Does Social Capital Improve Labour Productivity in Small and Medium Enterprises?

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Abstract

This paper carries out an empirical assessment of the relationship between social capital and labour productivity in small and medium enterprises in Italy. By means of structural equations models, the analysis investigates the effect of different aspects of the multifaceted concept of social capital. While the bonding social capital of strong family ties seems to be irrelevant, the bridging social capital of weak ties connecting friends and acquaintances is proved to exert a significant and positive influence both on labour productivity and on human development.

JEL Classification: J24, R11, O15, O18, Z13.

Keywords: Labour productivity, Small and medium enterprises, Social capital, Social networks, Structural equations models.

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1. Introduction

Finally, the award ceremony has come. Five guys, quite self-conscious and not properly having an athletic frame, are standing on the stage, together with a popular, statuesque, television showgirl. She is giving them a cup: besides being electrical engineers, fatty guys are an amateur football team, and they have just won the Edison's annual soccer competition. The company has afforded all the tournament organization's costs, like those for buying technical materials (i.e. players' t-shirts, shorts, soccer balls), renting fields, paying for referees. And now it has organized the award ceremony, offering a rich buffet to all employees and paying for the showgirl's fee. Why the first Italian electric company carries out such an effort? Is it just for fun? Of course it is not. Managers have just made another investment. This time they have not bought a new machinery, or a warehouse. They have improved the quality of interpersonal relationships inside the workforce. They know that this will foster labour productivity, therefore increasing profits.

Most case studies show that enterprises devote an ever more relevant part of their financial resources to activities which are not directly related to production processes. Nurturing a cooperative climate inside the workforce and building trustworthy relationships with external partners generally constitute a key task for management. On the other side, workers' satisfaction is ever more affected by the quality of human relationships among colleagues, and not only by traditional factors like wage and job's conditions. According to Gui (2000), such relational assets contribute to firms' economic performance just like new investments in physical capital. The claim is that a better quality of social interactions inside and outside the firm, which is generally referred to as a form of social capital, can improve productivity, therefore fostering the economic performance.

The aim of this paper is to investigate the relationship between social capital and labour productivity in small and medium enterprises (SMEs) in Italy. Since the publication of the famous study on the Italian regions carried out by Putnam, Leonardi and Nanetti in 1993, the Italian case is in fact particularly popular in the literature on cultural and social structural factors of economic growth. On the other side, the importance of SMEs and their contribution to economic growth, social cohesion, employment, regional and local development is widely recognized. SMEs account for over 95% of enterprises and 60%-70% of employment and generate a large share of new jobs in OECD economies. As globalisation and technological change reduce the importance of economies of scale in many activities, the potential contribution of smaller firms is enhanced.

The study in this paper is based on a dataset collected by the author including about two hundreds indicators of social capital, which, by means of factor analyses, are used to build synthetic indicators for four core dimensions of this multifaceted concept: bonding social capital, shaped by

strong family ties, bridging social capital, shaped by weak informal ties among friends and neighbours, linking social capital, given by the formal ties connecting people within the boundaries of voluntary organizations, and active political participation. The correlation between these social capital's dimensions and labour productivity is analyzed through a principal component analysis, which shows a positive and significant association of productivity with a latent indicator measuring bridging and linking social capital. The form and direction of the causal nexus linking these variables is then analyzed through a simple structural equations model (SEM) and some refinements. The use of SEMs presents a wide range of advantages compared to multiple regression analysis, among which, for example, the possibility to pose more flexible assumptions, the use of confirmatory factor analysis to reduce measurement error by having multiple indicators per latent variable, the attraction of SEM's graphical modelling interface (see for example Figure 3), the desirability of testing models overall rather than coefficients individually, the ability to test models with multiple dependents.

The model substantially confirms that higher levels of developmental social capital significantly foster labour productivity in SMEs. On the contrary, the effect of bonding social capital seems to be irrelevant, as well as the effect of an adjusted measure of human development. The widespread idea that different social capital's dimensions exert diverse effects is therefore confirmed by the empirical analysis, which also highlights a strong polarization between Northern and Southern Italy, both in terms of social capital's endowments and labour productivity. SEMs appear to be a suitable method to carry out further researches on the causal relationships linking social capital with its supposed economic outcomes.

The outline of the paper is as follows: section two introduces the concept of social capital and presents a brief review of the literature on its relationship with labour productivity and firms' performance. Section three carries out a critical discussion of some measurement issues, pointing out the main weaknesses of the empirical literature in the field. Section four carries out a brief description of the adopted methodology and presents the synthetic indicators built by means of principal component analyses for each social capital dimension. Synthetic indicators resulting from the analysis are then used within structural equations models for the empirical investigation of the relationship between social capital and labour productivity carried out in sections from five to seven. Section eight presents some concluding remarks and guidelines for further researches.

2. Social capital and labour productivity

The concept of social capital has a long intellectual history in the social sciences, but has gained celebrity only in the nineties, due to Bourdieu's (1980, 1986), Coleman's (1988, 1990) and

Putnam's (1993, 1995) seminal studies. Bourdieu identifies three dimensions of capital each with its own relationship to the concept of class: economic, cultural and social capital. Bourdieu's idea of social capital puts the emphasis on class conflicts: social relations are used to increase the ability of an actor to advance her interests, and social capital becomes a resource in the social struggles: social capital is 'the sum of the resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition' (Bourdieu and Wacquant, 1986, 119, expanded from Bourdieu, 1980, 2). Social capital thus has two components: it is, first, a resource that is connected with group membership and social networks. 'The volume of social capital possessed by a given agent ... depends on the size of the network of connections that he can effectively mobilize' (Bourdieu 1986, 249). Secondly, it is a quality produced by the totality of the relationships between actors, rather than merely a common "quality" of the group (Bourdieu, 1980). At the end of the 80s, Coleman gave new relevance to Bourdieu's concept of social capital. According to Coleman, 'Social capital is defined by its function. It is not a single entity, but a variety of different entities, with two elements in common: they all consist in some aspect of social structures, and they facilitate certain actions of actors within the structure' (Coleman, 1988, 98). In the early 90s, the concept of social capital finally became a central topic in the social sciences debate. In 1993, Putnam, Leonardi and Nanetti carried out a famous research on local government in Italy, which concluded that the performance of social and political institutions is powerfully influenced by citizen engagement in community affairs, or what, following Coleman, the authors termed "social capital". In this context, social capital is referred to as 'features of social life-networks, norms, and trust, that enable participants to act together more effectively to pursue shared objectives' (Putnam, 1994, 1). Like other forms of capital, social capital is productive, making possible the achievement of certain ends, that in its absence would not be possible. But, in Coleman's words, 'Unlike other forms of capital, social capital inheres in the structure of relations between actors and among actors. It is not lodged either in the actors themselves or in physical implements of production' (Coleman, 1988, 98).

The cited perspectives on social capital are markedly different in origins and fields of application, but they all agree on the ability of certain aspects of the social structure to generate positive externalities for members of a group, who gain a competitive advantage in pursuing their ends.

The empirical research has widely shown that informal interactions developing inside the firm's workforce improve the diffusion of information and foster the creation of a stock of knowledge which constitutes an asset for future production processes. Differently from Becker's (1975) notion of "specific human capital", such a stock is relational in nature, and exists only as long as it is

shared among workers. Summarizing, we may identify two main channels through which social capital may affect labour productivity.

Firstly, social capital fosters the diffusion of knowledge and information among workers, 'making possible the achievement of certain ends that would not be attainable in its absence' (Coleman, 1990, 302). Managers and employees constantly experience the need to mobilize others' support and advice, well beyond the hierarchical structure of the firm. When formal organizational routines and the knowledge of individuals fail to produce a desired outcome, it is necessary to consult with others who may or may not be part of the formal organization or the work group. Ideally, every worker can be considered as part of an informal structure whose resources improve his problem solving ability. This structure may also extend across organizations, such as professional networks, friends, and colleagues from earlier jobs. Social capital is particularly significant in project work, whose participants are specialists that need to locate and bring together experts to complete complex tasks. To cooperate in multidisciplinary project teams, each specialist needs to know how others can contribute to the common goal. They develop these shared frames of reference over a long period of interaction (Carley, 1986) and can use each others' specialties to come up with and complete projects. During project work people draw on their social capital to complement the knowledge within the team (Greve and Salaff, 2001).

Secondly, social interactions may affect workers' effort and motivation. In their famous study on organizations, March and Simon (1958) argued that, even if managers are authoritative and the enterprise's hierarchy is definite and well functioning, employees are able to influence tasks' achievement in different ways, like delaying orders' execution and, more in general, carrying out opportunistic behaviours. Many studies show that, if human interactions within the workforce are trustworthy and relaxed, employees are more inclined to do their best at work, and will be more likely to sanction shirking behaviours through peer monitoring (Kandel and Lazear, 1992, Osterloh and Frey, 2000, Huck, Kübler and Weibull, 2001, Herries, Rees and Zax, 2003, Carpenter and Seki, 2004, Minkler, 2004). As argued by Bowles and Gintis: 'Monitoring and punishment by peers in work teams, credit associations, partnerships, local commons situations, and residential neighbourhoods is often an effective means of attenuating incentive problems that arise where individual actions affecting the well being of others are not subject to enforceable contracts (Bowles and Gintis, 2002, 427).

3. The problem of measuring social capital

Despite the immense amount of research on it, the definition of social capital has remained elusive. Conceptual vagueness, the coexistence of multiple definitions, the chronic lack of suitable data have

so far been an impediment to both theoretical and empirical research of phenomena in which social capital may play a role. On this regard it is possible to observe that the problems suffered by social capital empirical studies are, at some level, endemic to all empirical work in economics. Heckmann (2000) states that the establishment of causal relationships is intrinsically difficult: 'Some of the disagreement that arises in interpreting a given body of data is intrinsic to the field of economics because of the conditional nature of causal knowledge. The information in any body of data is usually too weak to eliminate competing causal explanations of the same phenomenon. There is no mechanical algorithm for producing a set of "assumption free" facts or causal estimates based on those facts' (Heckman, 2000, 91). However, according to Durlauf (2002), 'The empirical social capital literature seems to be particularly plagued by vague definition of concepts, poorly measured data, absence of appropriate exchangeability conditions, and lack of information necessary to make identification claims plausible' (Durlauf, 2002, 22). In his article, the author reviews three famous empirical studies, concluding that they don't help in understanding the socioeconomic outcomes of social capital, which remain unclear and to be demonstrated. Durlauf's critique is one step forward in respect to the position of some prominent economists, who, prior to discuss the ability of the econometric analysis to investigate social capital's supposed outcomes, doubt the possibility to provide credible measures of its stock, and question about the opportunity itself to consider the concept as an useful analytical tool for economics. In his critique to Fukuyama, Solow (1995) writes: 'If "social capital" is to be more than a buzzword, something more than mere relevance or even importance is required. ... The stock of social capital should somehow be measurable, even inexactly' (1995, 36). As a reply, it is possible to observe that, during the last ten years, the empirical research has proposed a great variety of methods for measuring social capital and testing its ability to produce relevant social, economic, and political outcomes. However, the empirics of social capital still continue to suffer from a definite difficulty to address macro outcomes in a convincing way. On this regard we can identify two main problems.

The first is the use of macro indicators not directly related to social capital's key components. Such indicators – e.g. crime rates, teenage pregnancy, blood donation, participation rates in tertiary education – are quite popular in the empirical research, but their use has led to considerable confusion about what social capital is, as distinct from its outcomes, and what the relationship between social capital and its outcomes may be. Research reliant upon an outcome of social capital as an indicator of it will necessarily find social capital to be related to that outcome. Social capital becomes tautologically present whenever an outcome is observed (Portes, 1998, Durlauf, 1999, Stone, 2001). In order to avoid such shortcomings, my study focuses only on the "structural" dimensions of social capital, as identified with social networks.

The second main problem facing the empirical literature is "aggregation". Great part of existing cross-national studies on the economic outcomes of social capital is based on measures of trust drawn from the *World Values Survey*. Trust measured through surveys is a "micro" and "cognitive" concept, in that it represents the individuals' perception of their social environment, related to the particular position that interviewed people occupy in the social structure. The aggregation of such data, however, creates a measure of what can be called "macro" or "social" trust which looses its linkage with the social and historical circumstances in which trust and social capital are located. As pointed out by Foley and Edwards (1999), empirical studies based on cross-country comparisons of trust may be a "cul de sac", because of their inability to address macro outcomes, in view of the absence of the broader context within which attitudes are created and determined. Fine (2001) argues that 'if social capital is context-dependent – and context is highly variable by how, when and whom, then any conclusion are themselves illegitimate as the basis for generalisation to other circumstances' (Fine, 2001, 105). My effort of taking into account such insights is based on the rejection of trust as a suitable social capital indicator and on the use of data on people effective behaviour as collected by the Italian National Institute of Statistics (Istat) in its multipurpose surveys.

4. Measuring social capital in Italy[1]

The point of departure of the empirical analysis carried out in this paper is the acknowledgment of the very multidimensionality of the concept of social capital, which cannot be represented by a single indicator. This study is therefore based on a wide dataset collected by the author including about two hundred indicators of four main social capital dimensions: strong family ties, weak informal ties, voluntary organizations, and political participation. Data are drawn from a set of multipurpose surveys carried out by the Italian National Institute of Statistics (Istat) on a sample of 20 thousand households between 1998 and 2002 (see Istat, 2000, 2001, 2002a, 2002b, 2002c, 2002d, 2003, 2004a, 2004b, cited in bibliography). Principal component analyses (PCAs) are performed on each of the four groups of variables, in order to build synthetic, latent, indicators of each social capital "structural" dimension. I do not want to go into the details about the computational aspects of PCA here, which can be found elsewhere (see for example Lebart, Morineau and Warwick, 1984, Johnson and Wichern, 1992). However, basically, PCA explains the variance-covariance structure of a dataset through a few linear combinations of the original variables. Its general objectives are data reduction and interpretation. Although p components are required to reproduce the total system variability, often much of this variability can be accounted for by a small number, k, of principal

[1] For a in-depth explanation of the adopted measurement method and of its results, see Sabatini (2005b).

components. If so, there is (almost) as much information in the k components as there is in the original p variables. The k principal components can then replace the initial p variables, and the original dataset, consisting of n measurements on p variables, is reduced to one consisting of n measurements on k principal components. An analysis of principal components often reveals "latent" relationships that were not previously suspected and thereby allows interpretations that would not ordinarily result. Every couple of selected principal components creates a factorial plan, which may offer a powerful graphic representation of distances between analysis units. Factorial plans are particularly suitable for comparing different geographical areas. This approach is considered "exploratory" - as opposed to great part of the other empirical analyses, which constitutes confirmatory approaches - in that it explores the underlying relations existing in data without having the claim to explain causalities in such relations. Analysis units can be reclassified according to the new "composite measures" provided by underlying factors, and factor scores can then be used as the raw data to represent the independent variables in a regression, discriminant, or correlation analysis. In this study, factor scores are the Italian regions' coordinates on the first principal components representing the four social capital dimensions taken into consideration. For the region i, the factor score is given by the sum of scalar products between the p variables describing i and versor u_a corresponding to the a-th principal component. It therefore constitutes a new variable measuring region i, resulting as a linear combination of the initial p variables, whose weights are given by the a-th factorial axis. Formally, the a-th principal component is expressed as a new variable c_a by:

$$c_a = Xu_a \quad \text{or} \quad \{...c_{ai}...\} = \left\{...\sum_j^p x_{ij} u_a^j\right\}, \quad (1)$$

where $\boldsymbol{X}$ is the data matrix and x_{ij} are its elements.

4.1 Bonding social capital

The family household, as a place in which social relations characterised by trust and reciprocity operate, is generally referred to as a form of bonding social capital. In this paper, I measure family social capital through 18 indicators (see Annex 1, Table A1) representing the family composition (e.g. COPFIG and FAMSING), the spatial distance between family members (e.g. MUM1KM and FIG1KM), the relevance of other relatives (e.g. INCPAR2S), and the quality of relationships both with family members and with the other relatives (e.g. CONTPAR and SODDPAR). Adopted variables are used to run a PCA, which provides a valuable indicator of the bonding social capital shaped by strong family ties. In particular, lower factor scores are associated with a higher

frequency of family contacts and with a higher spatial proximity between family members, but also with a lower satisfaction for the quality of familiar relationships. It is noteworthy that the variable CONTPAR, expressing people propensity to count on parents in case of need, is weakly correlated with the first two axes. The synthetic indicator provided by the PCA is therefore an expression of the strength of family ties, but does not take into account their quality. Southern regions exhibit the higher levels of family social capital and lead the ranking based on strong family ties, while Northern regions lie at the bottom.

4.2 Bridging social capital

Putnam (1995a) identified neighbourhood networks – something he described as "good neighbourliness" – as promoting social capital. In contrast, the leisure activity of bowling alone, rather than in an organised club activity, is presented by Putnam as evidence of "social disengagement". Since Putnam's (1995a) analysis, a number of studies have measured networks of friends, neighbours and acquaintances somewhat more precisely. In this paper I focus on 11 indicators of people social engagement or, in other terms, of what can be referred to as "relational goods", like ASSPORT and BAR2S (see Table A2). According to great part of the literature, social capital is accumulated not only through standard mechanisms of individual investments, but also as a result of the simultaneous production and consumption of relational goods taking place in the context of different kinds of social participation. It is noteworthy that the relationship between (production and consumption of) relational goods and the accumulation of social capital has a double direction. On one side, a higher social capital increases the returns to the time spent in social participation. For instance, it is easier and more rewarding going out with friends in a context that offers many options for socially enjoyed leisure (e.g. MUBAR and CENAF2S). In other words, social capital may be seen as an improvement in the technology of production of relational goods. On the other side, a higher social participation brings about social capital accumulation as a by-product. For instance, trust (or empathy) may be reinforced and generalized through social interactions (Antoci, Sacco and Vanin, 2002).

The first principal component obtained from a PCA on considered variables provides a synthetic indicator of the bridging social capital given by weak ties connecting friends and acquaintances. The new, synthetic, indicator represents a higher level of contacts with other people in informal contexts like sport circles, bars, restaurants and music clubs, and also, but more weakly, with a higher propensity to talk with neighbours. In respect to the familiar dimension of social capital, the ranking of the Italian regions is upturned: Northern regions now lead the classification, while Southern regions lie at the bottom.

4.3 Linking social capital

Following Putnam (1993, 1995a), great part of the literature has used membership in voluntary associations as an indicator of social capital, assuming that such groups and associations function as "schools of democracy", in which cooperative values and trust are easily socialized.

Most empirical studies on the effect of voluntary associations have shown that their members exhibit more democratic and civic attitudes as well as more active forms of political participation than non-members. Membership in associations should also facilitate the learning of cooperative attitudes and behaviour, including reciprocity. In particular, they should increase face-to-face interactions between people and create a setting for the development of trust. In this way, the operation of voluntary groups and associations contributes to the building of a society in which cooperation between all people for all sort of purpose – not just within the groups themselves – is facilitated (Almond and Verba, 1963, Brehm and Rahn, 1997, Hooghe, 2003, Seligson, 1999, Stolle and Rochon, 1998). The claim is that in areas with stronger, dense, horizontal, and more cross-cutting networks, there is a spillover from membership in organizations to the cooperative values and norms that citizens develop. In areas where networks with such characteristics do not develop, there are fewer opportunities to learn civic virtues and democratic attitudes, resulting in a lack of trust.

In this paper, the density of voluntary organizations is measured through ORGANIZ. The degree of members involvement in the association's life is measured through AIUTOVOL, RIUASCU, RIUASEC, SOLDASS and AMIVOL. Adopted variables are described in detail in Table A3. The first principal component obtained from the PCA explains about 67 percent of the variation of the data, and provides a synthetic indicator associated with a higher propensity to join meetings and funding associations and also, but more weakly, with the propensity to carry out volunteering activities, as expressed by AIUTOVOL. This variable more powerfully loads on the second principal component. This suggests that civil society is a complex phenomenon with at least two major dimensions. The first one is shaped by people propensity to carry out light forms of participation, like joining meetings and giving money to associations. The second one is given by people propensity to carry out volunteering activities "on the field", with the aim to give concrete help to disadvantaged people. As for the bridging dimension of social capital, the Italian regions ranking is led by Northern regions, while Southern regions close the classification.

4.4 Active political participation

In this paper, political parties are considered as a particular type of formal networks which constitute an integral part of social capital's definition. Adopted variables (Table A4) have been

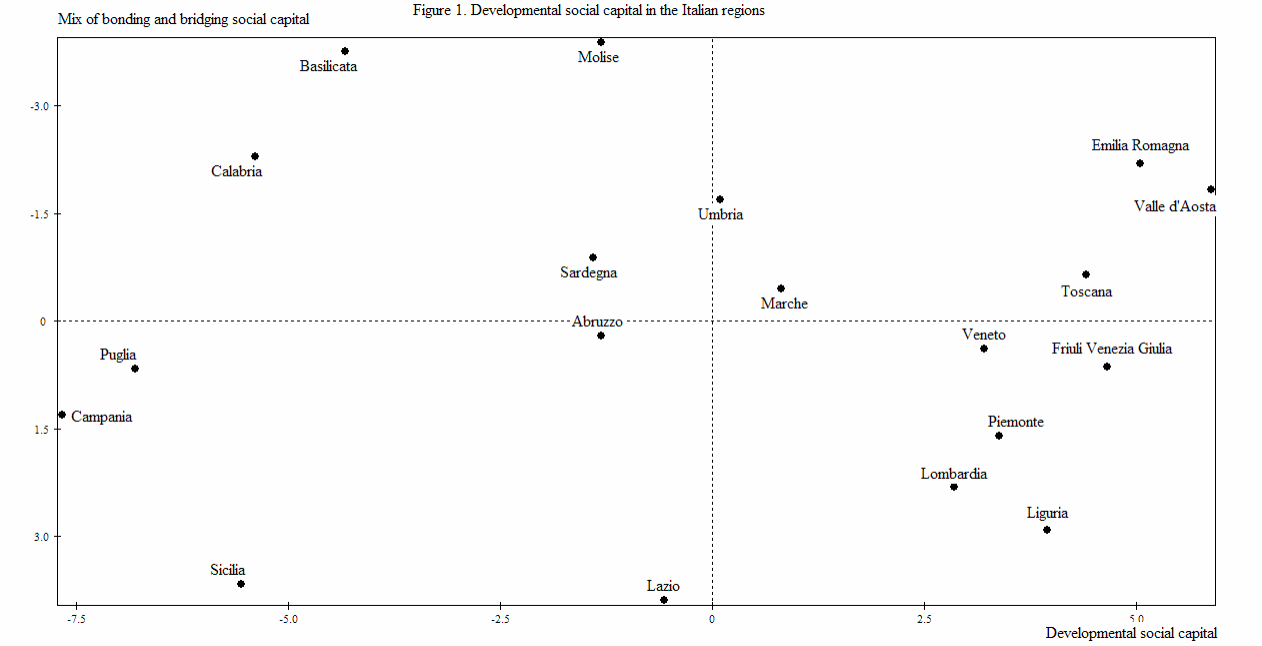
chosen in the attempt to capture the relational dimension of political participation (COMIZIO and CORTEO) and the degree of involvement in the organization's life (ATGRAPAR and SOLDPAR). The first two axes account for 80,34 percent of the variance. Three variables representing more active political participation (COMIZIO, CORTEO and ATGRAPR) are strongly correlated with the first axis, while people's propensity to fund political parties (SOLDPAR) is highly correlated with the second axis. Therefore, we can state that political participation, as well as social participation through voluntary organizations, is a complex phenomenon, with at least two dimension: the first one is shaped by active forms of political participation, while the second one represents a lighter form of involvement. The classification based on the first principal component is led by some Northern regions characterized by a deep tradition of political participation, but also by Southern regions generally showing low levels of civic attitudes, as measured by the latter two social capital's dimensions (see sections 4.2 and 4.3) and by other notable empirical studies like that carried out by Putnam, Leonardi and Nanetti (1993). This trend can be attributed to the fact that, in Southern Italy, political militancy is often considered as a mean to pursue narrow, sectarian, interests and to obtain patronage favours, rather than a way to participate in collective affairs (Walston, 1988, Mutti, 2000, Golden, 2003).

4.5 Developmental social capital: a synthetic measure

A PCA on the whole dataset representing the four dimensions of social capital is then run in search of suitable synthetic indicators for regional endowments. The dataset has been enriched with the addition of measures of people engagement in religious practices which, following Putnam (1995), can be considered as proxies for bonding social capital (Table A5).

The first principal component obtained from the PCA represents lower levels of bonding social capital, a higher quality of family relationships (summarized by variables like SODDPAR and CONTPAR), higher levels of the bridging social capital shaped by weak ties among friends, higher levels of the linking social capital shaped by ties connecting members in voluntary associations, and lower levels of participation to religious practices. In other terms, the first principal component provides a powerful, synthetic, indicator of that particular configuration of social capital which the literature generally associates with positive economic outcomes. This measure is therefore here labelled as "developmental social capital". The scattergram in Figure 1 highlights the well-known polarization between Northern and Southern Italy.

Figure 1. Developmental social capital in the Italian regions



5. Relating social capital to SMEs' productivity in Italy

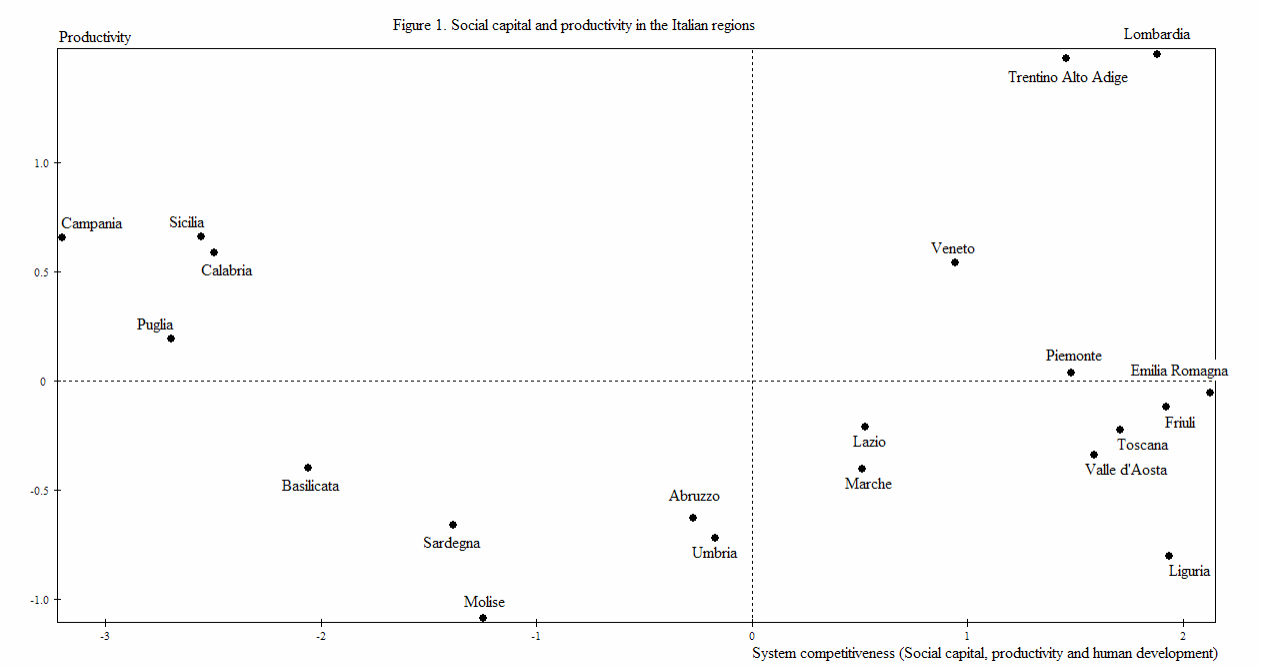
Indicators of bonding social capital and developmental social capital are then used, together with measures of labour productivity in Italian SMEs and human development at the regional level, to run a new exploratory analysis aimed to shed light on the statistical correlation among these variables. Labour productivity is computed by the Istat (2005) as the corporate added value per employee in small and medium enterprises (from 1 to 99 employees). Human development has been considered in the analysis for two main reasons. Firstly, its hypothetical ability to improve labour productivity provides a control variable for the social capital's supposed effect. Indeed, besides the income effect, human development may affect productivity through its components measuring workers' endowments of human capital and health (Deolalikar, 1988**,** Black and Lynch, 1996, Cörvers, 1997, Glick and Sahn, 1998, Anand and Sen, 2000, Ranis, Stewart and Ramirez, 2000, Arora, 2001). Secondly, it allows a first, exploratory, evaluation of the role of social capital in economic development. The human development index has been adjusted according to our need to carry out a comparison between the Italian regions, and not between countries at different stages of the development process. The adult literacy rate has therefore been replaced by an enrolment rate in high schools, while dimensional indexes representing per capita income and life expectancy at birth have been computed on the basis of adjusted minimum and target values (see Annex B for further details). The correlation matrix is presented in Table 1.

Table 1. Correlation matrix				
	Human development	Bonding social capital	Developmental social capital	Labour productivity
Human development	1,00			
Bonding social capital	-0,83	1,00		
Developmental social capital	0,80	-0,88	1,00	
Labour productivity	0,55	-0,65	0,75	1,00

Developmental social capital, labour productivity in SMEs and human capital powerfully load on the first principal component, which is also associated with low levels of bonding social capital. The first factor therefore provides an interesting index of system competitiveness for the Italian regions. The second principal component represents, even if more weakly, high levels of labour productivity. The analysis provides new evidence of the diverse effects caused by different types of social capital. The presence of bonding social capital is associated with lower levels of human development and labour productivity, while developmental social capital (i.e. bridging and linking social capital) exhibits a strong positive correlation with such economic outcomes.

Table 2. Loadings of active variables and active variables- factors correlations			
	Axis 1	Axis 2	Axis 3
Human development	0,89	-0,37	-0,29
Bonding social capital	-0,94	0,17	-0,22
Developmental social capital	0,96	0,03	0,16
Labour productivity	0,81	0,57	-0,13

The first factorial plan, which suggestively confirms the Italian North-South polarization, is presented in Figure 2. Since higher scores on the first principal component imply higher levels of developmental social capital, human development and labour productivity, we have labelled the first axis as “system competitiveness” to the seek of brevity.



6. Beyond correlation: a structural equations model

Structural equation modelling (SEM) grows out of and serves purposes similar to multiple regression, but in a more powerful way which takes into account the modelling of interactions, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators. SEM may be used as a more powerful alternative to multiple regression, path analysis, factor analysis, time series analysis, and analysis of covariance. That is, these procedures may be seen as special cases of SEM, or, to put it another way, SEM is an extension of the general linear model (GLM) of which multiple regression is a part.

The use of SEM therefore presents a wide range of advantages compared to multiple regression analysis, among which, for example, the possibility to pose more flexible assumptions, the use of confirmatory factor analysis to reduce measurement error by having multiple indicators per latent variable, the attraction of SEM graphical modelling interface, the desirability of testing models overall rather than coefficients individually, the ability to test models with multiple dependents, the ability to model mediating variables and error terms, and the ability to handle difficult data (time series with auto correlated error, non-normal data, incomplete data). SEM is usually viewed as a confirmatory rather than exploratory procedure, like the principal component analysis carried out in section five. A model is tested using SEM goodness-of-fit tests to determine if the pattern of variances and covariances in the data is consistent with a structural (path) model specified by the researcher. However as other unexamined models may fit the data as well or better, an accepted model is only a not-disconfirmed model.

In our structural equations model, hypotheses on causal relationships between variables are those suggested by the principal component analysis' results. Following the Lisrel (LInear Structural RELationships) praxis on symbols' attribution, let x_1 be bonding social capital, h_1 developmental social capital, h_2 labour productivity in SMEs, and h_3 adjusted human development. b_{ij} are the coefficients in the relationships between endogenous variables, and g_{ij} define the relationships between endogenous and exogenous variables, where the first deponent is referred to the dependent variable in the considered equation, and the second refers to the independent variable.

Of course it would have been possible to describe the interaction between variables through a great variety of models. Here we have selected the three "best" models according to two main criteria.

Firstly, models with the best goodness of fit have been chosen. Several models, which would have seemed interesting from a theoretical point of view, have been discarded for their unsatisfactory coherence with data. Secondly, among the former set of models, we have selected those ones with the more significant parameters. In order to avoid indetermination problems connected with negative numbers of degrees of freedom, reciprocal influences among variables have not been tested all together in the same model, but have been distributed to different sets of structural equations.

In the model with the best goodness of fit, developmental social capital is influenced by bonding social capital and by human development. The PCAs performed in previous sections indeed show a strong negative correlation between the two forms of social capital, which can be attributed both to cultural factors and to substitution effects, clearly pointed out by data, between strong family ties and weak ties connecting friends and acquaintances. Formally:

$$h_1 = b_{31}h_3 + g_{11}x_1 + z_1 \qquad (2)$$

Labour productivity is influenced by all the other variables of the model. As suggested by data, bonding social capital is supposed to exert a negative influence, coherently with Banfield's (1958) early thesis on "amoral familism" as a factor hampering development. Human development may affect labour productivity through all the three channels given by human capital, income, and health. Finally, the equation takes into account the positive correlation between developmental social capital and labour productivity:

$$h_2 = b_{21}h_1 + b_{23}h_3 + g_{21}x_1 + z_2 \qquad (3)$$

Human development is in turn supposed to be positively related to labour productivity in SMEs:

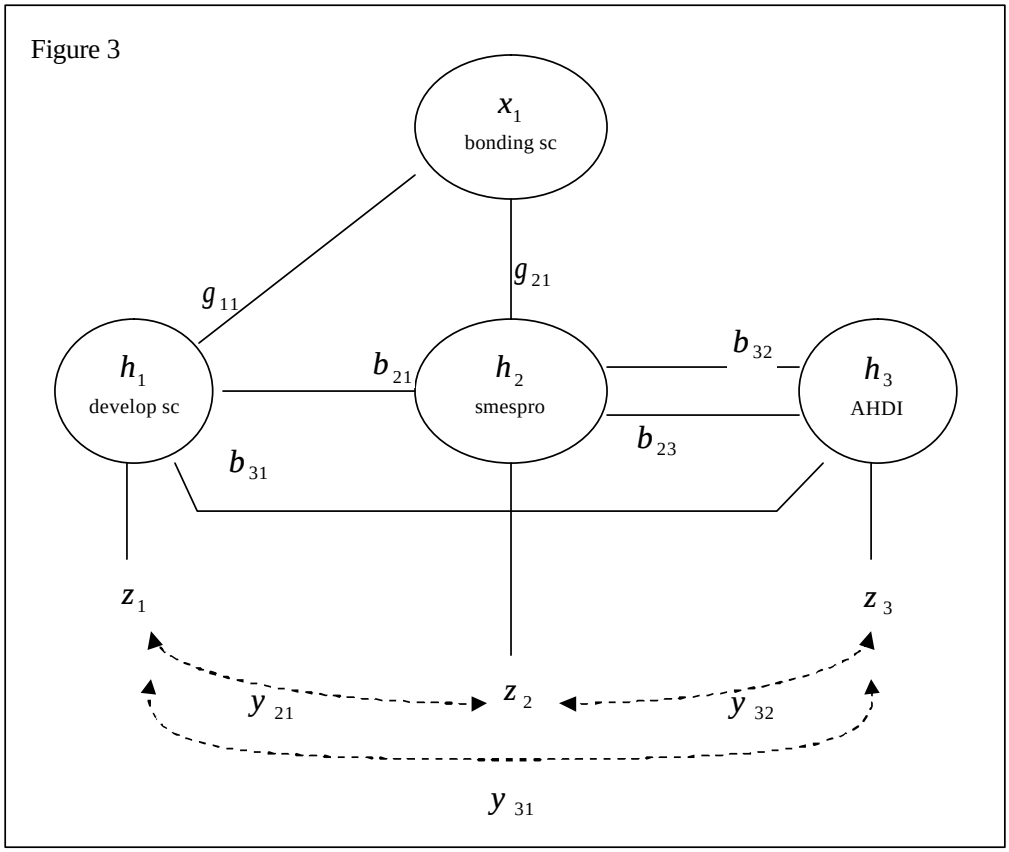
$$h_3 = b_{32}h_2 + z_3 \qquad (4)$$

Bonding social capital is considered as an exogenous variable which may affect all the others. Errors z_1, z_2 and z_3 are all correlated. This assumption aims to synthesize the action exerted on dependent variables (h_1, h_2, h_3) by all the other (potentially infinite) variables neglected by the model. This implies the need to estimate, besides parameters b and g, also covariances y between errors. In fact, if the same independent variable has been omitted both, for instance, for h_1 and h_2, then the corresponding errors z_1 and z_2 will be correlated, and we have to pose the hypothesis that the covariance between errors, y_{21}, is different from zero and has to be estimated. Other assumptions, carried out to the seek of simplicity, are as follows: independent variables and errors are not correlated in the same equation: $E(xz') = 0$; structural equations are not redundant; this condition means that h-equations are independent between them, and each endogenous variable h can not be a linear combination of the others; finally, we have supposed that all variables have been measured without errors, therefore there is a perfect identity between latent and observed variables. This allows us to omit the measurement models for endogenous and exogenous variables and to focus exclusively on the structural equations model and on the explanation of the causal relationships linking variables. Combining equations (2), (3) and (4) with the errors' covariances matrix, Ψ, the specification of the model is as follows:

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ g_{21} \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \qquad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (5)$$

Figure 3. provides a graphic representation of the model.

Figure 3



The empirical analysis shows that developmental social capital positively affects labour productivity in SMEs, which in turn exerts a positive influence on human development. Maximum likelihood estimates of parameters are reported in Table 3.

Table 3. Maximum likelihood estimates for the Model (5)

Variables h and x		Develop. social capital	Labour productivity	Human development	Bonding social capital
Developmental social capital	h_1	-	-	-0.56 (0.60) -0.93	-1.34 (0.52) -2.59
Labour productivity	h_2	1.93 (0.84) 2.30	-	-1.34 (0.65) -2.07	-0.06 (0.81) -0.07
Human development	h_3	-	1.28 (0.40) 3.17	-	-

However, three obstacles may undermine the development of a virtuos circle: the negative influence of human development on labour productivity, the negative correlation of bonding social capital with human development and bridging social capital, and the negative relationship between human development and developmental social capital.

The first factor may be controversial and certainly requires further examinations. As a point of departure, we can state that, in Italy, rich Northern regions showing the higher endowments of physical capital also exhibit the lowest rates of enrolment in high schools, together with Southern regions with a long tradition of cultural and social disadvantage. Anyway, the negative effect of human development on labour productivity almost disappears with a model's refinement which will be presented in section 7.

On the other side, the negative influence of bonding social capital must be taken with a certain caution: firstly, the SEM does not highlight a significant influence on labour productivity. Secondly, strong family ties could be considered as an indispensable asset for the production of some dimensions of well-being that we are still not able to measure, and that economists usually neglect within their analyses.

The negative influence exerted by human development on developmental social capital deserves a more in-depth reflection. Factor loadings resulting from the PCA performed on the entire dataset for the measurement of social capital in Italy (see section 4.5) show that relational goods, or what is generally referred to as bridging social capital, play an important role in building the synthetic indicator of developmental social capital. According to some authors, the process of economic growth generates an increasing pressure on time, which leads to a substitution of time-saving (e.g. fast-foods) for time-intensive consumption (e.g. relational goods emerging from participation to social activities). Hirsch (1976) argues that 'As the subjective cost of time rises, pressure for specific balancing of personal advantage in social relationships will increase (…). Perception of the time spent in social relationships as a cost is itself a product of privatized affluence. The effect is to whittle down the amount of friendship and social contact (…). The huge increase in personal mobility in modern economies adds to the problem by making sociability more of a public and less of a private good. The more people move, the lower are the chances of social contacts being reciprocated directly on a bilateral basis' (Hirsch, 1976. 80). In other words, the process of growth, which is in part empirically represented by the human development index, may exert a definite pressure on bridging ties connecting friends and acquaintances, leading to a reduction in developmental social capital's stocks.

The model we have just presented is saturated, and its fit is perfect. This means that there is no difference between the theoretical model-created variance-covariance matrix and the empirical variance-covariance matrix. Not only the model is not falsified by data, but it seems to represent them in an optimal way. However, it is possible to point out two main shortcomings. Firstly, there is a problem of parsimoniousness, in that degrees of freedom are equal to zero. Secondly, the model

does not estimate the direct effect of developmental social capital on human development, which was suggested by the PCA performed in section 5.

7. Model's refinements

In order to increase the degrees of freedom, we have removed from the model the influence of bonding social capital on labour productivity, which, according to the previous analysis, is not particularly significant. The model now becomes:

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ 0 & b_{32} & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ 0 \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \qquad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (6)$$

Parameters estimates are presented in Table 4:

Table 4. Maximum likelihood estimates for the Model (6)					
Variables h and x		Develop. social capital	Labour productivity	Human development	Bonding social capital
Developmental social capital	h_1	-	-	-0.59 (0.42) -1.42	-1.37 (0.38) -3.64
Labour productivity	h_2	1.98 (0.58) 3.40	-	-1.32 (0.39) -2.23	-
Human development	h_3	-	1.29 (0.39) 3.32	-	-

Results from the previous model are substantially confirmed and the model satisfactorily fits the data. Measures of the model's goodness of fit are in fact a function of the residual, i.e. the difference between the empirical variance-covariance matrix and the model-created variance-covariance matrix (see Annex C for further details). It is possible to show (Bonnet and Bentler, 1983), that, if the model is correct, the fitting statistic follows a c^2 with df degrees of freedom, where $df = \frac{1}{2}(p+q)(p+q+1) - t$, p is the number of endogenous variables, q is the number of exogenous variables, and t is the number of estimated parameters.

In order to evaluate the goodness of fit we have compared the residual function for our model with critical values reported in c^2 distribution tables with a probability $P = 0.100$. Since our value is significantly lower than the critical value for a c^2 with one degree of freedom, we can state that the difference between the two variance-covariance matrixes is stochastic in nature, and is not due to

the inappropriateness of the theoretical model. All the other goodness of fit indexes exhibit satisfactory values.

Another possible refinement to the model is the consideration of the direct influence of developmental social capital on human development. The model becomes:

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ b_{31} & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ 0 \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \qquad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (7)$$

Parameters estimates are presented in Table 5:

Table 5. Maximum likelihood estimates for the Model (7)					
Variables h and x		Develop. social capital	Labour productivity	Human development	Bonding social capital
Developmental social capital	h_1	-	-	-0.59 (0.42) -1.42	-1.37 (0.38) -3.64
Labour productivity	h_2	0.87 (0.25) 3.46	-	-0.15 (0.25) -0.58	-
Human development	h_3	0.94 (0.17) 5.64	-	-	-

All model's goodness of fit measures are satisfactory. Social capital positively affects both labour productivity and human development, while the negative influence of human development on labour productivity is trimmed down.

8. Concluding remarks

Overall, the empirical evidence in this paper shows that different dimensions of social capital produce diverse economic outcomes. While the bonding social capital shaped by strong family ties seems to be irrelevant, the developmental social capital shaped by weak ties linking friends and acquaintances is proved to exerts a positive influence on labour productivity in SMEs. The latter in turn positively affects human development, but negatively affects developmental social capital. This sounds as a confirmation for Hirsch's (1976) early thesis on the "social limits to growth", according to which the process of economic development generates an increasing pressure on time, which leads to a substitution of time-saving for time-intensive consumption, leading to a reduction in relational goods production and consumption. The model shows the social capital's ability to foster

human development both directly and through the increase of labour productivity. Bonding social capital is proved to exert a negative influence on bridging and linking ties (i.e. developmental social capital), which can be attributed both to cultural factors and to substitution effects, clearly pointed out also by the principal component analysis. Regional endowments of the two types of social capital reveal to be very different. Areas characterized by higher levels of bonding social capital can suffer from a lack of bridging and linking social capital: differently from what to date has been done by most cross-country studies, we have to be very cautious in carrying out international comparisons laying just on a single measure.

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Annex A. Basic variables for the measurement of social capital

Table A1. Indicators of family social capital

Label	Description	Year	Source	Mean	St. Dev
CONTPAR	People aged 14 and more particularly caring relatives other than parents, children, grandparents and grandchildren, or counting on them in case of need, for every 100 people of the same area.	1998	Istat (2001)	3,905	1,037
COPFIG	Couples with children, for every 100 families of the same area.	2001/02	Istat (2003)	18,470	4,861
COPNOFIG	Couples without children, for every 100 families of the same area.	2001/02	Istat (2003)	71,500	5,424
FAM5COMP	Families with 5 components and more for every 100 families of the same area.	2001/02	Istat (2003)	10,990	3,995
FAMSINGL	Singles-families for every 100 families of the same area.	2001/02	Istat (2003)	72,790	5,022
FIG16KM	People aged 15 and more with children living 16 kilometres away or more (in Italy or abroad) for every 100 families with children of the same area.	1998	Istat (2001)	10,225	3,958
FIG1KM	People aged 15 and more with children living within 1 kilometre (cohabitants or not) for every 100 families with children of the same area.	1998	Istat (2001)	86,245	3,594
FRATELTG	People meeting their brothers and/or sisters everyday for every 100 people with brothers and/or sisters of the same area.	1998	Istat (2001)	6,955	3,199
GIOBAM2S	People aged 6 and more playing with children once a week or more for every 100 people of the same area.	2000	Istat (2002b)	32,11	2,33
INCPARTG	People aged 6 and more meeting family members or other relatives everyday for every 100 people of the same area.	2000	Istat (2002b)	59,735	5,448
MUM16KM	People up to 69 having their mother living 16 kilometres away or more (in Italy or abroad) for every 100 people with an alive mother of the same area.	1998	Istat (2001)	28,595	5,408
MUM1KM	People up to 69 having their mother living within 1 kilometre (cohabitant or not) for every 100 people with an alive mother of the same area.	1998	Istat (2001)	46,055	9,139
NOGIOBAM	People aged 6 and more never playing with children for every 100 people of the same area.	2000	Istat (2002b)	36,22	4,19
NOINCPA	People aged 6 and more never meeting their family members and other non cohabitant relatives for every 100 people of the same area.	2000	Istat (2000b)	10,790	4,937
NOPARENT	People aged 6 and more having neither a family nor other non cohabitant relatives for every 100 people of the same area.	2000	Istat (2000b)	23,075	4,900
SODDPAR	People aged 14 and more declaring themselves satisfied of relationships with their relatives for every 100 people of the same area.	2002	Istat (2004a)	36,27	6,34
VFIGTG	People meeting their children everyday for every 100 people with non cohabitant children of the same area.	1998	Istat (2001)	43,245	4,176
VMUMTG	People meeting their mother everyday for every 100 people with non cohabitant mother of the same area.	1998	Istat (2001)	17,075	3,253

Table A2. Indicators of the informal networks of friends and neighbours					
Label	Description	Year	Source	Mean	St.dev
ASSPORT	Non profit sport clubs for every 10.000 people of the same area.	2002	Istat (2002d)	11,440	4,829
BAR2S	People aged 6 and more attending bars, pubs, and circles at least once a week for every 100 people of the same area.	2000	Istat (2002b)	21,500	4,076
CENAF2S	People aged 6 and more having dinner outside more than once a week for every 100 people of the same area.	2000	Istat (2002b)	5,045	1,198
INCAMI2S	People aged 6 and more meeting friends more than once a week for every 100 people of the same area.	2002	Istat (2004)	28,735	1,485
MUBAR	People aged 14 and more attending pubs and bars to listen to music concerts for every 100 people of the same area.	2000	Istat (2002b)	18,620	2,411
NOBAR	People aged 6 and more never attending bars, pubs and circles for every 100 people of the same area.	2000	Istat (2002b)	47,865	6,513
NOCENF	People aged 6 and more never having dinner outside for every 100 people of the same area.	2000	Istat (2002b)	17,265	4,954
NOPARLCO	People aged 6 and more never talking with others for every 100 people of the same area.	2000	Istat (2002b)	8,510	1,269
NOPARVIC	People aged 6 and more never talking with neighbours for every 100 people of the same area.	2000	Istat (2002b)	25,585	3,314
PARCON2S	People aged 6 and more talking with others once a week or more for every 100 people of the same area.	2000	Istat (2002b)	46,965	6,074
PARVIC2S	People aged 6 and more talking with neighbours once a week or more for every 100 people of the same area.	2000	Istat (2002b)	22,940	3,328

Table A3. Indicators of social capital as voluntary organizations					
Name	Description	Year	Source	Mean	St. Dev.
AIUTOVOL	People aged 14 and more who have helped strangers in the context of a voluntary organization's activity, for every 100 people of the same area.	1998	Istat (2001)	5,080	1,407
AMIVOL	People aged 6 and more who, when meeting friends, carry out voluntary activities for every 100 people meeting friends of the same area.	2002	Istat (2004a)	3,920	1,287
ORGANIZ	Voluntary organizations for every 10.000 people	2001	Istat (2004b)	4,195	3,284
RIUASCU	People aged 14 and more who have joined meetings in cultural circles and similar ones at least once a year for every 100 people of the same area.	2002	Istat (2004)	8,485	3,862
RIUASEC	People aged 14 and more who have joined meetings in ecological associations and similar ones at least once a year for every 100 people of the same area.	2002	Istat (2004)	1,755	0,458
SOLDASS	People aged 14 and more who have given money to an association at least once a year for every 100 people of the same area.	2002	Istat (2004)	15,635	6,250

Table A4. Indicators of social capital as active political participation					
Label	Description	Year	Source	Mean	St.Dev
ATGRAPAR	People aged 14 and more who have carried out unpaid work for a political party in the 12 months before the interview, for every 100 people of the same area.	2002	Istat (2004)	1,500	0,365
COMIZIO	People aged 14 and more who have joined a political meeting in the 12 months before the interview, for every 100 people of the same area.	2002	Istat (2004)	6,025	2,698
CORTEO	People aged 14 and more who have joined a march in the 12 months before the interview, for every 100 people of the same area.	2002	Istat (2004)	5,700	1,525
SOLDPAR	People aged 14 and more who have given money to a political party in the 12 months before the interview, for every 100 people of the same area.	2002	Istat (2004)	2,630	1,178

Annex B. The Adjusted Human Development Index for Italy

The Adjusted Human Development Index (AHDI) is the simple average of three indexes representing income, schooling and health. Schooling is represented by the enrolment rate in high schools of the population aged 14-18. Dimensional indexes regarding income and life expectancy at birth are represented by the ratio:

$$index = \frac{effective\ \ value - minimum\ value}{target\ \ value - minimum\ value}.$$

Life expectancy at birth is estimated adopting 50 and 85 years as minimum and target values, while the income index adopts $\log 5.000$ as the minimum value and $\log 40.000$ as the target.

Annex C. Models' goodness of fit

The model (5):

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ g_{21} \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \quad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (5)$$

is saturated and the fit is perfect.
Model (6):

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ 0 & b_{32} & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ 0 \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \qquad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (6)$$

has one degree of freedom. $c^2 = 0.0058 < 2.70554$: the model is not falsified by data.
The Goodness of Fit Index (*GFI*):

$$GFI = 1 - \frac{T}{\max(T_i)}$$

is equal to 1.00. This means perfect fit.
The Adjusted Goodness of Fit Index (*AGFI*) takes into account also the model's number of degrees of freedom, i.e. its parsimoniousness:

$$AGFI = 1 - \left(\frac{k}{df}\right)(1 - GFI)$$

where *df* are degrees of freedom, and *k* is the number of variances-covariances in input; *k* is given by:

$$k = \frac{1}{2}(p+q)(p+q+1)$$

The *AGFI* of model (6) is equal to 1.00, indicating perfect fit.
The Root mean squared residuals (*RMR*) is:

$$RMR = \sqrt{\frac{1}{k}\Sigma(s_{ij} - s_{ij})^2}$$

is equal to 0 when the theoretical model-generated variance-covariance matrix fits the empirical matrix, and infinitely grows when the model's goodness of fit worsens.
RMR for model (6) is equal to 0.0015, therefore indicating a quite perfect fit.
The model (7):

$$\begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & b_{13} \\ b_{21} & 0 & b_{23} \\ b_{31} & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} h_1 \\ h_2 \\ h_3 \end{bmatrix} + \begin{bmatrix} g_{11} \\ 0 \\ 0 \end{bmatrix} \cdot [x_1] + \begin{bmatrix} z_1 \\ z_2 \\ z_3 \end{bmatrix} \qquad \begin{bmatrix} y_{11} & & \\ y_{21} & y_{22} & \\ y_{31} & y_{32} & y_{33} \end{bmatrix} \qquad (7)$$

has one degree of freedom. $c^2 = 0.0058 < 2.70554$: the model is not falsified by data.
Goodness of fit measures for model (7) are all satisfactory:

GFI = 1.00; *AGFI* = 1.00; *RMR* = 0.0015;

indicating a quite perfect fit.