Solidarity as Byproduct of Professional Collaboration: Social Support and Trust in a Coworking Space

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1 Introduction

The relationship between economic exchange and solidarity is still debated in the social sciences. On the one hand, some scholars suggest that successful economic interactions structured as "negotiated exchanges" (Blau 1964; Emerson 1981; Molm 2003) can generate solidarity, provided that the joint bargaining activity promotes coordination of common interests between the partners. The perception of cooperative attitudes would confer expressive value to the relation (Lawler 2001; Thye, Yoon, and Lawler 2002; Lawler, Thye, and Yoon 2008; Kuwabara 2011). On the other hand, other scholars argue that economic exchanges cannot easily generate solidarity, because negotiated agreements binding actors' interaction tend to exacerbate conflict between their mutual interests. Moreover, by preventing actors to mutually exploit each other, an economic exchange would not allow partners to show their trustworthiness, thereby hindering the development of mutual trust, which is a crucial component of solidarity (Molm, Collett, and Schaefer 2007; Molm, Schaefer, and Collett 2009; Molm, Takahashi, and Peterson 2000; Molm 2003; Molm, Collett, and Schaefer 2006).

This paper aims to contribute to this debate, by analysing the multiplex network of relations of economic exchange, trust, and solidary behaviour within a group of freelance professionals. In order to measure solidarity at a dyadic level, we studied subjects' expectations of getting social support

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from other members when they are in a situation of need (Lindenberg 1998; see also Flache and Hegselmann 1999a, 1999b). As a proxy for economic exchange, we analysed professional collaborations between partners .

In order to disentangle the effect of the exchange interactions from that of particular institutional and organisational contexts, we selected a group of ICT professionals working as independent freelancers, while sharing the same coworking space (DeGuzman and Tang 2011). This setting provided the opportunity to observe economic exchange among peers who are free to select their partners outside the constraints of a formal organisational or hierarchical structure. Moreover, the absence of a formal organisation allowed us to study emergent solidary behaviour among subjects who did not share any group-related collective interest.

At the same time, we also analysed the *structural logic* (Markovsky, Willer, and Patton 1988; Rank, Robins, and Pattison 2010) of the network of expected social support emerging among collaboration partners. To do so, we assessed the impact of reciprocity (Wasserman and Faust 1994) and closure (Davis 1970; Holland and Leinhardt 1971) independently from the multiplex effects of collaboration and trust.

The rest of the paper is organised as follows. The next section presents our research background, while Section 3 reports on data collection and analysis. Section 4 discusses our results, while the final section summarizes the main findings and discusses limitations and prospects.

2 Research Background

The importance of the embeddedness of the economy within social structures is a key point of sociological analysis (Granovetter 1985). Social network research has shown that the control and exchange of social resources, such as advice or information, affect the performance of entrepreneurs and organisations through informal interpersonal relationships (see f.i. Krackhardt 1992; Ingram and Roberts 2000; Lazega 2001; Brass et al. 2004; Rank, Robins, and Pattison 2010; Brailly et al. 2015), which often entail trust and support (Coleman 1988; Coleman 1990; Granovetter 2002). Though it is acknowledged that "most forms of social capital are created or destroyed as a byproduct of other activities" (Coleman 1990, p. 317), we know less about the structural conditions under which instrumental relations, such as professional collaborations, develop into expressive ties (Ibarra 1992), such as social support.

Social support mainly encompasses a *material* (or tangible) along with an *emotional* (or intangible) component, according to the nature of the resources which one is asked to mobilize in order to help the recipient (van der Poel 1993; see also Lin, Dean, and Ensel 1982). Research on personal social support networks (Hall and Wellman 1985) has identified some regularities in the determinants of social support relations along individual characteristics.

Different kinds of support are expected by Ego according to Alter's role status in Ego's personal network (Agneessens, Waege, and Lievens 2006).

Besides the literature on personal social support networks (see f.i. Fischer 1982; Wellman and Wortley 1989, 1990; Wellman et al. 2001), one of the most important facets of solidary behaviour is that its scope goes beyond one's kinship or proximate social circle. Dyadic exchange relations provide actors with opportunities to develop beliefs on each other that may trigger the change of that relation into a different one, or to develop new relations of different nature (Emerson 1976; Molm and Cook 1995). Following Granovetter's claim that "[c]ontinuing economic relations often become overlaid with social content that carries strong expectations of trust" (1985, p. 490), we argue that solidary behaviour in the form of social support between two otherwise unrelated individuals might arise as the byproduct of an economic exchange relation between them.

Exchange theorists (Homans 1974 [1961]; Blau 1964; Emerson 1976; Molm and Cook 1995) have provided a sound conceptualization of *economic exchange* as a specialized form of social exchange (Homans 1974 [1961]), which is often referred to as *negotiated exchange* (Blau 1964; Lawler 2001; Molm 2003). In this view, an economic exchange between two partners is defined as a bilateral transfer of resources which benefits both, upon a jointly negotiated agreement. The benefits yielded to both partners occur as two paired events, which identify a discrete transaction, although the agreement is reached through a joint bargaining process. The terms of the agreement can be either binding or non-binding (Molm, Schaefer, and Collett 2009; Kuwabara 2011).

This implies that the ongoing engagement in exchange relations elicits actors' attribution of expressive value to the relation, which in turn reinforces the duration of the exchange (Blau 1964; Emerson 1976). Especially relevant for our study is the research on the interdependency between instrumental and expressive ties (Ibarra 1992) in intraorganisational networks. A seminal study by Lazega and Pattison 1999 (see also Lazega 2001) has shown that the collective efficiency of an organisation made by associated professionals rests upon the complex interdependencies between collaboration ties, the instrumental exchange of valuable resources, and friendship. In a similar vein, Rank, Robins, and Pattison (2010) have shown that employees who collaborate frequently are more likely than others to exchange information and to support each other.

Experimental research in social psychology has shown various evidence on the effects of the economic exchange on solidarity (Molm, Takahashi, and Peterson 2000; Thye, Yoon, and Lawler 2002; Molm, Collett, and Schaefer 2007; Barrera 2007; Lawler, Thye, and Yoon 2008; Molm, Schaefer, and Collett 2009; Kuwabara 2011). Some scholars suggest that economic exchanges do not provide sufficient structural conditions for the emergence of solidarity (see Molm 2010 for a comprehensive account). The joint character of the

decision-making process inherent to the negotiating activity and the bilateral transfer of benefits during the transaction, while providing the room for cooperation, may exacerbate at the same time the salience of the conflict between the two partners' interests (Molm, Collett, and Schaefer 2006). First, the bilateral structure of the exchange heightens the perception of competition between the partners, who can frame the splitting of benefits as a zero-sum game. Secondly, the instrumental and strategic nature of the other partner's commitment is made explicit by constraining the exchange within the terms of the negotiated agreeement (Molm 2003; Molm, Collett, and Schaefer 2007). Finally, the most relevant point is that the establishment of an agreement in itself reduces the risk of being exploited by an opportunistic partner (Molm, Takahashi, and Peterson 2000; Molm 2003; Molm, Collett, and Schaefer 2007).

The risk of exploitation is a necessary condition for trust to develop within an exchange relation, since it provides actors the opportunity to prove themselves trustworthy (Gambetta 1988; Hardin 2002; see also Kollock 1994; Yamagishi, Cook, and Watabe 1998). If actors succeed in finding an agreement, trust is rather unnecessary to get positive outcomes in economic exchanges, as they can rely on the assurance provided by the agreement (Yamagishi and Yamagishi 1994; Malhotra and Murnighan 2002).

Nonetheless, other studies suggest that the structure of joint negotiation entailed by economic exchanges generates solidarity between the partners through a cognitive mechanism which makes them attribute the positive outcomes of the exchanges to each other and to the relation as a unit (see Thye, Yoon, and Lawler 2002 for a review; see also Lawler, Thye, and Yoon 2008). First, Lawler, Thye, and Yoon (2008) show that the character of jointness entailed by the bargaining activity promotes coordination and the partners' collective responsibility, which eventually increases the chances to reach agreements. In theses cases, the benefit of the exchange can trigger positive emotions that actors tend to link to collective responsibility. The relation in itself is made more salient by the character of task-interdependence of the negotiating process, which makes single contributions to the exchange hardly separable (Lawler 2001). However, laboratory experiments have found conflicting evidence of the effects of economic exchange on solidarity (Lawler, Thye, and Yoon 2008; Molm, Collett, and Schaefer 2007).

Other laboratory experiments have questioned the existence of a negative effect of economic exchange on trust, by relaxing some characteristics of the negotiated exchange model. For instance, Barrera (2007) has shown that repeated economic exchanges generate trust between actors with equal distribution of resources, although it is unclear whether this was due to the actors' learning of the partner's trustworthiness or to personal characteristics. By loosening the terms of the agreements between partners, Molm, Schaefer, and Collett (2009) have shown that non-binding economic exchanges can be successful in generating trust, as they let partners prove their trustworthiness

to each other. However, the higher risk of opportunistic behaviour mines the likelihood of success of such exchanges. Finally, Kuwabara (2011) suggests that the structure of joint negotiation which underlies economic exchanges might generate solidarity or exacerbate conflict depending on contextual factors. More precisely, varying levels of perceptions of risk-taking, conflict, and expressive value entailed by various forms of economic exchanges yielded different results in terms of trust and solidarity.

Our aim here was to empirically test the effect of the economic exchange on solidarity. We also wanted to understand the role of trust as a causal mechanism that accounts for the formation of expectations of social support. Here we hypothesized that, where there is no hierarchical structure or formal organisation providing top-down incentives, engaging in a professional collaboration among peers is hardly sufficient to develop expectations of support. However, if a trust relation develops between the partners, this is sufficient to develop expectations of social support. Therefore, expectations of social support could emerge from professional collaborations as long as trust develops between the partners.

Thus, assuming a group of peers who are independent from each other, we formulated the following hypotheses:

> *Hypothesis 1*: There is no net association between successful collaborations and expectations of social support.
>
> *Hypothesis 2*: There is a positive association between business-related trust and expectations of social support.

3 Research Design and Method

In order to test our hypotheses, we conducted a full-network study on a group of 29 independent workers sharing the same "coworking space". Our empirical strategy included the collection of relational and individual survey data on the entire population.

3.1 Empirical setting

Coworking spaces are office-like working environments where freelancers, entrepreneurs, or employees of small companies are allowed to pursue independent activities while sharing the same working space. Members of a coworking space usually get access to self-managed goods (e.g., personal desk, mailbox) and collective goods and services.

It is important to note that, since they mostly work as freelancers, members of a coworking space do not usually share any collective economic interest. Moreover, unlike employees in a company, members of a coworking space are not embedded in any formal organisational structure. Thus, the selection of collaboration partners is by no means related to any superimposed directive.

Finally, the absence of hierarchy makes members of a coworking space peers to each other. Thus, studying a coworking space allows us to disentangle the effects of professional collaborations on trust and expectations of social support from confounding factors of institutional or organisational nature.

As a suitable case, we collected data on the whole population of "Talent Garden Brescia" (TaG), a coworking space located in Brescia, in Northwestern Italy (DeGuzman and Tang 2011). The lack of a shared collective identity allowed us to control *a priori* for self-selected orientation towards solidarity among the subjects. Moreover, being all TaG members ICT professionals, skill complementarity allowed us to observe a sufficiently dense network of professional collaborations.

3.2 Qualitative fieldwork

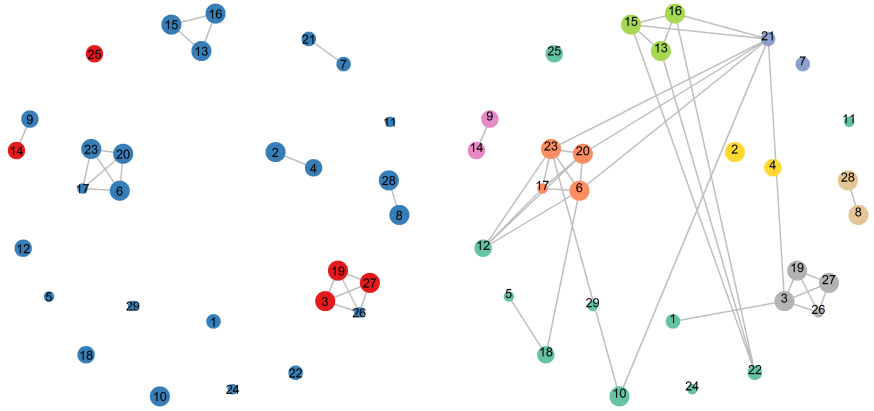
Before collecting network data, we conducted a qualitative study of the empirical setting, in order to shed light on the content of interaction between coworkers and the institutional and organisational context in which they worked. This has been accomplished through a 4-month participating observation, during which casual contacts with coworkers were established. The aim was twofold: (i) establishing rapport with the subjects in order to maximize the rate of participation to the survey (see f.i. Johnson 1990); (ii) calibrating the survey questionnaire with meaningful content for the subjects in order to maximize validity and reliability of the data.

By means of direct observation and administrative data, we reconstructed the structure of company co-membership within TaG. While 10 out of 29 subjects worked as independent freelancers, 19 TaG members were distributed among 7 small companies of 2, 3, or 4 members each. Figure 1a shows the network of co-membership to the same company among TaG members.

3.3 Data: Variables and measures

We collected relational and individual-level data by means of a CAPI questionnaire personally and individually administered to all 29 members of TaG by one interviewer. Since we could not leverage on any formal hierarchy to ensure participation to the survey, respondents were invited by casual contact during the fieldwork. 28 out of 29 interviews were conducted through a 2-week time period, while 1 interview was conducted with a 2-month delay. Respondents filled the questionnaire independently, although the interviewer was always available to help respondents and improve respondent recall (e.g. Brewer 2000). Response rate was 100%.

In order to control for the interplay between coworkers' individual properties and the relationships between them, we collected node-level attribute data about both sociodemographic and business-related characteristics: *Gender*, *age*, *family status*, *seniority* in TaG, *educational degree*. Table 1 summarizes



(a) *Company co-membership.* (b) *Previous acquaintance.*

Figure 1: The networks of *Company co-membership* (left) and *Previous acquaintance* (right). On the left panel, node colors represent actors' gender (blue = male; red = female). On the right panel, node colors represent company co-membership (dark green = freelancers). In both panels, node size represents seniority in the group.

the main characteristics of respondents.

Number of coworkers	29
Gender	Male = 24, Female = 5
Age (years)	Mean = 31.83 (SD = 6.04)
Family status	Single = 4
	In a stable relationship = 6
	Cohabitant with partner = 11
	Married = 8
Seniority in coworking space (months)	Mean = 29.34 (SD = 14.26)
Educational degree	Middle school or vocational training = 2
	High school = 10
	Bachelor = 7
	Master = 10

Table 1: Members of Talent Garden Brescia coworking space: Main characteristics.

Relational data were collected by means of sociometric questions formatted according to the conventional repeated roster method (Kilduff and Krackhardt 2008). English translations of the questions are provided in the Appendix.

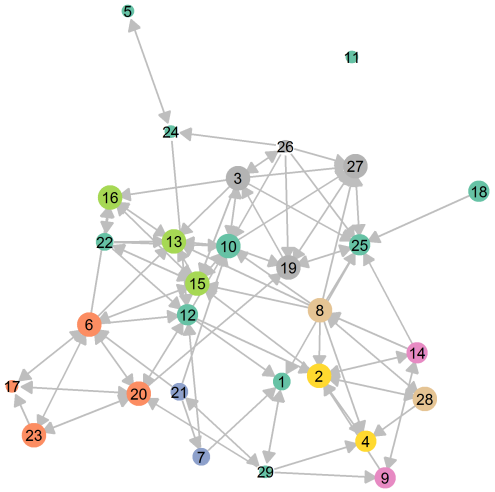
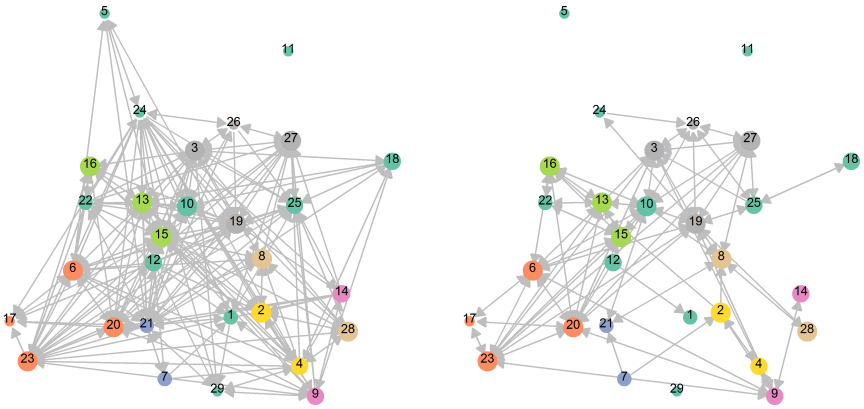


Figure 2: On the left panel, the *Social support* network. On the right panel the undirected network of the reciprocated ties of *Social support*. Node colors represent company co-membership (dark green = freelancers); node size represents seniority in the group.

Social support is the *explanandum* of this study (see 2a). A tie-variable was built by merging the answers to two different questions, addressing respectively the mobilization of *material* and *emotional* resources in the context of out-of-work private life (van der Poel 1993; Lin 1999), so that $x_{ij} = 1$ if i expects j to support her with either material or emotional resources, and $x_{ij} = 0$ otherwise. Both questions were formulated as passive and attitudinal measures, in order to minimize social desirability and avoid the biasing effect of the opportunity of being in a situation of need (van der Poel 1993; Lange, Agneessens, and Waege 2004).

In the *Trust in business* variable, $x_{ij} = 1$ if i considered j to be trustworthy for a hypothetical risky business partnership, and $x_{ij} = 0$ otherwise. This was to relate our measure to the concept of trust in a risky situation (Gambetta 1988; Hardin 2002). Figure 3a shows the *Trust in business* network.

Data about professional collaborations between TaG members, by asking three questions, according to the types of collaboration observed during the fieldwork. Firstly, we asked about "incoming commissions", where respondents had to select other members who offered one or more effectively completed commissions. Secondly, a similar question was asked to measure "outgoing commissions". Thirdly, respondents were asked about those other members with whom they worked at jointly designed new projects. Moreover, we measured subjects' satisfaction levels for their collaboration partners by asking them to express how much they would recommend them as business partners to others on the basis of their own past experience through a 1-7



(a) *Trust in business.* (b) *Positive collaboration.*

Figure 3: The networks of *Trust in business* (left) and *Positive collaboration* (right). Node colors represent company co-membership (dark green = freelancers); node size represents seniority in the group.

Likert scale. We then built a *Positive collaboration* network, where $x_{ij} = 1$ if i has collaborated with j and evaluated her with a value > 4. Otherwise, $x_{ij} = 0$. This was made to build a proxy for "successful" economic exchange relations (Lawler, Thye, and Yoon 2008). Figure 3b shows the *Positive collaboration* network.

Finally, as a control variable, we asked subjects to cite those TaG members whom they had already known in person before becoming a TaG member. The resulting answers constitute the *Previous acquaintance* network, which is reported in Figure 1b.

Table 2 reports descriptive graph-level statistics of the *Social support*, *Trust in business*, and *Positive collaboration* networks.

	Social support	*Trust in business*	*Positive collaboration*
Number of ties	99	235	130
Density	0.122	0.290	0.160
Mean in/outdegree	3.414	8.103	4.483
Minimum outdegree	0	0	0
Maximum outdegree	8	20	12
Outdegree centralization	0.170	0.440	0.278
Minimum indegree	0	0	0
Maximum indegree	7	16	11
Indegree centralization	0.133	0.292	0.241
Number of reciprocated pairs	25	64	58
Number of transitive triads (030T)	11	89	0
Number of cyclic triads (030C)	0	1	0

Table 2: Basic statistics for *Social support*, *Trust in business*, and *Positive collaboration* networks

3.4 Model specification

In order to test our hypotheses, we estimated univariate and multivariate Exponential Random Graph (p^*) Models (ERGMs) for the *Social support* and *Trust in business* networks (Pattison and Wasserman 1999; Snijders et al. 2006; Robins, Pattison, Kalish, et al. 2007; Robins, Snijders, et al. 2007; Robins, Pattison, and Wang 2009; Lusher, Koskinen, and Robins 2013). Univariate ERGMs for social network analysis have the following general form:

$$Pr(Y = y) = \frac{1}{k} exp\left[\sum_{A} \lambda_A z_A(y)\right], \tag{1}$$

where, $Pr(Y = y)$ represents the probability of the tie-variable Y taking the observed value y, $\frac{1}{k}$ is a normalizing quantity, A represents a potential network substructure , λ_A is the parameter corresponding to configuration A, and $z_A(y)$ is the graph statistic corresponding to configuration A, which indicates the presence of configuration A in the observed network.

In case of the multivariate model, the statistics $z_A(y)$ are defined within and among ties from different types of networks (Pattison and Wasserman 1999), such that:

$$z_k(y) = \sum_{A \in A_k} \prod_{(i,j,m) \in A} x_{ijm}\,, \tag{2}$$

where A_k is a collection of isomorphic configurations A of tie-variables.

For the multivariate ERGMs, we simulated the emergence of the observed networks of *Social support* and *Trust in business* simultaneously, assuming

the exogenous occurrence of the observed network of *Positive collaboration*. In order to test our hypotheses, we computed estimates of the entrainment effect of *Positive collaboration* and *Trust in business* on *Social support*. In the former case, the effect measures how likely i expects support from j if i and j have collaborated and i would recommend j as a partner. In the latter case, the effect measures how likely it is that i expects support from j and considers her trustworthy in business as well. In order to control for the co-occurrence of other confounding processes, we specified the models with endogenous structural effects, exogenous actor-relation effects, and exogenous network covariate effects.

Concerning within-network structural effects, we specified the model with basic reciprocity, closure, and connectivity parameters for non-directed networks (Robins, Pattison, and Wang 2009; Lusher, Koskinen, and Robins 2013). As regarding to actor-relation effects, we included parameters concerning individual demographic properties, namely *gender* and *age*, along with actors' working experience, namely *seniority* in the coworking space. For each attribute, the value of the *sender* effect measures the likelihood for a tie to be directed from an actor with a particular attribute rather than another, while the *receiver* effect expresses the likelihood of a tie to be received by an actor with that attribute. The *homophily* effect statistics measure the propensity for actors to form ties with actors with the same categorial attribute. In multivariate modelss, actor-relation effects were also estimated for both *Social support* and *Trust in business* networks.

Finally, the entrainment effect of *Previous acquaintance* as covariate network was estimated as control factor. We dropped the specification of a similar effect for *Company co-membership* on *Social support* because it was not significant in any of the model configurations.

We estimated our models through Monte Carlo Markov Chain Maximum Likelihood Estimation (MCMCMLE) (Snijders et al. 2006) using the Pnet software (Wang, Robins, and Pattison 2005) for the univariate models and the XPnet software (Wang, Robins, and Pattison 2006) for the multivariate model.

4 Results

4.1 Descriptive statistics

Table 3 (Krackhardt 1987) shows that both *Positive collaboration* and *Trust in business* are significantly correlated with *Social support*, with slight differences between the two values. By considering the number of entrained arcs between the three networks, Table 4 shows that out of 130 ties of *Positive collaboration*, 58 co-occur with ties of *Social support*, while 72 do not, with a Multiplexity

Index $\upsilon = 0.712$ (*z-score*=11.676) (Skvoretz and Agneessens 2007) [1]. A higher multiplexity is observed between *Trust in business* and *Social support*, as 82 out of 99 ties of social support expectations co-occur with trust in business-related situations, with $\upsilon = 0.821$ (*z-score*=12.788).

Table 3: Pearson graph correlations of *Social support*, *Positive collaboration*, and *Trust in business* networks with Quadratic Assignment Procedure (QAP) tests.

Network	1	2
1. Social support		
2. Positive collaboration	0.433∗	
3. Trust	0.443∗	0.410∗

∗ $p < 0.001$, QAP test with 1,000 repetitions.

Table 4: Entrained arcs for *Social support*, *Trust in business*, and *Positive collaboration*

	1	2
1. Social support		
2. Positive collaboration	58	
3. Trust in business	82	93

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Anyway, due to complex interdependencies within the data, we cannot draw relevant conclusions on our hypotheses on the basis of the previous descriptive statistics.

4.2 ERGM results

Table 5 shows estimates and standard errors of univariate ERGMS of *Social support*, while Table 6 reports the same values estimated in multivariate ERGMs of *Social support* and *Trust in business*. Following an established procedure in the literature, we considered as statistically significant those effects whose standard errors were greater than twice the absolute value of the estimated coefficient.

In order to test *Hypothesis 1*, we first looked at the entrainment effect of *Positive collaboration* on *Social support*, as estimated in Model 1.1 (see Table 5). Results showed that the estimated coefficient is positive and significant.

1. The index depends on the calculation of the maximum number of multiplex pairs that could occur and of the expected number conditioned on outdegree.

This would mean that the observed proportion of positive collaboration ties which overlap with expectations of social support is greater than we would expect by chance, controlling for exogenous actor-relation effects and other structural within-network effects of the *Social support* network. Model 1.2 (see Table 5) shows that such effect holds true even by controlling for subjects' previous acquaintance. More precisely, the model shows that, although expectations of social support are directed preferably towards those with whom i was previously acquainted, a positively evaluated collaboration made more likely for i to expect support from a partner j rather than from others, even if i did not already know j before that.

Table 5: Parameter estimates and standard errors for multivariate ERGMs of *Social support*.

Parameters	**Estimates (S.E.)**	
	Model 1.1	Model 1.2
Structural effects (endogenous)		
Arc	-3.843 (1.429)∗	-3.938 (1.487)∗
Reciprocity	1.905 (0.551)∗	1.708 (0.532)∗
Simple 2-path	-0.409 (0.166)∗	-0.340 (0.173)
Popularity (in-degree)	-0.442 (0.519)	-0.435 (0.513)
Activity (out-degree)	-0.087 (0.373)	-0.063 (0.420)
Path closure (transitivity)	0.918 (0.228)∗	0.762 (0.240)∗
Cyclic closure	-0.118 (0.196)	-0.138 (0.179)
Multiple connectivity	0.117 (0.189)	0.037 (0.195)
Actor-relation effects (exogenous)		
Gender (sender)	-0.551 (0.529)	-0.527 (0.578)
Gender (receiver)	-0.943 (0.567)	-0.752 (0.597)
Gender (homophily)	0.811 (0.561)	0.552 (0.645)
Age (sender)	0.017 (0.023)	0.025 (0.024)
Age (receiver)	0.070 (0.025)∗	0.073 (0.025)
Age (difference)	-0.028 (0.024)	-0.041 (0.028)
Seniority (sender)	0.002 (0.011)	0.005 (0.013)
Seniority (receiver)	0.023 (0.015)	0.027 (0.016)
Seniority (difference)	-0.009 (0.010)	-0.025 (0.011)∗
Covariate network effects (exogenous)		
Positive collaboration (entrainment)	1.833 (0.294)∗	1.447 (0.312)∗
Previous acquaintance (entrainment)		1.530 (0.388)∗

∗ $|\text{Est.}|/\text{S.E.} > 2$
$\lambda = 2.00$

Hypothesis 2 can be tested by looking at the entrainment effect of *Trust in business* and *Social support* in the multivariate models reported in Table

6. Model 2.1 shows that i is more likely to expect social support from j if the former trusts the latter for business-related issues, beyond the effect of all other processes specified in the model. Such effect remains positive and significant even if we control for the entrainment effect of *Positive collaboration* (Model 2.2) and *Previous acquaintance* (Model 2.3) on both *Social support* and *Trust in business*.

Our results showed that the likelihood that i expects social support from j if the latter is considered trustworthy by i is greater than we would expect by chance. This is true even if the two actors had no previous successful collaboration nor were they previously acquainted for other reasons. These results provide clear support for Hypothesis 2.

Furthermore, the multivariate models reported in 6 show that the effect of *Positive collaboration* on *Social support* is not significant if we control for the endogenous emergence of *Trust in business*. By comparing the entrainment effect of *Positive collaboration* on *Social support* in Models 2.1 and 2.2, we notice that the estimate is not significant once we control for the effect of positive collaboration ties on those pairs with overlapping *Social support* and *Trust in business* ties. More precisely, Model 2.2 shows that *Positive collaboration* yields a positive and significant effect on *Trust in business*. This means that, beyond other effects in the model, if i has collaborated satisfactorily with j it is more likely that i trusts j for business-related issues than others. Indeed, after including this in the model, the proportion of ties of *Positive collaboration* which co-occurred with expectations of social support was not greater than expected by chance, given the other processes at work. More precisely, in 55 out of 58 pairs with entrained ties of *Positive collaboration* and *Social support*, ties of *Trust in business* occur as well[2]. Furthermore, results do not qualitatively change if we control for the entrainment effect of *Previous acquaintance* on both emergent networks (see Model 2.3). Finally, it is also worth mentioning that being previously acquainted with j makes i more likely to trust her or to expect social support from her, beyond all other factors, as is shown by Model 2.3 (see Table 6).

Therefore, our results suggest that, once we account for the endogenous effect of trust, there is no net association between a successful collaboration and the expectation of social support from the partner, beyond other confounding processes. This would confirm Hypothesis 1. This would also imply that there is an association between positive collaborations and expectations of social support, but only as long as the collaboration generates trust for the partner. If i's collaboration with j, though positively evaluated, does not generate business-related trust for the partner, then i is not more likely to

2. It is also meaningful that simulations of Model 2.2 without including the effect of *Positive collaboration* on entrained *Trust in business* and *Social support* ties were sufficient to generate networks with an average of 54.18 overlapping ties of *Trust in business* and *Social support*

Table 6: Parameter estimates and standard errors for multivariate ERGMs of *Social support* and *Trust in business*.

Parameters	Estimates (S.E.)					
	Model 2.1		Model 2.2		Model 2.3	
	Social support	Trust	Social support	Trust	Social support	Trust
Arc	-6.919 (1.730)∗	-1.534 (1.652)	-6.292 (1.687)	-1.811 (1.704)	-6.283 (1.787)∗	-1.723 (1.655)
Reciprocity	0.842 (0.605)	0.869 (0.348)∗	1.102 (0.599)	0.757 (0.343)∗	0.999 (0.578)	0.746 (0.339)∗
Simple 2-path	-0.464 (0.191)∗	0.052 (0.022)∗	-0.480 (0.197)∗	0.054 (0.024)∗	-0.446 (0.206)∗	0.056 (0.026)∗
Popularity	-0.627 (0.517)	-0.161 (0.528)	-0.600 (0.537)	-0.060 (0.570)	-0.613 (0.524)	-0.036 (0.525)
Activity	-0.344 (0.409)	0.762 (0.462)	-0.339 (0.418)	0.781 (0.481)	-0.331 (0.422)	0.810 (0.481)
Path closure	0.845 (0.236)∗	0.653 (0.202)∗	0.866 (0.250)∗	0.596 (0.207)∗	0.747 (0.263)∗	0.561 (0.196)∗
Cyclic closure	-0.098 (0.197)	-0.263 (0.120)∗	-0.097 (0.203)	-0.251 (0.116)∗	-0.111 (0.191)	-0.254 (0.118)∗
Multiple connectivity	0.134 (0.207)	-0.048 (0.054)	0.148 (0.210)	-0.044 (0.055)	0.111 (0.222)	-0.048 (0.059)
Entrainment	2.249 (0.337)∗		2.014 (0.389)∗		2.024 (0.398)∗	
Exchange	1.079 (0.363)∗		0.899 (0.354)∗		0.824 (0.344)∗	
Gender (sender)	-0.155 (0.598)	-0.652 (0.555)	-0.235 (0.624)	-0.725 (0.617)	-0.135 (0.649)	-0.742 (0.632)
Gender (receiver)	-0.534 (0.638)	-0.716 (0.602)	-0.575 (0.635)	-0.820 (0.652)	-0.349 (0.702)	-0.801 (0.642)
Gender (homophily)	0.387 (0.676)	0.817 (0.623)	0.437 (0.663)	0.944 (0.700)	0.130 (0.710)	0.922 (0.718)
Age (sender)	0.052 (0.025)∗	-0.030 (0.014)∗	0.046 (0.026)	-0.025 (0.015)	0.049 (0.027)	-0.024 (0.015)
Age (receiver)	0.102 (0.027)∗	-0.032 (0.015)∗	0.094 (0.027)∗	-0.025 0.017	0.096 (0.028)∗	-0.027 (0.017)
Age (difference)	-0.039 (0.028)	0.016 (0.016)	-0.036 (0.028)	0.016 (0.019)	-0.048 (0.033)	0.011 (0.018)
Seniority (sender)	0.005 (0.013)	-0.014 (0.006)∗	0.009 (0.012)	-0.018 (0.007)∗	0.011 (0.014)	-0.019 (0.007)∗
Seniority (receiver)	0.019 (0.015)	0.013 (0.007)	0.023 (0.015)	0.009 (0.007)	0.028 (0.016)	0.009 (0.007)
Seniority (difference)	0.009 (0.011)	-0.023 (0.008)∗	0.005 (0.011)	-0.022 (0.008)∗	-0.012 (0.013)	-0.025 (0.009)∗
Positive collaboration	1.828 (0.293)∗		0.932 (0.710)	0.868 (0.281)∗	0.566 (0.711)	0.771 (0.288)∗
Previous acquaintance					2.027 (0.819)∗	1.140 (0.471)∗

∗ $|\text{Est.}|/\text{S.E.} > 2$
$\lambda = 2.00$

expect social support from j than from other subjects.

Furthermore, it is important to look at the structural logic of the *Social support* network by examining the endogenous structural parameters of the ERGMs, concerning the structural logic (Markovsky, Willer, and Patton 1988; Rank, Robins, and Pattison 2010) of the *Social support* network. Reciprocity is one of the most interesting effects of the model. In the multivariate models reported in Table 6 the estimate is positive but not significant, which brings us to conclude that the amount of reciprocated ties in the *Social support* network is not significantly different from what we would expect by chance, given the other effects in the model. It is interesting to note that reciprocity is significant if the model is specified without controlling for the emergence of *Trust in business* (see Table 5). When not controlling for the presence of other ties, we found a tendency of actors to reciprocate expectations of social support. However, by taking into account the positive effects of reciprocity within *Trust in business* and entrainment between the latter and *Social support*, we claim that in this data the direct reciprocation of expectations of social support is mainly due to the co-occurrence of trust ties.

Concerning closure, the model reports values of two effects. First, the estimate of path closure is positive and statistically significant. This means that there is a tendency for a subject i to expect social support from another subject j if the same is done by other people who are expected by i to provide her support. Moreover, the likelihood of i expecting support from j increases non-linearly with the number of two-paths between i and j, following a law of diminishing returns. Secondly, the value of the cyclic closure effect is negative and not significant. This indicates that peers did not share social support because of indirect reciprocity. However, this is also not significantly different from chance, controlling for the other specified parameters, which prevents us to conclude that we are observing a tendency against cyclic closure. The joint interpretation of the two closure parameters indicates that there is a tendency towards transitivity.

Another interesting point is that the estimates for degree-related parameters are not significant, which means that the in- and out-degree centralization of *Social support* is not significantly different from what we would expect by chance, controlling for other effects.

Finally, some interesting effects are shown by the multivariate models on the emergence of the *Trust in business* network. The reciprocity effect is positive and significant, and so is the path closure value, while cyclic closure is negative and significant. This is consistent with previous studies of trust in intraorganisational networks, which found that trust is often reciprocated at the dyadic level, while showing at the same time high transitivity closure and anti-cyclicality (see f.i. Robins, Pattison, and Wang 2009; Lusher et al. 2012).

5 Discussion and conclusions

Eliciting solidarity between strangers is of particular importance in modern complex societies, where an increasing number of individuals interact without necessarily sharing common group belongings or identities. Economic exchanges, such as business relations or professional collaborations, provide the opportunity for individuals to interact and develop social relations. However, the conflict between interests entailed by economic exchange may hinder the formation of expressive ties that overcome the original scope of the interaction.

In this paper, we addressed this problem by analysing expectations of social support between independent workers occasionally collaborating for business-related reasons. We found no evidence for an effect of successful professional collaborations on support expectations. Yet, our results show that such expectations are associated with trust for business-related issues. This supports the idea that solidarity cannot emerge from economic interactions unless the partner is considered to be trustworthy for risky exchanges (Molm, Collett, and Schaefer 2007; Molm, Schaefer, and Collett 2009).

However, our study shows that the formation of trust-based solidarity is triggered by professional collaborations. First, learning about partners' trustworthiness mainly occurs within the context of successful professional collaborations. This result supports findings about the positive effect of negotiated exchanges on trust (Barrera 2007; Molm, Schaefer, and Collett 2009; Kuwabara 2011). Therefore, on one hand, expectations of social support between collaborators do not form outside the frame of a trusted relation. On the other hand, the development of business-related trust is mainly triggered by successful professional collaborations.

Hence, although we found no support of a direct effect of economic interaction on solidarity, our study provides evidence that the latter may emerge as a byproduct of economic exchange interactions within a network of independent professionals (Coleman 1990).

Furthermore, our study also attempts at making a wider theoretical contribution. First, studying social support among peers is relevant for understanding the microfoundation of prosocial behaviour (see f.i. Simpson and Willer 2015; Baldassarri 2015). Second, by analysing solidarity within a network of economic exchange, we account for a mechanism which makes economic ties generate trust and expressive value (Granovetter 1985).

Finally, our results imply that solidarity among peers in an organisation can emerge from their spontaneous economic interaction. Nonetheless, this is conditional to decentralised partner selection, as this exposes peers to the risk of exploitation, thus allowing them to learn about others' trustworthiness. These results suggest that a policy aiming at the creation of social relations through top-down incentives might be outperformed by the peers' self-organisation.

However, more research is needed to further investigate the emergence of

solidarity from economic exchange. In particular, other empirical studies are needed to test existing theories on different organisational contexts, where specific forms of economic exchange may yield different combinations of cooperation and conflict that can affect actors' framing of the partner's motivations (Kuwabara 2011).

Appendix

Sociometric questions

Social support

Material support:

> Suppose that you need to solve some practical problems related to your private life. In order to accomplish that, you need help from another person, who will provide time, effort, tools, or other kinds of material resources. To which TaG member would you turn?

Emotional support:

> Suppose you have a problem related to your private life and you need to talk with someone for advice or comfort. To which TaG member would you turn?

Trust in business

> Suppose you need to involve other TaG members in a new personal business project, potentially open to all competencies supplied within TaG. Whom would you trust as business partners? Please, do not consider the competencies needed for your actual business.

Professional collaboration

Incoming commission:

> Have you ever been offered a commission or a collaboration opportunity by another TaG member? If so, please select their names only in case you accepted the offer. Please consider only those cases which were regulated by an explicit agreement about timing, resources, and payment.

Common projects:

> Have you ever started a new common project with another TaG member (e.g., a new partnership, a joint venture, etc.)? If so, please select their names, independently from the outcome. Please consider only those cases which were regulated by an explicit agreement about time, resources, and payment.

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