Social Capital and Labour Productivity in Italy

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Summary

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. The bonding social capital of strong family ties and the bridging social capital shaped by informal ties connecting friends and acquaintances are proved to exert a negative effect on labour productivity, the economic performance, and human development. On the contrary, the linking social capital of voluntary organizations positively influences such outcomes.

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

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

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Useful materials for the study of social capital are available on Social Capital Gateway, web site providing resources for social sciences edited by the author of this article, at the address www.socialcapitalgateway.org (Sabatini, 2005a).

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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, the 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 does the first Italian electric company carry 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 equipment, 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[1].

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 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 35 indicators of social capital, which, by means of factor analyses, are used to build synthetic indicators for three core

[1] I am grateful to Daniele Lamotta Genovese for enlightening me on Edison's workforce management strategies.

dimensions of this multifaceted concept: 1) *bonding social capital*, shaped by strong family ties, 2) *bridging social capital*, shaped by weak informal ties among friends and neighbours, and 3) *linking social capital*, given by the formal ties connecting people within the boundaries of voluntary organizations. Due to the chronic shortage of data in the field, there has not been the possibility to relate labour productivity to the internal social capital "possessed" by firms, as given, for example, by bridging ties connecting employees, the quality of the organizational structure and norms and values shared within the workforce. The relationship assessed in this analysis is between labour productivity and the "environmental" social capital. The claims are that: a) the socio-cultural context within which firms are embedded may sort spill-over effects affecting labour force's social norms and values; b) social networks involving employees from different firms may act as a powerful mean to foster the diffusion of trust and knowledge, as it has been widely shown by the voluminous literature on "learning regions", with particular regard for the case of Silicon Valley (Florida, 1995).

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 latent indicators 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 possibility to account for unknown phenomena affecting the model's variables' behaviour, the attraction of SEM's graphical modelling interface (see for example Figures 2 and 3), the desirability of testing overall models rather than individual coefficients, the ability to test models with multiple dependents.

The empirical analysis shows that different types of social capital exert diverse effects on labour productivity in SMEs and on the economic performance. Bonding and bridging social capital negatively affect labour productivity and the economic performance, differently from linking social capital, which exerts a positive influence on these outcomes. Such structure of relationships among variables is confirmed even if controlling for the stock of physical capital, as expressed by the capital – labour ratio. The claim is that the presence of dense and cross-cutting formal networks is associated with the diffusion of social norms of trust and reciprocity which in turn may sort a positive influence on workers' effort and motivation. More in general, the analysis' results provide a new confirmation of the multidimensional, dynamic and context-dependent nature of social capital.

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 on 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 provides a first exploratory analysis on the role of physical capital. The paper is closed by 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 role of social capital as a collective resources serving the achievement of macro outcomes is instead well explained by the new economic sociology perspective (Granovetter, 1973, 1985). Granovetter identifies social capital mainly with social networks of weak bridging ties. According to the author, 'Whatever is to be diffused can reach a larger number of people, and traverse greater social distance, when passed through weak ties rather than strong. If one tells a rumour to all his close friends, and they do likewise, many will hear the rumour a second and third time, since those linked by strong ties tend to share friends' (Granovetter, 1973, 1366). Social networks can thus be considered as a powerful mean to foster the diffusion of information and knowledge, lowing uncertainty and transaction costs. 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. 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 by 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[2]

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 dataset collected by the author including 35 indicators of three main social capital dimensions: strong family ties, strong and weak informal ties among friends and acquaintances, and voluntary organizations. 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, 2001a, 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 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. 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_α corresponding to the α-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 α-th factorial axis. Formally, the α-th principal component is expressed as a new variable c_α by:

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

$$c_\alpha = Xu_\alpha \quad \text{or} \quad \{...c_{\alpha i}...\} = \left\{ ... \sum_j^p x_{ij} u_\alpha^j \right\}, \quad (1)$$

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. However, there are several reasons to doubt of the efficacy of social capital measures simply based on the density of voluntary organizations. Firstly, even though individuals who join groups and who interact with others regularly show attitudinal and behavioural differences

compared to nonjoiners, the possibility exists that people self-select into association groups, depending on their original levels of generalized trust and reciprocity. Secondly, the group experiences might be more pronounced in their impact when members are diverse and from different backgrounds. This type of group interaction, which is called "bridging", brings members into contact with people from a cross-section of society and, as a result, gives a more relevant contribution to the "socialization" of norms of trust and reciprocity. The "heterogeneity argument" has been used to criticize the empirical literature on social capital. According to some authors, if diversity matters for socialization of cooperative values, then voluntary associations might not be the measure to take into account, as such groups have been found relatively homogeneous in character. Voluntary associations indeed generally recruit members who have already relatively high civic attitudes (Popielarz, 1999, Mutz, 2002, Uslaner, 2002). Finally, face-to-face interactions inside voluntary organizations could be modest and not necessarily imply the sharing of information and values. This is particularly true in advanced economies, where participation in voluntary organizations is often limited to an annual subscription related to the payment of a membership fee. This kind of civic participation may have small spillover effects, scarcely contributing to the diffusion of trust. In the light of the arguments summarized above, indicators of social capital as civic participation might take into account different variables measuring not only the density of voluntary organizations (i.e. the number of organizations in which a mean citizen is involved, or the so-called "Putnam's instrument"), but also the heterogeneity of members, and the degree of their involvement into the associational life. In this paper, the linking social capital of voluntary organizations has been measured through their number and through several indicators capturing the degree of members involvement in the associational life, like the frequency of meetings, and the practice of carrying out unpaid work and volunteering activities in the field. 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.

5. Relating social capital to SMEs' productivity in Italy

Indicators of the three types of social capital are then used, together with measures of labour productivity in SMEs and human development, to run a new exploratory analysis aimed to shed light on the correlation among variables. Labour productivity is computed by the Istat (2001b, 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 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

	Bridging social capital	Linking social capital	Labour productivity	Human development	Bonding social capital
Bridging social capital	1				
Linking social capital	.827	1			
Labour productivity	.641	.662	1		
Human development	.689	.398	.546	1	
Bonding social capital	-.638	-.480	-.650	-.830	1

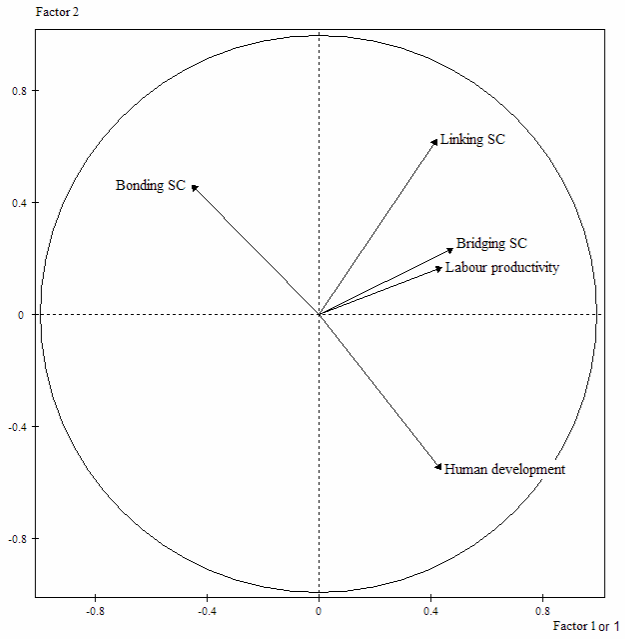
From table 2 we learn that bridging and linking social capital, labour productivity in SMEs and human development powerfully load on the first principal component, which is also associated with low levels of bonding social capital. The first factor therefore provides an interesting index of

system competitiveness for the Italian regions. The second principal component represents, even if more weakly, high levels of linking social capital. The analysis provides new evidence of the diverse correlations between different types of social capital, on the one hand, and various economic outcomes, on the other. The presence of bonding social capital is associated with lower levels of human development and labour productivity, while bridging and linking social capital exhibit a strong positive correlation with such economic outcomes.

Table 2. Loading of variables on the first three axes			
Label variable	**Axis 1**	**Axis 2**	**Axis 3**
Human development	0,82	-0,49	0,17
Bonding social capital	-0,86	0,41	0,08
Bridging social capital	0,90	0,21	0,31
Linking social capital	0,80	0,56	0,11
Labour productivity	0,83	0,15	-0,52

The correlation circle highlights the negative and significant correlation between bonding social capital and human development, and a positive and significant correlation between the other two types of social capital and labour productivity.

Figure 1. Correlation circle



Simplifying, the correlation circle shows a projection of the initial variables in the factors space. When two variables are far from the centre, then they are significantly positively correlated if they

are close to each other, and not correlated if they are orthogonal. If they are on the opposite side of the centre, then they are significantly negatively correlated. When the variables are close to the centre, it means that some information is carried on other axes and that any interpretation might be hazardous.

6. Beyond correlation: a structural equations analysis

Relationships connecting considered variables are then investigated by means of a structural equations model (SEM). A SEM is 'A stochastic model where each equation represents a causal linkage, rather than a simple empirical association' (Goldberger, 1972, 979). SEMs are composed by regression equations, which are included in the model only so far as it is possible to interpret them as causal relationships, theoretically justifiable and not falsified by data. The use of structural models instead of regression models implies a complete revision of the parameters' estimation mechanism. In the regression model, parameters can be estimated through the ordinary least squares (OLS) method. In a model including two or more structural equations, where the same variables are independent within an equation and dependent in all the others, the estimation process is remarkably more complicated. Instead of equations estimates, we have to compute "system estimates". Another peculiarity of SEMs is the possibility to account for other parameters in addition to structural β linking endogenous and exogenous variables. More in particular, it is possible to account for variances and covariances among errors e. A careful specification of the matrix Ψ of covariances among errors ζ allows us to account for variables which, although not explicitly considered within the model, may play a role in the real scenario described by observed data. When a model is perfectly specified, i.e. it includes all the variables effectively interacting in the real world, and correctly accounts for their dynamics, then each equation's stochastic error component is just a negligible detail. However, generally, this component includes all those factors that in the real world affect the model's dependent variable, but that we have not accounted for in the model's design because they are unknown or not measurable. If one of these unknown variables affects two of the model's endogenous variables at the same time, for example bridging social capital and human development, and if we do not explicitly consider this possibility within the model, then the empirical investigation will necessarily find a spurious correlation between bridging social capital and human development, which could be without precedent in the real world. On the contrary, if we explicitly consider a correlation between the errors respectively related to social capital and human development, then the effect of the unknown variable will be included in the model, thereby reducing the probability to find misleading spurious correlations (Goldberger, 1972, Jöreskog and Sörbom, 1979, Bollen, 1989).

Let ξ_1 be bonding social capital, η_1, bridging social capital, η_2 linking social capital, η_3 labour productivity in SMEs, and η_4 the adjusted human development index. β_{ij} are the coefficients of the relationships between endogenous variables, and γ_{ij} define the relationships between endogenous and exogenous variables. In each equation, the first parameter's deponent refers to the dependent variable, and the second to the independent variable. 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, bridging social capital is influenced by human development:

$$\eta_1 = \beta_{14}\eta_4 + \zeta_1 \qquad (2)$$

Linking social capital is influenced by bonding social capital:

$$\eta_2 = \gamma_{21}\xi_1 + \zeta_2 \qquad (3)$$

Labour productivity is affected by the three types of social capital:

$$\eta_3 = \beta_{31}\eta_1 + \beta_2\eta_2 + \gamma_{31}\xi_1 + \zeta_3 \qquad (4)$$

Adjusted human development is affected by the three types of social capital:

$$\eta_4 = \beta_{41}\eta_1 + \beta_{42}\eta_2 + \gamma_{41}\xi_1 + \zeta_4 \qquad (5)$$

Errors ζ_1 and ζ_2 are correlated. This assumption aims to synthesize the action exerted on dependent variables η_1 and η_2 by all the other (potentially infinite) variables neglected by the model. This implies the need to estimate, besides parameters β and γ, also covariances ψ between errors. In fact, if the same independent variable has been omitted both, for instance, for η_1 and η_2, then the corresponding errors ζ_1 and ζ_2 will be correlated, and we have to pose the hypothesis that the covariance between errors, ψ_{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: $E(\xi\zeta') = 0$; structural equations are not redundant; this condition means that η-equations are independent between them, and each endogenous variable η 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:

$$\begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & \beta_{14} \\ 0 & 0 & 0 & 0 \\ 0 & \beta_{32} & 0 & 0 \\ \beta_{41} & \beta_{42} & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} + \begin{bmatrix} 0 \\ \gamma_{21} \\ \gamma_{31} \\ \gamma_{41} \end{bmatrix} \cdot [\xi_1] + \begin{bmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \end{bmatrix} \quad \begin{bmatrix} 1 & & & \\ \psi_{21} & 1 & & \\ 0 & 0 & 1 & \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad (6)$$

Figure 3 provides a graphic representation of model (6). The graphic representation of structural equations models follows the path analysis symbology. It reports the variables, their errors and the linkages connecting variables. Such connections are represented both graphically, by arrows, and numerically, by regression coefficients. In the Lisrel (LInear Structural RELationships) praxis, the graphic representation is based on the following criteria: latent variables are inscribed in an ellipse, while observed variables in a rectangle. In models presented in this chapter, all variables are inscribed in ellipses, due to the hypothesis that variables have been measured without errors. The causal nexus between two variables is represented by a straight arrow moving from the independent variable to the dependent variable. The association (covariation or correlation) between two variables is represented by a bidirectional curved arrow connecting them. The absence of arrows means the absence of linkages between variables.

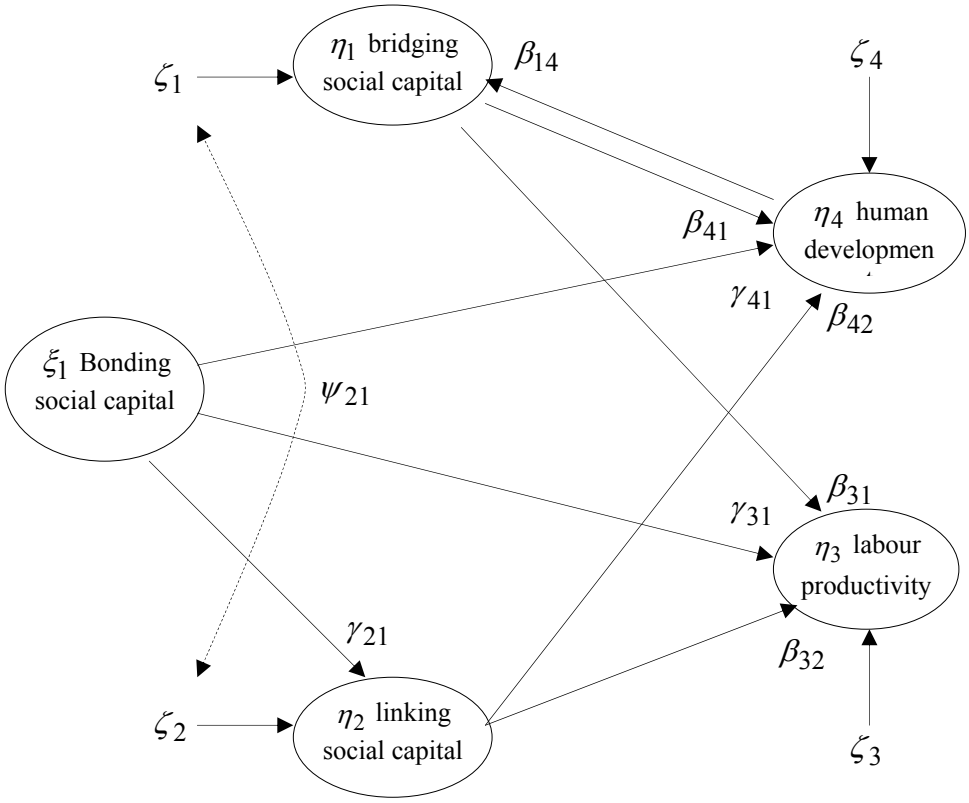


Figure 2. Graphic representation of model (6)

The model has five degrees of freedom and exhibits a satisfactory goodness of fit. Measures of the model's ability to fit data 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. It is possible to show (Bonnet and Bentler, 1983), that, if the model is correct, the fitting statistic follows a χ^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, the residual function for the model must be compared with critical values reported in χ^2 distribution tables with a probability $P = 0.100$. Since the value for this model is significantly lower than the critical value for a χ^2 with five degrees of freedom ($\chi^2 = 5.39 < 9.25$), 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 (see Annex C for further details). The empirical analysis shows that different types of social capital exert diverse effects on labour

productivity in SMEs. Bonding social capital negatively affects productivity, while bridging social capital seems to be quite irrelevant, thereby contradicting the idea that, in Italy, informal social networks of friends can constitute a channel fostering the diffusion of information and knowledge benefiting workers' problem solving ability. On the contrary, linking social capital exerts a positive influence both on labour productivity and on human development. Moreover, the effect of social capital's various dimensions on human development proves to be different: strong ties connecting relatives and friends seem to hamper development, differently from the linking social capital of voluntary organizations, which instead exerts a positive effect. Parameters estimates are presented in table 3.

Table 3. Maximum likelihood estimates of parameters β and γ of the model (6)

Variables η and ξ		Bridging social capital	Linking social capital	Labour productivity	Human development	Bonding social capital
Bridging social capital	η_1	-	-	-	0.92 (0.19) 4.94	
Linking social capital	η_2					-0.59 (0.18) -3.31
Labour Productivity	η_3	-0.04 (0.46) -0.09	0.48 (0.42) 1.14			-0.45 (0.30) -1.46
Human Development	η_4	-1.18 (0.36) -3.25	0.79 (0.36) 2.19			-1.20 (0.29) -4.09

The positive developmental effect of linking social capital sounds as a proof of Putnam's (1993) claims on the role of voluntary organizations, therefore contradicting part of the economics and political science literature in the field. According to Putnam, Leonardi and Nanetti (1993), associations function as "schools of democracy", in which cooperative values and trust are easily socialized. 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.

According to a prominent school of sociological thought, the determinant of workers' effort is the "norm of the work group" (Mayo, 1949).This approach has been modelled by Akerlof (1982), who states that, above a certain minimum effort, the workers' performance is freely determined. According to the author: 'The norm … for the proper work effort is quite like the norm that determines the standards for gift giving at Christmas' (Akerlof, 1982, 549), in the sense that it is

determined by shared values and social norms. A social environment rich of linking social capital and participation opportunities, allowing people to meet frequently, is a fertile ground for nurturing shared values and social norms of trust and reciprocity, that may exert positive spill-over effects on the behaviour of workers, making them more motivated and less inclined to develop shirking attitudes.

The empirical analysis in this paper is thus the umpteenth confirmation of the multidimensional, dynamic and context-dependent nature of social capital. As argued by Coleman (1988), 'Social capital is defined by its function … Like physical capital and human capital, social capital is not completely fungible, but may be specific to certain activities. A given form of social capital that is valuable in facilitating certain actions may be useless or even harmful for others' (Coleman, 1988, 98). On the other side, models in this section and in section 8 suggest that weak ties connecting friends and acquaintances may join to strong family ties in determining the perverse developmental effects that Banfield (1958), just referring to the Italian context, ascribed to the "amoral familism". More in particular, the models suggest that, in the Italian regions, informal social networks may configure themselves as forms of "amoral friendships", hampering development as well as the bonding social capital of strong family ties. Another interesting hint provided by the empirical analysis is the ability of human development to foster relational goods' consumption, thus leading to the creation of bridging social capital.

7. Model's refinement

A slight refinement provides a test for the analysis' reliability and improves the model's goodness of fit. Omitting the consideration of the influence sorted by bridging social capital on labour productivity – which, according to the previous model, is quite irrelevant - significantly increases the probability that the difference between the empirical variance-covariance matrix and the model-created variance-covariance matrix is stochastic in nature, and is not due to the inappropriateness of the theoretical model. The new chi-square is significantly lower than the critical value for a χ^2 with six degrees of freedom: $5.39 < 10.64$, and the new formulation of the model is as follows:

$$\begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & \beta_{14} \\ 0 & 0 & 0 & 0 \\ 0 & \beta_{32} & 0 & 0 \\ \beta_{41} & \beta_{42} & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{bmatrix} + \begin{bmatrix} 0 \\ \gamma_{21} \\ \gamma_{31} \\ \gamma_{41} \end{bmatrix} \cdot [\xi_1] + \begin{bmatrix} \zeta_1 \\ \zeta_2 \\ \zeta_3 \\ \zeta_4 \end{bmatrix} \quad \begin{bmatrix} 1 & & & \\ \psi_{21} & 1 & & \\ 0 & 0 & 1 & \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad (7)$$

All the other goodness of fit measures are reported in Annex C. Parameters estimates are reported in table 4 and are quite identical to those presented in the previous paragraph.

Table 4. Maximum likelihood estimates of parameters β and γ of the model (7)						
Variables η and ξ		Bridging social capital	Linking social capital	Labour productivity	Human development	Bonding social capital
Bridging social capital	η_1	-	-	-	0.92 (0.19) 4.94	
Linking social capital	η_2					-0.59 (0.18) -3.31
Labour Productivity	η_3	-	0.45 (0.24) 1.93			-0.43 (0.27) -1.58
Human Development	η_4	-1.18 (0.36) -3.25	0.79 (0.36) 2.19			-1.20 (0.29) -4.09

It is noteworthy that, in both models, the negative influence of bonding social capital on labour productivity and human development must be taken with a certain caution: 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.

8. Social capital vs. physical capital: a first exploratory analysis

All relationships found in the previous section are confirmed if controlling for physical capital. The analysis in this section is intended to be a mere exploration, since it suffers from the considerable shortcoming that data on total gross capital stock are available only for the period 1974-1994 and do not account for firms size, while the other data on social capital and well-being generally refer to 2001-2002. The capital-labour indicator is built drawing on CRENos[3] data as the ratio:

$$K/L = \frac{K_{AG} + K_I + K_{MS} + K_{NMS}}{L_{AG} + L_I + L_{MS} + L_{NMS}} \quad (8)$$

[3] CRENoS (*Centro Ricerche Economiche Nord Sud,* Centre for North South Economic Research) is a section of the inter-universities consortium CIREM, Center on Economic and Mobility Research, in collaboration with CRiMM (Center for Research on Mobility Models, University of Cagliari), and with DiESiL (Center for the Local Systems Economic Dynamics, University of Sassari).

where K_{AG}, K_I, K_{MS} and K_{NMS} are the total gross capital stock respectively used in agriculture, industry, market services and non-market services, while L_{AG}, L_I, L_{MS} and L_{NMS} are the units of labour employed in the same sectors.

In order to carry out a more specific assessment of the role that different social capital dimensions play in the economic performance, this section adopts also an index of per capita income in spite of the adjusted human development index. The new index has been computed as:

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

where the minimum value is 5.000€ and the target value = 40.000€. The index can thus be expressed as follows:

$$Income = \frac{\log(effective\ value) - \log(5.000)}{\log(40.000) - \log(5.000)}$$

Let ξ_1 be bonding social capital, ξ_2 the K/L ratio, η_1, bridging social capital, η_2 linking social capital, η_3 labour productivity in SMEs, and η_4 per capita income.

In the model with the best goodness of fit, bridging social capital is influenced by income:

$$\eta_1 = \beta_{14}\eta_4 + \zeta_1 \qquad (9)$$

Linking social capital is influenced by bonding social capital:

$$\eta_2 = \gamma_{21}\xi_1 + \zeta_2 \qquad (10)$$

Labour productivity is affected by the three types of social capital and by physical capital:

$$\eta_3 = \beta_{31}\eta_1 + \beta_2\eta_2 + \gamma_{31}\xi_1 + \gamma_{32}\xi_2 + \zeta_3 \qquad (11)$$

Income is affected by the three types of social capital and by physical capital:

$$\eta_4 = \beta_{41}\eta_1 + \beta_{42}\eta_2 + \gamma_{41}\xi_1 + \gamma_{42}\xi_2 + \zeta_4 \qquad (12)$$

Errors ζ_1 and ζ_2, and ζ_1 and ζ_2 are correlated. Combining equations from (9) to (12) with the errors' covariances matrix, Ψ, the specification of the model is as follows:

$$\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix}=\begin{bmatrix}0 & 0 & 0 & \beta_{14}\\ 0 & 0 & 0 & 0\\ 0 & \beta_{32} & 0 & 0\\ \beta_{41} & \beta_{42} & 0 & 0\end{bmatrix}\cdot\begin{bmatrix}\eta_1\\ \eta_2\\ \eta_3\\ \eta_4\end{bmatrix}+\begin{bmatrix}0 & 0\\ \gamma_{21} & 0\\ \gamma_{31} & \gamma_{32}\\ \gamma_{41} & \gamma_{42}\end{bmatrix}\cdot\begin{bmatrix}\xi_1\end{bmatrix}+\begin{bmatrix}\zeta_1\\ \zeta_2\\ \zeta_3\\ \zeta_4\end{bmatrix}\quad\begin{bmatrix}1 & & & \\ \psi_{21} & 1 & & \\ 0 & 0 & 1 & \\ 0 & 0 & \psi_{43} & 1\end{bmatrix} \quad (13)$$

Figure 3 provides a graphic representation of the model:

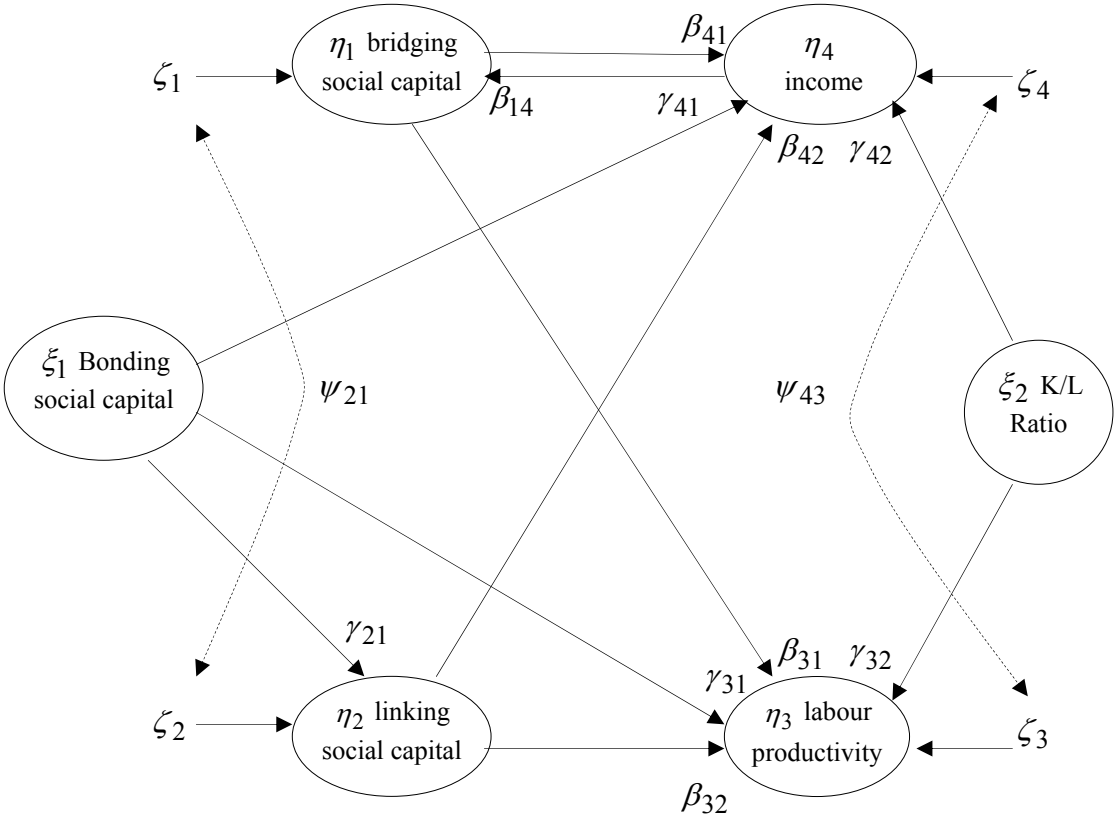


Figure 3. Graphic representation of model (13)

The analysis confirms that different social capital's dimensions exert diverse effects on labour productivity and the economic performance. Bonding and bridging social capital exert a negative influence, differently from linking social capital. Parameters' estimates are presented in table 6.

Table 6. Maximum likelihood estimates of parameters β and γ of the model (13)						
Variables η and ξ	Bridging social capital	Linking social capital	Labour productivity	Per capita income	Bonding social capital	K/L ratio
Bridging social capital				1.07 (0.24) 4.52		
Linking social capital					-0.69 (0.22) -3.16	
Labour Productivity	-1.55 (0.43) -3.64	1.49 (0.41) 3.62			-0.89 (0.34) -2.62	0.08 (0.27) 0.28
Per capita income	-1.53 (0.39) -3.91	1.28 (0.39) 3.28			-1.13 (0.34) -3.35	0.26 (0.27) 0.95

8. Concluding remarks

Overall, the empirical evidence in this paper shows that different dimensions of social capital produce diverse economic outcomes. The bonding social capital shaped by strong family ties and the bridging social capital of strong and weak ties connecting friends and acquaintances exert a negative effect on labour productivity, the economic performance and human development, differently from the linking social capital of voluntary organizations which, on the contrary, positively influences such outcomes. The positive developmental effect of linking social capital sounds as a proof of Putnam's theses on the role of voluntary organizations, therefore contradicting part of the economics and political science literature in the field. According to Putnam, Leonardi and Nanetti (1993), associations function as "schools of democracy", in which cooperative values and trust are easily socialized. 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. A social environment rich of participation opportunities, allowing people to meet frequently, is a fertile ground for nurturing shared values and social norms of trust and reciprocity. Where such values and norms develop, the likelihood of cooperative behaviours is higher, and workers may be more motivated and not inclined to shirking behaviours.

This is a new confirmation of the multidimensional, dynamic and context-dependent nature of social capital. On the other side, weak ties connecting friends and acquaintances seem to join to strong family ties in determining the perverse developmental effects that Banfield (1958), just referring to the Italian context, ascribed to the "amoral familism". The models in this paper suggest

that, in the Italian regions, informal social networks may configure themselves as forms of "amoral friendships", hampering development as well as the bonding social capital of strong family ties.

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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

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 measures

The model (6) has five degrees of freedom and $\chi^2 = 5.39 < 9.25$: the model is not falsified by data.

The Goodness of Fit Index (*GFI*):

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

is equal to 0.85. This means good 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 0.54, indicating perfect fit.

The Root mean squared residuals (*RMR*) is:

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

is equal to 0.26.

Model (7) has 6 degrees of freedom and $\chi^2 = 5.39 < 10.64$: the model is not falsified by data.

GFI for model (7) is equal to 0.85, RMR = 0.26 and AGFI = 0.62.

Model (8) has 6 degrees of freedom and $\chi^2 = 6.74 < 9.25$: the model is not falsified by data.

GFI for model (8) is equal to 0.87, AGFI = 0.55, and RMR = 0.22.

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