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ATINER CONFERENCE PAPER SERIES No: SOC2017-2392

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This paper should be cited as follows:

Carradore, M. (2018). **"A Synthetic Indicator to Measure Social Capital in the Different Italian Regions: A Before and After Comparison of the Economic Crisis",** Athens: ATINER'S Conference Paper Series, No: **SOC2017-2392.**

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URL Conference Papers Series: www.atiner.gr/papers.htm

ISSN: 2241-2891
14/02/2018

A Synthetic Indicator to Measure Social Capital in the Different Italian Regions: A Before and After Comparison of the Economic Crisis

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Abstract

The distribution of social capital across the different Italian regions has been the subject of academic interest in Italy for many years. In the wake of the pioneering work by Robert Putnam (1993), researchers have identified various patterns of social capital using different approaches and indicators. Social capital can be considered a "set of social relations" that provide access to different types of resources, and these social relations can be informal and/or formal. Using the distance method approach as applied by Pena (2009), two synthetic indicators were created to measure the social capital of the different Italian regions: one using data collected during the year 2003; and a second using data pertaining to the year 2013. The data sources were the "Aspects of daily life" surveys and the units of analysis were the 20 Italian regions. These two synthetic indicators permit the distribution of social capital before and after the 2008 global financial crisis to be compared, to rank the Italian regions and to evaluate the impact of each individual indicator on the synthetic indicator. The main findings can be summarized as follows: the synthetic indicators confirm the disparity in social capital between the north and the south of Italy; some northern regions with high levels of social capital prior to 2008 had lost their social capital endowment in the second time period considered; and the simple indicators used to calculate the synthetic indicator of social capital have a differential affect upon the latter. The results of this study forecast that the gap in social capital between northern and southern Italy will increase; the development of additional initiatives for monitoring and measuring social capital are therefore required.

Keywords: *social capital, territorial disparities, synthetic indicator, distance DP_2, Italian regions*

Acknowledgments: I would like to thank Prof. Pilar Zarzosa Espina from the University of Valladolid (Spain) for her advice regarding the technical aspects of the methodology. However, the responsibility of the content remains the Author's. I would also like to thank the anonymous reviewers for their invaluable comments and suggestions on how to improve the quality of the paper.

Introduction

The concept of social capital has been adopted by scholars in a number of research fields and its meaning varies according to different theoretical frameworks, hence it has been measured using many different indicators.

First introduced into the literature by Hanifan in 1916, but resumed much later by Loury (1977), the first systematic definitions of social capital were formulated by Bourdieu (1986), Coleman (1988, 1990) and Putnam (1993, 2000).

Bourdieu (1986), who considered social capital together with others forms of capital such as cultural, economic and human capital, defined it as "the aggregate of the actual potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (Bourdieu 1986: 248). This vision of social capital, however, was heavily criticized because it was considered too reductionist and in favour of economic capital (Alexander 1996, Jenkins 1992).

Coleman, on the other hand, defined social capital by combining two theoretical concepts: the functionalist view of social action and rational theory. By combining his interpretations of these concepts, Coleman proposed that "Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure" (Coleman 1990: 302). However, others consider Coleman's definition to be weak, and some of the main criticisms in its regard included: that it did not adequately recognise the difference between resources and the ability of network members to obtain them (Portes 1998); it focuses on network closure as a precondition of the functionality of social capital (Lin 1999); and that it fails to explain how social capital turns from an individual feature into a community quality (Portes 2000).

According to Putnam, social capital "refers to features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions" (Putnam 1993: 167) and similar to economic capital and human capital, social capital enables goals to be achieved that would not otherwise be achieved in its absence. Later, Putnam reformulate his first definition as: "Whereas physical capital refers to physical objects and human capital refers to the properties of individuals, social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them. In that sense social capital is closely related to what some have called "civic virtue". The difference is that "social capital" calls attention to the fact that civic virtue is most powerful when embedded in a sense network of reciprocal social relations. A society of many virtuous but isolated individuals is not necessarily rich in social capital." (Putnam 2000: 19). The major remonstrance attributed to Putnam's theory concerns, not only the way in which trust was aggregated as indicator of social capital, but also the way it is related to associational participation, economic growth and democratic culture at regional or national levels (Tzanakis 2013).

The Cambridge Dictionary of Sociology defines social capital as one that "arises from relationships between individuals, families, groups, or communities that provide access to valuable benefits and/or resources" (Manza 2006: 557) and this is the definition adopted in the present work. Although less tangible than economic capital, social capital has the same characteristics: it can be accumulated and bears value to its holders, which can invest in it in ways such that it is able to produce other social advantages.

Furthermore, an animated discussion, as underlined by Andriani and Christoforou (2016), has taken place in the literature about how social capital should be defined and measured; thus, observations on the indicators used to assess social capital are also commonplace in the literature. In fact, in some cases, social capital has been assessed using "indirect" or "outcome" indicators (Pisani 2014), such as: crime rate, teenage pregnancy, blood donation, participation rates in tertiary education (Sabatini 2008, 2009b), which, according some scholars (Righi and Turi 2007, Righi 2013), are not key elements of social capital, but instead regard networks, social norms and the element trust. In other research, especially in cross-national studies, social capital has been reduced to a single proxy measure, such as trust (Fukuyama 1995) or voluntary association participation (Rotolo 1999, Wollebaek and Selle 2002, Hustinx et al. 2013).

Social capital is a multidimensional concept and for this reason it is useful to detect it using many different dimensions, such as: family ties, information ties, voluntary organizations, and political participation; and not just a single dimension, like trust. Moreover, the understanding of social capital is important in the current era of declining public resources, as stated by Engbers et al. (2017).

Numerous research studies exist concerning the distribution of social capital in the different Italian regions. However, the majority of studies mainly focus on a specific year; thus, the literature suffers from the lack of temporal comparative studies on social capital. In other words, little research has been directed at comparing the social capital "trends" over time. However, such studies are needed, especially considering the recent/current economic crisis. This investigation therefore aims to compare the distribution of social capital in two different years, one characterized by the aftermath of a global economic crisis and the other prior to this time, in order to see how regional social capital endowment has changed in Italy as the economic crisis has unfolded. To achieve this goal, a new social capital measurement method was adopted: the Pena (1977) distance approach combined with the synthetic indicator approach. Italy can be considered as an appealing case study because, not only was it the first "setting" for Putnam’s (1993) research, but it also presents different cultures within it. One of these cultures was underlined, for example, by Banfield (1958) in terms of the "amoral familism" theory. Furthermore, the different levels of socio-economic development (Bagnasco 1977) represent Italy as a non-homogenous case, which deserves attention. Here, the focus is on the twenty Italian regions, and not, for example, on other sub-levels, such as the provinces as has been the focus in other studies (Cartocci 2007, Scarlatto 2001), because, via the processes of decentralization, the regions have increased

their functions during the years, assuming a major role in delivering services and coordinating the different actors between local and central government; the Italian regions therefore represent a strategic dimension for studying socio-economic development.

The present paper is structured as follows. First, a review of the literature concerning the spread of social capital at the Italian regional level is presented. This is followed by a description of the methods used, the data and the indicators. The results section presents the synthetic social capital indicator output and the discrimination power of each simple indicator used. The main results are summarised in the conclusions.

Brief Review of the Studies that Describe How Social Capital is Distributed across the Italian Regions

This section considers some of the most relevant research papers concerning the distribution of social capital in different Italian regions. Specifically, studies are assessed that consider the Italian regions as the unit of analysis and that apply statistics to evaluate their data (e.g., studies that build an index of social capital using the mean values of indicators, and that apply factor analysis and cluster analysis or other arithmetic methods to draw their conclusions).

Robert Putnam's (1993) research concerning the performance of regional institutions in Italy aggregated four variables – preference voting (1953-79 years), referendum turnout (1974-87 years), newspaper readership (1975 year) and scarcity of sports and cultural associations (1981 year) – to form a single indicator for each Italian region in order to measure civic engagement. This pioneering work led to the studies on the distribution of social capital across the Italian regions and since then research into social capital have multiplied, following different perspectives, such as political (Cartocci 2007, Bordandini and Cartocci, 2014, Cartocci and Vanelli 2015), economic (Nuzzo 2006, Pedrana 2012, Rizzi 2003, Sabatini 2008, 2009a, 2009b) and sociological viewpoints (Carradore 2009, Righi and Turi 2007, Righi 2013). Moreover, not only has the topic of social capital attracted the interest of academic researchers, but it has also been a subject of debate for national institutions, such as the Bank of Italy and the National Institute of Statistics (Istat).

Nuzzo, for example, published a paper in 2006 on the Economic History Working Paper series of the Bank of Italy in which he ascertained whether regional differences in social capital endowment are unrelenting or convergent. Starting form a set of twelve indicators concerning trust, social and political participation, Nuzzo created a synthetic indicator of regional social capital for each decade starting from 1901 and ending in 2001. What emerged from the historical analysis, according to the author, is that a moderate level of the convergence exists regarding regional social capital endowment, while it was not possible to identify the trend at the national level. However, although Nuzzo (2006) recognized some convergence signals, he underlined the persistence of the differences between the different Italian regions.

Cartocci's (2007) research, although mainly focusing on 103 Italian provinces, a level of analysis lower than regional "status", allows us to understand, as pointed out by Righi (2013), which regions are more prosperous in social capital and which suffer from a lack of social capital.[1] Four indicators – 1) newspaper diffusion; 2) turnout in national elections, European elections, and referendums during the 1990s; 3) blood donations; and 4) participation in voluntary associations – were used to measure social capital and referred to in the years 1999-2002. The work underlines, once again, that the northern regions are endowed with more social capital than the southern regions.

Righi and Turi (2007), on the other hand, applying a benchmarking method to official statistical data collected over the period 2001-2003 generated a description of regional social capital performance, i.e., how social capital is distributed between regions, thus providing a tool for policy makers to evaluate social issues and improve social cohesion.

As far as social capital is concerned, the authors identified seven key indicators concerning social participation, civic participation, social interactions and trust.[2] Once again, the results show that the northern regions of Italy outperform the southern regions.

The publications by Sabatini (2008, 2009a, 2009b) also provide a description of regional social capital endowment in Italy, although these studies focus on the relationships between social capital and a range of socio-economic phenomena, such as the link between social capital and economic development (i.e. human development, social well-being, health of urban ecosystem, public services, gender equality and the labour market) (Sabatini 2008), the correlation between social capital and the quality of development, inequality and public services (Sabatini 2009a), and the relationship between social capital and the human development index and labour precariousness (Sabatini 2009b). Before analysing the effects of social capital, Sabatini created some indicators of different social capital dimensions (i.e. family social capital/ bonding social capital; informal networks of weak ties/bridging social capital, voluntary organisation and political participation/linking social capital),[3] which "aggregate" them into a synthetic index.[4] The data considered in Sabatini's publications span eight years: 1998 to 2006. The concept of a "segmented" Italy once again emerges in these studies: considerable social capital endowment in the northern regions of Italy and a Mediterranean area with a considerable

[1] In this case the regional data derive from the aggregation of the provincial data thus the regional results are lost by this aggregation.

[2] The simple indicators are clustered into three areas. Social participation: 1) number of volunteers in non-profit organizations; 2) number of social organizations; 3) meeting in social or cultural circles. Civic participation: 4) donating money to a political party; 5) frequency of accessing political information. Social interactions: 6) relationships with friends. 7) Trust in others.

[3] In the 2009b publication, Sabatini also considered the dimension of civic awareness and an indicator of religious practice in his synthetic index of social capital, in accordance with Putnam (1993).

[4] Principal Component Analysis is the statistical method used by Sabatini (2008, 2009a, 2009b) to analyze the data.

lack of social capital. In the rankings proposed by Sabatini, the regions at top of the classification are Trentino-Alto Adige/Südtirol followed by Friuli Venetia Giulia and Emilia-Romagna in the 2008 paper;[5] Veneto and Valle d'Aosta in first publication of 2009 (2009a);[6] and Emilia-Romagna, Friuli Venetia Giulia, Valle d'Aosta and Emilia Romagna in the latter publication of 2009 (2009b). The three regions ranked lowest in these papers, starting from the worst, are: Sicily, Calabria and Campania (Sabatini 2008); Calabria, Campania and Sicily (Sabatini 2009a); Apulia, Calabria and Campania (Sabatini 2009b).

Carradore (2009) also performed a secondary data analysis of the Istat Multipurpose Survey - Aspects of daily life; but, unlike Sabatini (2008, 2009a, 2009b), which used indicators pertaining to eight different years, he focused on a specific period of time: the year 2003. Starting from the idea that social capital relies on social relations (Di Nicola 2006), Carradore considered five different types of social capital: social capital generated from relationships with family members, social capital generated from relationships with friends and neighbours; social capital generated from relationships between association co-members, and relationships with others in general. All these diverse kinds of social capital were used to generate a single synthetic index.[7] What emerged from the analysis confirmed the results of the abovementioned previous studies, that social capital is differentially distributed among the Italian regions: Aosta Valley, Lombardy, Trentino-Alto Adige/Südtirol and Veneto are the regions endowed with most social capital; meanwhile social capital is less diffuse in Abruzzo, Apulia, Campania and Sicily.

More recently, Righi (2013) presented an initiative to measure regional social capital, conducted by the Italian National Statistical Institute (Istat) in collaboration with the Bank of Italy. Using data from the Istat Multipurpose survey (2009), and the Bank of Italy SHIW survey (2010), Righi applied principal component analysis and identified seven factors referring to: friendship relations; social and political participation; involvement in professional/particularistic purpose associations; generalized trust; trust in "strong ties" and norms/values. These indicators were then examined using cluster analyses. The finding was that the Italian regions are split into three groups: the first composed of the northern regions and some central regions with weak altruistic values; the second composed of Basilicata and Sardinia, which have strong ties (Granovetter 1973), and the final cluster composed of the remaining southern regions plus Marche, Lazio and Abruzzo, which show a low level of participation and high particularistic trust. As emerged in all of the abovementioned papers, once again social capital is shown to be differentially distributed between the north and the south of Italy.[8]

[5] This classification also included an index of economic development.

[6] In this case, Trentino-Alto Adige/Südtirol is split into two units representing the two provinces.

[7] The synthetic index was weighted according to the values obtained from a regression model.

[8] The analysis of the single factors conducted by Righi (2013) is interesting because it allowed the author to make some observations that expanded the dichotomous North-South division.

Bordandini and Cartocci (2014),[9] using the same indicators used by Cartocci (2007) – rate of blood donors, electoral participation, volunteering and newspaper readerships – but referring to the years 2008-2013, arrived at the same conclusion as the 2007 paper, namely that the difference in the distribution of social capital between the northern and the southern regions continue to persist. At the top of the social capital index, built combining the mean values of the four indicators, is Trentino-Alto Adige/Südtirol, Emilia-Romagna and Friuli Venetia Giulia; whereas Sicily, Calabria and Campania are at the bottom of the classification.

Looking at the research considered, the ancient division between the northern and southern Italian regions still runs very deep. The northern regions have more social capital than the southern regions, and this is also true considering the historical perspective.

The data used in the studies mentioned here, which refer to different years, do not represent the reality/society at a specific time; the only exception is Carradore's (2009) publication, which used data collected in a specific year. Furthermore, with the exception of the studies by Righi (2013) and Bordandini and Cartocci (2014), the other studies are based on data collected before the year 2008 – the starting point of the global financial crisis (Lewis et al. 2010).

The literature offers a lot of studies concerned with comparing social capital endowment at the Italian regional level; however, very little effort has been directed at comparing different points in time.[10] Thus, considering the relationship between social capital and socio-economic development (Chiesi 2007, Granovetter 1973, Trigilia 2001), it would be of considerable interest to compare the regional endowment of social capital before and after the 2008 global financial crisis.

In order to achieve this objective, various indicators were adopted concerning the core dimensions of social capital and a method of analysis applied that allows the information to be synthesized into a single indicator such that it can then be ranked.

The Method Applied

The method applied to create the synthetic social capital indicator that allows both spatial and temporal comparison was first proposed by Pena (1977) and later elaborated by the same author (2009). The method has been applied to many different fields of sociological research, such as welfare (Zarzosa and Sommariba 2013, Martinez-Martinez et al. 2016), quality of life (Somarriba and Pena 2009, Somariba et al. 2015), child health and education (Rodríguez Martín 2012, Rodríguez Martín and Salinas Fernández 2012) and economic and social cohesion (del Mar Holgado Molina et al. 2015).

[9] The same results are also presented in Cartocci and Vanelli (2015).
[10] Righi and Turi (2007) present a brief comparison of the years 2001 and 2003.

The method is based on the family of distance measures, and it offers a suitable distance measure (DP_2) for creating a synthetic indicator that can deal with the problem of aggregation and the weighting of simple indicators.

For a region *j*, the DP_2 is computed as:

$$DP_2 = \sum_{i=1}^{n}\left\{\frac{d_{ij}}{\sigma_i}\left(1 - R^2_{i,i-1,\ldots,1}\right)\right\}$$

with $R_1^2=0$; where $d_i = d_i(r^*) = \left|x_{ji} - x_{*i}\right|$ with the reference base $X_* = \left(x_{*1}, x_{*2}, \ldots, x_{*n}\right)$ where:

n is the number of variables;

x_{ij} is the value of the *i* variable in the region *j*;

σ_i is the standard deviation of variable *I*;

$R^2_{i,i-1,\ldots1}$ is the coefficient of determination in the regression of X_i over X_{i-1}, X_{i-2}, …, X_1;

$\left(1 - R^2_{i,i-1,\ldots,1}\right)$ is the correction factor, which weights indicators with useful information not already included and it provides the variance part of X_i not explained by the linear regression model. In other words, these values indicate the new information explained by each single simple variable, and avoiding the duplication of information already contained in the preceding indicator.

The DP_2 index measures, therefore, the distance between each region and a fictitious base reference, which is represented by the worst possible scenario for all the simple indicators used and to which the value of zero is attributed in the social capital indicator. Thus a higher DP_2 value indicates more social capital, as it shows a greater distance from the worst theoretical condition.

This method offers multiple advantages: it allows spatial and temporal comparisons to be carried out; it permits variables expressed in different units of measurement to be aggregated; it prevents information duplication and it allows arbitrary weighting. The DP_2 distance synthetic indicator has also the following mathematical properties: existence, determination, monotony, uniqueness quantification, invariance, homogeneity, transitivity, exhaustiveness of the reference base, additivity, invariance compared with the base reference, conformity and neutrality (Somarriba and Pena 2009, Zarzosa and Somariba 2013). Furthermore, as proved by Somarriba and Pena (2009), this method offers a number of advantages over both Principal Component Analysis and data Envelopment Analysis.

It is also interesting to determine the impact of each single simple indicator as part of the synthetic indicator. To do this, the Relative Individual Information Coefficient (Zarzosa 1996) was applied. The Relative Individual Information Coefficient values come from the following equation, where *DC* is the Ivanovic (1974) discrimination coefficient: [11]

[11] The Ivanovic (1974) discrimination values, which indicate the quantity of information contributed by each variable to the final indicator, are calculated as following:

$$\alpha_i = \frac{DC_i\left(1 - R^2_{i,i-1,\ldots,1}\right)}{\sum_{i=1}^{n} DC_i\left(1 - R^2_{i,i-1,\ldots,1}\right)}$$

This coefficient, which merges the "useful information" from each simple indicator, the discriminatory power (DC) and the measures of the amount of relative (combined) information that each simple indicator contributes individually, indicates the increase occurring when that variable is incorporated in the synthetic indicator. In this way, it is possible to eliminate redundant information and weight the discrimination coefficient by the correction factor. The range is from 0 to 1 and the sum of all α_i values is equal to 1.

The Data Used

In order to answer the research questions it was necessary to identify some data that refer to social capital and that allow temporal comparison. The criteria followed to select the data were the following: data referring to social capital dimensions (as identified in the literature considered above); data referring to the same unit (i.e., region); and data referring to different years and available for all the Italian regions.

Table 1. *Variables chosen from the Aspects of daily life survey (Istat) to calculate the synthetic DP_2 indicator*

Social capital categories	**Items**	**Codes**	$\bar{x}_{2003}$ s_{2003}	$\bar{x}_{2013}$ s_{2013}
Social interaction	People declaring to be very satisfied with their relationships with relatives in the 12 months before the interview	SATRREL	35.59 4.85	33.59 6.23
	People declaring to be very satisfied with relationships with friends in the 12 months before the interview	SATRFRI	24.46 3.98	23.92 4.20
	People with relatives, friends and neighbours they can count on in case of need	COUNRFN	76.2 4.6	81.2 3.84
Social participation	People who attend meetings of associations that regard ecological or associated topics at least once a year	JOIMEAS	2.34 0.59	1.54 0.48
	People who attend meetings held by cultural societies or similar clubs at least once a year	JOIMCAS	9.46 3.73	8.77 3.39
	People who give money to an association at least	MONASS	16.46	13.2

$$DC_i = \frac{2}{m(m-1)} \sum_{j,l>j}^{k_i} m_{ji} m_{li} \left| \frac{x_{ji} - x_{li}}{\overline{X_i}} \right|$$

where m is the number of units of analysis (regions) and m_{ji} is the absolute frequency of x_{ji}. This measure ranges between 0 and 2 (Zarzosa 1996), which are the two extremes of theoretical cases as regards discriminating power. If a variable has the same value for all units of analysis, *DC* will be zero; in this case, the variable will not hold any discriminating power. Whereas, if a variable has a value other than zero for one unit of analysis (regions) (the remainder m – 1 equal to zero), *DC* will be equal to two and in this case the variable will exert full discriminating power.

	once a year		5.95	5.77
	People who have carried out unpaid work for a voluntary association in the 12 months before the interview	UNWVASS	8.66 4.02	9.56 3.64
Participation in professional/ particularistic associations	People who have carried out unpaid work for a particularistic association in the 12 months before the interview	UNWPASS	3.71 2.34	3.30 1.94
	People who have carried out unpaid work for a labour union in the 12 months before the interview	UNWLUNI	1.43 0.39	0.99 0.31
Political participation	People who have given money to a political party in the 12 months before the interview	MONPPAR	2.77 1.36	2.62 1.23
	People who have carried out unpaid work for a political party in the 12 months before the interview	UNWPPAR	1.3 0.29	1.12 0.36
	People who attended a political meeting in the 12 months before the interview	JOINPME	6.14 2.39	7.85 3.92
	People who joined a march in the 12 months before the interview	JOIMARC	6.62 1.3	4.47 1.44
Civic awareness	People who listened to a political debate in the 12 months before the interview	LISTPDE	21.22 3.05	27.64 2.71
	People who talk about politics at least once a week	TALKPOL	4.73 1.54	5.48 1.41
	People that inform themselves about politics at least once a week	KEEPINF	3.57 1.0	3.85 0.88

All indicators refer to the number of people aged 14 or above per 100 people from the same area.

A survey that offers data according to our parameters and that meets our criteria is the "Aspects of daily life" survey, carried out by ISTAT, which covers a wide range of different aspects, such as household relationships, political and social participation, leisure time and opinions about public service. This survey is a part of The Multipurpose Survey on Households, which collects information about individuals through face-to-face interviews on a sample of approximately 20,000 households, roughly corresponding to 50,000 individuals.

Some of the information gathered by this survey considered to belong to social capital dimensions are collected every year, and this allows a comparison to be made before and after the height of the economic crisis; in particular it allows social capital to be assessed five years before *vs*. five years after 2008 – the year in which the global economic crisis started. For this analysis, a 10-year time frame (2003-2013) was considered, because, not only does it correspond to the time frame used to carried out the census, but it is a rational time period within which social phenomena can be set. It also permits "social mobility" change to be addressed, because the fourteen-year-olds interviewed in 2003 will have completed the higher educational system ten years later and be in the work place. Following this idea, and considering that in the 2008 the financial crisis started, it was preferable that this event occurred "in the middle" of the two times considered. Data are representative at the regional level (Istat 2006).

The formal and informal (Pichler and Wallace 2007) social capital indicators available and used for the secondary data analysis are reported in table 1; data show means and standard deviations. The sixteen indicators were divided into six categories in accordance with previous research (Carradore 2009, Righi 2013, Sabatini 2008, 2009a, 2009b). Two synthetic indicators of social capital were created using the DP_2 method:[12] one with data collected in the year 2003 and another with data collect in 2013.

Results Analysis

The results of the DP_2 method applied to the indicators shown in Table 1 are reported in Tables 2 and 3. The second and third columns of Table 2 show the values of the social capital synthetic indicator for the years 2003 and 2013, respectively. The difference in value between the indicators is shown in the fourth column, thus showing the changes undergone by the synthetic indicator with respect to the initial period. The fifth and sixth columns report the indicator values in normalised terms, and the seventh illustrates the corresponding variation rates. The last three columns reflect each region's position in the 20-region ranking in terms of the social capital synthetic indicator for 2003 and 2013 and the ranking positions each region gained or lost over the course of the ten years considered. It should be remembered, bearing in mind how the reference base was defined, that higher synthetic indicator values mean a higher level of social capital endowment and low synthetic indicator rates denote a lack of social capital.

In view of the properties of the DP_2 synthetic indicator, it is possible to interpret the distances between two regions as a cardinal measure. In 2003, as illustrated in Table 2, Sicily, which has the lowest value in the synthetic indicator, is at a distance of 1.23 units from the undesirable fictitious region (with a value of zero in the synthetic indicator) and a distance (spread) of 11.1 from the most desirable region, which is Trentino-Alto Adige/Südtirol. In 2013, Campania was the worst region, at a distance of 1.37 units from the most undesirable fictitious country, and a distance of 12.69 from the most desirable region, which once again corresponded to Trentino-Alto Adige/Südtirol. All the regional distances were measured in this way.

In addition, considering that the synthetic indicators were calculated using the same indicators and the identical reference bases for both periods, it is also possible to provide a cardinal reading of the distance between the two moments in time for each region. For example, the figure for Campania, fell from 2.33 in 2003 to 1.37 in 2013, a reduction that corresponds to a relative loss of over 40%. Other regions with a high synthetic indicator level of social capital also witnessed a substantial loss during this ten-year period; such regions include, Emilia-Romagna, Lombardy and Tuscany.

[12] The analyses were carried out using the package R (Pérez-Luque et al. 2012).

Table 2. *Synthetic Indicator of Social Capital in Italy 2003-2008*

Regions	**DP_2 03**	**DP_2 13**	Δ	**$\|\|DP_2$ 03$\|\|$**	**$\|\|DP_2$ 13$\|\|$**	$\|\|\Delta\|\|$	**Rank 2003**	**Rank 2013**	Δ_R
Abruzzo	4.10	5.56	0.36	0.26	0.33	0.07	15	13	2
Aosta Valley	6.55	5.70	-0.13	0.48	0.34	-0.14	9	12	-3
Apulia	3.30	3.88	0.18	0.19	0.20	0.01	16	17	-1
Basilicata	5.35	6.39	0.20	0.37	0.40	0.02	13	10	3
Calabria	2.68	4.23	0.58	0.13	0.23	0.09	17	16	1
Campania	2.33	1.37	-0.41	0.10	0	-0.10	19	20	-1
Emilia-R.	10.00	7.84	-0.22	0.79	0.51	-0.28	2	3	-1
Friuli V. G.	7.04	7.63	0.08	0.52	0.49	-0.03	5	4	1
Lazio	2.56	7.02	1.75	0.12	0.45	0.33	18	7	11
Liguria	5.95	4.89	-0.18	0.43	0.28	-0.15	10	15	-5
Lombardy	7.22	6.46	-0.11	0.54	0.40	-0.14	4	8	-4
Marche	5.83	6.27	0.08	0.41	0.39	-0.03	11	11	0
Molise	4.52	3.26	-0.28	0.30	0.15	-0.15	14	18	-4
Piedmont	6.82	7.12	0.04	0.50	0.45	-0.05	6	6	0
Sardinia	5.78	6.43	0.11	0.41	0.40	-0.01	12	9	3
Sicily	1.23	2.43	0.98	0	0.08	0.08	20	19	1
Trentino-A. A.	12.33	14.06	0.14	1	1	0	1	1	0
Tuscany	9.40	7.85	-0.16	0.74	0.51	-0.23	3	2	1
Umbria	6.65	5.24	-0.21	0.49	0.30	-0.18	8	14	-6
Veneto	6.80	7.16	0.05	0.50	0.46	-0.05	7	5	2

Eight regions display a negative relative variation rate: (from the least to the greatest) Lombardy, Aosta Valley, Tuscany, Liguria, Umbria, Emilia-Romagna, Molise and Campania. At the other extreme, the regions showing the greatest increase in social capital are: Basilicata, Abruzzo, Calabria, Sicily and Lazio.

These results illustrate the individual relative change for each region over the period. We were also interested to examine how the ranked position of each Italian region had changed; for this reason, the synthetic social capital indicators were standardised using the normalized procedure.[13]

Focusing on the normalized values shown in Table 2, we can see that the most prominent drops in social capital happened in Emilia-Romagna (-28%), Tuscany (-23%) and Umbria (-18%). In contrast, the regions that underwent an increase were regions that traditionally showed low levels of social capital, and they are: Lazio (33%); Calabria (9%); Sicily (8%) and Abruzzo (7%).

[13] The normalized values were calculated as following: $(DP_{2j}\text{-min}DP_2)/(\text{max}DP_2\text{-min}DP_2)$, where DP_2 is the value of the synthetic indicator in region j, minDP_2 and maxDP_2 are respectively the min and max value of the DP_2 vector.

Table 3. *Ranking of Italian Regions Following the Normalized DP_2 synthetic Indicator of Social Capital in 2003 and 2013*

2003		Rank	2013	
$\|\|DP_2$ 03$\|\|$	**Regions**		**Regions**	**$\|\|DP_2$ 13$\|\|$**
1	Trentino-Alto Adige	1	Trentino-Alto Adige	1
0.79	Emilia-Romagna	2	Tuscany	0.51
0.74	Tuscany	3	Emilia-Romagna	0.51
0.54	Lombardy	4	Friuli Venetia Giulia	0.49
0.52	Friuli Venetia Giulia	5	Veneto	0.46
0.50	Piedmont	6	Piedmont	0.45
0.50	Veneto	7	Lazio	0.45
0.49	Umbria	8	Lombardy	0.40
0.48	Aosta Valley	9	Sardinia	0.40
0.43	Liguria	10	Basilicata	0.40
0.41	Marche	11	Marche	0.39
0.41	Sardinia	12	Aosta Valley	0.34
0.37	Basilicata	13	Abruzzo	0.33
0.30	Molise	14	Umbria	0.30
0.26	Abruzzo	15	Liguria	0.28
0.19	Apulia	16	Calabria	0.23
0.13	Calabria	17	Apulia	0.20
0.12	Lazio	18	Molise	0.15
0.10	Campania	19	Sicily	0.08
0	Sicily	20	Campania	0

As far as the change in ranking is concerned (i.e., the last three columns of Table 2, generated using the normalized values), eight regions (Umbria, Liguria, Molise, Lombardy, Aosta Valley, Emilia-Romagna, Campania and Apulia) dropped to a lower position in the ranking, while nine regions (Lazio, Basilicata, Sardinia, Abruzzo, Veneto, Calabria, Friuli Venetia Giulia, Sicily and Tuscany) climbed to a higher position over the time period considered. Three regions (Marche, Piedmont and Trentino-Alto Adige/Südtirol) maintained the same position. From the ranking analysis, a relevant issue emerges: after the year 2003, an increase in social capital is evident in the regions that historically showed low levels of this "resource", meanwhile some northern regions with high levels of social capital prior to 2008 (i.e. Aosta Valley, Emilia-Romagna and Lombardy) witnessed a drop in the synthetic indicator value of social capital during the years that the economic crisis was persisting.

The change in regional ranking from 2003 to 2013 becomes clearer when we study the data in Table 3, which presents the normalized synthetic indicators of social capital divided into quartiles, highlighted through the use of different shades of grey. The parts of the table in light grey cluster the regions with the lowest values of the normalized synthetic indicator (values between 0 and 0.25), meanwhile the part in black includes the region(s) with the highest value(s) of social capital (values between 0.75 and 1).

For 2003, the regions with the highest normalized synthetic indicator values of social capital are Trentino-Alto Adige/Südtirol and Emilia-Romagna. Below them – highlighted in dark grey – (values between 0.51 and 0.75) are

Tuscany, Lombardy and Friuli Venetia Giulia. The following 10 regions have a medium-low value of social capital (values between 0.26 and 0.5), – "medium" shade of grey – namely, Abruzzo; Aosta Valley; Basilicata; Liguria; Marche; Molise; Piedmont; Sardinia; Umbria and Veneto. At the end of the scale (values between 0 to 0.25) – light grey – are the southern regions Apulia, Calabria, Campania, Lazio and Sicily.

Ten years later, only Trentino-Alto Adige/Südtirol maintained its position at the top of the classification with the best value of social capital. The number of regions with a medium-high (0.51-0.75) level of social capital dropped to just two: Tuscany and Emilia-Romagna. Friuli Venetia Giulia fell to the top of the medium-low cluster, which in 2013 is composed of twelve regions. Molise dropped four ranking positions (it moved from the fourteenth to the eighteenth position) as did Lombardy, while Aosta Valley was demoted three places. Lazio, on the other hand, is an exception to the rule, because this region moved from the lowest group to the medium-lower group, improving its social capital ranking by eleven places. Basilicata and Sardinia also went up the scale. In 2013, the number of regions included in the second quartile (0.26-0.5) are more than in the 2003 (12 versus 10). The number of regions ranked in the first quartile (0-0.25) remained unchanged. This indicates that, overall, the number of regions with medium-low social capital increased, while the number of regions with a medium-high quantity of social capital decreased. In some northern regions, with traditionally high levels of social capital, a process of social capital weakening has commenced since the onset of the global economic crisis in relation to other regions.

Contribution of Simple Indicators to the Synthetic Social Capital Indicator

A relevant aspect to consider is the contribution of each single indicator to the synthetic social capital indicator. Therefore, this section investigates the relative importance that each single variable has in constructing the output; in order to do this, the three following statistical criteria were calculated for each variable: 1) absolute linear correlation with the resulting synthetic indicator, 2) the correcting factor, and 3) the Relative Individual Information Coefficient as defined by Zarzosa (1996).

Table 4, reporting data corresponding to the years 2003 and 2013, shows the simple indicators ordered according to their degree of absolute correlation with the resulting synthetic indicator; hence we can see the relative degree to which the variables correlate – in absolute value – with the social capital indicator. For the year 2003, the indicator with the highest absolute linear correlation with the final indicator is the "percentage of people who give money to an association at least once a year". The other variables with high absolute correlation are: "carrying out unpaid work for voluntary associations"; "being very satisfied with relationships with relatives"; "people who attended meetings of associations that regard ecological or related topics"; and "having friends and neighbours that one can count on in case of need".

The simple indicators with the lowest absolute correlations are: "have attended a political meeting"; and "have carried out unpaid work for a labour union or a political party", both of which refer to the 12 months before the interview.

For the year 2013, the simple indicators that present the highest absolute correlation values are: "attended meetings of cultural societies or similar clubs"; "the percentage of people who carried out unpaid work for a particularistic association"; and "the percentage of people who give money to an association at least once a year", and "do unpaid work for a voluntary association". The simple indicators with the least absolute correlation are the same as those for 2003.

With regard to the correcting factor ($1-R^2$), as set out in the methodology section it indicates the amount of new information attributable to each simple indicator. The correcting factors shown in Table 4 were obtained using the order defined by the linear absolute correlation coefficients corresponding to the final iteration.

The simple indicator "percentage of people who give money, at least once a year, to an association" is the one that most correlates with the synthetic social capital indicator for 2003. All of its information contributes to the synthetic indicator of social capital and for this reason the corresponding correcting value is equal to 1 ($1-R^2=1$).

"The percentage of people who have attended meetings of associations that regard ecological or related topics", which is ranked fourth in relation to contribution to the synthetic indicator according to its absolute correlation, contributes 37% of its information. The residual 63% is redundant with regard to the information contained in the "percentage of people who give money to an association" variable. "Satisfaction with relationships with relatives" contributes for 36%. The remaining results can be similarly interpreted. The variables that contribute the smallest proportion of new information to the synthetic indicator, despite having a high correlation value with social capital indicator, are "attended meetings of cultural societies" and "joined a march", which contribute 3% and 5% of new information, respectively. In summary, the variables that have the most discriminating power in the synthetic index for 2003 concern the "donation of money to associations", "attending meetings of ecological associations" and "friend relationship satisfaction".

The last three columns of Table 4 show the same measures obtained for 2013, and they allow us to comprehend how the structure of the synthetic indicator has evolved during the intervening period. The simple indicator that contributes all of its information to the synthetic indicator is the "percentage of people who have attended meetings of cultural societies or similar clubs at least once a year". The other variables that contribute to a high degree in terms of new information are "percentage of people with relatives, friends and neighbours they can count on in case of need" (which contributes for 43%); "talking about politics once a week", "percentage of people who have attended meetings of ecology or related associations at least once a year", and "percentage of people who carried out unpaid work for a labour union in the 12

months before the interview" (together contributing 31%).

Table 4. *Absolute Correlation Coefficients and Correction Factors of the Simple Indicators Ranked in order of their Absolute Correlation with the Synthetic Indicator*

2003				2013		
(1-R^2)	**Indicators**	**|r|**		**(1-R^2)**	**Indicators**	**|r|**
1	MONASS	0.95		1	JOIMCAS	0.92
0.18	UNWVASS	0.89		0.08	UNWPASS	0.89
0.36	SATRREL	0.88		0.26	MONASS	0.89
0.37	JOIMEAS	0.87		0.09	UNWVASS	0.88
0.22	COUNRFN	0.81		0.31	TALKPOL	0.82
0.21	TALKPOL	0.79		0.43	COUNRFN	0.82
0.07	UNWPASS	0.79		0.23	MONPPAR	0.8
0.03	JOIMCAS	0.78		0.31	JOIMEAS	0.78
0.16	MONPPAR	0.77		0.07	SATRREL	0.75
0.07	SATRFRI	0.76		0.15	KEEPINF	0.75
0.19	LISTPDE	0.57		0.04	SATRFRI	0.73
0.18	KEEPINF	0.54		0.24	JOIMARC	0.33
0.05	JOIMARC	0.38		0.28	LISTPDE	0.21
0.15	UNWPPAR	0.34		0.31	UNWLUNI	0.17
0.33	UNWLUNI	0.29		0.05	JOINPME	0.14
0.13	JOINPME	0.0		0.05	UNWPPAR	0.09

As far as the 2003-2013 comparison concerns, if we consider the absolute correlation values, it is possible to affirm that the simple indicators that correlate poorly with the social capital indicator are the same for the two years. On the other hand, the simple indicators that correlate best with the social capital indicator in 2003 are different to those of 2013.

Considering the "new information contribution" of each simple indicator, there is a substantial change over the period in the "structure" of the social capital synthetic indicator. The variable that, in the 2003, provides least information to the synthetic indicator ("have attended meetings of cultural societies"), offers more information that helps create the social capital synthetic indicator in the 2013 analysis. The same is true for the variable that measures "people who have relatives, friends and neighbours they can count on" that only contributes 22% in 2003, meanwhile in the 2013 its contribution is more than 40%. The high contribution of the variable "donate money to associations" variable in 2003 decreases to 26% by 2013; a similar case regards "satisfaction with relationships with relatives", which contributes 36% in 2003, but only 7% in 2013.

One possible scenario, although further analysis is required, is that in times of economic uncertainty people place more trust on their relationships with relatives, friends and neighbours, even though the quality of their relationships have diminished. In fact, the simple indicator that measures the percentage of people who declare to be very satisfied with their relationships with relatives decreases by 29%.

Thus, a relevant change in the "structure" of the social capital synthetic indicator occurred over the period, and according to these data, it was due to two main aspects: greater importance placed on attending cultural societies and being able to count on relatives, friends and neighbours in case of need, although the level of relationship satisfaction with relatives lost importance in terms of new information contribution.

Table 5 reports the Relative Individual Information Coefficient values of the single indicators considered for the two surveys. The variables are ranked according to their associated values.

Table 5. *Simple Indicators Ranked in Terms of the Relative Individual Coefficient in 2003 and 2013*

α_{2003}	**Indicator**	**Ranking**	**Indicator**	α_{2013}
0.345	UNWPASS	1	JOIMCAS	0.299
0.089	SATRFRI	2	MONASS	0.106
0.086	JOIMCAS	3	MONPPAR	0.095
0.074	KEEPINF	4	JOIMEAS	0.084
0.065	UNWVASS	5	UNWLUNI	0.082
0.064	COUNRFN	6	TALKPOL	0.074
0.056	JOIMARC	7	JOIMARC	0.072
0.048	JOINPME	8	UNWPASS	0.032
0.045	TALKPOL	9	UNWVASS	0.028
0.032	MONASS	10	KEEPINF	0.026
0.031	MONPPAR	11	LISTPDE	0.025
0.025	JOIMEAS	12	JOINPME	0.022
0.012	SATRREL	13	COUNRFN	0.019
0.010	UNWLUNI	14	UNWPPAR	0.016
0.010	LISTPDE	15	SATRREL	0.013
0.009	UNWPPAR	16	SATRFRI	0.007

The most relevant indicator in determining social capital in Italy in 2003 was "carrying out unpaid work for a particularistic/purposive association". The other indicators that contribute new information when included in the calculation of the synthetic indicator are: "being satisfied with relationships with relatives", "attending meetings of cultural societies" and "keeping themselves informed about politics". The partial indicators with "irrelevant" levels of influence on social capital are: "carried out unpaid work for a political party", "listening to a political debate" and "doing unpaid work for a labour union".

For 2013, the most discriminating variable is "attending meetings of cultural societies" followed by "donating money to associations". The next variables

with most discriminatory power are: "percentage of people who given money to a political party", and "percentage of people who have attended meetings of ecology or related associations at least once a year". The simple indicators ranked lowest in terms of determining social capital disparities amongst Italian region are: "satisfied with relationships with friends and relatives", and "doing unpaid work for a political party".

By comparing the relative individual information values for 2003 and 2013 we can see that partial indicators change their ranking positions. Only "attending political meetings" remains in the same position for both classifications. Other simple indicators change ranking position: some gain relevance, while others lose their importance. The indicators that go up the ranking are: "attending meetings of ecology-related associations" that was ranked third from the top in 2013, but eleventh in 2003. "Donating money to an association" or "to a political party" were ranked second and third, respectively, in 2013, and "carried out unpaid work for a labour union" went up the ranking by nine positions. The indicators that moved down the ranking between the two years that bridge the financial crisis are: "satisfaction with relationships with relatives", "carried out unpaid work for particularistic associations" and "carried out unpaid work for a voluntary association"; the indicators that lost their explanatory power in terms of information contributed were "keeping themselves informed about politics" and "have relatives, friends or neighbours to count on in case of need".

Conclusions

The purpose of this paper was to compare social capital endowment between the different Italian regions before and after the 2008 global financial crisis. This goal was achieved by applying the DP_2 distance method to allow the creation of a synthetic indicator of social capital that "encapsulates" the various dimensions that describe social capital. This paper is one of the first to apply this method to the research field concerned with social capital in Italy.

What emerges from the analyses is that the DP_2 synthetic indicator confirms the disparity between the north and the south of Italy as far as social capital is concerned. In terms of geographical distribution in 2003, the northern regions have more social capital than the southern regions; and this confirms what the literature has been saying for many years. However, this work shows, for the first time, a change in the distribution of social capital following the onset of the financial crisis, although the polarization between the north and the south persists. The main variation is that social capital endowment was shown to increase in the Lazio region and this may be due to the high values for some of the single variables, such as "can count on other people in case of need", "social participation", "doing unpaid work for voluntary and particularistic organizations" and "donating money to voluntary associations". In addition, Sardinia and Basilicata, another two regions traditionally considered deficient in social capital, show a significant increase in social capital during the years considered, which included the onset of the crisis. Thus, it seems that some of

the areas of Italy traditionally described as having low levels of social capital are changing in this regard compared with others. While this could be considered a hopeful sign of positive change in some southern regions, some northern regions show evidence of an opposite trend, i.e., the erosion of social capital resources since the year 2003. The Aosta Valley, Emilia-Romagna, Liguria and Lombardy are the regions showing a decline in social resources. The reduction in social capital endowment is corroborated by the number of regions included in the medium-low social capital group calculated for the year 2013, which clusters more regions compared with 2003, and by the decrease in the number of regions with high levels of social capital. Moreover the DP_2 distance between the best and the worst value in 2013 is greater than that for 2003. These results suggest that the process of declining social capital identified in the US by Putnam (2000) appears to be occurring likewise in Italy. Further research is required to describe this trend in more detail and to develop strategies aimed at preventing the "erosion" of social capital.

The outcome of the analysis therefore confirms the existence of differences between northern and southern Italy in terms of social capital, and that the north-south divide has become somewhat blurred, probably since the economic crisis began.

The analysis also examined the "weight" of each simple indicator's contribution to the synthetic social capital indicator and how the relative "importance" of each variable changed over the period studied. A shift in the relative level of each simple indicator's importance in the synthetic indicator occurred between the 2003 and 2013. The factor related to "interactions with relatives" dropped down the ranking in terms of its correlation with the synthetic indicator, whereas "social participation", in cultural societies in particular, gained relevance.

The indicators that contribute most information to the measurement of social capital changed over the period studied: in 2003, the most influential factors were "giving money to associations" and "satisfaction with relationships with relatives", whereas in 2013 the most influential factors were "participation in cultural associations", "counting on other people in case of need" and "talking about politic factors". Following the financial crisis, the explanatory power of "monetary donations" and "satisfaction with relatives" declined, forcing people to rely on others and this might be because in times of economic difficulty people must turn to their social relations to obtain help. On the other hand, the level of satisfaction with relationships lost relevance and this appears to be discordant with the fact that the relative impact of the variable "can count on other people in case of need" increases. More in-depth analyses should look at the role of social relationships in analysing if and how the financial crisis has influenced them.

The most significant changes that occurred over the time period with regard to the structure of the synthetic indicator are due to the fact that social participation has gained importance in Italy. Other indicators that gained in importance were: "donating money to associations and political parties", "attending meetings of ecological associations", "carrying out unpaid work for

labour unions" and "talking about politics". However, although these changes were present in the indicator "weights", prudence must always be applied when social capital is defined and measured, as pointed out by Andriani and Christoforou (2016).

Another lesson arising from this research is that the trends of the social capital should always be analyzed over time; therefore studies should be repeated some years after their entry into the literature to investigate for further changes. Furthermore, this study provides a perspective that goes beyond the Italian case and could be applied to other countries in order to investigate how widespread social capital is at the sub-national level, considering the importance of this administrative level.

This research has the following limitations: the set of simple indicators used is largely conditioned by the accessibility of comparable data referring to the same year for all twenty Italian regions. Furthermore, the data were collected by interviewing people aged 14 years or more and then aggregating the collected information at the regional level, and this reduces the "quality" of the data. Finally, while the research describes the variations occurring since the economic crisis began, it cannot claim that the effects observed were actually caused by the economic crisis, so more detailed analyses are required to further the analysis.

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