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The relationship between trust and networks. An exploratory empirical analysis

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Abstract

Which kind of network fosters the diffusion of development-oriented trust? This paper carries out an empirical investigation into the causal relationships connecting four types of social networks (i.e. bonding, bridging, linking, and corporate), and different forms of trust (knowledge-based trust, social trust, trust towards public services and political institutions), in a community of entrepreneurs located in the Italian industrial district of the Tuscia. Our results suggest that the main factors fostering the diffusion of social trust among entrepreneurs is the establishment of corporate ties through professional associations. Trust in people is positively and significantly correlated also to higher levels of satisfaction and confidence in public services. Participation in voluntary organizations does not appear to increase trust towards strangers. Rather, we find evidence of the other way round: interpersonal trust seems to encourage civic engagement.

1. Introduction

Trust is an indispensable asset for the economic activity, due to its ability to promote cooperation and to improve the efficiency of markets (Arrow, 1974). The empirical research often refers to trust as a form of social capital fostering economic growth (Knack and Keefer, 1997, Zak and Knack, 2001). However, despite the huge amount of research on the topic, we still have a poor knowledge on the origins of trust. In this paper, we argue that conceptual ambiguities and measurement problems are two of the main reasons for this gap in the literature. Following Putnam, Leonardi and Nanetti's (1993) seminal work, social capital is commonly defined as the features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives (1993). However, networks do not necessarily contribute to the creation of trust. The nature of the linkage connecting these two phenomena is highly context-dependent and needs to be carefully assessed every time. As everyday-life experience and the literature on the so-called "anti-social capital" suggest, some kinds of network can hamper the diffusion of trust and cooperative attitudes, thereby exerting a negative influence on well-being and development (Portes and Landolt, 1996, Molyneux, 2002, Streeten, 2002, Quibria, 2003, Sabatini, 2008). By contrast, if we define (and measure) social capital *as* trust, any empirical testing will tautologically find that social capital plays a positive role for the economic activity.

In this paper, we take trust and social capital separately. Social capital is defined as networks of relationships cemented by repeated interactions and shared values. The economic effects of such networks should be assessed in relation to their role in the "socialization" of trust. Trust is defined as the belief in others' good intentions. According to Schul et al., "A state of trust is associated with a feeling of safety. The environment is as it normally is and things really are as they appear to be. Thus, individuals see no reason to refrain from doing what they routinely do" (2008, 1293). The degree to which entrepreneurs share such a positive attitude towards the environment may be regarded as a crucial factor of local development.

We try to account for the complexity of the two concepts through the definition of four types of networks - *bonding*, *bridging*, *linking*, and *corporate* networks – and the consideration of different levels of trust – social trust, knowledge-based trust, trust towards the institutions, trust in public services, and "subjective safety". The concept of safety" can have many different meanings. The *Concise Oxford Dictionary* defines it as "freedom from danger and risks". Here we define safety as the subjective perception that the local community is a safe place, where, for example, there is no fear of walking alone after dusk.

The empirical analysis carries out an assessment of the relationships connecting trust's and social capital's sub-dimensions. Given the assumptions that the type of trust that benefits growth is "social trust", i.e. towards strangers (Knack and Keefer, 1997, La Porta et al, 1997, Beugelsdijk et al, 2005, Bjørnskov, 2006a), the research question to which we attempt to provide an answer is: which kind of social ties leads entrepreneurs to trust others?

To this purpose, we collected micro data on trust and social capital in the field through the submission of a questionnaire to a community of small entrepreneurs in the Italian industrial district of Tuscia, located 60 miles north of Rome. This case study is of general interest for at least two reasons. Firstly, industrial districts (IDs) are a central feature of the Italian model of development, largely based on the driving force of small and medium enterprises. Secondly, this model of development is currently facing a major challenge, since globalization's processes are posing a threat just to the socio-economic ties that function as the glue holding together IDs.

The relationships between the forms of social capital and the different types of trust are assessed by means of structural equations models (SEMs) and a probit analysis. Our results suggest that, in Tuscia district, the main factors fostering the diffusion of social trust are the establishment of corporate ties through professional associations, and the perception that the local community is a safe place. Trust in people is positively and significantly correlated also to higher levels of confidence in public services. Participation in voluntary organizations does not appear to increase trust in people. Interestingly, we find evidence of the other way round: interpersonal trust seems to

encourage civic engagement. The correlation between participation and social trust may be created in a self-selection process where people who are already high social trusters are more likely to join and become active in organizations and networks.

The outline of the paper is as follows: the next section describes data and methodology. Section three presents the results of the empirical analysis. The survey is closed by a discussion of the main findings.

2. Data and methodology

The questionnaire was submitted in spring 2007 to a group of 82 entrepreneurs through customized interviews. Participants were selected following qualitative criteria, and do not constitute a representative sample of the entire population. Interviewees were entrepreneurs (business owners, associates, and managers) running small and medium enterprises (SMEs) in the Italian industrial district of Tuscia, located 60 miles north of Rome. In particular, 49% of the sample were sole proprietors, owners or members of family businesses, or active shareholders, 27% were self-employed professionals strictly cooperating with entrepreneurs (in most cases, they were relatives of theirs), and 24% were managers of the enterprises under consideration. Interviewees were all males. In Tuscia district, it is in fact sill unconceivable for a woman to start, or even to run, a business.

Measurement problems have widely plagued the empirical research on social capital, trust and their possible outcomes. Summarizing, it is possible to identify two main shortcomings affecting the literature. The first one is the use of macro indicators not directly related to social capital's key components, like crime rates, blood donation, and voter turnout at referenda. Such indicators may be regarded as measures of social capital's possible (and not necessary) outcomes, rather than as forms of social capital themselves. Secondly, cross-country studies on the economic pay-off of social capital generally measure trust as the percentage of people responding that most people can be trusted. However, the aggregation at nation-wide level of people's responses breaks the linkage with the social and historical circumstances in which trust and social capital are located. As stated by Fine (2001), "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' (2001, 105).

We do not want to get to the heart of this debate here. The reader can find extensive reviews on the empirics of social capital in Durlauf and Fafchamps (2006) and Sabatini (2007, 2009).

In this paper we measure the different types of networks basically through indicators capturing relational goods' consumption and the strength of strong and weak ties. On the other side, measures of the various kinds of trust are used just at the micro level, without carrying out any form of aggregation.

Variables accounted for within the analysis are briefly presented below. Table I reports some descriptive statistics. A more detailed description of the indicators is reported in Appendix A.

- Knowledge-based trust, as given by the confidence in well-known people and in people holding a similar status. This variable is computed as the arithmetic mean of the scores assigned by respondents to the trustworthiness of the following people: family members, friends, and people in the neighbourhood.
- Trust towards political institutions, as measured through the question: "I am going to name a number of organizations. For each one, could you tell me whether do you feel confidence in them? Is it a great deal of confidence, quite a lot of confidence, not very much confidence or none at all?". The relative indicator is the arithmetic mean of the scores given by respondents to the following items: the national government, the parliament, politicians in general, and political parties.
- Trust in public services, as computed through the same question reported above as the arithmetic mean of the scores given by interviewees to the court system, bureaucrats of the public administration, the public health care system, and public transports. This variable has been

accounted for with the purpose to test Kumlin and Rothstein's (2005) claims on the role of the welfare state in the socialization of trust.

Table I. Descriptive statistics										
	Mean	S.D.	Bonding SC	Bridging SC	Linking SC	Corporate SC	Social trust	Know. trust	T. public	Safety
Bonding SC	2.54	.18369	1							
Bridging SC	2.80	.867	.126	1						
Linking SC	5.6400	2.72152	-.049	-.116	1					
Corporate SC	.899	.9253	-.036	.064	.192	1				
Social trust	2.3544	.27494	-.079	-.105	.499*	.140	1			
Know. trust	.5815	.35534	.178	-.001	.154	.303**	.101	1		
T. public services	.3313	.27494	.008	-.364**	.243	-.118	.154	-.089	1	
Safety	.7439	.18369	-.095	-.033	.207	.113	.876**	.071	.063	1
*Correlation is significant at the 0.05 level. **Correlation is significant at the 0.01 level.										

- Generalized or social trust, i.e. trust towards unknown people, as measured through the question developed by Rosenberg (1956): "Generally speaking, would you say that most people can be trusted or that you can be too careful in dealing with people?". Possible responses to this question are: "Most people can be trusted", "Can't be too careful", or "Don't know". Subsequently, we asked interviewees to assign a score to the statement "people can be trusted", the score ranging from 1 to 5. This measure is highly controversial. For an extensive review of its reliability, we refer the reader to Foley and Edwards (1998) and Fine (2001).

- Safety, here defined as the subjective perception that the surrounding social environment is a safe place. The indicator is computed as the arithmetic mean of the scores assigned by respondents to a series of statements on the local community.

- Bonding social capital, which refers to small circles of homogeneous people that do not cooperate with other outside the boundaries of the group. It is computed as the arithmetic mean of the frequency of the encounters with a range of familiars, as measured through the question "How many times in the past 12 months did you meet your familiars?", where possible responses are "everyday", "once or more a week", "once or more a month", "once or more a year", "never", and "I have no living familiars", with reference to the interviewee's parents, brothers, and children.

- Bridging social capital, as given by horizontal ties shaping heterogeneous groups of people with different backgrounds. It is measured by the frequency of the encounters with friends, as captured through the question "How many times in the past 12 months did you meet your friends?".

- Linking social capital, as shaped by ties connecting individuals, or the groups they belong to, to people or groups in position of political or financial power. For example, civil society organizations allow citizens to come into contact with the institutions to carry out advocacy activities through collective action. We measure civic participation through the density of voluntary organizations (i.e. the average number of organizations in which interviewees are involved, or the so-called "Putnam's instrument"), and the degree of members' involvement in the associational life. The latter is captured through the frequency of meetings, the performance of unpaid work as a volunteer for an association, the making of payments for funding associational activities, and the willingness to give concrete help to strangers in need in the context of volunteering activities, considered as the most demanding way of participation. The synthetic indicator of linking social capital is computed as the weighted mean of the basic variables, where weights reflect the level of relational involvement.

- Corporate social capital, as shaped by professional associations pursuing the special interests of its members. It is measured by the weighted mean of four variables capturing a) the density of professional organizations protecting entrepreneurs' interests and b) the degree of members' involvement in the associational life.

The relationships between social capital's and trust's various dimensions are assessed through a SEM analysis and robustness checks carried out by means of some model refinements and of a probit analysis. The SEM approach builds upon the early work of Zellner (1970) and Joreskog and Goldeberger (1975). We refer the reader to Bollen (1989) and Garson (2009) for technical details, and to Bentler and Weeks (1980) and Aigner et al. (1984) for a review of the literature on the topic.

3. Empirical analysis

Let η_1 be linking social capital, η_2 knowledge-based trust, η_3 trust in public services, η_4 generalized or social trust, η_5 subjective safety, ξ_1 bonding social capital, ξ_2 corporate social capital, ξ_3 bridging social capital. ζ_i, with $i = (1,\ldots, 5)$ are the errors related to endogenous variables. In the model with the best goodness of fit, linking social capital is influenced by social trust, subjective safety, and other unknown factors affecting also confidence in public services and generalized trust:

$$\eta_1 = \beta_{14}\eta_4 + \beta_{15}\eta_5 + \zeta_1 \qquad (1)$$

Knowledge-based trust is mostly affected by bonding and bridging social capital:

$$\eta_2 = \gamma_{21}\xi_1 + \gamma_{23}\xi_3 + \zeta_3 \qquad (2)$$

Trust in public services is affected by linking and bridging social capital and by other variables influencing also linking social capital:

$$\eta_3 = \beta_{31}\eta_1 + \gamma_{33}\xi_3 + \zeta_3 \qquad (3)$$

Social trust is affected by linking, bridging, and corporate social capital, confidence in public services, subjective safety, and other unknown factors influencing also civic engagement:

$$\eta_4 = \beta_{41}\eta_1 + \beta_{43}\eta_3 + \beta_{45}\eta_5 + \gamma_{42}\xi_2 + \gamma_{43}\xi_3 + \zeta_4 \qquad (4)$$

Subjective safety is influenced by linking social capital:

$$\eta_5 = \beta_{51}\eta_1 + \zeta_5 \qquad (5)$$

Errors ζ_3 and ζ_1, and ζ_4 and ζ_1 are correlated. This implies the need to estimate, besides parameters β, also covariances φ between errors. The specification of the matrix of covariances among errors allows to account for phenomena which, although not explicitly considered within the model, may play a role in the real scenario described by observed data (Bollen, 1989, Corbetta, 1993). In the model, other assumptions are carried out to the sake of simplicity: 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 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 from (1) to (5) with the error covariance matrix, we can write the model as:

$$
\begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \end{bmatrix} =
\begin{bmatrix}
0 & 0 & 0 & \beta_{14} & \beta_{15} \\
\beta_{21} & 0 & 0 & 0 & 0 \\
\beta_{31} & 0 & 0 & 0 & 0 \\
\beta_{41} & 0 & \beta_{43} & 0 & \beta_{45} \\
\beta_{51} & 0 & 0 & 0 & 0
\end{bmatrix}
\cdot
\begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \end{bmatrix} +
\begin{bmatrix}
0 & 0 & 0 \\
\gamma_{21} & \gamma_{22} & 0 \\
0 & 0 & \gamma_{33} \\
0 & \gamma_{42} & \gamma_{43} \\
0 & 0 & 0
\end{bmatrix}
\cdot \begin{bmatrix} \xi_1 & \xi_2 & \xi_3 \end{bmatrix}
\begin{bmatrix}
1 & & & & \\
0 & 1 & & & \\
\psi_{31} & 0 & 1 & & \\
\psi_{41} & 0 & 0 & 1 & \\
0 & 0 & 0 & 0 & 1
\end{bmatrix}
\quad (6)
$$

It is noteworthy that the absence of a variable from the model can arise in two ways: a) a relationship was originally assumed to be insignificant for conceptual reasons; b) or a relationship was hypothesized to be potentially significant but was empirically found not to be. For example, variables ξ_1 and ξ_2 (bonding and bridging social capital) were allowed to enter in equation (7) describing subjective safety. They do not appear in the model because they were statistically insignificant when allowed to enter, not because they were excluded in the first place.

The model excellently fits the data and all the goodness of fit indexes exhibit satisfactory values (goodness of fit measures are briefly described in Appendix B). Parameters estimates are presented in Table II, where blank cells represent coefficients constrained to be zero.

Table II. Maximum likelihood estimates for model (6)	Linking social capital	Knowledge based trust	Trust in public services	Social trust	Subjective safety	Bonding social capital	Corporate social capital	Bridging social capital
Linking social capital				2.79 (0.24) 11.74	-2.26 0.22 -10.46			
Knowledge-based trust						0.19 (0.11) 1.67	0.31 (0.11) 2.73	
Trust in public services	-0.24 (0.17) -1.36							-0.39 (0.12) -3.41
Social trust	-0.61 (0.11) -5.38		0.48 (0.18) 2.59		0.70 (0.21) 3.33		0.25 (0.11) 2.24	0.03 (0.13) 0.26
Subjective safety	0.31 (0.22) 1.41							

The results suggest that social trust is positively and significantly affected by subjective safety and, to a quite lesser extent, by confidence in public services and corporate social capital. According to the SEM analysis, there is a negative significant association between trust in people and civic engagement through voluntary organizations. Associational participation seems to be negatively influenced by subjective safety, but is significantly reinforced by social trust. Such correlation suggests the possibility that high-trusters are more inclined to civic engagement and tend to self-select into voluntary organizations. Corporate ties positively and significantly affect trust towards strangers and, to a higher extent, knowledge-based trust among entrepreneurs.

These results are robust to different model specifications. First, in the process of refining the model and testing its consistency with the data, we estimated some refinements resulting from the inclusion of additional parameters, accounting for the possible existence of further linkages connecting the variables under consideration. Second, we tested the model again after the inclusion of control variables (educational qualification, age, work status and firm size). In none of these cases, the sign, the size, and the significance of the parameters' estimates presented in Table II changed significantly, nor the overall goodness of fit of the model worsened.

An interesting result is represented by the effect of linking social capital on social trust, which appears to be negative and significant. This finding suggests that associational activities not necessarily foster members' attitude to trust strangers. The correlation between participation in organizations and generalised trust found by several empirical studies (Mayer, 2003, Wollebaek and Selle, 2003a, 2003b) may reflect the fact that people who trust others are more likely to join associations, as previously claimed by Claibourn and Martin, 2000, Stolle, 2001, Uslaner, 2002, and Bjørnskov, 2006b.

In order to test the self-selection hypothesis, we run a probit analysis where linking social capital – as measured by a very simple indicator capturing membership in associations – is the dependent variable. Membership is a binary variable, which is equal to one when the respondent is member of at least one association, and 0 if the interviewee does not belong to any organizations. Generalized trust is now measured by the score assigned to the statement "most people can be trusted". The probit equation is as follows:

$$P(Y = 1 | X = x) = \Phi(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8) \qquad (7)$$

The independent variables are bonding social capital x_1, bridging social capital x_2, generalized trust x_3, corporate social capital x_4, knowledge-based trust x_5, trust in public services x_6, trust towards political institutions x_7, and subjective safety x_8. Parameters' estimates are presented in Table III.

Results from the SEM analysis are confirmed: social trust positively and significantly affects linking social capital, thereby supporting the self-selection hypothesis. An interesting additional finding is given by the positive and significant influence of bridging and corporate social capital on social participation. The model predicts membership in associations with a satisfactory accuracy of 75.9 percent. The model is statistically significant because the chi-square statistic is higher than the critical value with 8 degrees of freedom (31.94 > 13.36), and the p-value is less than 0.001, so the null hypothesis that all parameters are equal to zero is rejected.

Table III. Parameters estimates and goodness of fit chi-square for model (7)		
Variable	Regression coefficient	Coeff. / St. error
Bonding social capital	-0.00285917	-0.02569
Bridging social capital	0.730843	2.547
Social trust	0.822198	2.426
Corporate social capital	0.493714	2.319
Knowledge-based trust	-0.825483	-1.402
Trust in political institutions	0.175118	0.2664
Trust in public services	1.11666	1.368
Safety	-1.30771	-0.5570
Intercept	-4.57651	-2.973
Goodness-of-fit chi square = 31.9419; DF = 8; p-value = 0.000095		
Log-likelihood = -33.3384		

Due to the insignificance of $\beta_1, \beta_5, \beta_6, \beta_7, \beta_8$, we have tested the null hypothesis $H_0 : \beta_1 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$. The new equation is:

$$P(Y = 1 | X = x) = \Phi(\beta_0 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4) \qquad (8)$$

As reported in Table IV, results are confirmed again. The likelihood chi-square test statistic's value is 4,71957, which is lower than the critical value of the chi-square with 5 degrees of freedom at 0.100 level of significance (9.24), so the null hypothesis is not rejected and bonding social capital, knowledge-based trust, confidence in public services, and trust towards political institutions can be excluded from the model. Model (8) is statistically significant because the chi-square statistic is higher than the critical value for 3 degrees of freedom (28,5839 > 6.25), and the p-value is less than 0.001, so the null hypothesis that all parameters are equal to zero is rejected. The probit equation predicts membership in associations with a satisfactory accuracy of 74.4 percent.

Table IV. Parameters estimates and goodness of fit chi-square for model (8)

Variable	Regression coefficient	Coeff. / St. error
Social trust	0.583801	3.930
Bridging social capital	0.506589	2.142
Corporate social capital	0.371674	2.057
Intercept	-4.10780	-4.066
Goodness-of-fit chi square = 28.5839; DF = 3; p-value = 0.000003.		
Log-likelihood = -36.9288		

4. Conclusions

The essay has carried out an empirical investigation into the determinants of trust in other people within a community of entrepreneurs running small and medium businesses in the context of an industrial district. The results suggest that the main factors fostering social trust are corporate ties, a sense of safety (i.e. the perception that the local community is a safe place), and confidence in public services.
The positive association between corporate social capital and both knowledge-based and social trust was expected and sounds quite evident. In a small community, entrepreneurs can use membership in professional associations as a means to establish linking ties with agents belonging to other socio-economic categories, like people in the institutions or strangers operating in other sectors of the economy. The strength of such ties reduces social distances, thereby fostering the perception that both strangers and people in the institutions may be treated *as if* they were known and trustworthy. We can hypothesize three possible channels of transmission of such mechanism. A) even if there is not a history of past interaction with people in the institutions, the condition of belonging to an association raises the likelihood to interact with them again in the future. Moreover, the higher likelihood to repeat interactions raises the possibility of retaliation in case of free-riding. B) Associations are a powerful means for acquiring information on strangers. C) When they belong to a group, entrepreneurs do not feel defenceless against opportunist behaviours. So they are less

anxious and do not need to be on the defensive every time they interact with strangers. This could lead to a more open-minded and trusting attitude towards "the others".

On the contrary, civic engagement through voluntary organizations is found to be negatively and significantly associated with the social trust of entrepreneurs. These results are connected with the particular nature of the sample and only apparently conflict with Putnam's claims on the positive role of civil society and Olson's (1965) arguments "against" professional associations. Professional associations have for entrepreneurs the same "linking" role which Putnam et al (1993) attributes to civil society organizations in reference to the entire population. Even if such ties may be used to pursue special interests generating social costs and worsening social cohesion, they certainly reinforce entrepreneurs' self-confidence and trust in others.

Engagement in associations seems to be significantly reinforced by social trust. Such correlation suggests that, 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. Interestingly, the analysis shows a positive and significant correlation between social trust and trust in public services, suggesting that extensive and efficient public services may reinforce trust in other people. This finding seems to confirm pioneer insights from Kumlin and Rothstein (2005), who found that contacts with universal welfare-state institutions and efficient public services tend to increase social trust in Sweden. According to the authors, citizens in developed welfare states frequently come into direct personal contact with many different types of public agencies and services. The court system, public healthcare, and public transports are but a few examples of this. In many cases, such institutions can be pervasive factors in people's daily lives. So, "It is reasonable to suspect that people's views of the society around them and of their fellow human beings are shaped to a great extent through their contacts with such public state institutions" (Kumlin and Rothstein, 2005, 349).

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Appendix A. Measurement of social capital

The frequency of meetings is measured through the question: "In the last year, have you taken an active part in gatherings of any of the following groups or associations: associations/groups involved in social, environmental, religious, cultural, sports or recreational, or voluntary activities? With which frequency?".

The activity of carrying out unpaid work for an association is measured through the question: "In the last year, have you performed unpaid work for any of the following groups of associations: associations/groups involved in social, environmental, religious, cultural, sports or recreational, or voluntary activities?".

Funding associational activities is measured through the question: "In the last year, did you make payments to fund any of the following groups of associations: associations/groups involved in social, environmental, religious, cultural, sports or recreational, or voluntary activities?".

The willingness to give concrete help to strangers in need in the context of volunteering activities is measured through the question: "In the last year, did you give some form of concrete help to strangers in need, in the context of your associational activity?", where the people in need cannot be relatives, friends, colleagues and other known people.

The items in the questionnaire related to the measurement of corporate social capital are: "Are you a member of a professional association?", "How many?", "In the last year, have you taken an active part in gatherings of a professional association? With which frequency?", "In the last year, did you make payments to fund the activity of a professional association?".

Appendix B. Goodness of fit measures

Measures of the model's goodness of fit are 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 model (6) is significantly lower than the critical value for a χ^2 with 16 degrees of freedom, we can state that the difference between the two variance-covariance matrixes is stochastic in nature, and is not due to the inappropriateness of the theoretical model. All the other goodness of fit indexes exhibit satisfactory values.

The Goodness of Fit Index (*GFI*):

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

is equal to 0.98. This means a 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* is equal to 0.96, thus indicating a good fit.
The Root mean squared residuals (*RMR*) is:

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

is equal to 0 when the theoretical model-generated variance-covariance matrix fits the empirical matrix, and infinitely grows when the model's goodness of fit worsens. The RMR of model (6) is equal to 0.041, thus indicating a good fit.