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**Do Social Relations Affect
Economic Welfare? A
Microeconomic Empirical Analysis**

Giacomo Degli Antoni

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Giacomo Degli Antoni, *EconomEtica - Inter-University Centre for Economic Ethics and Corporate Social Responsibility University of Milano-Bicocca*

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Do Social Relations Affect Economic Welfare? A Microeconomic Empirical Analysis

Summary

Over the last few years, many studies have shown that social networks affect the socioeconomic development. This paper presents evidence, through the Italian microdata representative of the entire Italian population, that the quality and quantity of interpersonal relations of agents can increase their economic welfare. Two proxies of interpersonal relations at an individual level are considered: a proxy for the density and one for the quality of network structure of personal contacts. Both seem to have a positive effect on the level of household economic welfare of agents. This result proves robust to the inclusion of a variety of control variables and to the use of different econometric methods.

Keywords: Networks, Social Interactions, Household Economic Welfare, Microdata, Fuzzy Logic

JEL Classification: D10, Z13

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Address for correspondence:

Giacomo Degli Antoni
EconomEtica - Inter-University Centre for Economic Ethics
and Corporate Social Responsibility
University of Milano-Bicocca
Via dell'Innovazione 10
20126 Milan
Italy
E-mail: giacomo.degliantoni@unimib.it

1. Introduction

Recently, many studies have devoted more and more attention to the investigation on the effects that interpersonal relations have on economic variables. In particular, they are interested in the relationship between: social relations and economic growth (e.g. Knack and Keefer 1997; and Zak and Knack 2001); social relations and government performance (e.g. Putnam 1993; Easterly and Levine 1997; Hall and Jones 1999; and La Porta et al. 1999); social relations and human capital (e.g. Loury 1977; Coleman 1988; Goldin and Katz 1999; and Helliwell and Putnam 1999); and social relations and financial development (e.g. Guiso, Sapienza and Zingales 2004). With regard to this paper, in particular, it is worth stressing that there are many contributions showing a significant correlation between economic performance and different characteristics of social networks.

At an aggregate level, for example, Knack and Keefer (1997) and Zak and Knack (2001) find that the level of trust present in a country and its economic performance are positively associated. Narayan and Pritchett (1999) show that the level of social capital¹ present in different Tanzanian villages positively influences household wealth. Helliwell and Putnam (1995) and Lyon (2005) find that growth in per capita income in Italy is positively associated with an index of civic community which is measured by considering: Referendum Turnouts (1974-1987), Preference Voting (1953-1979), Newspaper Readership (%; 1975) and Association Density (1981). Granovetter (2005) analyses the impact of social networks on economic outcomes. He stresses that social structure affects economic outputs for three main reasons: “First, social networks affect the flow and the quality of information. Much information is subtle, nuanced and difficult to verify, so actors do not believe impersonal sources and instead rely on people they know. Second, social networks are an important source of reward and punishment, since these are often magnified in their impact when coming from others personally known. Third, trust, by which I mean the confidence that others will do the “right” thing despite a clear balance of incentives to the contrary, emerges, if it does, in the context of a social network.” (Granovetter, 2005, p.33)

At a micro level, many contributions have shown that social relations of individuals affect the possibility of increasing personal income. Granovetter (1974) focuses on the role that “Personal contacts” have on getting a job. Granovetter defines personal contacts as “individual known personally to the respondent², with whom he originally became acquainted in some context unrelated to a search for job information, from whom he has found out about his new job, or, who recommended to someone who then contacted him” (Granovetter, 1974, p.11). The author finds evidence that personal contacts are the main channel through which the unemployed get a job. Moreover, jobs found through personal contacts have higher wages than

¹ The concept of social capital is often used by economists in order to analyse the role of interpersonal relations in economics. There are many definitions of social capital and it is possible to identify two principal approaches to this concept. The first one considers social capital as a variable that mostly produces effects and is developed at an aggregate level. Putnam (1993), Fukuyama (1995, 1999), Narayan and Pritchett (1999), Uphoff (2000), Paldam and Svendsen (2000), the World Bank (2005) are exponents of this approach. The second one considers social capital at an individual level. The authors adopting this approach interpret social capital as a notion that operates at an individual level. Coleman (1988, 1990), DiPasquale and Glaeser (1999), Glaeser, Laibson and Sacerdote (2000), Glaeser, Laibson, Scheinkman and Soutter (2000) use this approach. The aim of this paper is not to investigate the concept of social capital and its features (for a discussion of social capital and its features see, for example, Paldam 2000; Woolcock e Narayan 2000; Durlauf e Fafchamps 2004). However, it is useful for the purposes of this work to refer sometimes to this notion. In these cases, the definitions of social capital used will always be specified. Narayan and Pritchett define social capital as the “quantity and quality of associational life and the related social norms” (Narayan and Pritchett 1999, p.872).

² In the study of Granovetter (1974), the respondents are workers who have found a job in the last five years.

jobs found by “Formal means” (advertisements, public and private employment agencies, interviews etc.) or “Direct applications” (when one goes directly to the firm without using a formal or personal intermediary). Grootaert (1999), Grootaert and Narayan (1999) and Grootaert, Oh and Swamy (1999) investigate the effect that the participation in local institutions has on the household welfare respectively in Indonesia, Bolivia and Burkina Faso. These three papers show that the participation in local associations reduces household poverty. The more household is involved in local associations, the higher the per capita household expenditures are and the better the access to credit of household is. Rose (1999) produces an empirical analysis of Russia and shows that social networks positively affect individual welfare. Three aspects of individual welfare are considered by the author: a measure of food consumption, a measure of income security and a proxy of health. Individual welfare is studied in relation to three groups of independent variables: individual attributes, social integration and generic social capital. The social capital measures, in particular, include different kinds of social networks that individuals can rely upon and that result positively correlated to individual welfare. Glaeser, Laibson, Scheinkman and Soutter (2000) use an experimental framework and investigate the individual determinants of trust and trustworthiness. They find, in a “trust game” design, that the family status (measured by the number of hours spent working for pay, which is a negative indicator of status, and by having a father that has a college degree) and charisma (measured by the number of beers drunk per week and by the presence of a sexual partner) affects the amount of pay-off gained by the agents in the trust game. The authors interpret status and charisma as components of “individual social capital” that reflect the ability to gain return from social situations. People with high level of individual social capital have more possibilities to reward and punish others and are more able to induce trustworthy behaviour. According to the “social capital of brokerage” idea of Burt (1992, 2002), people who are involved in networks that bridge the structural hole between groups have advantages in getting information and in pursuing rewarding opportunities. Burt shows that managers (Burt 2004) and bankers (Burt 2003) who are connected to different groups of individuals that share alternative ideas and ways of thinking are more able to get individual advantages such as higher salary, positive performance evaluations, positive peer evaluations, promotions and good ideas.

This paper follows a microeconomic approach and investigates, using Italian microdata, the effects of the social structure of personal contacts on household economic welfare. The main contributions of this paper in relation to the previous literature are two. The first one is related to the data used for the empirical work. The data are representative for the entire Italian population. The use of national-level data bases is quite rare in this kind of study. The second contribution is related to one of the proxies of social relations used in the empirical analysis. Two proxies are considered. They reveal information about the quality and the quantity of interpersonal relations that characterize the social life of individual agents. The proxy constructed in order to capture the quality of the network structure of personal contacts introduces original elements in the literature. This proxy reflects the satisfaction of agents in social relations whereas the socio-economic literature that analyses at a micro level the effects of the social network on economic outputs usually consider proxies of the density of interpersonal relations. The proxy of the quality of social networks is constructed by using a survey question with regards to the satisfaction of relationships with friends. In order to study the effects of social relations on economic welfare it is not important just the number of social relations that an individual has. What really matters is that the network is characterized by relations based on trust and trustworthiness. Only these kinds of relations are a capital for individuals. The proxy elaborated by measuring the satisfaction of relationships with friends allows us to focus on the importance of the qualitative characteristics of social networks in affecting individual economic welfare. The empirical evidence of this paper stresses that in order to study the effects of social networks on personal economic welfare it is not possible to neglect a direct consideration of the qualitative aspect of individual social relations. Both the

density and the quality of the social structure of personal relations are simultaneously effective on the possibility of agents to increase their economic welfare.

This paper is organized as follows. Section 2 describes the variables and the methodology used in the empirical analysis. Section 3 displays the basic ordinary least squares (OLS) regressions, testing the relations between social ties and household economic welfare, and the sensitivity analysis. Section 4 concludes. Appendix 1 presents the summary statistics. Appendix 2 shows the empirical results obtained by investigating the same relations studied in section 3, but using the discriminant analysis. It is useful to verify if the procedure adopted to create the dependent variables used in the OLS analysis has produced some effective distortions in these ones and in the OLS estimation. Appendix 3 describes the questions used in order to construct the economic welfare indices and the independent variables.

2. Social relations and economic welfare: data and methodological issues

The data considered in this paper are from the “Indagine Multiscopo sulle Famiglie-Aspetti della Vita Quotidiana”, a research published yearly from 1993 by ISTAT (The Italian National Institute of Statistics). In particular, the present analysis uses the microdata relating to two different years: 1993 and 2001. In these two years, the surveys examined 19.748 and 19.920 households and 55.844 and 53.113 individuals respectively.

The principal goal of the empirical analysis is to investigate the relationship between household economic welfare and the interpersonal relations of head of family (data collected in the ISTAT’s databases refer to social relations of head of family).

Two aspects of social relations are separately considered in this paper: the quantitative and the qualitative one. The quantitative aspect of social relations is measured by considering the relationships that agents form inside some particular types of formal institutions: the voluntary associations. The qualitative aspect is elaborated by considering the satisfaction in relationships with friends. One can imagine that these two aspects of social relations are positively correlated and this is true for the proxies considered in this paper (the correlation is equal to about 64%). If an individual decides to maintain and extend his/her social network, it is possible to imagine that he is satisfied with his/her social relations³. However, the distinction between these two aspects of social relations seem to be significant to understand the economic effects of all the different social behaviours of agents. This idea seems to be correct if we consider that both the proxy of quantitative social relations and the proxy of qualitative social relations are significant, if introduced in the same regression, to explain the role of social ties to increase the household economic welfare (Section 3).

The proxy of the quantitative aspect of social ties is an indicator of social participation. It reflects the propensity of individuals to participate in different groups. It is named membership and reflects the propensity of single agents to participate in “Putnam associations”⁴. Three types of groups are considered:

³ Probably, this is due to the role of social skills of individuals that can affect both the ability to create and maintain social relations and the ability to cultivate these in a satisfactory way.

⁴ Olson (1982) and Putnam (1993) offer two different explanations of the impact of private associations on economic growth and on social cohesion. Olson stresses some negative effects of associations. He argues that private associations pursue the special interests of its members and, for this reason, generate social costs and reduce social cohesion. In particular, this is a consequence of the fact that only the smaller associations emerge in the society and the small associations defend special interests of small groups. On the contrary, larger organizations, representing the interests of numerous individuals, are inefficient because they present many coordination problems and they cannot emerge in the society. Putnam emphasizes the propensity of groups to generate trust, social ties and civiness among people. Knack and Keefer (1997) and Knack (2003) investigate, at an empirical level, the different hypotheses of Olson and Putnam. Knack and Keefer (1997) and Knack (2003) consider the different characteristics of groups and distinguish between “Putnam” associations (education, arts, music or cultural activities; local

- cultural associations
- volunteer organizations
- ecological, human rights and peace associations.

This proxy has been computed by calculating the arithmetic mean of the number of associations the head of the family joined over the last year (Appendix 3).

The proxy of the qualitative aspect of social ties, named satisfaction, reflects the satisfaction of the head of family in interpersonal relations. It is constructed by using a survey question with regard to satisfaction of relationships with friends. The available responses to this question are: “not satisfied with the relationships with friends”, “not very satisfied”, “somewhat satisfied” and “very satisfied” (Appendix 3). This index of satisfaction of relationships with friends appears very useful in illustrating the quality of interpersonal relations characterizing the social life of agents. Not all the encounters among agents produce “positive relational outputs” such as mutual trust, closeness and reciprocal respect (Gui 2002)⁵. An encounter can generate “negative relational outputs” too, such as, among others, rancour and hatred. The proxy of satisfaction with social ties above described enables us to understand if the interpersonal relations of agents produce mostly positive or negative outputs and, consequently, if the social networks of agents are characterized by ties the agents can effectively rely upon. Essentially, it allows us to understand the role of qualitative characteristics in making social relations a capital that individuals can use to increase their economic welfare. Individuals can take more advantage from the social network if this network is characterized by relations based on trust and the more one is satisfied with social relations, the more it is likely that these relations link people who trust each other.

Both the proxies of social ties described are analysed in association with household economic welfare. Since there is not a direct measure of household income or household wealth in the data collected in the “Indagine Multiscopo”, two different household economic welfare indices have been elaborated using these data. These two indices present different information about household economic welfare. The first one can be considered a Subjective index of Economic Welfare (hereafter also SEW) and the second one an Objective index of Economic Welfare (hereafter also OEW).

The SEW has been elaborated by standardizing and calculating the average of the values related to:

- the responses of head of family about the general economic situation of the family
- the responses of head of family about financial difficulties to meet some expenditures.

(See appendix 3 for the specific questions used to calculate this index)

The responses of head of family about the general economic situation essentially reflect subjective considerations. They reveal satisfaction with regard to the economic situation of the family. This satisfaction depends mostly on personal expectations and on the consideration of the relative situation of each household group in respect to other ones belonging to the same social class. Similar considerations are valid for the responses about financial difficulties in meeting various expenditures. These responses can be determined by objective economic

community action on issues like poverty, employment, housing, racial equality; youth work, e.g. scouts, guides, youth clubs, etc.; sports or recreation associations) and “Olson” associations (professional associations; trade unions; political parties or groups). The associations considered in this paper to study the impact of social relations on economic welfare are identified as Putnam association following the criteria used by these authors.

⁵ This concept of positive relational outputs is very close to the notion of relational goods developed by Gui (2002). Gui stresses that each economic transaction among agents produces different outputs. These outputs are for example: the exchange of economic goods, contract supplies, the variation of the human capital of agents involved in the transaction and the production of relational goods. Relational goods are the emotional effects of the transactions such as the feeling between agents and the pleasure that they have in communicating.

difficulties, but the perception of difficulties depends also on the comparison between one's budgetary constraint and one's desired level of expenditure. This is a subjective element that plays an important role in this analysis. For these reasons, the SEW seems to be an index that mainly reflects subjective considerations on household economic welfare.

The OEW has been elaborated by standardizing and calculating the average of the values related to:

- the possession of some durable consumer goods
- the characteristics of the physical structure of house.

(See appendix 3 for the specific questions used to calculate this index)

Both these aspects do not reflect subjective considerations. The head of family simply lists a series of durable consumer goods and some characteristics of the physical structure of house.

In order to verify the reliability of these two economic welfare indices, it has been elaborated a measure both of SEW and of OEW at regional level and this measure has been related to the regional per capita GDP. The correlations between the SEW and the regional per capita GDP is equal to about 83%, the correlations between the OEW and the regional per capita GDP is equal to about 65%.

The SEW and the OEW are the dependent variables in the empirical analysis and have been calculated with reference to the year 2001.

Conversely, the independent variables, the two indices of social relations and a variable named education that reflects the educational qualification of agents (Appendix 3) have been calculated with reference to the year 1993⁶. This allows us to minimize the endogeneity problems.

Since the sample has changed over the two considered years, it was not possible to directly associate the variables related to the heads of the families with reference to 1993 and the economic welfare indices of 2001. For this reason, with regard to the age and the region of the heads of the families, different groups of the heads of the families (and of their relative household group) were created, both referring to 1993 and 2001. There are 247 groups for each year. The 247 groups were derived by a grouping based on 19 regions⁷ and 13 age brackets (the age brackets range 5 years and include the heads of families from 23 to 87 years old). The groups comprise an average of 75 observations. Groups including the heads of the families who are from 18 to 23 years old and above 87 years old were excluded due to insufficient data. Because 21 groups included in the 247 analysed comprise less than 20 observations, all the equations that are proposed in the next section have been newly calculated using only groups larger than 20 observations. The results do not change in the two different analyses. For each dependent and independent variable the arithmetic mean of the standardized values associated to each individual was calculated with reference to each group and the regressions were conducted based on these means. Because of that, the variables used in the empirical analysis are no longer categorical variables, but continuous ones.

Section 3 displays the results of the empirical analysis conducted using the OLS method. In particular, section 3.1 presents the empirical results with reference to the associations between subjective household economic welfare index and social relations. Section 3.2 shows the results regarding the relationships between interpersonal relations and the objective household economic welfare index. Section 3.3 presents the sensitivity analysis conducted introducing changes in terms of control variables in the OLS estimations presented in sections 3.1 and 3.2. The dependent variables considered in the OLS estimations have been calculated aggregating ordinal data derived by survey questions. In order to further prove the robustness of the OLS results other two dependent variables have been constructed using a different aggregation

⁶ Other explanatory variables, used in the sensitivity analysis, are introduced subsequently. Summary statistics of all the variables used in the analysis are presented in Appendix 1.

⁷ There are 20 Italian regions, but Valle d'Aosta and Piemonte are considered together in the "Indagine Multiscopo".

method. Instead of calculating the arithmetic mean, the individual data derived from questions on the economic situation of families have been added. The household economic welfare indices obtained are categorical variables instead of continuous ones. These categorical dependent variables have been studied using the discriminant analysis that essentially confirms the results of the OLS regressions. Appendix 2 shows the result of the discriminant analysis.

3. Social relations and household economic welfare

3.1. Social relations and the subjective household economic welfare index

Table 1 presents the results of the regression in which the dependent variable is the subjective household economic welfare index and the independent variables are: membership, satisfaction and education.

Tab. 1 Social relations and the subjective economic welfare (OLS)

| Dependent variable: the subjective economic welfare index | | | | |
|---|-------------|-----------------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 0.645 | 0.028 | 23.285 | 0.000 |
| Membership | 0.172 | 0.052 | 3.289 | 0.001 |
| Satisfaction | 0.037 | 0.010 | 3.611 | 0.000 |
| Education | -0.004 | 0.002 | -1.829 | 0.069 |
| R-squared | 0.147 | Mean dependent var | | 0.751 |
| Adj. R-squared | 0.136 | S.D. dependent var | | 0.027 |
| S.E. of regression | 0.025 | Akaike info criterion | | -4.500 |
| Sum squared resid. | 0.156 | Schwarz criterion | | -4.443 |
| Log likelihood | 559.772 | F-statistic | | 13.910 |
| | | Prob(F-statistic) | | 0.000 |

Sample size is 247

The R^2 of regression is equal to 13.6%. There is a correlation between all the regressors and the subjective index of economic welfare (SEW). The individuals showing a greater propensity to participate in Putnam associations and those that are more satisfied with their relations with friends, present a higher subjective household economic welfare. The relation between educational qualification and the subjective household economic welfare is negative and statistically significant at the 10 percent level. While the educational qualification increases, the SEW decreases. This is an interesting conclusion if one considers that some studies show a negative correlation between human capital and the satisfaction of individuals with reference to different variables. Clark and Oswald (1996), for example, using British data, show a negative association between education rate and job satisfaction. More in general, over the last few years,

many contributions have shown that the satisfaction of individuals with regard to their income or consumption is not determined only by the absolute level of these variables. Two other factors would contribute to increase individual satisfaction with reference to economic condition.

First, it is currently accepted that the satisfaction of agents depends also on the comparison between the individual level of income and/or consumption and the level of income and/or consumption reached by others. In this context, a pioneer research was carried out by Hirsch (1976). He argues that after a society has completely and widely satisfied primary needs it turns to the satisfaction of positional and relational needs. Neumark and Postlewaite (1998) show that the choice of women to work depends on the comparison between their individual household income and the income of household that are included in their social class. Corneo and Jeanne (1999) show that the wish to reach a high social status is an incentive to accumulate wealth and, for this reason, it can foster economic growth. Clark and Oswald (1996) and Clark (1997) find that the relative income matters for job satisfaction. Luttmer (2005) shows that, controlling for individual and local characteristics, higher earnings of neighbours are correlated to lower levels of self-reported happiness. Ferrer-i-Carbonell (2005) finds that “the larger an individual’s own income is in comparison with the income of the reference group, the happier the individual is” (Ferrer-i-Carbonell 2005, p.1015)

Second, personal expectations with regard to the possibility of reaching some results (in terms of income, consumption etc.) seems to be relevant to individual satisfaction. Clark (1997) finds that women consistently have higher job satisfaction than men even if the women’s job is less paid and is worse in terms of hiring, job content and promotion opportunities. Clark argues that “The resolution of this paradox is suggested to lie in the importance of expectations in well-being: those who expected less from working will be more satisfied with any given job” (Clark 1997, p.342). Sacco and Vanin (2000) consider a simulation model of network interaction and show that aspirations are a key factor in generating satisfaction. Stutzer (2004) investigates the effect of income aspiration on agents’ utility. The empirical results show that higher income aspirations reduce satisfaction with life. The existing literature seems to support the idea that two individuals with the same level of income but with different personal expectations could have different satisfaction with their situations. As Clark and Oswald (1996) argue in order to explain the negative correlation between the education rate and job satisfaction, it is plausible that a higher level of educational qualification corresponds to higher personal aspirations. A higher level of educational qualification corresponds to a larger investment in education. Larger investments are justified by the expectations of greater income in the future. This could explain the negative correlation between the SEW and the educational qualification shown in table 1.

As it will be shown in the next section, the correlation between the objective household economic welfare and the educational qualification is positive. It means that the heads of the families with higher education in effect reach higher level of objective economic welfare but they are less satisfied with their welfare. The negative association between the educational qualification and the subjective household economic welfare seems to be the principal result of the regression presented in table 1. In fact, it is important to stress the positive correlation between the level of individual interpersonal relations and the SEW. Nevertheless, the particular character of the dependent variable makes it difficult to interpret the correlations between the indices of social relations and the subjective household economic welfare. In order to understand if economic relations are effective in the creation of economic outputs, it is better to analyse the relationships between the two variables: membership and satisfaction and the objective index of economic welfare. This is the aim of the next section.

3.2.Social relations and the objective household economic welfare index

In this section, the empirical relationships between the social ties characterizing the social life of heads of families and the level of the objective household economic welfare (OEW) is analysed. Table 2 presents the results of the regression estimated using the OLS. These results show a positive and statistically significant association between the three independent variables and the OEW. However, in this case, the OLS method does not appear appropriate because the Ramsey RESET test reveals that the relation estimated in table 2 is not correctly specified and that there are some non linear relations between the independent variables and the dependent ones.

Tab.2 Social relations and the objective economic welfare (OLS)

| Dependent variable: the objective economic welfare index | | | | |
|--|-------------|-----------------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 0.089 | 0.055 | 1.622 | 0.106 |
| Membership | 0.493 | 0.103 | 4.780 | 0.000 |
| Satisfaction | 0.083 | 0.020 | 4.117 | 0.000 |
| Education | 0.030 | 0.005 | 6.199 | 0.000 |
| R-squared | 0.542 | Mean dependent var | | 0.489 |
| Adj. R-squared | 0.536 | S.D. dependent var | | 0.073 |
| S.E. of regression | 0.050 | Akaike info criterion | | -3.141 |
| Sum squared resid | 0.606 | Schwarz criterion | | -3.084 |
| Log likelihood | 391.884 | F-statistic | | 95.757 |
| | | Prob(F-statistic) | | 0.000 |

Sample size is 247

As a result, to study the effects of social relations on objective household economic welfare index, a fuzzy method was used. The fuzzy logic and the fuzzy set theory have been used in many disciplines since Zadeh's pioneering contribution (1965). In economics, these tools have been applied since the nineties. The fuzzy set theory is useful in case the analysis regards some variables characterized by elements that can not be divided into clearly bounded groups. In particular: "A fuzzy set is a class of objects with a continuum of grades of membership. Such a set is characterized by a membership (characteristic) function which assigns to each object a grade of membership ranging between zero and one." (Zadeh 1965, p.338). Let us assume that one wants to distinguish between the young and the old inside a group of individuals. What does "young" mean exactly? And "old"? The fuzzy set theory suggests the assignment of a "grade of membership" to each individual which is associated with the two different groups of the young and the old. In this case, the grades of membership characterize the individuals according to their age. A baby will have, for example, a very high grade of membership associated with the

set of young and a very low grade of membership associated with the set of old. In this paper, the fuzzy logic and the related fuzzy set theory are useful to investigate the connections between the interpersonal relations and the objective household economic welfare. The application of these tools is justified by two reasons. One is the non linear relationship characterizing the analysis presented in table 2. The fuzzy method allows us to study the impact of each independent variable on the dependent one even if this effect is not linear. The second reason is the fuzzy character of the variable satisfaction. The categories associated to these variables, that are “not satisfied with the relationships with friends”, “not very satisfied”, “somewhat satisfied” and “very satisfied”, are the expression of qualitative judgments. It is possible to imagine that people having similar but not exactly equal degrees of satisfaction are included in the same category. The fuzzy method allows us to associate to each person a grade of membership in three alternative degrees of satisfaction: “low” “medium” and “high”. In this way, it is possible to better understand the qualitative character of this variable. In order to conduct the fuzzy analysis, each independent variable is partitioned into three fuzzy sets by grouping the “high”, “medium” and “low” values of the variables. A grade of membership in each of the three fuzzy sets is associated with each observation. The method used in this paper to generate the fuzzy sets and the grade of membership is that reported in Giles and Draeseke (2001)⁸. Table 3 reports the results of the regression conducted using the tool of fuzzy logic. The regression presented in table 3 is a OLS regression in which each regressor is considered three times.

Each time the single regressors are weighed by the grades of membership associated with the three different partitioned sets. The grades of membership are named with the letter U plus the name of the regressor and a number that reflects the fuzzy sets “high”, “medium” and “low”. For example, the grade of membership associated with the high set of values of the variable satisfaction is named *Usatisfaction1*. In table 3, specifically, *Constant*, *Usatisfaction3* and *Ueducation3* are constants; *Membership*, *Satisfaction* and *Education* are the regressors related to the grade of membership associated with the medium sets of values, *Usatisfaction3*Satisfaction*, *Ueducation1*education* and *Ueducation3*education* are the regressors weighed by the grades of membership in the high (in the case of *Ueducation1*education*) or low (in the case of *Usatisfaction3*Satisfaction* and *Ueducation3*education*) sets. The regression presented in table 3 is obtained by eliminating one after the other the non statistically significant regressors. Initially, the variables included in the regression were all the grade of membership (that are constants) and the three variables *Membership*, *Satisfaction* and *Education* weighed by all the three grades of membership associated with the sets “high”, “medium” and “low”.

⁸ For a discussion about the fuzzy logic and the fuzzy set theory see: Zadeh (1965, 1987) and, from an economic perspective: Lindström (1998) and Giles and Draeseke (2001).

Tab.3 Social relations and the objective economic welfare (*Fuzzy logic*)

| Dependent variable: the objective economic welfare index | | | | |
|--|-------------|-----------------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | 0.010 | 0.084 | 0.113 | 0.910 |
| Usatisfaction3 | 0.736 | 0.188 | 3.913 | 0.000 |
| Ueducation3 | 0.285 | 0.113 | 2.522 | 0.012 |
| Membership | 0.443 | 0.093 | 4.748 | 0.000 |
| Satisfaction | 0.086 | 0.030 | 2.896 | 0.004 |
| Education | 0.056 | 0.012 | 4.700 | 0.000 |
| Usatisfaction3*Satisfaction | -0.227 | 0.059 | -3.835 | 0.000 |
| Ueducation1*education | -0.010 | 0.005 | -1.955 | 0.052 |
| Ueducation3*education | -0.073 | 0.025 | -2.954 | 0.003 |
| R-squared | 0.647 | Mean dependent var | | 0.489 |
| Adjusted R-squared | 0.635 | S.D. dependent var | | 0.073 |
| S.E. of regression | 0.044 | Akaike info criterion | | -3.360 |
| Sum squared resid | 0.467 | Schwarz criterion | | -3.232 |
| Log likelihood | 423.941 | F-statistic | | 54.411 |
| | | Prob(F-statistic) | | 0.000 |

Sample size is 247

Figures 1, 2 and 3 show, by considering the estimated coefficient obtained in table 3, the effects that each independent variable produces on the objective household economic welfare index.

Fig.1 The effect of formal social participation on the objective economic welfare index

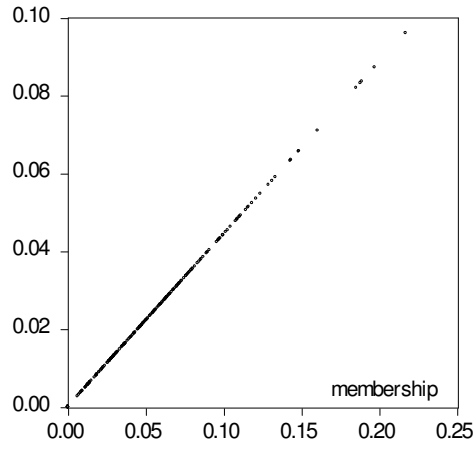


Fig.2 The effect of informal social participation on the objective economic welfare index

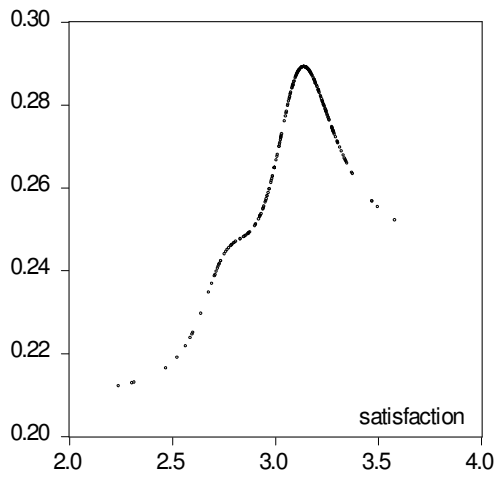
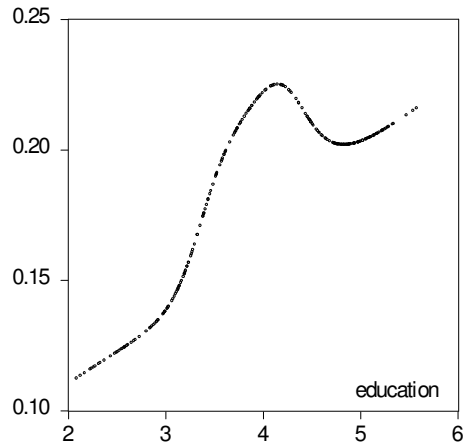


Fig.3 The effect of educational qualification on the objective economic welfare index



The effect of the variable membership on the objective household economic welfare is positive and linear (figure 1), the other two independent variables (satisfaction and education) seem to present a threshold effect. A greater satisfaction in relationships with friends and a higher level of education are associated with a greater level of objective household economic welfare, but this association is confirmed only until a specific value of these two independent variables. In particular, a growing satisfaction in the relations with friends increases the objective household economic welfare only for the range of values of satisfaction included between zero and about three (figure 2). Three is the value associated, in the questionnaire filled in by the heads of the families, with the assertion: “somewhat satisfied with relationships with friends”. This result suggests an essential consideration. When individuals reach a fairly high level of satisfaction in the relationships with friends, the channels by which the quality of social relations can promote the objective household economic welfare are fully exploited by the individuals. An individual who is not satisfied or has a low level of satisfaction with the relationships with friends, improving the quality of his network structure, acquires some advantages, for example in terms of possibility to obtain information by other agents, and increases the possibility of reaching a higher level of household economic welfare. The transition from a situation in which individuals are somewhat satisfied with relationships with friends to a situation in which they are very satisfied does not appear to produce positive effects on the OEW. For this reason, we can assume that there is a threshold effect related to the variable that captures the quality of social relations.

A similar effect is associated with the variable education. The educational qualification is associated with a growing OEW but only until the value of educational qualification is equal to about four that is the value associated with the Junior high School (figure 3).

To study the real presence of these two threshold effects that result in the fuzzy analysis, an OLS regression was conducted (table 4) in which two variables satisfaction and education are bounded according to the indications resulting in figures 2 and 3.

Tab.4 Social relations and the objective economic welfare (bounded OLS)

| Dependent variable: the objective economic welfare index | | | | |
|--|-------------|-----------------------|-------------|---------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| Constant | -0.091 | 0.063 | -1.437 | 0.152 |
| Membership | 0.417 | 0.092 | 4.546 | 0.000 |
| Satisfaction*(Satisfaction<=3.1)+(Satisfaction>3.1)*3.1 | 0.110 | 0.024 | 4.509 | 0.000 |
| Education*(Education<=4.0)+(Education>4.0)*4.0 | 0.063 | 0.008 | 8.244 | 0.000 |
| R-squared | 0.619 | Mean dependent var | | 0.489 |
| Adj. R-squared | 0.614 | S.D. dependent var | | 0.0733 |
| S.E. of regression | 0.046 | Akaike info criterion | | -3.324 |
| Sum squared resid | 0.504 | Schwarz criterion | | -3.267 |
| Log likelihood | 414.544 | F-statistic | | 131.354 |
| | | Prob(F-statistic) | | 0.000 |

Sample size is 247

The threshold effects seem to be effective close to a value of 3.1, for the variable satisfaction, and a value of 4 for the variable education. Compared to the regression in table 2, this bounded regression explains a higher percentage in the variation of the dependent variable (61.4% against 53.6%) and presents a lower standard error. Moreover, the Ramsey RESET test reveals that the relations estimated in this regression is correctly specified. It is thus interesting to calculate the precise effect of the two variables of social relations on the objective household economic welfare. In the equation presented in table 4, if membership were to increase by one standard deviation, the objective household economic welfare would increase by roughly 1.7%. If satisfaction were to increase by one standard deviation, the objective household economic welfare would increase by roughly 2.3%⁹. A sensitivity analysis is presented in the next section.

3.3 The sensitivity analysis with control variables on the OLS regressions

Table 5 shows the results of the sensitivity analysis regarding the relationships between the social ties of the head of family and the level of the objective household economic welfare.

Tab. 5 Social relations and the OEW: a sensitivity analysis (bounded OLS)

| Dependent variable: the objective economic welfare index | | |
|--|---------------------------|-----------------------------|
| Variables included in the basic equation (Tab. 4) | Coefficient of Membership | Coefficient of Satisfaction |
| None | 0.417 (0.092) | 0.110 (0.024) |
| Regional dummies | 0.622 (0.107) | 0.064 (0.025) |
| Cohort dummies | 0.328 (0.074) | 0.067 (0.020) |
| Employed | 0.304 (0.089) | 0.105 (0.023) |
| Source of income | 0.303 (0.089) | 0.105 (0.023) |
| Profession ^o | 0.407 (0.097) | 0.134 (0.039) |
| Cohort dummies, Regional dummies | 0.378 (0.084) | 0.012 (0.019) |
| Employed, Source of income, Profession ^o | 0.310 (0.094) | 0.126 (0.038) |

Standard error are shown in parentheses. The independent variables include educational qualification. Sample size is 247. ^o Sample size is 209. Sample size is smaller when the variable Profession is included because in many cases the answer to this question is non present in the survey. In those cases the observation were deleted from the sample.

⁹ This percentage is calculated by multiplying the standard deviation of the variable by his estimated coefficient.

The first row reports the coefficients and the standard errors of the two variables membership and satisfaction as they are shown in table 4. The following rows report the coefficients and the standard errors of these two independent variables when one or more control variables are introduced in the basic relation analysed in table 4. The control variables considered in the second and in the third row are two different dummies: the first one reflects the Italian regions (row 2) and the second one refers to the age of the head of the family (row 3)¹⁰. The introduction of the cohort dummies allows us to verify that the positive relation between the level of interpersonal relations and the objective household economic welfare is not merely due to an age effect. Both the regional dummies and the cohort dummies do not eliminate the effects of the variables membership and satisfaction on the objective household economic welfare. The control variable employed (row 4) is a dummy assuming a value of 1 if the head of the family has a job, and value of 0 if he is unemployed¹¹. The variable profession (row 5) assumes three values: a value of 3 is associated with the jobs generating a potential “high income”, a value of 2 and a value of 1 are associated with the jobs with a potentially lower income¹². The variable source of income assumes a value of 1 or 0 depending on the main source of household income: if it is an income from work (value 1) or not (value 0)¹³. The cohort dummies and the regional dummies are considered simultaneously in row 7. The variables employed, profession and source of income are considered, at the same time, in row 8.

The variables of social interactions membership and satisfaction are statistically significant in all the situation considered except when the cohort dummies and the regional dummies are introduced at the same time and only in regard to the variable satisfaction. The variable education, that is always considered in the estimations presented in table 5, is positively and statistically significant at least at the 5 percent in all the regressions except when the three control variables: employed, profession and source of income are considered at the same time (row 8).

The sensitivity analysis seems to confirm that the participation in formal and informal social relations can increase the level of household economic welfare, and, in particular, this result is robust to the inclusion of a variety of control variables. The control variables analysed are also considered in the study of relations between the social ties and the subjective household economic welfare index (table 6).

¹⁰ This dummy variable refers to four groups: the heads of the families who are from 23 to 37 years old, from 38 to 52 and from 53 and 67 and from 67 to 87.

¹¹ As described in section 2, the econometric analysis is conducted on values that represent an average value for a group of the heads of the families. The groups are derived by a grouping based on 19 regions and 13 age brackets. The cohort dummies and the region dummies are associated directly with the single groups. Alternatively, the control variables: *employed*, *source of income* and *profession* are initially referred to the single heads of the families. Subsequently, for these variables, the group means are calculated as they are for the other independent variables. For this reason, the variable *employed* can assume all the values between 0 and 1. The value 0 represents the groups in which everyone is unemployed, the value 1 is associated with the groups where each individual has a job. Similarly, the variables *source of income* and *profession*, described below, assume values ranging respectively between 1 and 3 and between 0 and 1.

¹² The profession associated with the value of 3 are: executive, middle-ranking, entrepreneur, self-employed person and professional, value of 2: salaried employee and foreman, value of 1: manual worker, partner in a co-operative society and house worker.

¹³ The source of income assuming 0 are: pension, benefit payment, estate income and household maintenance, the source of income assuming 1 are: self-employment income and income from employment.

Tab. 6 Social relations and the SEW: a sensitivity analysis (bounded OLS)

| Dependent variable: the subjective economic welfare index | | |
|---|---------------------------|-----------------------------|
| Variables included in the basic equation (Tab. 1) | Coefficient of Membership | Coefficient of Satisfaction |
| None | 0.172 (0.052) | 0.037 (0.010) |
| Regional dummies | -0.012 (0.043) | 0.004 (0.007) |
| Cohort dummies | 0.181 (0.093) | 0.093 (0.011) |
| Employed | 0.191 (0.053) | 0.038 (0.010) |
| Source of income | 0.191 (0.053) | 0.038 (0.010) |
| Profession ^o | 0.185 (0.052) | 0.042 (0.013) |
| Cohort dummies, Regional dummies | -0.029 (0.045) | 0.000 (0.008) |
| Employed, Source of income, Profession ^o | 0.200 (0.054) | 0.042 (0.013) |

Standard error are shown in parentheses. The independent variables include the Educational qualification. Sample size is 247. ^o Sample size is 209. Sample size is smaller when the variable Profession is included because in many cases the answer to this question is non present in the survey. In those cases the observation were deleted from the sample.

The first row presents the coefficients and the standard errors of membership and satisfaction as they are reported in table 1. The others rows show the coefficient and the standard errors of these two variables when the control variables are considered in the analysis. Table 6 shows that membership and satisfaction remain significant when the cohort dummies and the variables employed, profession and source of income are introduced in the regression. Membership and satisfaction are not significant if the region dummies are considered. The variable education, that is negatively correlated with the SEW in the analysis proposed in table 1, is no longer significant if one or more control variables are introduced in the regression.

4. Conclusion

Using Italian microdata, this paper investigates the association between the social structure of personal contacts and the individual economic household welfare. Many theoretical and empirical studies have shown that social networks have a role in promoting positive economic outputs (Granovetter 1974, 2005; Helliwell and Putnam 1995; Knack and Keefer 1997;

Grootaert 1999; Grootaert and Narayan 1999; Grootaert, Oh and Swamy 1999; Rose 1999; Glaeser, Laibson, Scheinkman and Soutter 2000; Zak and Knack 2001; Lyon 2005; Granovetter 2005). This paper has two main peculiarities with respect to the existing literature. First, the empirical analysis uses a very ample dataset representative of the entire Italian population. Second, it does not refer just to the density of social network, but it considers a proxy of the qualitative aspect of social structure. This distinction allows us to measure the effects of social relations on economic welfare by considering both the number and the intrinsic characteristic of the social relations of individuals. The quantitative aspect refers to the participation in voluntary associations. It is captured by the number of cultural, volunteer, ecological, human rights and peace associations the individuals participate in. The qualitative aspect concerns the satisfaction of agents in relations with friends. Individuals can take more advantage from the social network if this network is characterized by relations based on trust and trustworthiness. The satisfaction in relations with friends is a proxy of the quality concerning the network structure of personal contacts. The more one is satisfied with social relations, the more it is likely that these relations link people who trust each other. These two proxies of the quantity and quality of social relations have been analysed with regard to two different indices of household economic welfare: a subjective and an objective economic welfare index. The subjective household economic welfare has been constructed using: a) the responses of the head of the family about the general economic situation of the family and b) the responses of the head of the family about financial difficulties in meeting some expenditures. It essentially reveals subjective considerations of the heads of families on the economic and financial situation of their families. The objective household economic welfare has been measured considering: a) the possession of some durable consumer goods and b) the characteristics of the physical structure of the house. It reflects objective elements concerning the economic welfare of families. The analysis shows that both these economic welfare indices are positively associated with the two proxies of social relations. The importance of both the qualitative and the quantitative aspect of social relations in the empirical analysis stresses that these aspects must be both explicitly considered in order to completely understand the effects of social network on economic performance. If we just look at the density of network structure of personal contacts we lose a relevant piece of information. This result raises interesting under-investigated questions. First, the interrelations between the quantity and the quality of the social relations of agents could be interestingly analysed. Are individuals connected to many people always more satisfied in interpersonal relations? Second, this paper does not consider the factors that affect the formation of satisfying social relations. Is the satisfaction in social relation mostly related directly to the social skills of single agents or is it mostly connected to the social environment?

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Appendices

Appendix 1. Summary statistics

| Variable | Obs. | Mean | Std. Deviation | minimum | maximum |
|---|------|-------|----------------|---------|---------|
| Subjective household economic welfare (SEW) | 247 | 0.751 | 0.027 | 0.653 | 0.806 |
| Objective household economic welfare (OEW) | 247 | 0.489 | 0.073 | 0.312 | 0.630 |
| Membership | 247 | 0.055 | 0.040 | 0 | 0.217 |
| Satisfaction | 247 | 3.068 | 0.206 | 2.242 | 3.583 |
| Education | 247 | 3.949 | 0.900 | 2.091 | 5.583 |
| Employed | 247 | 0.500 | 0.393 | 0 | 1 |
| Source of income | 247 | 0.494 | 0.391 | 0 | 0.990 |
| Profession | 209 | 2.396 | 0.342 | 1 | 3 |

Appendix 2. Social relations and household economic welfare: the discriminant analysis

This appendix investigates, by using the discriminant analysis, the relationship between the household economic welfare and the quality and quantity of interpersonal relations of single agents. The discriminant analysis allows us to verify the robustness of the OLS results. The two household economic welfare indices considered in the empirical analysis of section 2 are continuous variables. They have been calculated by using the arithmetic mean. In this appendix a new aggregation method is proposed. With regard to each individual, the data obtained by the survey questions on the household economic welfare have been added. In this way we computed two new household economic welfare indices that are the sum of the values related to the survey questions and are categorical variables. As in section 2, different groups of the heads of the families (and of their relative household group) were created with regard to the age and the region of the heads of the families. There are 247 groups. The 247 groups were derived by a grouping based on 19 regions and 13 age brackets (the age brackets range 5 years and include the heads of families from 23 to 87 years old). The discriminant analysis with regard to both the

objective and the subjective household economic welfare index is conducted on these 247 groups considering, for each group, the median of the indices' values associated to the individuals that belong to the different groups. The new subjective economic welfare index presents only three different values, 19, 20 and 21, that are the sum of the values related to the survey questions used to compute this index. These values reflect a growing satisfaction of the head of the family with the welfare reached by the household. The new objective economic welfare index assumes thirteen values from 9 to 21. In order to have the same number of values in respect to the two indices, and in order to facilitate the interpretation of the discriminant analysis results, the thirteen values of the new objective economic welfare index were aggregated in three classes representing household with a high, medium and low objective economic welfare. The discriminant analysis was therefore conducted on the two new indices divided into three classes of household economic welfare.

Section 1 shows the results of the discriminant analysis referred to the new objective economic welfare index. Section 2 presents the discriminant analysis related to the new subjective economic welfare index.

1. The discriminant analysis related to the objective economic welfare index

Tables 1, 2 and 3 present the results of the discriminant analysis with regard to the objective economic welfare index.

Tab. 1 Eigenvalue, Canonical Correlation and Wilks' Lambda

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical cor. | Wilks' Lambda | Chi-Square | Df | Sig. |
|----------|------------|---------------|--------------|----------------|---------------|------------|----|------|
| 1 | 1.714(a) | 96.7 | 96.7 | .795 | .348 | 256.418 | 6 | .000 |
| 2 | .059(a) | 3.3 | 100.0 | .235 | .945 | 13.821 | 2 | .001 |

Tab. 2 Structure Matrix and Classification function

| | Structure matrix | | Classification function | | |
|--------------|------------------|------------|--------------------------------|--------------------------------|---------------------------------|
| | Function 1 | function 2 | low objective economic welfare | med objective economic welfare | high objective economic welfare |
| Constant | | | -182.366 | -218.059 | -219.906 |
| Membership | .518 | .750(*) | -185.662 | -182.361 | -161.229 |
| Satisfaction | .639(*) | -.388 | 123.848 | 131.831 | 130.956 |
| Education | .883(*) | .049 | 3.816 | 7.005 | 7.700 |

Tab. 3 Classification Results (b,c)

| | | Objective economic welfare | Predicted Group Membership | | | Total |
|-------------------|-------|----------------------------|----------------------------|--------|------|-------|
| | | | Low | medium | high | |
| Original | Count | Low | 70 | 6 | 1 | 77 |
| | | Med. | 12 | 60 | 36 | 108 |
| | | High | 0 | 24 | 38 | 62 |
| | % | Low | 90.9 | 7.8 | 1.3 | 100.0 |
| | | Med. | 11.1 | 55.6 | 33.3 | 100.0 |
| | | High | .0 | 38.7 | 61.3 | 100.0 |
| Cross-validate(a) | Count | Low | 70 | 6 | 1 | 77 |
| | | Med. | 12 | 60 | 36 | 108 |
| | | High | 0 | 25 | 37 | 62 |
| | % | Low | 90.9 | 7.8 | 1.3 | 100.0 |
| | | Med. | 11.1 | 55.6 | 33.3 | 100.0 |
| | | High | .0 | 40.3 | 59.7 | 100.0 |

(a) Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b 68.0% of original grouped cases correctly classified.

c 67.6% of cross-validated original grouped cases correctly classified.

The first discriminant function explains 96.7% of the variance. The canonical correlation indicating the association between the groups and the groups centroid is high, in particular in regard to the first discriminant function. This result reveals a good discriminant strength of the functions that is confirmed by the Wilks' Lambda Test. (Table 1)

The structure matrix shows that all the three independent variables are positively correlated with the first function. The coefficients of the classification function are substantially consistent with the hypothesis that the quantity (membership) and quality (satisfaction) of social relations have a positive effect on the objective household economic welfare. In particular, the coefficients of the variable satisfaction show a behaviour that is similar to the threshold effect illustrated in section 4.2¹⁴. (Table 2)

Finally, table 3 shows that about the 68% of the cases are correctly classified¹⁵.

The discriminant analysis seems to confirm the effects that emerged in the OLS regressions, of the interpersonal relations on the objective household economic welfare.

The next section presents the discriminant analysis with reference to the subjective economic household index.

¹⁴ See the coefficient related to the medium and the high objective economic welfare. These two coefficients are very similar, it is as if the variables *satisfaction* did not have any role in distinguishing the observations between the two groups: medium and high objective economic welfare.

¹⁵ In this analysis, the Box's M Test which tests the assumption of equality of covariances across groups is significant. In order to understand whether the results of the discriminant analysis are still consistent, a second analysis should be run using a separate-groups covariance matrix. If the results of the analysis conducted do not give radically different classification results, the first analysis can be accepted. In this case and in all the next discriminant analysis presented, the Box's M Test is significant, but in all the cases considered, the classification results do not change if the analyses are conducted using a separate-groups covariance matrix.

2 The discriminant analysis related to the subjective economic welfare

Tables 4, 5 and 6 show the results of the discriminant analysis with regard to the subjective economic household index.

Tab. 4 Eigenvalue, Canonical Correlation and Wilks' Lambda

| Function | Eigenvalue | % of Variance | Cumulative % | Canonical cor. | Wilks' Lambda | Chi-Square | Df | Sig. |
|----------|------------|---------------|--------------|----------------|---------------|------------|----|------|
| 1 | .137(a) | 99.2 | 99.2 | .347 | .878 | 31.501 | 6 | .000 |
| 2 | .001(a) | .8 | 100.0 | .034 | .999 | .278 | 2 | .870 |

Tab. 5 Structure Matrix and Classification function

| | Structure matrix | | Classification function | | |
|--------------|------------------|------------|---------------------------------|---------------------------------|----------------------------------|
| | function 1 | function 2 | low subjective economic welfare | med subjective economic welfare | high subjective economic welfare |
| Constant | | | -139.070 | -148.627 | -156.509 |
| Membership | .836(*) | .184 | -200.620 | -190.066 | -179.615 |
| Satisfaction | .890(*) | -.160 | 103.026 | 106.842 | 109.211 |
| Education | .654 | .717(*) | -3.828 | -4.348 | -4.310 |

Tab. 6 Classification Results (b,c)

| | | Subjective economic welfare | Predicted Group Membership | | | Total |
|-------------------|-------|-----------------------------|----------------------------|--------|------|-------|
| | | | low | medium | high | |
| Original | Count | Low | 1 | 0 | 1 | 2 |
| | | Med. | 21 | 22 | 31 | 74 |
| | | High | 24 | 34 | 113 | 171 |
| | % | Low | 50.0 | .0 | 50.0 | 100.0 |
| | | Med. | 28.4 | 29.7 | 41.9 | 100.0 |
| | | High | 14.0 | 19.9 | 66.1 | 100.0 |
| Cross-validate(a) | Count | Low | 0 | 1 | 1 | 2 |
| | | Med. | 21 | 21 | 32 | 74 |
| | | High | 24 | 34 | 113 | 171 |
| | % | Low | .0 | 50.0 | 50.0 | 100.0 |
| | | Med. | 28.4 | 28.4 | 43.2 | 100.0 |
| | | High | 14.0 | 19.9 | 66.1 | 100.0 |

(a) Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.

b 55.1% of original grouped cases correctly classified.

c 54.3 % of cross-validated original grouped cases correctly classified.

99% of the variance explained by the model is due to the first discriminant function. The second function contributes little to the model. (Table 4).

The two variables on social relations are positively correlated with the first function and their coefficients of the classification function assume values coherent with the idea that interpersonal relations can increase subjective household economic welfare. The effects of the educational qualification on the subjective economic welfare are not easy to interpret considering the values assumed by the coefficients of the classification function of this variables¹⁶. (Table 5)

Finally, the percentage of cases correctly classified in this analysis is lower than in the similar analysis with reference to the objective economic welfare (the 55.1% against the 68%). (Table 6)

Appendix 3.

A) The subjective household economic welfare index (SEW)

The subjective household economic welfare index was elaborated by calculating the arithmetic mean of two synthetic indices based on two types of information:

1. the responses of the head of family about the general economic situation of the family
2. the responses about financial difficulties to meet some expenditures.

1. Responses about the general economic situation

This index was obtained as an arithmetic mean of three variables¹⁷:

1.a Satisfaction about individual household economic welfare

| | |
|--------------------|-----|
| Very satisfied | = 4 |
| Somewhat satisfied | = 3 |
| Not very satisfied | = 2 |
| Not satisfied | = 1 |

1.b Assesment regarding the economic resources of household members

| | |
|------------------------|-----|
| Very good | = 4 |
| Satisfactory | = 3 |
| Less than satisfactory | = 2 |
| Inadequate | = 1 |

¹⁶ In particular, the negative effect of educational qualification on subjective household economic welfare which is the most interesting result of the OLS regression conducted in section 4.1, is apparently not confirmed in this analysis. However, it should be considered that only two observations are included in the group with low household economic welfare. We tried to apply the discriminant analysis aggregating the three classes of this subjective household economic welfare index into just two classes with more observations. In this case, it is confirmed both the negative effect of educational qualification and the positive effect of the two variables *membership* and *satisfaction* on the subjective household economic welfare.

¹⁷ The minimum value of these variables is always 1, but the maximum is different (4 or 5). For this reason, in order to assign the same weight at the different variables it was necessary to compute a standardization that equalizes the different ranges. The value of the single observation was newly calculated according to the formula: $(x-\min)/(n-1)$, where x is the value of the single observation, min is the minimum value of the variable and n is the numbers of values that the variable can assume.

| | |
|----------------------------------|-----|
| 1.c Household economic situation | |
| Very wealthy | = 5 |
| Wealthy | = 4 |
| Neither wealthy, nor poor | = 3 |
| Poor | = 2 |
| Very poor | = 1 |

2. Responses about financial difficulties to meet some expenditures

This index was obtained as an arithmetic mean of binary variables revealing the presence (value 1) or the absence (value 2) of difficulties in order to realize some household expenses:

Household expenses: Food, Clothes, Expenses for illness, Rent, Loan, Bills, School, Transports and Debts

B) The objective household economic welfare index (OEW)

The objective household economic welfare index was created by was elaborated by calculating the arithmetic mean of two synthetic indices based on two types of information

1. the possession of some durable consumer goods
2. the characteristics of wealth of house.

1. Possession of some durable consumer goods

This index was obtained as arithmetic mean of binary variables revealing the possession (value 2) or not (value 1) of some durable consumer goods.

durable consumer goods: Dishwasher, Washing machine, Video recorder, Video camera, Hi-Fi, Console (apart from the computer), Computer, Modem, Internet, Answerphone, Fax, Colour TV, Dish, Mobile telephone, Air conditioner, Bicycle, Scooter, Motorcycle and Car.

2. Characteristics of wealth of house

This index was obtained as an arithmetic mean of the following variables¹⁸:

1.a Number of rooms.

A variable assuming a value of 1 if the house has a number of rooms higher than the mean of the variable and assuming a value of 0 if the house has a number of rooms lower than the mean

1.b Bathroom

| | |
|-------------------------|-----|
| No Bathroom | = 1 |
| One bathroom | = 2 |
| Two bathrooms | = 3 |
| More than two bathrooms | = 4 |

1.c House expenses too high

| | |
|-----|-----|
| No | = 2 |
| Yes | = 1 |

¹⁸ See note 17.

| | |
|-----------------------------|-----|
| 1.d House in poor condition | |
| No | = 2 |
| Yes | = 1 |

| | |
|---------------|-----|
| 1.e | |
| Homeowner | = 2 |
| Not homeowner | = 1 |

C) The independent variables

The three more important independent variables introduced in the regressions are:

1. Membership: the propensity to participation in “Putnam” associations

Arithmetic mean of the following variables:

| | |
|--|---|
| Participation in cultural associations (in the last 12 months) | |
| Yes | 1 |
| No | 0 |
| Participation in voluntary organizations (in the last 12 months) | |
| Yes | 1 |
| No | 0 |
| Participation in ecological groups (in the last 12 months) | |
| Yes | 1 |
| No | 0 |

2.Satisfaction: Satisfaction in the relations with friends

| | |
|--------------------|-----|
| Very satisfied | = 4 |
| Somewhat satisfied | = 3 |
| Not very satisfied | = 2 |
| Not satisfied | = 1 |

3.Educational qualification

| | |
|--|-----|
| Phd | = 9 |
| Master’s degree | = 8 |
| Bachelor’s degree | = 7 |
| Secondary-School certificate (4-5 Years) | = 6 |
| Secondary-School certificate (2-3 Years) | = 5 |
| Junior high School (from age 11 to 14) | = 4 |
| Primary School | = 3 |
| No title (literate) | = 2 |
| Illiterate | = 1 |

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