TG over the 2000-2013 period.



Note:The rationale behind the selection of the years 2000, 2004, 2009 and 2013 is that they represent the initial period, two middle periods and the end of our sample.

Figure 8: Estimated TG for the periods 2000, 2003, 2008 and 2013.

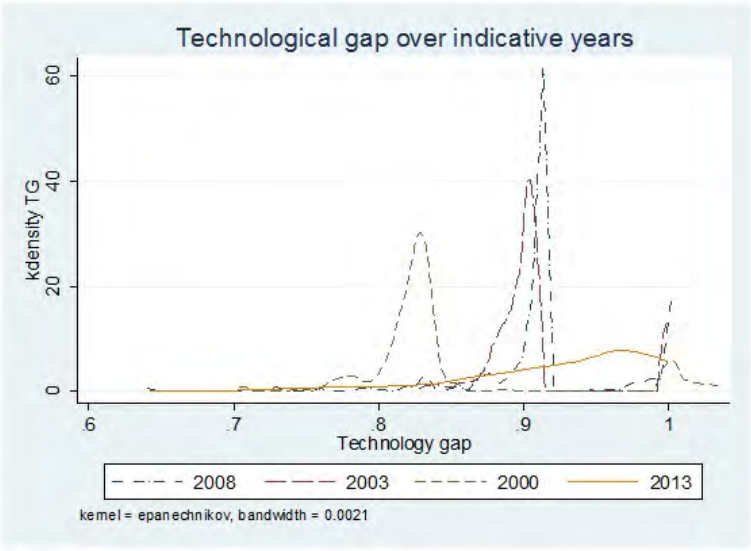
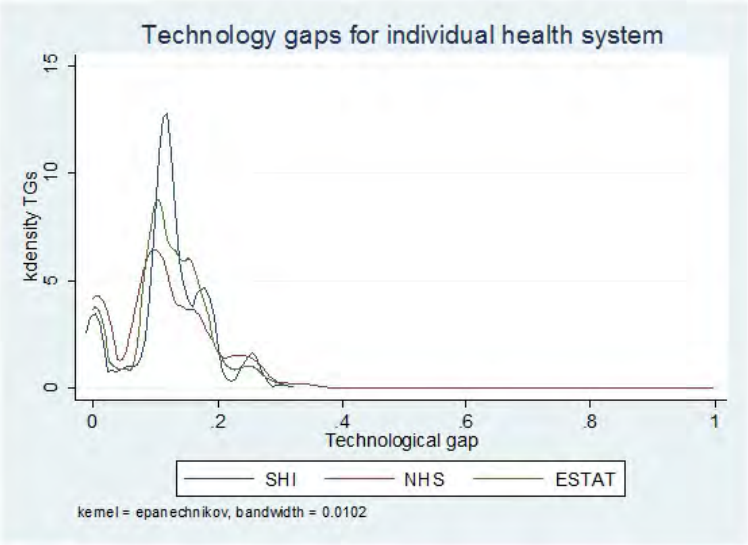


Figure 9: Estimated TG over the 2000-2013 period for each single health system.



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Economic Resilience and Regional disparities: the contribution of spatial analysis

De Siano Rita*

Abstract

The recent economic debate on the long run growth has emphasized that the social and economic evolution of a given geographical area can be influenced also by the occurrence of sudden and unpredictable shocks. In this regard, the ability to recover from or adjust to the negative impacts of external economic shocks, defined as the "Economic Resilience", can be conditioned by the pre-shock conditions. Characteristics such as the economic structure, dynamism, market and political conditions, resources endowment and the ability to innovate of a given region may contribute to shape its resistance and exacerbate, or on the contrary mitigate, economic disparities driving to either a convergence or a divergence process of income or employment across regions. Nevertheless, studies investigating the impact of economic resilience on regional disparities are still limited. The economic debated, instead, focused mainly on the research of the characteristics that would make each region most resilient in order to drive policymakers in building appropriate measures and strategies reducing the vulnerability of spatial systems to shocks and enhance their ability to better respond to and recover from a shock. It becomes crucial to account for the presence of spatial linkages, in particular when looking at policies' implications that may spread beyond the geographical boundaries and generate beneficial or harmful externalities on neighbouring regions. The use of spatial analytical tools, such as those provided by spatial econometric methodologies (Anselin, 1988; LeSage and Pace, 2009), enable to account for the presence of spatial effects that otherwise would lead to an incorrect representation and understanding of the true causal processes at work.

Keywords: Shocks, resilience, regional economies, regional disparities, spatial econometrics

JEL classification: C31, C33, O47, R11

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1. Introduction

Until a few years ago, studies on regional disparities focused mainly on the key factors of economic growth trying to shed light on the effects caused by changes in economic, technological and institutional features in terms of convergence/divergence paths. In the meantime, some studies showed that transitory shocks might also have permanent effects on macroeconomic variables rather than simply leading them to fluctuations around long-term trends (Blanchard and Katz, 1992; Cerra and Saxena, 2008). Nevertheless, the case that regions experiencing positive or negative shocks, even if returning to the previous output or employment growth rate, may place themselves on permanently different paths, has long been neglected. In the literature, the ability to recover from or adjust to negative impacts of external economic shocks is defined as "Economic Resilience". The investigation of regional economic resilience provides useful insights for policymakers as public intervention, by reducing local vulnerability and increasing the ability to adjust themselves to internal or external shocks, can play an important role in stimulating resilience, accelerating the speed of recovery and shrinking the persistence of a shock.

In the last decades, several factors renewed interest on the issue of economic resilience both in urban and regional analyses. First, the occurrence of major natural and environmental emergencies that made it necessary to predict how fast and to what extent an ecological system or an economy responds to such unfavorable events. Second, the evolutionary perspective in the economic geography and the acknowledgement that shocks may have a persistent effect on growth paths (Blanchard and Katz, 1992; Cerra and Saxena, 2008; Martin, 2012; Simmie and Martin, 2010). Finally, the outbreak of the global economic and financial crisis in 2008, that hit world economies much harder than previous ones, increased the overall perceived uncertainty and the need to understand why some countries/regions/cities respond differently to economic downturns. Altogether, these factors contributed to rise the general sense of risk connected to economic as well as political and environmental conditions. On the other hand, the globalization process contributed to make places and regions more permeable and therefore more vulnerable to external shocks, motivating so the search for new paths of resilience considering also the influences of spatial interdependencies (Fingleton and Palombi, 2013; Doran and Fingleton, 2016).

The aim of this contribution is to consider the recent literature on economic resilience in order to seek an understanding of the way it affects regional growth paths and disparities. For the European context, in particular, the regional geographical disaggregation level is particularly relevant, as regions are considered as the key spatial units in the sustainable and balanced development of the EU as a whole.

This contribute takes also into account the increasing consideration that the spatial dimension is recently receiving in the applied economic modelling. Indeed, in line with the idea that "space matters", as stated by Tobler (1970) in the First Law of Geography "*Everything is related to everything else, but near things are more related than distant things*", to account for the presence of spatial linkages in regional disparities analyses is extremely important. The reason is that both shocks hitting a specific area and policies implemented to detect their aftermaths spread beyond the borders affecting also neighbouring places. In this regard, it becomes crucial to account for the presence of spatial interdependencies also in the investigations dealing with regional disparities and spatial econometrics provides a large set of alternative estimation approaches when dealing with spatial data samples (Anselin, 1988).

The rest of this contribute is organized as follows. The second section describes the concept of economic resilience and the ways it may be measured. The third section presents some insights on the relation between resilience and regional disparities. The fourth section overviews the main features of the spatial analysis tools. The fifth section concludes the paper synthesizing some of the relative few analyses on the spatial dependence of regional economic resilience.

2. Economic Resilience definition and measurement

Holling (1973) originally developed resilience as an ecological concept to describe the capacity of ecosystems to survive when subjected to disturbance or adverse environmental conditions. Later, other disciplines used this concept giving it new meanings and relevance. As regards the economic field, this concept has been applied to understand how local economies react to and recover from recessionary or other negative type of shocks (Crescenzi and Milio, 2016; Lagravinese, 2015). In particular, Martin (2012) identified three different, but not unrelated, interpretations of regional resilience, namely, engineering, ecological and evolutionary (Martin, 2012; Martin and Sunley, 2015). The notion of engineering resilience refers to the resistance of a regional system and its ability to return to its pre-shock state of equilibrium. The ecological resilience defines the scale of a disturbance a regional system is able to absorb before changing its structure and moving to a new equilibrium state. Finally, the notion of adaptive resilience is based on an evolutionary approach and denotes the ability of a region to reconfigure itself, that is to adjust its structure (industries, firms, institutions, technologies) in response to shocks so as to keep itself on a sustainable growth path (Pendall, Foster, and Cowell, 2010; Pike, Dawley, and Tomaney, 2010).

Most of the recent empirical analyses on regional economic resilience follow the evolutionary approach (Simmie and Martin, 2010; Hassink, 2010; Martin and Sunley, 2015; Boschma, 2015). The

useful insights arising from these investigations is that, rather than simply recovering from a short-term shock, cities or regions do success in preventing a decline or worse a stagnation the more they are able to develop new growth paths by boosting new industries or technological changes.

In this regards, different factors may contribute to shape the economic resilience of a specific geographical area. First of all the economic structure because a diversified industrial mix characterized by low sectoral interdependencies may surely support a greater regional resistance. Other key factors are the following: skilled and innovative workforce, modern productive infrastructures, highly developed knowledge networks (i.e. between universities and local industries and firms), supportive financial systems, liberal market conditions, policy activism (Christopherson et al., 2010; Davies and Tonts, 2010; Desrochers and Leppälä, 2011; Martin; 2012; Boschma, 2015; Di Caro, 2015; Sensier and Artis, 2016).

The measurement of economic resilience represents another relevant issue in the reference literature. An overview of the methodologies largely employed in the empirical analyses may be found in Martin and Sunley (2015) and Doran and Fingleton (2016). Although regional resilience can be measured through any macroeconomic indicator (Sensier and Artis, 2016), usually researchers choose a measure of the employment changes in order to account also for the social impact of a given recessionary shock (Fratesi and Rodriguez-Pose, 2016). Indeed, as employment takes longer to return to its pre-crisis level respect to income, greater efforts are required from policymakers in order to tackle social problems following whichever severe economic shock (Reinhart and Rogoff, 2009). To this extent, Martin (2012) suggests to measure regional resistance through a "sensitivity index" (β_r) that compares the percentage change in employment in a given region with the change at the national level. Indicating with E le level of employment, the sensitivity index is calculated as follows:

$$\beta_r = \frac{\Delta E_r / E_r}{\Delta E_N / E_N}$$

If β_r for a given region is greater than one, the region shows a low resistance to a recessionary shock respect to the country, while values lower than one imply a high level of regional resistance (low sensitivity to shocks).

The literature proposes several strategies to evaluate regional resilience. These methodologies range from descriptive analyses, that usually employ case studies comparing geographical units on the basis of more or less complex indexes (Simmie and Martin, 2010; Evans and Karecha, 2013; Bailey and Berkeley, 2014), to more sophisticated statistical and econometrics ones. The latter are usually followed in order to explore to which extent pre-existing conditions shape the ability of a region to resist to or to recover form a shock. Econometric analyses may follow either a time-series approach, more robust but requiring long time-periods (Fingleton et al., 2012), or panel data approaches, based

on multi-dimensional measurements of a number of local units over time. Recently, empirical studies started to follow different methodologies as for example spatial panel models, accounting for the presence of spatial interdependencies within places (Fingleton and Palombi, 2013), or procedures merging individual data with regional data (Doran and Fingleton, 2015, 2016).

3. Resilience and Regional Disparities

Recently, also the economic debate on the long run growth has been enriched by several contributes asserting the relevance of sudden and unpredictable shocks in determining the social and economic evolution of a given geographical area. In general, among the changes that have been recognized as the most related to local economic growth we could mention the ending of business cycle phases, sizable socio-economic reforms, closures and delocalization of key factories and environmental disasters. The empirical evidence, indeed, shows that each one of this event may exert a permanent effect with consistent aftermaths on long run growth paths (Blanchard and Katz, 1992; Krugman, 1993). Consequently, the modalities and times with which a region reacts and/or adjusts to such a disturbance become crucial. In this regard, economic structure, dynamism, market and political conditions, resources endowment and the ability to innovate of a given region may contribute to shape its resistance. Different pre-shock conditions may drive to different degrees of resilience contributing to either exacerbate or mitigate the regional disparities. In other words, regional resilience may definitely affect the convergence/divergence process of income or employment across regional economies.

Several studies investigated the possibility to extend to regional analysis what found at country level and, in particular, the evidence that countries hit by more severe or frequent negative shocks show lower growth rates (Cerra and Saxena, 2008). To this end, Martin and Sunley (2015, p.22) state that a "*recessionary or other shock may be so pronounced that it causes significant structural and functional change, leading to a permanent shift in a region's 'maximum feasible growth ceiling' and thence its actual growth path*". Indeed, they suggest that a recession could be so severe as to cause the disappearance of a large number of companies and a deep loss of resources (labor and capital) that a region will very difficult recover its pre-shock position (Martin, 2012). Consequently, it can be pushed to a lower growth path and, then, either recover its pre-shock growth rate or not. A strong negative economic shock might so shrink the current and short run regional income and employment levels and, due to an irreversible deterioration of businesses' climate and confidence, prejudice the possibility of any future recover, too. This occurrence indicates a high sensitivity of a region to a recessionary shock and, hence, a relative low degree of resilience.

On the contrary, when a strong negative shock causes the disappearance of most unproductive firms and practices, resources like capital and labor can be reallocated to more productive economic activities. The consequent rise in productivity, together with a renewed wave of growth, may even favor the attraction of additional resources from other regions, above all from neighboring regions. A higher capacity of reaction may help a region to shift upwards its growth path and go beyond its pre-shock output or employment feasible 'ceiling'. This represents the situation in which a region exhibits a high degree of robustness and resilience.

Empirical studies investigating the impact of economic resilience on regional disparities is still limited. Among others, Fingleton et al. (2012) focused on changes in employment and output over the past forty years in the based 12 major UK regions (NUTS-1 level) finding a sort of homogeneity in regional effects and aftermaths of the recessionary shocks occurred in the time period. Analogous result emerges from the analysis by Cellini and Torrisi (2014) conducted on the 20 Italian regions (NUTS-2 level) observed over a longer time-period (1890-2009). Controlling for different length of recovery and different estimators the study shows that the recovery effects from any single shock are equal across regions. Simmie and Martin (2010), instead, by using narrower local units do success in finding significant effect of economic resilience on regional disparities. The researchers used a two cities case study, considering Cambridge and Swansea as units of analysis, to explore the usefulness of the adaptive cycle model in shaping regional economic resilience. These case studies suggested that endogenous sources of new knowledge, together with a dynamism in entrepreneurial environment, institutions and cultures, are key factors for the capacity of the local economy to adapt and react to external shocks. Similarly, the absence of these features may contribute to the lack of resilience and the exacerbation of regional inequalities.

4 An overview of Spatial analysis

Accounting for the presence of spatial linkages is extremely important when analysing the determinants of regional economic development as policies implemented at any place to detect problems of a specific geographical unit can also influence the proximate locations. In this regard, spatial analysis provides different tools to detect such spillover effects generated by the presence of spatial interdependencies (Anselin, 1988). The key instrument of this methodological approach is the Weight Matrix that models the spatial relationship among different regions. The spatial weight matrix is a table with cell values quantifies the spatial relationship between regions he regions identified by the row/column combination. There are different weighting possibilities including inverse distance, fixed distance, K-nearest neighbours, contiguity and spatial interaction. The selected

conceptualization should be the one that best reflects the way regions actually interact with each other in the real world. Weights may be either binary or variable. Binary weights, used with fixed distance, K nearest neighbours and contiguity spatial relationships, indicate whether a relationship between two regions does actually exists, in which case regions are considered as neighbours and the associated cell value is 1, otherwise it is 0. For inverse distance or inverse time spatial relationships the weights range from 0 to 1 and grow as the "distance" between regions increases. When regions have an unequal number of neighbours, or when there are problems linked to sampling schemes, spatial matrix are row standardized in order to get proportional weights.

The Exploratory Spatial Data Analysis (ESDA) is the first step to check whether spatial patterns do exist, in other words, whether there is a clustering in the space and, in this case, if it's the case of high or low values cluster. Clustering of high values, emerging when standard deviations away from the mean of the sample are positive, indicates the presence of a positive spatial autocorrelation (Anselin et al., 2000) while, in the opposite case, the spatial autocorrelation is negative.

To test for the presence of spatial interdependencies ESDA provides both global and local indexes. The most common measure of global spatial autocorrelation is the Moran's I statistic (Moran, 1948):

$$I = \frac{\sum_{ij}^{R} w_{ij}(x_i - \mu)(x_j - \mu)}{\sum_{i}^{R}(x_i - \mu)^2}$$

where x_i represents the variable describing the phenomenon under study in region i, μ is the sample mean and w_{ij} is the weight of a row-standardized spatial matrix. The expected value of the Moran index (E(I)) is equal to *-1/(R-1)*. Values of I greater than the expected value indicate positive spatial autocorrelation, which means that regions with high (low) values tend to be located close to other regions with high (low) levels. By contrast, values of I lower than the expected value indicate a negative association, and hence a tendency for dissimilar values in nearby regions.

Local indicators of spatial clustering analysis consider the relationship between each couple of neighboring regions, identifying hot spots (high-value clusters) and cold spots (low-value cluster). Among these tests there are the Getis-Ord statistic (Getis and Ord ,1992; Getis and Ord, 1995; Sokal et al., 1998), the Moran scatterplot (Anselin, 1996) and the Local Indicator of Spatial Association LISA, (Anselin, 1995).

The Getis-Ord test refers to the concentration of values of the variable of interest in the neighborhood of region *i*. The original statistic is as follows:

$$G_i = \frac{\sum_{j=1}^{R} w_{ij} x_j}{\sum_{j=1}^{R} x_j} \qquad \text{with } j \neq i$$

where w_{ij} is the corresponding element of a non-standardized symmetric binary weights matrix which attributes 1 to neighboring regions and 0 to the others and to the pivot region. Positive values of G_i indicate spatial clustering of highly values around region *i*, while negative values indicate a cluster of regions showing low values.

Finally, The Local Indicator of Spatial Association (LISA) provides a way to asses significant local spatial patterns using the local version of Moran's I statistic for each spatial unit *i*:

$$I_i = \frac{(x_i - \mu)}{m_0} \sum_{j}^{R} w_{ij}(x_j - \mu) \qquad with\ m_0 = \sum_{i}^{R} (x_i - \mu)^2 / R$$

A positive value for I_i indicates spatial clustering of similar values (high or low) whereas a negative value indicates spatial clustering of dissimilar values between region *i* and its neighbours.
As regards modeling spatial interaction (Anselin, 1988), depending on the type of interaction between observations of neighboring units, different specifications may be followed.

- *Spatial Autoregressive Model* (SAR) is the proper specification when the outcome in a given region is affected by the outcome in neighboring regions (spatial lag model):

$$\boldsymbol{y} = \lambda \boldsymbol{W y} + \boldsymbol{X}\beta + \boldsymbol{\varepsilon}$$

where λ is the spatial autocorrelation parameter, $\boldsymbol{Wy}$ represents the spatially lagged value of the dependent variable, $\boldsymbol{X}$ is a vector of explanatory variables and $\boldsymbol{\varepsilon}$ is the independently and identically distributed error term for region *i* with zero mean and variance σ^2.

- *Spatial Error Model (*SEM), when spatial interdependency passes through unknown characteristics of the neighboring regions.

$$\boldsymbol{y} = \boldsymbol{X}\beta + \boldsymbol{\varepsilon}$$
$$\boldsymbol{\varepsilon} = \rho \boldsymbol{W \varepsilon} + \boldsymbol{\upsilon}$$

with υ assumed to be normal with zero mean and variance σ^2 I.

• *Spatial Durbin Model* (SDM), which includes both spatially lagged dependent and independent variables.

$$\boldsymbol{y} = \lambda \boldsymbol{W}\boldsymbol{y} + \boldsymbol{X}\beta + \boldsymbol{W}\boldsymbol{X}\theta + \boldsymbol{\varepsilon}$$

The most appropriate spatial model specification is identified by means of Lagrange Multiplier for a spatially lagged dependent variable (LMlag) and for the spatial error autocorrelation (LMerr) tests (Anselin et al., 2006; LeSage and Pace, 2009). The null hypothesis for these tests is the absence of spatial dependence.

5 Evidences on spatial dependence in resilience empirical analyses

The empirical literature dealing with the effects of spatial dependence in the regional economic resilience analysis is still scarce. So far, the spatial econometrics modelling have been used to obtain counterfactual predictions on income or employment market features (wages and employment levels) to compare with the actual paths that followed a negative economic shock. The main aim of this type of comparisons is to investigate the transmission of economic shocks across different geographical locations and to test whether the responsiveness of each of them may be influenced by the presence of spatial interdependencies.

The first study analyzing local economies resilience to recessionary shocks in a context of spatial interdependence is that of Fingleton and Palombi (2013). In particular, their study analyzes the relative resilience of UK towns to the major recessionary shocks occurred in the historical period 1871-1906. By combining the insights of the resilience literature and spatial econometrics methods to model the transmission of the shocks they show that highly and increasingly specialized towns resulted to be relatively more prone to shocks. The sectoral composition of employment, therefore, turns out to be crucial for the economic resilience. The more the productive activity is diversified the higher the ability of a town to adapt to a shock and even to outperform their counterfactual paths by the end of the post-shock period.

Given the acknowledgment on the validity of spatial panel data model for forecasting purposes, Angulo et al. (2014) followed the work by Fingleton and Palombi (2013) to evaluate the impact of the 2007 crisis on the employment annual growth rate of the Spanish provinces. Different spatial panel specifications were initially used to analyze the evolution of the employment before the crisis, from 1980 to 2006. After choosing the best model in adjusting the data, the researchers used the

estimation results to forecast employment annual growth rates over the period after the crisis and considered them the counterfactual values, that is what would have been the rates if the crisis had not taken place. Finally, counterfactual values have been compared to actual ones in order to measure the responsiveness of each province to the economic crisis. Using a localization quotient as a measure of economic specialization, the researchers explored also the possibility that the crisis did not equally affect all sectors. In doing so, they found that sectors as non-market services and construction showed a higher vulnerability to the economic shock while specialization on energy, manufacturing, transport and common services reinforced the resilience of provinces helping them to return to their pre-shock growth paths.

Another study that confirms the importance of the industrial structure on the economic resilience is the analysis of the impact of the 2008 crisis on the US metropolitan areas by Doran and Fingleton (2018). The main contributes of this paper are the use of a spatial dynamic panel model, to account for dynamic as well as for spatial interactions, and the introduction of covariates that enable to obtain consistent results in presence of problems of omitted variables and potential endogeneity of regressors. The key findings of this analysis are, first, that high-specialized metropolitan areas appear to be more severely affected by the crisis and, second, that during the post-crisis period a structural change may help the recovery of the area.

Differently from other studies focusing on aggregated data at city, region or country levels, Doran and Fingleton (2016) use micro-level data for a sample of 13 European countries to analyze individual employment resilience to the 2008 economic crises. More precisely, this paper follows an empirical methodology that merges individual and regional data (Doran and Fingleton, 2015). Data from the European Social Survey (ESS) over the period 2002-2008 are taken to investigate the influence of individual characteristics like education and age and regional unemployment rate on individual employment resilience by controlling also for potential labor market spillover effects across regions. Results reveal that Central Europe regions appear to be more resilient than peripheral ones with regions of Ireland, Spain and Portugal most severely affected by the 2008 crisis. As regards individual characteristics, high skilled individuals are more resilient than low skilled suggesting that, on one side, education increases the possibility to find a job and, on the other, it makes employees more resilient to negative economic shocks. Moreover, middle-aged individuals are more resilient than younger and older individuals are.

6. Conclusions

The idea of regional economic resilience, usually employed to describe how regional economies respond to undesired external disturbances, refers to the ability of regions to resist and recover from

a given shock. Actually, this concept has been used to analyze various dimensions of regional economic performances (Martin and Sunley, 2015; Giannakis and Bruggeman, 2017), such as the vulnerability or the sensitivity to different types of shocks, the resistance to the impact of economic shock impacts, the way firms, workers and institutions respond or adapt to shocks, and, finally, the nature of recovery. Empirical evidences show that different pre-shock conditions may influence regional resilience contributing to either exacerbate or mitigate economic disparities, affect in this way the convergence/divergence process of income or employment across regions. Nevertheless, studies investigating the impact of economic resilience on regional disparities are still limited.

The economic debated focused mainly on the research of the characteristics that would make each region most resilient in order to drive policymakers in building appropriate measures and strategies reducing the vulnerability of spatial systems to shocks and enhance their ability to better respond to and recover from the crises (Bristow and Healy, 2014; Crespo, Suire and Vicente, 2014; Wink, 2014). However, various theoretical analyses evidence the presence of beneficial or harmful externalities created by policies in one region on neighbouring regions (Kelejian and Robinson, 1993; Solé-Ollé, 2006). The reasons why this occurs may be different, from the intergovernmental competition (Buettner, 2001) to the case of policy "mimicking", when voters judge the competence of their own politicians comparing their performances with neighbours' ones (Salmon, 1987; Besley and Case, 1995). To account for the presence of externalities and spillover mechanisms, empirical analyses may relate to spatial econometrics approaches that enable to consider both geographical and socio-economic proximities (Anselin, 1988; Corrado and Fingleton, 2012).

This is needed since that failure to acknowledge the presence of spatial effects would result in a misspecified model (LeSage and Pace, 2009), and lead to an incorrect representation and understanding of the true causal processes at work.

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