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Participation in Organizations, Trust, and Social Capital Formation: Evidence from Chile *

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Abstract

This paper introduces an ordinal rational choice model for multiple kinds of social participation intensities to empirically investigate the relevance of several theoretical determinants of formation of Social Capital (SC) introduced in the literature. The framework is rich enough to investigate the importance of demographic individual variables, social/peer effects interactions, endogenous trust, and politico-institutional factors as sources of participation. Using Chilean data, we find that politico-institutional factors are jointly important to account for SC formation, as well as social interactions. Trusting community is a highly significant factor behind political participation and non-participation in religious activities. In addition, there are clear interrelated decisions among different kinds of participation. The evidence shows that SC formation is a multidimensional complex process, as advocated by prevailing theories in the literature.

Keywords: Social Capital, Trust, Participation, Institutions, IV Ordered Probit

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1 Introduction

Even though Social Capital (SC) is a fertile area of research, the importance of its multiple determinants is not fully understood and the main mechanisms behind its formation remain largely untested. An extensive literature presents little consensus on the relevant processes originating SC (Davidson-Schmich 2006) as well as its appropriate measurement.[1] Building on several insights from the literature, our first contribution is to construct and estimate an eclectic empirical model, taking into account several parameter identification and statistical issues generally overlooked in the literature. We apply our general setup to Chilean data to understand several complex aspects of SC formation in that country. Moreover, we test whether some of the factors stressed in the theoretical discussion are empirically relevant to explain the phenomenon in Chile.

An eclectic view of literature portrays SC as a complex and multidimensional phenomenon. There are numerous relevant concepts about creation or formation, and complicated interconnected issues on its effects. Given the complexity and extent of the existing approaches, we choose to incorporate in our empirical model some substantial aspects of SC that are stressed by previous literature. First, we focus on investment in Social Capital via participation in social activities, a channel notably advocated by Putnam(1993, 1995). We view this kind of investment as an optimal decision problem, given individual preferences. Second, since individual attitudes and behavior are structured both by personal traits and social context, we incorporate the possibility of social effects of individual decisions, i.e. participation choices may have (positive) externalities on community life (Manski 1993; Durlauf 2002). Third, we introduce general trust (Coleman 1988; Coleman 1990; Putnam 1993; Newton 2006; Geys and Murdoch 2008) as a key motivating aspect in social participation, and explicitly deal with its endogenous nature. Fourth, we formally consider the political and institutional designs as prime elements in the process of SC formation, both as driving forces for certain forms of associative life, as well as a chief factor explaining trust (Kim 2005; Freitag 2006). Finally, we recognize another layer of complexity in the choices of associational life by analyzing several kinds of social participation linked to fundamental areas of human life (religious activities, local community - neighborhood, parental association, professional association, and political movements).

Studying Chilean SC formation process is interesting by itself, but also sheds light on the determinants and mechanisms behind the social development of a country which is making a transition from Latin-American standards to the ones achieved by OECD countries.[2] As a case of study, the SC formation process in Chile may help understand the cultural and social development transition

[1] See Newton 2006; Bjørnskov 2006; Geys and Murdoch 2008; Hotta and Inoguchi 2009

[2] Indeed, Chile was the first South American country accepted by the OECD in January 11, 2010

towards development. This article focuses on the processes of SC formation at the sub national context, with explicit consideration of individual and local government (municipality) level heterogeneity and cross-interactions. In this way, we avoid the frequent criticism of SC research neglecting the importance of governmental institutions (Oxendine et al. 2007). In contrast to aggregate national data studies, our framework considers local context variables which are potentially important to explain SC formation (Freitag 2006). Our focus on the local government level is justified by several studies suggesting that people are more connected and committed to the policies at local community rather than those of the central government (Hiskey and Bowler 2005; Montalvo 2007). Municipalities in Chile are particularly well-suited for the research on SC, as they are the closest link between the structure of the State and citizens. Although the Chilean municipalities involve several political and economic structures, they are entities which are comparable one to another in a single unitary political and economic national context. Majors gain office in open relative majority elections every four years. Institutional and performance data of municipalities represent the political and institutional environment in which individuals live. Another reason for this choice relies on the availability of individual-level data collected from individuals living in many municipalities across the country (LAPOP[3] and CASEN[4] and detailed political, institutional, budgetary, and performance measures at the local government level at the SINIM (National System of Municipal Information)[5] database. The combination of these sources offers an interesting possibility of analyzing and testing several hypotheses advocated by major contributors in the SC literature.

On technical grounds, we construct a model as a linear approximation for a standard utility maximization problem of social participation intensity depending on individual, social and institutional and political variables. Then, we show how to include social interactions in the fashion of Durlauf (2002) in order to consider possible externalities of individual decisions on SC formation. We also explicitly incorporate institutional factors of the municipality in which the individual lives as a way to uncover variables that spur or deter associative life. Our model also deals with the relationship between social participation and trust, considering the endogeneity or reverse causality problem. As identification strategy, we rely on an exogenous instrumental variable, being a crime victim, which affects individual's trust with no direct effects on social participation, conditional on socioeconomic background and municipality characteristics. Finally, we deal with the ordinal

[3]Latin America Public Opinion Project, Vanderbilt University. For more details see `http://www.vanderbilt.edu/lapop`

[4]*Encuesta de Caracterización Socioeconómica Nacional* (National Survey of Socioeconomic Characterization), administered by the *Ministerio de Planificación Nacional*, today known as *Ministerio de Desarrollo Social*. For further details, see in `http://www.ministeriodesarrollosocial.gob.cl/casen/index.html`

[5]For details, see `http://www.sinim.cl`

nature of the data on participation and trust in LAPOP surveys. by estimating a multivariate ordinal probit model with an endogenous regressor via Limited Information Maximum Likelihood (LIML), implemented along the lines of Roodman (2009).

Our results show that all the mechanisms of SC formation are significant, although the particular relevance of each element varies from one kind of social participation to another. These findings confirm the complexity of the creation of , and show that our approach contributes to systematize the empirical knowledge on the subject. Our results show that the causal effect of trust is positive for political participation, but negative for religious activities. Most participation activities have a clear gender bias. While females participate more in religious, parental and community activities, males are more involved in professional and political activities. Age plays particular roles for different kinds of activities. Participation intensity in religious activities increases in age, while there are hump shaped profiles for other activities, peaking at different ages.

Among politico-institutional factors, most of them are not individually significant at conventional levels. Remarkable exceptions are the negative impact of our efficiency measure in community and professional activities, the positive impact of the municipality expenditure in civic organizations for political participation. In addition, the political party of the incumbent major plays a significant role for community and political participation. Despite of the lack of individual significance, we reject the null hypothesis of no social/peer interactions. In addition, we also reject the null of no politico-institutional factors. Finally, unobserved factors driving participation are significantly correlated one to another. All in all, the evidence is concordant with a multidimensional and heterogeneous complex process of SC formation, as advocated by prevailing theories in the literature.

2 Literature Background

Bourdieu (1980) and Coleman (1990) influential studies about SC initiated a very large literature. The research agenda highlights the complex relationships among civic engagement, social structures (associations, social networks), the norms of cooperation and reciprocity, and the trust in general, in socio-economic development and political processes (Putnam 1993; Maloney et al. 2008). While some researchers, mainly economists, have investigated SC impact on specific contexts such as economic growth (Knack and Keefer 1997) , among other economic outcomes (Guiso et al. 2004; David et al. 2010; Freitag and Kirchner 2011), others have stressed SC as a remedy for most problems that affect the modern democracies (Putnam 1995; Kim 2005). Along this line of research, SC formation could revitalize participation, governability, and sustainable socio-economic development.

In methodological terms, many studies compare statistics within a country or across groups of countries and develop multilevel empirical strategies (Welzel et al. 2005). These papers incorporate individual-level data from surveys, as well as economic, political and institutional context variables (Letki 2006). While these studies agree on the existence of multilevel structure and provide empirical evidence regarding the relationship between micro, meso and macro SC dynamics, only Keele (2005) presents a simple macro model to explain the dynamics of SC in a cross national perspective. Brehm and Rahn (1997) and Glaeser et al. (2002) adopt a viewpoint that is similar to ours, by focusing is individual-level evidence on SC formation. For the Chilean case, Salazar and Jaime (2009) study participation in social organizations, following a very different approach and using other data. To the best of our knowledge, our study is unique in developing an empirical model of SC creation including both individual and sub national levels, and fully acknowledging endogeneity, identification issues and the multidimensional nature of the phenomenon.

Since Alexis de Tocqueville, the associative life has been considered a relevant factor for the democracy and other dimensions of development. Associative life generates active citizens and becomes the main vehicle for coordinating joint actions, among many other positive outcomes (Wallis and Dollery 2006; Anderson 2009; Onyx et al. 2012). SC formation is usually measured as the degree of involvement in participation and associativism. Many researchers have related this to positive effects on civic attitudes, trust, and subjective consequences of social networks (Putnam 1993; Von Erlach 2005; Freitag et al. 2009). Moreover, many studies consider associative life as the appropriate subject of study in cross national and sub national comparative research (Wagle 2006; Freitag 2006; Lee 2010; Menahem et al. 2011). Although different types of association may generate different outputs, as shown in the debate about "bonding" and "bridging" types of association (Putnam 2000, pp 22-23, Geys and Murdoch 2008), there is no conclusive evidence on particular effects from specific participation kinds (Maloney et al. 2008). Since we focus on several participation kinds in the paper, we discuss this topic in light of our empirical results in the subsection 5.2.

Since the decade of 1960s, studies of political culture have focused on attitudes and trust beliefs that of groups, organizations and individuals as a resource for democracy (Maloy 2009). Research on SC proposes trust as a basis for achieving social, economic and political goals. Some studies try to measure its effects on other components of SC(Keele 2005; Bjørnskov 2006; Jamal and Nooruddin 2010). However, the direction of causality between trust and participation could run in both ways. Indeed many researches emphasize the "virtuous circle" between trust and participation as key conception in SC (Putnam 1993; Brehm and Rahn 1997).Dealing with this problem usually relies on the use of instrumental variables (IV) that provide quasi experimental exogenous variation to

allow disentangling one causality direction.[6]

The inclination to participate depends on resources and possibilities varying according to demographic variables such as gender, age, education, among others. In order to capture these factors, the literature include socio-demographic factors at the individual level as predictors or control variables to explain participation and civic engagement (Von Erlach 2005; Behtoui 2007; Morjé and Gilbert 2008). In addition, the social context and the information environment influence individuals' behaviors. For instance, Campbell (2009) shows that the status related to the educational level is related to average education within the social environment.

Since John Stuart Mill, many researchers argue that one of the main functions of institutions and the governments is the formation of people's moral quality and desirable intelligence. Having this insight as a remote ancestor, many theoretical and empirical studies show the impact that political design and institutions have on the formation of SC (Freitag 2006). Modern studies on SC in general, including trust, civic engagement and democracy, have increasingly been focused on the role of the State and political institutions in the creation of SC(McLaren and Baird 2006; Oxendine et al. 2007; Wagner et al. 2009). The institutions are conceived as normative orders with incentives (Jones 2008; Jamal and Nooruddin 2010) and as sources of information (Boudreau 2009) that influence world views and preferences. In this context, several studies have converged on the implication of institutions at the local level for social outputs (Esau 2007), or as source of environments which may allow for the creation of SC (Boeck and Fleming 2005). Some experimental studies have examined the effects of public policies and social programs in the perceptions and behaviors of people in local communities (Richey 2005; Andrews et al. 2011). From the case studies and comparative research literature on governance there are evidence about the effects of institutional structures, constraints and designs for citizen empowerment, too (Gaynor 2011; Wampler 2012).

3 Social Capital: Conceptualization and Hypotheses

In this study, we see Social Capital as a group of actual and potential resources, individuals and collective groups that come out of connections, social relationships, "durable network of relationships", and the processes of material and symbolic exchanges (Bourdieu 1980, p 1-3; Coleman 1990, p. 304-305, Migheli (2011)).

On the other hand, Robert Putnam underlines the economic and political benefits obtained by associativism. In his research about SC in Italy, Putnam (1993) concludes that institutions and

[6]There are virtually endless number of papers in empirical economics using this approach. In Political Science, these techniques are used and discussed in Dunning (2008),Pacheco and Lange (2010) and Rogowski and Sinclair (2012). For a technical discussion, see Morgan and Winship (2007) and Angrist and Pischke (2009)

political systems are formed by the historical and social context in which they operate. From this perspective, he highlights the positive role of associativism, "the civic community", that encourages an active, egalitarian, public-oriented citizenry and is truly a cooperation and "trust factory". Consequently, associations and the levels of associational membership are considered a standard to observe stocks of SC. In line with these insights, a good part of the subsequent literature conceptualizes SC as structures and social networks (associative life), and norms of cooperation and trust with positive effects on several socioeconomic outcomes(Knack 2002; Ostrom and Ahn 2003; Maloney et al. 2008). We adopt a similar approach, using a particular measurement advocated in Putnam's work: participation intensity in a variety of social activities as a quantification of the individual's involvement in social networks. Bourdieu and Coleman support the notion of rational decisions in regards to associative life. We develop and interpret our empirical model in this research tradition of Economics and Political Science (Penn 2009). Unsurprisingly, the economic literature on SC has stressed the rational cost-benefit choice of participation and social network formation (Glaeser et al. 2002).

Following the literature about the impact of social contexts on Social Capital, some studies in sociology stress the fact that SC is more than the mere sum of individuals' choices of social participation. Hence, individual social participation decisions generate externalities that affect other members on their communities because they change the size and the configuration of the social network in which others would choose to participate. As Durlauf (2002), we conceptualize these externalities in a similar fashion as the "peer effects" literature in economics starting with the seminal work of Manski (1993). We formally test for the presence of such effects in our model. In Chile, as in other countries public policies are linked to citizen engagement, democratic representation of social interests at different stages of local policies Valdivieso (2012). There is some evidence on the effect of political designs, institutions and public services on the formation of SC (Freitag 2006; Letki 2006). The theoretical expectation is that institutional features and policies impact the individual participation in civil organizations with programmatic purposes, such as community, professional and political organizations. In particular, we focus on measures of budgetary independence, social program subsidies, investment in social organizations, consensus/majority democracy, efficiency, and political party of the incumbent major.

Starting with Coleman's insight that creating-value community networks are the base for SC (Coleman 1990, p.311-312) and the empirical findings of some literature on SC (McMiller 2005; Lowry 2005; Schulz and Bailer 2012; Hindriks 2008; Krishna 2007; Andersen and Jennings 2010), we consider that interpersonal relationships can adopt different formats depending on the contexts and the specific situations. In this study, we observe SC through participation in five categories

of associative life: religious activities, parents associations, community committees, , professional associations ,and political movements and. Besides, we consider trust as another dimension of SC, jointly determined with participation. All these dimensions of SC may be intrinsically interrelated at individual level. We formally test if there is a significative interdependence among participation choices and trust.

4 Modeling Participation using Utility Index

Participating in social activities entails benefits and costs. Along the lines of Bourdieu (1980) and Coleman (1990), individuals obtain emotional, social and pecuniary gains through the increased interaction in social networks. These benefits may also include satisfaction derived from expressing identity with collective interests Jones (2009). On the other hand, associative life generates numerous costs, in particular the alternative use of time (working, leisure, home production) as well as monetary costs (transportation, fees, etc). Conceptually, individuals may choose their intensity level of participation in social activities as a continuous decision variable. Furthermore, we can represent this choice in a very simplified way. The optimal level of participation intensity in a social activity is obtained by maximizing the net utility (benefits minus costs) given a vector of individuals' characteristics X and the political and institutional context variables vector Y.

$$U(P; X, Y) = B(P; X, Y) - C(P; X, Y)$$

Assuming that the benefit function $B(P; X, Y)$ is increasing and strictly concave, and that the cost function $C(p; X, Y)$ is increasing and convex[7], the optimal choice implies that marginal benefit equals marginal cost of participation intensity. Hence, $B'(P; X, Y) - C'(P; X, Y) = 0$. The latter condition implicitly defines an optimal choice of intensity depending on X and Y, i.e $P^* = G(X, Y)$. The solution is depicted graphically in Figure 1. The benefits of participation intensity grow at a decreasing rate reflecting the fact that individuals who intensively participate in a social organization obtain little additional gains from increasing their involvement. The net utility obtained from participation activities has a bliss point, which defines the optimal individual behavior, given X and Y. Hence, the formation of SC can be represented through a utility index that is monotonically correlated with the observed degree of participation. For various reasons presented elsewhere (Valdivieso 1998), individuals are naturally inclined to participate and cooperate, but face opportunity costs that could vary according to individual characteristics and to the politic and institutional context. Using a simple linear approximation for $P(X, Y)$ we can write as

$$P_i = \alpha + \beta X_i + \gamma Y_{m(i)} + \varepsilon_i$$

[7]Technically, we also require that $B(P; X, Y)$ and $C(P; X, Y)$ are twice continuously differentiable.

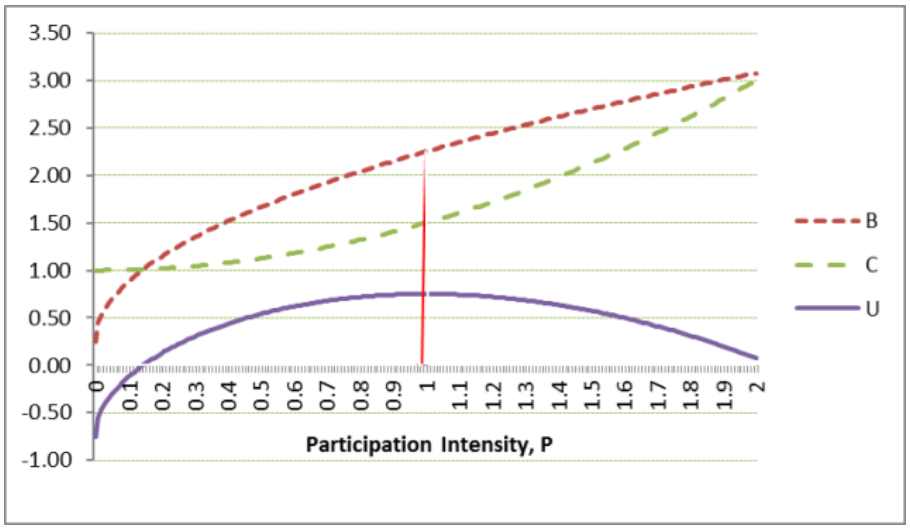

Figure 1: Determination of optimal participation intensity

We denote P_i the participation of individual i. X_i is a set of particular predetermined characteristics of individual i that affects the participation decision such as gender, age, and educational level. Notice that income does not fit into this category properly in that individuals' earnings could be affected by the community social network, which makes this variable endogenous.[8] The vector $Y_{m(i)}$ represents a number of features of the municipality or area $m(i)$ in which individual i lives. This set may include institutional and political characteristics of the municipality, as well as, physical, geographical and historical characteristics that influence social participation.

4.1 Incorporating social effects

Manski (1993) seminal paper presents an empirical model with social interactions to model situations in which social behavior influences individual behavior. Thus, in our setup an individual is more likely participate in a community where participation is already high because he benefits from the large existing social network. We incorporate the latter consideration by introducing aggregate participation as a right-hand side variable

$$P_i = \alpha + \beta X_i + \gamma Y_{m(i)} + \delta \mathbb{E}[P_i|\Omega_{m(i)}] + \varepsilon_i \tag{1}$$

Individuals have rational expectations, that is, they make the best possible forecast using all the information available. We assume that (i) the fact that individual participation is determined

[8] Our results should be interpreted as a reduced form of the effects of several exogenous variables on participation, including side-effects on earnings.

by equation (1) is common knowledge, and (ii) the information set $\Omega_{m(i)}$ known by the individual i is $(X_{m(i)}, Y_{m(i)})$. Therefore, a rational individual computes the expected participation value as

$$\mathbb{E}[P_i|\Omega_{m(i)}] = \alpha + \beta X_{m(i)} + \gamma Y_{m(i)} + \delta \mathbb{E}[P_i|\Omega_{m(i)}]$$

Substituting back into the first equation yields

$$P_i = \alpha + \beta X_i + \gamma Y_{m(i)} + \delta \left(\frac{\alpha}{1-\delta} + \frac{\beta}{1-\delta} X_{m(i)} + \frac{\gamma}{1-\delta} Y_{m(i)} \right) + \varepsilon_i$$

$$P_i = \frac{\alpha}{1-\delta} + \beta X_i + \frac{\beta\delta}{1-\delta} X_{m(i)} + \frac{\gamma}{1-\delta} Y_{m(i)} + \varepsilon_i \tag{2}$$

The presence of municipality averages of individual characteristics provides us a simple way to test the presence of social interactions (Manski 1993). The fact that population characteristics matter for individual choices is an indication of externalities in the process of SC formation. Individual participation intensity choice changes the incentives other individuals face to determine their own participation intensity. The proposed model expresses an equilibrium situation in which (i) individuals make their decisions taking into account the best assessment (rational expectation) of the aggregate participation intensity, and (ii) the aggregate participation behavior is fully consistent with the individuals' participation choices.

4.2 Introducing social trust

On one hand, an individual's trust in others is a main determinant of social participation because it raises the expected payoff a person could obtain in their associative lives. On the other hand, subjective individual trust does not arise in social isolation. The odds for developing a trusty attitude towards others depend on the chances of interacting with reliable people in social networks. Hence, it is hard to empirically uncover the relationship between social participation and trust because they mutually cause each other. Our identification strategy follows the standard approach of Instrumental Variables.[9] In a nutshell, we need to find a variable Z that provide us a quasi-experimental source of variation for trust. Formally, two conditions must be satisfied:

- Conditional exclusion restriction or validity: Conditional on observable individual and municipal information, the variable Z affects the level of trust, but does not affect the participation directly, i.e. all the variation of participation caused by Z comes through a trust variation. In practice, this condition means that the variable Z is excluded from the equation of participation intensity.

- Strength: The variable Z is significantly correlated with trust T.

[9]For a textbook treatment of this subject, see Morgan and Winship (2007), Angrist and Pischke (2009)

We postulate that a natural candidate for an exogenous variation is an indicator of being a crime victim, conditional on individual and municipal demographic and socioeconomic factors. The literature of SC has already used crime experiences to explain trust (Lederman et al. 2005; Keele 2005; Córdova 2007), so that this is factor generates an exogenous variation of trust with consequences in social participation intensity.

In this case, validity implies that, conditional on individual and municipality characteristics, all changes in social participation intensity generated by being a crime victim are entirely due to the impact on general trust caused by the crime event. Despite the crucial importance of this assumption for the method, it cannot be statistically tested, only defended on theoretical grounds (Morgan and Winship 2007). In this case, our main argument goes as follows. Considering individuals who share the same observable features (gender, age, education, etc) and live in the same municipality at the same time, being a crime victim is driven just by luck.

Admittedly, the most problematic part is that any effect on participation caused by a crime experience must only come through a reduced level of trust. One counterargument could be that experiencing a crime may directly affect participation due to the economic loses generated. Nevertheless, most of the types of participation require little economic resources, but only personal time and effort. Since we control for municipal characteristics, age, and education, the socioeconomic status of and individual is held constant after being a crime victim. Moreover, intrinsic motivations seem to be fundamental to explain participation in associations (Degli Antoni 2009).

In the last fifteen years the theoretical and applied literature have stressed the Weak Instruments problem (Stock et al. 2002). Whether instruments are weak or not can be formally tested, once defined an acceptable level of bias in the IV estimation (Stock and Yogo 2005). Even though these insights do not directly carry over to our non-linear approach, we will show that being a crime victim is a strong predictor of trust level.

Using these ideas, we have the following two-equation model

$$P_i = \frac{\alpha}{1-\delta} + \beta X_i + \frac{\beta\delta}{1-\delta} X_{m(i)} + \frac{\gamma}{1-\delta} Y_{m(i)} + \lambda T_i + \varepsilon_i \tag{3}$$

$$T_i = \theta_0 + \pi X_i + \psi X_{m(i)} + \eta Y_{m(i)} + \nu Z_i + \varepsilon_i \tag{4}$$

4.3 Considering ordinal responses

While utility-maximizing behavior generates a continuous participation intensity decision, the collected data of participation mostly comes in discrete variables. For instance, the data from LAPOP (Latin American Public Opinion Project) used in this paper categorizes the participation activity into four possible answers (“Once a week”, “One or twice a month”, “Once or twice a year”,

"Never"). Considering that these discrete choices are logically ordered through an underlying intensity of response, we can use an ordered probit model if we allow for a normal random component into the utility index. Hence, we observe intensity categories that allow us to uncover the unobserved continuous participation intensity. The thresholds determining in which category lies a particular participation intensity are parameters to be estimated. We can easily adapt our linear continuous framework and social/peer effects under the assumptions that (i) individuals are truly affected by the aggregate participation intensity (which is unobservable to the researcher), and (ii) individuals have rational expectations of participation intensity.

The trust variable T is also an ordinal random variable which prevent us from using linear IV estimation methods. If we would do that, the estimation were not invariant to the arbitrary numerical labels of the categories. Assuming joint normality of errors on the participation and trust equations, we can write the joint likelihood of the equation system, in a multivariate ordered probit[10]. The system has the "first-stage" equation (analog to the one used in linear IV estimation), a reduced form of an ordered probit of trust categories explained by the exogenous regressors $(X_i, Y_{m(i)}, X_{m(i)})$ and the instruments Z_i that are absent in the ordered probit participation equations . The latter ones are also an ordered probit whose linear index depends on $(X_i, Y_{m(i)}, X_{m(i)})$ and trust level T_i. The modeling approach is essentially a Limited Information Maximum Likelihood (LIML) for multivariate ordered probit equations. The term "Limited" means that we are not estimating the causal effect of participation categories on trust and the other categories.. Identification is obtained, as in IV settings, by an excluded exogenous regressor into the participation intensity equations. This Limited Information approach suffices for identification and estimation of the causal effect of trust into participation categories.

Fortunately, Roodman (2009) has developed a statistical computer package for `Stata` called `cmp`. The program can estimate several types of systems of equations combining different types of limited dependent variables. The approach needs that (i) all errors of all equations are Gaussian, and (ii) the system of equations is recursive. Limited Information Maximum Likelihood method perfectly fits into this setting. The full structure of the likelihood of this model can be found in our online Appendix.

4.4 Considering multiple participation categories

There are several kinds of social organizations of great interest in LAPOP data. These are religious activities, parental associations, community/neighborhood organizations, professional associations, and political movements. Since and individual simultaneously decides participation intensity in

[10]For a thorough discussion of discrete response models, see Train (2009)

each category, these choices are obviously interrelated. In principle, these several types may be complements or substitutes. Participation in certain activities may reduce costs or increase the benefits of participation in other types. Of course, to some extent all activities may be substitutes since the amount of time and resources of individuals is limited.

We pursue a reduced-form and flexible approach in dealing with these multiple simultaneous choices. We allow for free contemporaneous correlations across participation equations and the trust equation. This implies that we deal with a 6-dimensional multinomial recursive ordered probit model. As shown in the Appendix, this implies a numerical computation of a 5-dimensional integral. We estimate the model via Simulated Limited Information Maximum Likelihood (SLIML) using numerical integration using GHK (Geweke, Hajivassiliou & Keane) simulation method (Geweke 1989; Geweke and Keane 2001; Train 2009) with $5\sqrt{N}$ draws from Halton sequences, a quasi-MonteCarlo sampling method, where N stands for the total number of observations.[11]

4.5 Model Identification

In a setup of continuous participation intensity with no endogenous regressor such as general trust, the parameters are identified as long as there is at least one individual variable X_i whose municipality average level variable $X_{m(i)}$ does not affect participation intensity (Brock and Durlauf 2001; Durlauf 2002). This result does not apply to our setup since our municipal averages $X_{m(i)}$ are not constructed from observations of individuals in the sample of X_i variables. Our primarily source for participation comes from LAPOP surveys, which contain too few observations per municipality for us to compute meaningful averages. Thus, we obtain those averages from Chilean household surveys CASEN 2006 and 2009. Since the average of individual's characteristics at each municipality is computed using a larger sample of other individuals who are different from those we study their participation in the LAPOP survey, there is no risk of perfect collinearity between X_i and $X_{m(i)}$ in principle, as it happens in Durlauf's analysis.

Moreover, our main purpose is to test the existence of social interaction effects on participation decisions. Manski (1993) and Durlauf (2002) show that we can test for these effects in equation (3) even if we cannot identify the parameter δ by studying the joint significance of the parameters associated to $X_{m(i)}$.

[11] An alternative approach is using Monte Carlo methods, which consists in drawing pseudo-random numbers (coming from random number deterministic simulators) to compute this multidimensional integral. Train (2009) reports that quasi-random number sampling schemes, such as Halton sequences, perform substantially better in both accuracy and computational time.

5 Empirical Results

5.1 Data Sources and Variables

Individual-level data: To measure individual participation (as an ordinal outcome) we use 2008 and 2010 LAPOP surveys.[12] We also use the variable "trust in community people" as an overall measure of trust. Individual characteristics such as gender, age, marital status, catholic (majority religion in Chile), educational attainment, and urbanity are also in LAPOP. These individual factors have a role in determining costs and benefits of several kinds of participation. Table 1 contains information on individual ordinal categorical variables of participation in religious activities, parental associations, community committees, professional associations, and political movements, and trust. We report the shares of individuals in each category of participation or trust for the whole sample and selected subsamples.

A majority of individuals choose not to participate. Roughly 60% of individuals do not participate in any religious activity. These numbers reach 65%, 69%, 72% and 97% for parental associations, community, professional, and political activities, respectively. The participation intensity across the three other participation categories is unevenly split. While low, medium, and high levels of religion participation categories roughly have similar shares, other activities look very different. A majority of individuals engaged in parental associations do it at the medium intensity level. Conditional on participation, most individuals choose low and medium participation in community, professional, and political activities.

There are clear gender patterns in participation as well. While women predominate at religious, parental, and community activities, male participate more in professional and political categories. Age matters too. Religious participation and participation intensity clearly increase with age. Parental association participation depicts an inverse U-shape that peaks at 35-44 years old, a standard life-cycle pattern of parenthood. Community committee participation increases with age before 65, but intensity seems larger for individuals in the 35-44 and 55-64 years old. For professional associations, quite stable for age groups above 24. Political movement participation shows an hump shaped pattern peaking at 35-44 years old.

In regards to trust in community people, most individuals say that common people is somewhat trustworthy (39.8%, category 3) or little trustworthy (28.8%, category 2). Around 10% of the sample believe that people is no trustworthy (category 4). The data shows a clear increase of trustworthiness from 2008 to 2010. Gender differences in trust attitudes are subtle: women tend

[12] We may have used 2006 LAPOP data, but unfortunately the municipality of residence of the interviewed subject is not codified.

to be polarized in their answers, while the modal male is somewhat trustworthy (45.2%, category 3). Age patterns are hard to summarize in a sentence. Total lack of trust is quite constant across ages, although it is slightly lower for individuals 25-34 and older than 55. The "Very trustworthy" category shows an increasing pattern in age, with a remarkable large increase for people older than 65. The "Little" decreases in age, while "Somewhat" shows an increasing pattern.

Municipal demographic data: To test for the existence of social interaction effects or participation externalities, we need data on average demographic characteristics such as gender, education, etc. at the municipality level. We obtain these variables from the 2006 and 2009 CASEN surveys, although the measurement of these variables is not perfectly contemporaneous with LAPOP individual-level variables. If there is measurement error on these variables due to the lagged nature of variables or due to the sampling error of CASEN data, our estimates would be biased towards zero. Hence, finding significant social effects would be noticeably in this context. The last subtable of Table 2 summarizes aggregate demographic characteristics of the municipalities from CASEN 2006 and 2009 databases. Between the two years, there is a slight decrease of the male share of the population, an increase of the share of individuals who are married and those who live with a partner. In addition, the average age and schooling years increased.

Institutional and Political data: The institutional, budgetary and administrative data of municipalities are obtained from SINIM 2008 and 2010. Data on language and math test scores (SIMCE) of municipal schools is also obtained through SINIM, although the primarily database is the Ministry of Education of Chile. Data on municipal elections is obtained from a website of the Ministry of Interior Government of Chile (`http://www.elecciones.gov.cl`). The first Panel of Table 2 shows information on different associations targeting population segments or promoting specific activities in each municipality per 1000 inhabitants: sport centers, mothers centers, senior centers, parental associations, etc. Community and municipal organizations account for the most part of this "organization supply". The average number of supply per inhabitant and its dispersion across municipalities substantially increases from 2008 to 2010, which is accounted by a large increase of average and standard deviation of community organizations in the period. These social organizations typically depend on municipal government programs and policies through subsidies. For this reason, the increase in 2010 may be partially attributed to revitalized programs as a response to the 8.8 Richter earthquake of February 27th, 2010.

In the Chilean local context, two issues affecting participation are the budgetary self-funding capacity of municipalities[13] and the resources allocated to strengthen public programs, services,

[13]Chilean municipalities receive funding from their own territorial taxes, commercial and drivers' licences, among other sources. A handful of wealthy municipalities support a Common Municipal Fund (CMF), which is redistributed to the rest of municipalities of the country.

social organizations, and participation at the local level. We expect that the control over own resources increases the autonomy of municipalities and makes it possible for them to focus on local priorities, spurring the participation in social organizations. Moreover, the economic resources for social organizations encourage participation. The greater the resources for organizations, the greater the incentives for people to participate in associative life. In Table 2 average municipality expenditure in organization related activities data shows a clear decrease between 2008 and 2010, along with a decrease in dispersion of expenditure. The budget share of the share of municipal own revenue shows a slight average and dispersion decrease between 2008 and 2010. These findings could be related to changes in transfer policies due that a new President took office in March 2010, shortly after February 27th earthquake. The population density is likely to be a determinant of associative life since it proxies the cost of linking to other network members within a municipality. This variable shows a decrease during the period, averaging 835 inhabitants per square kilometer, suggesting some migration from high to low density municipalities between 2008 and 2010.

The literature highlights that consensus democracy incentives participation more than majority democracy does. When there is involvement of majority and minority citizens in policy decision-making and monitoring, participation tend to increase. The opposite occurs in systems with exclusion of majorities and minorities (available literature summarized in Freitag (2006)). In order to measure the degree of voting consensus in each municipality, we construct a Herfindahl Index of voting concentration, used in the Industrial Organization literature as a measure of industry concentration. It is computed as the sum of squared voting shares of each candidate in the last election. The political municipal scenario show a very stable concentration of votes at the municipal level (Herfindahl 0.44) between major elections in 2004 (associated to 2008 data) and 2008 (associated to 2010 data). Between 2004 and 2008 elections the *Concertación por la Democracia*, the center-left coalition[14] drastically reduced the number of elected majors. This electoral loss chiefly concerns to the coalition's largest party, the Christian Democracy, which decline from almost 29% of elected majors to 17%. On the other hand, the *Alianza por Chile*[15], the center-right coalition, notably increased the number of elected majors. The average voting share of the elected major slightly decreased between 2004 and 2008 elections.

We also hypothesize that managerial efficiency of municipalities fosters social participation. The quality of public policies influences the governance and sustainability of the democracy and affects participation (Kim 2005; Hagopian and Mainwaring 2005). In the Chilean context, since

[14]This coalition,composed by Christian Democratic Party (PDC), Party for Democracy (PPD), Radical Social Democratic Party (PRSD), and Socialist Party (PS), held presidential office since 1990 until March 11, 2010

[15]This coalition is composed by the Democratic Union Party (UDI) and National Renovation Party (RN). In March 11th, 2010, Sebastián Piñera became its first elected President.

most of the municipalities are important actors for local development, people may evaluate the political performance in terms of its effects on life quality (for arguments and facts see Valdivieso 2009). Since Chilean majors administer local schools, its relative failure or success could be seen as a signal of efficiency. Hence, we use the percentage change of language and math test scores (SIMCE) of fourth-grade students in municipal schools to capture major's quality performance. It is reasonable to use changes rather than score levels to proxy efficiency because the latter is highly correlated with population characteristics beyond the control of the major. In contrast, variation in test changes could be attributed to major's policies. Our data shows that the rate growth of SIMCE scores (average of language and math tests) increases between 2008 and 2010. In addition, the dispersion of growth rates shows a slight decline, suggesting an overall increased performance of the municipal educational system during the period.

5.2 Estimation and Results

The estimation procedure is implemented using the LIML procedure through the `cmp` package created by Roodman (2009) in `Stata`. The estimates are displayed in Tables 3-4. These two tables contain the Simulated Limited Information Maximum Likelihood (SLIML) estimation of the multivariate ordered probit model for five types of associational life and trust. In addition, we estimate several other models. We show and discuss the most general model in the main text, which includes individual variables, social effects, institutional and political variables, trust,and cross-equation correlations.

We also formulate and estimate a model with municipal fixed effects[16] in order to see whether the results on individual and social effects coefficients remain similar when we fully control for local idiosyncratic effects. Of course, the reduced temporal variation of institutional and political variables prevent us from estimating a meaningful model with both institutional-political factors $Y_{m(i)}$ and municipal fixed effects. In our online appendix[17], we display tables for all models including trust and free cross-equations correlations. We also compute some restricted models in order to test for the non-existence of social effects, institutional-political factors, cross-equation correlations under several different assumptions. These results are explained in subsection 5.3. In the following pages, we discuss the results by each social participation kind and comment on the estimates of institutional and political variables.

Religious Activities: The first columns of Tables 3-4 show that participation intensity in religious activities behaves considerably different from other participation categories. Males tend

[16] We include fixed effects if (i) we have at least 10 individuals for that municipality and (ii) those observations show positive variance.

[17] `http://www.benjaminvillena.com/data/uploads/online-appendix-SC-VV.pdf`

to participate significantly less than women. Married individuals participate more in religious activities, while life-partners do it less, though not significantly at 10%. Catholics significantly participate less than non-catholic individuals. Perhaps surprisingly, greater trust in community significantly reduces religious participation. This result is highly significant and robust across additional specifications in our online appendix as well. Several papers have studied the link between religion and SC formation (Quaile Hill and Matsubayashi 2005; Córdova 2007; Patterson 2008; John et al. 2011). Our interpretation of the findings goes as follows. Many currently predominant social behaviors collide with traditional religious precepts of zealous Christian (particularly Catholic) groups which follow the guidelines of church leaders (Hagopian 2008). In that scenario, other channels for social integration may be reduced as religious participation increases. Hence, for members of these groups, distrust may arise as a predominant approach to the rest of the society. This tension is probably increasing over time since the Chilean governments have increasingly favored a secular orientation in public education, taking away the traditional influence of Catholic Church in this area.

Older people tend to participate more in religious activities, as we anticipate from the descriptive statistics. This kind of participation increasing in age is in line with a life-cycle hypothesis: individuals facing an increasing chance of death for their family and friends, as well as themselves, may find psychological relief for uncertainty in afterlife beliefs advocated by Christians and other religions. Another competing explanation is the cohort hypothesis: older people were raised in a society in which the Church had much greater influence than it has today. Since the squared-age term is non-significant, and the implied peak of religious participation is around 110.5 years old[18], it is not possible to discern between the two hypotheses.

Average subsidies have a positive significative influence on religious participation. We interpret this result as evidence for an important role of religious associations in information diffusion and advising with respect to procedures to obtain assistance in the community. People perceive that the chances for obtaining subsidies increase when they are supported by organizations. In particular, religious ones seem to play a large role in this process. On the other hand, our efficiency proxy affects negatively this category. This finding is consistent with a substitution pattern between local governments and religious organizations in the provision of some community services, particularly education.

Finally, the cross-equation correlations show that unobserved factors behind religious participation intensity are significantly positively correlated to unobserved factors spurring participation in

[18]Considering that the profile is given by $\alpha_0 \times \text{age} - \alpha_1 \times \text{age}^2$ with $\alpha_0, \alpha_1 > 0$ the bliss point is achieved at $\text{age} = -\frac{\alpha_0}{2\alpha_1}$

parental centers, community organizations and trust. The latter could be explained because Christian churches (in particular Catholic) are very important actors in the educational supply in Chile. Many Christian schools offer a potential social network through joint participation in religious and parental activities. The relationship between unobserved components of community and religious associations could be explained by the influence of priests in local communities at all socioeconomic levels.

Parents Associations: Participation intensity in meetings of parental associations at the school is higher for women, catholic, and coupled (either married or living with a partner) as shown in the second columns of Tables 3-4. There is also evidence of participation intensity life-cycle profile, with significant linear and quadratic age terms implying a peak at 37.5 years old. Thus, parental association participation is consistent with a life-cycle profile, as in the US data (Putnam 2000; Glaeser et al. 2002). Trust level does not significantly significantly impact this kind of participation, although the point estimate is negative. Aggregate demographic variables at municipality level are not individually significant, as well as politico-institutional factors. Nevertheless, our efficiency measure of school test scores has a negative point estimate. Some authors have studied participation in parental associations and other organizations with programmatic purposes. Their members are involved in common interest topics regarding public matters, and try to influence the distribution of public resources (Maloney et al. 2008; Davies and Falleti 2012). Although the latter aspect is not a good description of Chilean educational system, parents often organize to enhance school performance in several aspects.

Community Committees: In regards to participation in "Committee meetings to improve community" in Tables 3-4, we find evidence of significantly lower male participation intensity, as well as greater intensity for married individuals. The effect of having a life partner (but not married) is positive, significant, and larger than the one associated to married. Urbanity also increases participation intensity. Older individuals significantly significantlyparticipate with greater intensity although the life-cycle profile has hump-shaped pattern peaking at age 66.7. Trust in community does not increase participation at this particular dimension. Aggregate demographic variables at municipality level are not individually significant.

Some politico-institutional variables have an individually significant effect. Having a major of the *Renovación Nacional* party increases this sort of participation at 5% of significance. This may be explained by the fact that RN has have a relative greater decentralization with respect to other Chilean political parties (Joignant 2010). The percentage variation of test scores at municipal schools, has a significantly negative impact on community participation. A possible explanation is that major inefficiency motivates citizens to organize themselves in order to remedy neighborhood

problems, or to demand better public goods to the local or central government.

Professional Associations: Participation intensity in "professional, merchants, producers, and farmers associations" is significantly higher for urban individuals. The effect of age describes a significantly inverse-U shape profile peaking at age 43.4.. Education also shows a significant effect for most educated individuals, with a U-shape pattern with a lowest value around 7 years of schooling. Trust in the community people does not significantly affect the degree of social participation of this kind. Aggregate demographic variables at municipality level are not individually significant.

Most institutional factors and demographic municipality variables are not significant individually, except for SIMCE percentage variation. The negative significant effect suggests a similar interpretation we have for the community committee participation. Major inefficiency motivates citizen organization to either offset deficient public policies or to demand efficiency improvements. The unobserved factors behind professional participation are not significantly correlated to other participation categories.

Political Movements: Political participation in movements or political parties behave somewhat different from other social participation categories. Gender and marital status are not statistically significant. Catholicism affects negatively the participation intensity. Political participation shows an inverted U-shape profile in age, which peaks at age 46.4. The most remarkable difference with respect to other types of participation is the importance of community trust. The effect is very large, positive, statistically significant,and robust across specifications. Trusting in the community seems to be key for promoting political participation, but not necessarily for other types of participation linked to private life dimensions. The correlation between this type of participation and trust suggests that local political participation is an important source of SC. Education is relevant for political participation, especially for highly-educated citizens, since the profile has a U-shape with a minimum at 6 years of schooling.

Among institutional variables, the results show that the expenditures on social organizations have a significant impact on political participation index. This suggests that either that political participation is oriented to the distribution of public resources, or that organizations funded by municipalities promote political associations in fact. Another interesting result shows that a greater Herfindahl index (that is, larger political concentration) decreases political participation. Higher concentration could be interpreted as a larger cost of a competing with an incumbent major. On the other hand, a larger share of votes of the elected major in the last election increases the intensity of political participation. These patterns are consistent with larger political participation in groups supporting the incumbent major, but a larger offsetting negative effect of intensity political participation in major's opposition. In addition, a major of the Renovación Nacional (RN) Party or of

Socialist Party (PS) significantly decrease intensity of political participation. Since the most common situation is that only two candidates compete per municipality (one center-left (*Concertación*) and one center-right (*Alianza*)), RN and PS systematically negotiate with their respective allies to allow their candidates run for major in municipalities with low political participation.[19] Finally, unobserved factors behind political participation are significantly positively correlated with those spurring participation in professional associations.

Trust: The most important result in the trust equation is that the criminality victim works as a highly significant determinant of this variable, meaning that our instrument is sufficiently strong. The sign of this coefficient is negative, as expected because being a crime victim hurts individual's trust in the people of their communities. Applied econometricians often see this as a good sign that the mechanism of the instrument works as hypothesized (Murray 2006; Angrist and Pischke 2009).Interestingly, catholic seem to have a higher degree of trust. The effect of age shows a U-shape pattern, with its lowest value at age 25. Estimates show that education increases trust people with more than 6 years of schooling. In line with Campbell (2009), education may proxy the socioeconomic or educational status for a given individual.

Among institutional factors, the share of own revenue in total municipality revenue -as a measure of budget independence- increases the trust in community's people because greater autonomy can help local government to serve better their communities. In line with our results, Freitag (2006) argues that local government autonomy favor associative life and trust. Having a RN or PS major is also associated with greater levels of trust in the municipality. As in the previous subsection, an explanation for these facts is that RN and Socialist parties tend to allocate their best competitors in municipalities with higher levels of trust. A competing hypothesis is that those political parties have majors who advocate transparent and ethical practices causing higher trust in their municipalities. Joignant (2010) argues that both parties have a relatively decentralized organization. Finally, the estimation of hyperbolic arctangent[20] of the correlation coefficient shows that point estimates are positive for religious, parental, and community participation, but negative for professional and political categories. Only the first and last kinds show significant correlation at conventional significance levels. This evidence shows that, at least for religious and political categories, there is a substantial gain in estimating the joint model with a reduced form for the trust equation.

Transversal Issues: Although education is regarded as a strong factor associated with SC formation, particularly in relation to trust and tolerance (van Oorschot and Finsveen 2009;

[19]This arrangement is a natural response of the two largest coalitions since major elections are won by relative majority rule. Hence, if more than one candidate from one side runs for major, the chances to win for a coalition would be severely diminished.

[20]The function is $\arctan \rho = \frac{1}{2} \log \left(\frac{1+\rho}{1-\rho} \right)$ and monotonically maps the interval $[-1, 1]$ into the real line.

Borgonovi 2012), we find mixed empirical to support for that claim since only for professional associations participation intensity increases in educational level. While the importance for this category is expected, its non-significance for the rest is somewhat surprising. On the other hand, the evidence shows that through the indirect channel of higher trust, highly educated individuals increase their participation in political activities and decrease it in religious ones. Hence, values and norms for civic involvement, transmitted through formal education foster SC formation by direct and indirect mechanisms. While some advocate that an educated environment may strengthen the relationship between education and civic engagement (Lidström 2006; Jerit et al. 2006), average municipal level of education along with other average municipality features of individuals do not improve the explanatory power of the model by much.

The effects of gender has also attracted attention in the literature (Son and Lin 2008; Parks-Yancy et al. 2008). Different use of time for males and females is a frequent explanation for gender participation patterns. Usually, men participate more in the labor market, which are linked to professional and political activities. In contrast, women often take care of children education and family welfare. Religious activities, parental association in schools, neighborhood and community associations are places where they can express and strengthen this role. Since the growth of SIMCE scores in municipal schools matters for participation decisions, we show that public services provision may influence individual attitudes and personal behavioral patterns (Krishna 2007; Gundelach et al. 2010). Another explanation behind cross-national and sub-national differences for the quality of democracy outputs, civic engagement and participation is the level of consensus in the political system (Lijphart 1999; Freitag 2006). While majoritarian democracies favor straightforward decision-making process, consensus systems require more time and effort to make decisions due to the lower power concentration (Skelcher et al. 2011). Supporters of the latter argue that consensus institutions provide superior representation of the citizenry segments and public policies' performance, and therefore, incentive associative life. Our results partially support this view for political participation, given the negative effect of the Herfindahl index of political consensus.

5.3 Testing Hypothesis

To test whether the eclectic approaches to explain SC formation in the literature haveempirical support, we construct and estimate various additional models, some of which are nested into the general specification we discussed above. As an alternative, we also estimate a municipality fixed-effects model, to examine whether our conclusions remain robust in this general setting (although we cannot learn how municipal characteristics affect participation and trust). This Likelihood Ratio testing is summarized in Table 5. A large difference between two likelihoods shows that the least

general version is rejected in favor of the most general. In the upper subtable, we show that Social Effects of participation do have a significant impact even if we allow for Institutional-Political effects, municipal fixed effects, or none of them. The results are also robust to the introduction of trust as an endogenous regressor with an associated equation, as well as to the presence of arbitrary correlations or independence among equations (highest p-value is 3.7%).

Politico-institutional factors are significant to explain social participation. The result is robust to many different specifications: with or without Social interactions effects, trust or arbitrary correlations among error terms of multiple equations. Finally, joint test clearly reject joint non-significance of Social interaction effects, Politico-Institutional variables, and individual effects. Comparing the magnitude of the χ^2 tests, social effects have the lowest explanatory power compared to individual, Politico-Institutional variables, and individual effects.

In the lower subtable, we reject the null hypothesis of independence of equations' errors by a large margin under several different specifications. Thus, allowing cross-effects between multiple types of participation and trust substantially enhances the understanding of the phenomenon. This is evidence of a multidimensional and complex process of SC formation in Chile. Diverse factors and different kinds of participation are involved in the process and interrelated in non trivial ways.

6 Conclusions

The purpose of this study is to achieve a better understanding of the mechanisms behind SC formation. With a novel multi-equation empirical model, we acknowledge the rich set of connections among several aspects emphasized in the literature. We apply our approach to the Chilean data, highlighting the important institutional role of municipalities. Using a utility function approach, we construct a quite general model to assess the role of individual, social and institutional factors in decision making process in which people evaluate the costs and benefits of simultaneous participation in different instances of associative life. We build and estimate the model taking into consideration important, often overlooked, aspects of identification, endogeneity, ordinal nature of variables, and interrelated decisions. We show how to introduce and test several competing or complementary hypothesis on SC formation advocated in Political Science, Sociology and Economics.

Our first finding is that a particular form of SC formation, participation in social organizations is a multidimensional and heterogeneous phenomenon. Different kinds of associative life are influenced for distinct factors in different ways. We interpret that benefits and costs of different kinds of activities exhibit a substantial interpersonal variation due to both individual and environment factors. The most relevant variables determining participation choices are gender, age, marital

status, and religion. We find consistent patterns of life-cycle profiles of participation, except in the case of religious association, in which a cohort effect hypothesis cannot be ruled out.

Second, our estimates and formal statistical tests show that we cannot rule out the existence of effects in associative life of social interaction or peer's effect (Manski 1993; Durlauf 2002) and some political-institutional factors (Letki 2006; Freitag 2006), both separately and jointly. The results are also robust to a more general but less informative setup using municipality fixed effects. Moreover, the results show that political-institutional factors have effects on the probability of participation, principally in the participation categories of community and political organizations, and general trust. Among the most relevant factors, we find the expenditure in social organizations at the local government level, the amount of local subsidies, the Herfindahl index of political concentration (proxy for consensus democracy at the local level), and the change or test scores in municipal schools (proxy for local government efficiency). In addition, the political party of the major (National Renovation and Socialists parties) affects political participation and trust. These puzzling findings are compatible with different hypotheses we explained above. In terms of social effects, there is a modest, yet jointly significant evidence of participation externalities, even though there are no individually significant effects of municipal averages in the reported estimates.[21].

Third, we formally model the relationship between participation and trust, which is present all over the literature on Social Capital. There is a reverse causality issue in using one as a determinant of the other in standard statistical procedures. Hence, we try to uncover the causal effect of trust of participation using a victim crime experience as a "natural experiment" conditional on individual and municipality characteristics. The empirical strategy works well because the crime victim variable significantly reduces trust. However, the causal effect of trust is not homogeneous: while increases the political participation intensity, it decreases the religious one.

Fourth, we directly deal with the interrelated determination of different kinds of social behaviors, instead of usual approaches constructing indices through factor analysis or similar techniques. Prime examples gains achieved through this richer conceptual framework is that unobserved factors explaining one kind of participation and trust are useful to understand other categories. For instance, religious, parental associations, and community associations are positively correlated. The same occurs with political and professional participation intensities.

Finally, our investigation, merging several empirical and theoretical considerations in a multidimensional yet interpretable model, provides a deeper understanding of underlying mechanisms of SC formation. We hope that our work help systematize our knowledge and eases rigorously

[21] Alternative specifications in the online Appendix do show some significant results for average age, age-squared and urbanity

empirical testing of many theories on Social Capital formation.

Table 1: Categorical Variables Means by Subsample

	Religion Participation					Parental Assoc Participation				
Sample	Cat 1	Cat 2	Cat 3	Cat 4	N	Cat 1	Cat 2	Cat 3	Cat 4	N
year 2008	61.5	12.6	12.0	13.8	1518	63.9	6.5	27.3	2.3	1515
year 2010	58.6	10.9	12.8	17.7	1963	66.4	3.1	29.2	1.3	1963
female	53.9	12.2	14.8	19.1	2115	56.6	3.8	37.3	2.3	2113
male	69.0	10.8	8.9	11.3	1366	78.8	5.7	14.6	0.9	1365
age ≤ 24	73.7	9.9	7.4	9.0	434	80.5	3.0	15.4	1.1	436
age 25-34	66.4	11.4	10.3	12.0	643	49.3	6.8	40.6	3.3	645
age 35-44	58.7	11.8	11.0	18.5	610	40.3	6.5	51.1	2.1	613
age 45-54	56.2	12.0	15.2	16.6	699	58.2	5.5	34.1	2.2	697
age 55-64	54.3	12.3	14.1	19.3	538	80.7	3.7	14.4	1.1	535
age ≥ 65	52.8	12.0	15.6	19.6	557	93.8	0.7	5.4	0.0	552
Total	59.9	11.6	12.5	16.0	3481	65.3	4.6	28.4	1.7	3478

	Community Participation					Professional Assoc Participation				
Sample	Cat 1	Cat 2	Cat 3	Cat 4	N	Cat 1	Cat 2	Cat 3	Cat 4	N
year 2008	77.3	10.9	10.3	1.5	1517	92.3	4.3	2.7	0.7	1509
year 2010	80.6	7.4	11.1	0.9	1963	92.5	3.3	3.6	0.7	1963
female	77.6	9.3	11.9	1.2	2112	93.4	2.9	3.0	0.7	2108
male	81.7	8.4	9.0	1.0	1368	91.0	5.0	3.4	0.6	1364
age ≤ 24	89.4	5.3	4.4	0.9	435	95.4	2.3	1.8	0.5	435
age 25-34	83.5	7.2	8.4	0.9	643	91.7	4.2	2.7	1.4	641
age 35-44	76.4	8.2	14.1	1.3	610	90.1	4.3	5.1	0.5	607
age 45-54	76.5	11.6	11.2	0.7	698	92.3	3.7	3.6	0.4	697
age 55-64	74.0	11.5	12.6	1.9	538	92.2	3.9	3.2	0.7	536
age ≥ 65	77.7	8.8	12.4	1.1	556	93.9	3.4	2.3	0.4	556
Total	79.2	8.9	10.7	1.1	3480	92.4	3.7	3.2	0.7	3472

	Political Mov Participation					Common people trust				
Sample	Cat 1	Cat 2	Cat 3	Cat 4	N	Cat 1	Cat 2	Cat 3	Cat 4	N
year 2008	97.2	1.2	1.0	0.6	1510	10.5	28.8	39.8	20.9	1500
year 2010	96.5	1.4	1.8	0.2	1963	9.2	19.2	44.3	27.3	1915
female	97.2	1.2	1.4	0.2	2110	10.9	23.8	40.5	24.8	2069
male	96.3	1.5	1.5	0.7	1363	8.2	22.7	45.2	23.8	1346
age ≤ 24	97.5	0.7	1.4	0.5	435	10.3	29.7	44.0	15.9	427
age 25-34	96.9	1.7	1.1	0.3	643	9.4	22.8	49.0	18.7	635
age 35-44	95.7	1.6	2.0	0.7	608	10.8	24.1	41.2	23.9	602
age 45-54	96.3	1.3	2.2	0.3	697	10.2	26.1	41.2	22.5	677
age 55-64	97.4	1.1	1.1	0.4	534	9.1	20.7	42.5	27.7	527
age ≥ 65	97.7	1.3	0.9	0.2	556	9.0	17.6	35.8	37.7	547
Total	96.8	1.3	1.5	0.4	3473	9.8	23.4	42.3	24.5	3415

Table 2: Municipal variables

		Organizations per 1000 inhabitants							
		Sport Clubs	Mother Centers	Senior Centers	Parents Unions	Neighbors Unions	Community Orgs	Municipal Orgs	Total Orgs
2008	av	2.06	0.67	0.93	0.81	2.22	12.82	6.83	25.63
	sd	1.58	1.76	0.77	0.74	1.74	10.68	7.84	20.54
	N	317	317	317	316	317	317	317	316
2010	av	2.16	0.67	1.07	0.96	2.25	15.41	7.72	29.28
	sd	1.95	1.32	0.94	2.13	1.91	26.86	10.02	34.66
	N	331	331	331	330	331	329	331	328
Total	av	2.11	0.67	1.00	0.89	2.23	14.14	7.28	27.49
	sd	1.78	1.55	0.86	1.61	1.83	20.60	9.02	28.65
	N	648	648	648	646	648	646	648	644

		Municipal Expenditures per 1000 inhabitants				Independ	Demographic	Efficiency	
		Community Orgs	Volunteer Orgs	Part Paviment Program	Total Civic Orgs	% own Budget	Population Density	SIMCE score 4th grade	%chg SIMCE 4th grade
2008	av	5.1	2.1	3.8	11.1	26.6	854.4	480.6	0.011
	sd	8.6	5.7	12.5	16.8	17.6	2526.5	27.4	0.046
	N	345	345	345	345	340	325	339	338
2010	av	2.4	0.9	0.9	4.2	26.4	817.9	495.9	0.022
	sd	4.8	2.7	4.8	7.3	17.3	2440.9	27.0	0.044
	N	344	344	344	344	339	334	338	328
Total	av	3.8	1.5	2.4	7.6	26.5	835.9	488.2	0.016
	sd	7.1	4.5	9.6	13.4	17.4	2481.7	28.3	0.046
	N	689	689	689	689	679	659	677	666

		Political variables							
		Herfindahl major	UDI major	RN major	PDC major	PPD major	PRSD major	PS major	Voting share major
2008	av	0.443	0.148	0.110	0.287	0.099	0.035	0.130	0.523
	sd	0.089	0.355	0.314	0.453	0.298	0.183	0.337	0.109
	N	345	345	345	345	345	345	345	345
2010	av	0.444	0.168	0.159	0.171	0.101	0.029	0.087	0.515
	sd	0.092	0.375	0.367	0.377	0.302	0.168	0.282	0.111
	N	345	345	345	345	345	345	345	345
Total	av	0.444	0.158	0.135	0.229	0.100	0.032	0.109	0.519
	sd	0.090	0.365	0.342	0.420	0.300	0.176	0.311	0.110
	N	690	690	690	690	690	690	690	690

		Municipality Aggregate				
		Mun share male	Mun share married	Mun share partner	Mun avg age	Mun avg educ
2008	av	0.494	0.315	0.101	33.8	8.8
	sd	0.019	0.041	0.035	2.4	1.4
	N	335	335	335	335	335
2010	av	0.491	0.319	0.107	35.3	9.0
	sd	0.021	0.046	0.035	2.7	1.4
	N	334	334	334	334	334
Total	av	0.492	0.317	0.104	34.5	8.9
	sd	0.020	0.044	0.035	2.7	1.4
	N	669	669	669	669	669

Notes: (1) UDI = Unión Demócrata Independiente (Democratic Independent Union), RN = Renovación Nacional (National Renovation Party), PDC = Partido Demócrata Cristiano (Christian Democratic Party), PPD = Partido por la Democracia (Party for the Democracy), PRSD = Partido Radical Social Demcrata (Radical Social Democrat Party), PS = Partido Socialista (Socialist Party)

Table 3: Multivariate SLIML ordered probit model: Participation and Trust (Part I)

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
male	-0.39***	-0.68***	-0.18***	0.039	0.048	0.012
	(0.072)	(0.079)	(0.052)	(0.080)	(0.094)	(0.042)
married	0.16***	0.47***	0.13**	0.14*	-0.093	0.074
	(0.054)	(0.055)	(0.058)	(0.085)	(0.089)	(0.057)
partner	-0.10	0.44***	0.19*	0.069	0.076	0.071
	(0.086)	(0.094)	(0.10)	(0.12)	(0.16)	(0.079)
catholic	-0.15***	0.13**	0.069	-0.061	-0.29***	0.10**
	(0.053)	(0.062)	(0.062)	(0.076)	(0.096)	(0.042)
urban	0.075	-0.057	0.31**	0.38**	-0.23	0.17
	(0.091)	(0.087)	(0.14)	(0.18)	(0.22)	(0.11)
y08	-0.098	-0.060	0.029	0.22*	-0.17	-0.18*
	(0.096)	(0.074)	(0.11)	(0.12)	(0.15)	(0.093)
age	0.021**	0.12***	0.032***	0.033***	0.039**	-0.0088
	(0.0084)	(0.014)	(0.0088)	(0.012)	(0.018)	(0.0062)
age2	-9.5E-5	-1.6E-3***	-2.4E-4**	-3.8E-4***	-4.2E-4**	1.8E-4***
	(9.1E-5)	(1.7E-4)	(9.3E-5)	(1.3E-4)	(1.8E-4)	(6.6E-5)
educ	0.0042	-0.031	0.046	-0.10**	-0.045	-0.047**
	(0.030)	(0.032)	(0.033)	(0.049)	(0.056)	(0.022)
educ2	5.8E-4	1.3E-3	-1.9E-3	7.4E-3**	3.8E-3	4.2E-3***
	(1.6E-3)	(1.7E-3)	(1.9E-3)	(3.5E-3)	(3.1E-3)	(1.0E-3)
avg male	-2.97	0.15	-1.43	-2.12	2.17	-1.28
	(2.64)	(2.24)	(3.13)	(3.42)	(2.89)	(2.07)
avg married	2.25	-0.013	0.44	-0.037	-3.49	1.31
	(1.83)	(1.35)	(2.11)	(1.87)	(2.42)	(1.87)
avg partner	-0.96	-0.15	-1.17	2.84	-0.57	-0.26
	(2.29)	(1.66)	(2.55)	(2.28)	(3.08)	(2.09)
avg urban	-9.5E-4	-1.9E-3	-2.8E-3	4.9E-3	-4.8E-3	-5.4E-3
	(2.9E-3)	(3.1E-3)	(4.0E-3)	(5.2E-3)	(5.7E-3)	(3.4E-3)
avg age	0.00084	-0.029	0.15	-0.029	0.076	0.13
	(0.12)	(0.13)	(0.17)	(0.22)	(0.30)	(0.17)
avg age2	-5.2E-4	5.0E-4	-1.9E-3	8.4E-4	-7.8E-4	-1.6E-3
	(1.4E-3)	(1.6E-3)	(2.1E-3)	(2.6E-3)	(3.7E-3)	(2.0E-3)
avg educ	-0.13	-0.015	0.12	0.075	0.20	-0.27
	(0.24)	(0.27)	(0.30)	(0.33)	(0.35)	(0.22)
avg educ2	7.6E-3	2.4E-4	-8.7E-3	-5.3E-3	-1.6E-2	1.2E-2
	(1.1E-2)	(1.2E-2)	(1.4E-2)	(1.5E-2)	(1.6E-2)	(9.9E-3)
trust	-0.53***	-0.31	-0.30	0.37	0.58***	
	(0.19)	(0.20)	(0.26)	(0.52)	(0.21)	

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) *avg male* and similar variables with indicate the municipality average of the variable, (CASEN 2006 and 2009); (5) "crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

Table 4: Multivariate SLIML ordered probit model: Participation and Trust (Part II)

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
org supply	-0.0035	0.0022	0.0052	-0.0043	-0.0026	-0.0010
	(0.0034)	(0.0024)	(0.0040)	(0.0033)	(0.0059)	(0.0029)
exp supply	-2.61	-4.33	-7.01	1.25	17.3*	-0.99
	(6.05)	(5.48)	(8.04)	(7.19)	(9.26)	(5.25)
avg subs	11.1***	0.25	0.71	4.52	-10.9**	1.82
	(3.14)	(2.59)	(3.18)	(4.23)	(4.41)	(2.43)
% own revenue	0.28	0.24	0.017	-0.56	-0.14	0.50*
	(0.24)	(0.24)	(0.32)	(0.35)	(0.34)	(0.26)
pop dens	-3.1E-4	2.9E-3	-2.1E-2	-2.2E-2	-3.4E-3	-6.6E-4
	(9.9E-3)	(9.7E-3)	(1.3E-2)	(1.5E-2)	(1.5E-2)	(1.1E-2)
Herfindahl	0.17	-1.33	-1.81	0.0039	-3.01**	0.89
	(1.15)	(0.85)	(1.27)	(1.27)	(1.44)	(1.07)
UDI major	-0.10	-0.11	0.15	0.029	0.016	0.0013
	(0.10)	(0.091)	(0.11)	(0.12)	(0.12)	(0.12)
RN major	0.093	-0.033	0.28**	-0.045	-0.26*	0.26**
	(0.11)	(0.10)	(0.13)	(0.20)	(0.14)	(0.11)
PDC major	0.017	0.017	0.12	0.040	0.022	0.16
	(0.11)	(0.083)	(0.13)	(0.17)	(0.14)	(0.10)
PPD major	0.14	-0.20	0.25	-0.28	-0.22	0.25*
	(0.19)	(0.13)	(0.18)	(0.23)	(0.23)	(0.14)
PS major	0.035	-0.016	0.21	-0.22	-0.44***	0.39***
	(0.12)	(0.11)	(0.16)	(0.24)	(0.12)	(0.14)
% vote major	-0.57	1.00	1.31	0.43	2.77**	-0.86
	(0.89)	(0.72)	(1.07)	(1.09)	(1.18)	(0.82)
Chg SIMCE	-2.44*	-1.54	-3.68**	-3.00*	-2.77	-0.63
	(1.45)	(1.32)	(1.52)	(1.60)	(2.15)	(1.29)
crime vic						-0.22***
						(0.046)
			arctan Residual Correlations			
		resid 2	resid 3	resid 4	resid 5	resid 6
resid 1		0.31***	0.35***	0.0086	-0.16	0.57**
		(0.085)	(0.12)	(0.27)	(0.14)	(0.23)
resid 2			0.31***	0.11	0.14	0.24
			(0.058)	(0.17)	(0.12)	(0.21)
resid 3				0.35	0.25	0.36
				(0.32)	(0.20)	(0.28)
resid 4					0.79***	-0.36
					(0.28)	(0.57)
resid 5						-0.59**
						(0.29)
Obs			3061			
LL			-12405			

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) arctan ρ is the arctangent of the correlation coefficient between the errors of the participation and trust equations per category; (5) LL is the log likelihood of the model.

Table 5: Log Likelihood Ratio test for Null Hypotheses

Null Hypothesis	Testing SC formation channels											
	Trust & Indep			No Trust & Indep			Trust & Corr			No Trust & Corr		
	LR	dof	p-val	LR	dof	p-val	LR	dof	p-val	LR	dof	p-val
no Social Effects | Individual & Inst-Political	87.4	48	4.4E-04	63.9	40	9.6E-03	82.8	48	1.3E-03	59.7	40	2.3E-02
no Social Effects | Individual & no Inst-Political	108.3	48	1.5E-06	83.6	40	6.6E-05	98.5	48	2.4E-05	74.4	40	7.7E-04
no Social Effects | Individual & Muni Effects	81.7	47	1.3E-03	79.0	40	2.3E-04	65.7	47	3.7E-02	68.2	40	3.5E-03
no Inst-Political | Individual & Social Effects	173.6	78	3.1E-09	125.7	65	9.5E-06	165.4	78	3.1E-08	117.9	65	6.6E-05
no Inst-Political | Individual & no Social Effects	194.5	78	6.3E-12	145.3	65	4.4E-08	181.1	78	3.5E-10	132.6	65	1.5E-06
no Individual | no Social Effects & no Inst-Political	1402.8	60	9.7E-254	1272.0	45	4.9E-237	1392.0	60	1.7E-251	1264.1	45	2.3E-235
no Social Effects & Inst-Political | Individual	281.9	126	6.0E-14	209.2	105	6.5E-09	263.9	126	8.5E-12	192.3	105	4.3E-07
no Social Effects & Muni Effects | Individual	1172.0	551	6.0E-47	920.9	460	4.6E-33	1081.3	551	8.0E-37	838.3	460	2.0E-24
no Individual & Social Effects & Inst-Political	1684.7	186	1.9E-239	1481.3	150	1.7E-217	1656.0	186	6.7E-234	1456.4	150	1.2E-212
no Individual & Social Effects & Muni Effects	2574.8	611	1.8E-238	2193.0	505	2.3E-208	2473.3	611	9.6E-222	2102.5	505	2.6E-193

Null Hypothesis		Testing Equations' Independence						
		Indiv & SE & IP	Indiv & SE & ME	Indiv & SE	Indiv & ME	Indiv & IP	Indiv	none
Indep | Trust	LR	532.6	459.9	540.8	537.2	475.9	550.6	561.4
	dof	15	15	15	15	15	15	15
	p-val	7.0E-104	1.7E-88	1.3E-105	7.5E-105	7.0E-92	1.1E-107	5.7E-110
Indep | no Trust	LR	518.6	452.9	526.4	522.8	463.7	535.5	543.4
	dof	10	10	10	10	10	10	10
	p-val	4.6E-105	5.0E-91	1.0E-106	5.9E-106	2.4E-93	1.1E-108	2.3E-110

Notes: (1) Likelihood ratio test is $LR = 2(LL_u - LL_c)$ following a χ^2(dof) distribution, where dof is the number of degrees of freedom, i.e. number of restrictions imposed in the constrained model c with respect to the unconstrained model u. (2) p-values are written in scientific notation, i.e 5.2E-3 equals 5.2×10^{-3}.

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Online Appendix
Participation in Organizations, Trust, and Social Capital Formation in Chile

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Model Likelihood

In this section, we derive the likelihood of the model. Let us develop some notation. We denote (unobserved) participation intensity of the individual n in activity $j = 1, ..., J$ as $p^*_{j,n}$, and we assume it is explained by an index of exogenous variables w_n and an endogenous categorical variable (trust) denoted by q. In addition, the unobserved trust intensity q^* depends on the vector w_n and on a vector of instrumental exogenous variable z_n. All of these can be expressed by

$$p^*_{j,n} = \alpha_j w_n + \beta_j q_n + \epsilon^*_{j,n} \quad \forall j = 1, ..., J \tag{5}$$

$$q^*_n = \gamma w_n + \delta z_n + \epsilon^*_{J+1,n} \tag{6}$$

Allowing participation and trust to be simultaneously determined, the errors of the model follow a multivariate normal distribution, which is common for all $n = 1, ..., N$ individuals in the sample.

$$\epsilon = [\epsilon_{1,n} \quad ... \quad \epsilon_{J+1,n}] \sim \mathcal{N}\left(0_{1\times J}, \Sigma_{J\times J}\right)$$

with $\Sigma = \begin{bmatrix} 1 & \rho_{12} & ... & \rho_{1J} \\ \rho_{12} & 1 & ... & \rho_{2J} \\ ... & ... & ... & ... \\ \rho_{1J} & \rho_{2J} & ... & 1 \end{bmatrix}$.

A Cholesky decomposition of Σ gives us linear combinations of errors denoted $u = Q\epsilon$ such that $Q\Sigma Q' = I_{J+1}$, where I_{J+1} is an identity matrix of size $J + 1$ and Q is an upper triangular matrix.

Redefined errors u are mutually independent since $E[uu'] = E[Q\epsilon\epsilon'Q'] = E[Q\Sigma Q'] = I_{J+1}$. Hence, we can rewrite the equations (5) and (6) as

$$\begin{aligned}
p^*_{j,n} &= \alpha_j w_n + \beta_j q_n + u_{j,n} \quad \forall j = 1, 2, ..., J \\
q^*_n &= \gamma w_n + \delta z_n + u_{J+1,n} \\
\text{with } u_{1,n} &= \epsilon_{1,n} \\
u_{2,n} &= \epsilon_{1,n} + \lambda_{2,2}\epsilon_{2,n} \\
u_{3,n} &= \epsilon_{1,n} + \lambda_{3,2}\epsilon_{2,n} + \lambda_{3,3}\epsilon_{3,n} \\
&... \\
u_{J+1,n} &= \epsilon_{1,n} + \lambda_{J+1,2}\epsilon_{2,n} + ... + \lambda_{J+1,J}\epsilon_{J,n}
\end{aligned}$$

We observe K possible ordinal categories of participation (in our case $K = 4$) instead of the continuous intensities $p^*_{j,n}$ and $q^*_{j,n}$. Assuming Gaussian errors, the stochastic ordinal answer of participation in activity j of individual n denoted $A_{j,n}$ have realizations $k \in \{1, 2, ..., K\}$. A specific realization of ordinal response $A_{j,n} = k$ for participation category j by individual n occurs whenever the participation intensity is between the cuts or thresholds $c_{j,k-1}$ and $c_{j,k}$. Denoting $d_{j,k,n} \equiv \mathbb{I}[A_{j,n} = k]$, the probability of observing the individual n giving a particular answer k conditional on unobservable factors $\tilde{u} \equiv (u_{2,n}, ..., u_{J+1,n})$ is

$$\begin{aligned}
\mathcal{L}_{1,n}(\theta|\tilde{u}) &= \prod_{k=1}^{K} Pr\left(c_{1,k-1} < p^*_{j,n} < c_{j,k},\right)^{d_{1,k,n}} \\
&= \prod_{k=1}^{K} \left(\Phi\left(c_{1,k-1} - \alpha_1 x_n - \beta_1 q_n\right) - \Phi\left(c_{1,k} - \alpha_1 x_n - \beta_1 q_n\right)\right)^{d_{1,k,n}}
\end{aligned}$$

For categories 2 to J, we have

$$\begin{aligned}
\mathcal{L}_{2,n}(\theta|\tilde{u}) &= \prod_{k=1}^{K} \left(\Phi\left(c_{2,k-1} - \alpha_2 x_n - \beta_2 q_n - \lambda_{2,2} u_{2,n}\right)\right. \\
&\quad \left.-\Phi\left(c_{2,k} - \alpha_2 x_n - \beta_2 q_n - \lambda_{2,2} u_{2,n}\right)\right)^{d_{2,n,k}} \\
&... \\
\mathcal{L}_{J,n}(\theta|\tilde{u}) &= \prod_{k=1}^{K} \left(\Phi\left(c_{J,k-1} - \alpha_J x_n - \beta_J q_n - \sum_{i=2}^{J} \lambda_{J,i} u_{i,n}\right)\right. \\
&\quad \left.-\Phi\left(c_{J,k} - \alpha_J x_n - \beta_J q_n - \sum_{i=2}^{J} \lambda_{J,i} u_{i,n}\right)\right)^{d_{J,n,k}}
\end{aligned}$$

Finally, for category $J+1$ we have

$$\mathcal{L}_{J+1,n}(\theta|\tilde{u}) = \prod_{k=1}^{K} \left(\Phi \left(c_{J+1,k-1} - \gamma_{J+1} x_n - \delta_{J+1} z_n - \sum_{i=2}^{J+1} \lambda_{J+1,i} u_{i,n} \right) \right.$$
$$\left. - \Phi \left(c_{J+1,k} - \gamma_{J+1} x_n - \delta_{J+1} z_n - \sum_{i=2}^{J+1} \lambda_{J+1,i} u_{i,n} \right) \right)^{d_{J+1,n,k}}$$

where $\Phi(\cdot)$ is the normal cumulative distribution function, and $\theta = (\alpha, \beta, \gamma, \delta, \lambda)$. Thresholds $c_{j,0} = -\infty$, $c_{j,K} = +\infty$ for all $j = 1, ..., J+1$. Since the components of $\tilde{u}$ are mutually independent, the joint probability of observing a profile of ordinal responses of discrete responses, conditional on $\tilde{u}$ is

$$\mathcal{L}_n(\theta|\tilde{u}) = \prod_{j=1}^{J+1} R_{j,n}(\theta|\tilde{u})$$

Since the last likelihood is conditional of unobserved $\tilde{u}$, we need to integrate out those errors

$$\mathcal{L}_n(\theta) = \int \prod_{j=1}^{J+1} R_{j,n}(\theta|\tilde{u}) d\Phi_J(\tilde{u})$$

where $\Phi_J(\tilde{u})$ is a J-dimensional multivariate normal distribution with independent vector components. The integral is J-dimensional, too.

For greater details, the reader may consult Train (2009) or Roodman (2009).

Table 1: Multivariate SLIML ordered probit model: Participation and Trust, Individual variables with Social Effects and Municipal Fixed Effects

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
male	-0.46***	-0.70***	-0.20***	0.061	0.042	0.024
	(0.056)	(0.066)	(0.051)	(0.084)	(0.099)	(0.042)
married	0.13*	0.47***	0.11*	0.22***	-0.12	0.094*
	(0.071)	(0.066)	(0.061)	(0.079)	(0.088)	(0.055)
partner	-0.20**	0.43***	0.18	0.11	0.034	0.081
	(0.080)	(0.099)	(0.11)	(0.12)	(0.16)	(0.082)
catholic	-0.22***	0.093	0.026	0.026	-0.28**	0.083**
	(0.054)	(0.063)	(0.069)	(0.077)	(0.12)	(0.042)
urban	-0.069	-0.19*	0.38**	0.56***	-0.30	0.35**
	(0.17)	(0.11)	(0.19)	(0.18)	(0.27)	(0.14)
y08	-0.11	0.056	0.20*	-0.015	-0.17	-0.11
	(0.16)	(0.092)	(0.11)	(0.16)	(0.23)	(0.13)
age	0.025***	0.13***	0.036***	0.021	0.034**	-0.014**
	(0.0090)	(0.015)	(0.0094)	(0.013)	(0.017)	(0.0063)
age2	-1.7E-4	-1.8E-3***	-3.0E-4***	-2.2E-4	-3.8E-4**	2.2E-4***
	(1.1E-4)	(1.8E-4)	(9.7E-5)	(1.4E-4)	(1.8E-4)	(6.7E-5)
educ	0.042	-0.018	0.071**	-0.14***	-0.0044	-0.055**
	(0.031)	(0.032)	(0.030)	(0.033)	(0.051)	(0.022)
educ2	-2.4E-3	-4.0E-6	-3.6E-3**	1.0E-2***	1.5E-3	4.2E-3***
	(1.9E-3)	(1.5E-3)	(1.5E-3)	(1.7E-3)	(3.0E-3)	(1.0E-3)
avg male	-0.66	3.65	3.39	-4.03	14.8**	-4.62
	(4.47)	(2.72)	(3.85)	(6.08)	(6.70)	(3.15)
avg married	-2.06	-2.33	-2.82	-1.13	-6.44	4.02
	(3.12)	(2.95)	(3.39)	(4.29)	(6.50)	(3.32)
avg partner	6.92**	2.01	-3.26	-2.47	-7.30	-1.61
	(3.17)	(2.57)	(3.52)	(4.03)	(6.07)	(2.85)
avg urban	2.4E-2	-1.2E-2	7.2E-2	1.8E-1**	-4.5E-2	3.1E-2***
	(1.9E-2)	(8.2E-3)	(5.5E-2)	(8.8E-2)	(6.4E-2)	(7.1E-3)
avg age	0.040	0.18	0.75**	0.68*	0.85	0.028
	(0.27)	(0.22)	(0.36)	(0.35)	(0.53)	(0.24)
avg age2	-8.6E-4	-1.8E-3	-8.3E-3*	-7.4E-3*	-1.0E-2	7.6E-5
	(3.3E-3)	(2.7E-3)	(4.4E-3)	(4.2E-3)	(6.4E-3)	(3.0E-3)
avg educ	0.49	-0.52	0.46	0.64	1.37	0.14
	(0.63)	(0.59)	(0.65)	(0.80)	(1.42)	(0.63)
avg educ2	-3.0E-2	2.8E-2	-1.6E-2	-4.0E-2	-8.9E-2	-6.0E-3
	(2.9E-2)	(2.7E-2)	(2.8E-2)	(4.0E-2)	(6.7E-2)	(2.7E-2)
trust	0.30	0.21	0.20	-0.39	0.78***	
	(0.47)	(0.19)	(0.18)	(0.29)	(0.26)	
			Residual Correlations			
		resid 2	resid 3	resid 4	resid 5	resid 6
resid 1		0.27***	0.24***	0.12	0.23	-0.26
		(0.097)	(0.067)	(0.14)	(0.30)	(0.46)
resid 2			0.27***	0.11	0.39***	-0.24
			(0.057)	(0.11)	(0.13)	(0.18)
resid 3				0.46***	0.47***	-0.13
				(0.11)	(0.17)	(0.17)
resid 4					0.19	0.37
					(0.19)	(0.29)
resid 5						-0.93*
						(0.55)
Obs			3061			
LL			-11996			

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) *avg male* and similar variables with indicate the municipality average of the variable, (CASEN 2006 and 2009); (5) "crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

Table 2: Multivariate SLIML ordered probit model: Participation and Trust, Individual variables with Social Effects

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
male	-0.39***	-0.66***	-0.18***	0.041	0.035	0.021
	(0.064)	(0.079)	(0.053)	(0.082)	(0.089)	(0.042)
married	0.16***	0.46***	0.13**	0.13	-0.080	0.082
	(0.055)	(0.054)	(0.061)	(0.089)	(0.094)	(0.057)
partner	-0.097	0.45***	0.20*	0.079	0.088	0.072
	(0.084)	(0.095)	(0.10)	(0.12)	(0.16)	(0.079)
catholic	-0.17***	0.13**	0.050	-0.062	-0.26***	0.100**
	(0.051)	(0.059)	(0.064)	(0.081)	(0.095)	(0.043)
urban	0.072	-0.063	0.29**	0.39**	-0.25	0.15
	(0.091)	(0.089)	(0.14)	(0.19)	(0.20)	(0.11)
y08	-0.22***	-0.061	0.029	0.15	0.093	-0.17**
	(0.082)	(0.061)	(0.091)	(0.11)	(0.11)	(0.074)
age	0.021**	0.12***	0.033***	0.033***	0.037**	-0.0094
	(0.0083)	(0.014)	(0.0086)	(0.012)	(0.018)	(0.0062)
age2	-1.0E-4	-1.6E-3***	-2.5E-4***	-3.7E-4***	-4.0E-4**	1.8E-4***
	(9.0E-5)	(1.7E-4)	(9.1E-5)	(1.4E-4)	(1.7E-4)	(6.7E-5)
educ	0.0073	-0.035	0.045	-0.10**	-0.038	-0.047**
	(0.029)	(0.031)	(0.032)	(0.048)	(0.053)	(0.021)
educ2	3.9E-4	1.6E-3	-1.9E-3	7.5E-3**	3.6E-3	4.1E-3***
	(1.6E-3)	(1.6E-3)	(1.8E-3)	(3.6E-3)	(2.9E-3)	(1.0E-3)
avg male	-2.57	1.16	-1.28	-3.49	1.40	0.25
	(2.46)	(1.86)	(2.96)	(3.65)	(2.79)	(2.46)
avg married	2.82	0.13	0.0010	1.73	-2.85	0.85
	(1.94)	(1.37)	(2.18)	(1.98)	(2.45)	(1.84)
avg partner	-0.64	-0.35	-2.81	3.10	-0.17	-0.49
	(2.62)	(1.79)	(2.63)	(2.38)	(3.48)	(2.00)
avg urban	-1.1E-3	-1.8E-3	-4.5E-3	2.0E-3	-2.9E-3	-3.4E-3
	(2.8E-3)	(2.8E-3)	(4.0E-3)	(5.0E-3)	(5.1E-3)	(3.3E-3)
avg age	-0.16	-0.11	0.041	-0.054	0.042	0.056
	(0.13)	(0.12)	(0.18)	(0.22)	(0.32)	(0.16)
avg age2	1.4E-3	1.5E-3	-6.7E-4	9.4E-4	-3.9E-4	-6.9E-4
	(1.5E-3)	(1.5E-3)	(2.1E-3)	(2.5E-3)	(3.8E-3)	(1.8E-3)
avg educ	-0.32	0.056	0.12	-0.11	0.25	-0.32
	(0.21)	(0.23)	(0.29)	(0.38)	(0.37)	(0.21)
avg educ2	1.3E-2	-2.9E-3	-9.3E-3	1.5E-3	-1.3E-2	1.5E-2
	(9.5E-3)	(1.0E-2)	(1.3E-2)	(1.6E-2)	(1.7E-2)	(9.2E-3)
trust	-0.47***	-0.36**	-0.25	0.33	0.57***	
	(0.16)	(0.17)	(0.25)	(0.57)	(0.22)	
crime vic						-0.23***
						(0.042)
			Residual Correlations			
		resid 2	resid 3	resid 4	resid 5	resid 6
resid 1		0.32***	0.33***	0.044	-0.14	0.50***
		(0.069)	(0.11)	(0.26)	(0.13)	(0.19)
resid 2			0.31***	0.10	0.11	0.29*
			(0.055)	(0.18)	(0.13)	(0.17)
resid 3				0.37	0.27	0.32
				(0.31)	(0.18)	(0.27)
resid 4					0.78**	-0.33
					(0.32)	(0.61)
resid 5						-0.60*
						(0.31)
Obs			3061			
LL			-12487			

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) *avg male* and similar variables with indicate the municipality average of the variable, (CASEN 2006 and 2009); (5) "crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

Table 3: Multivariate SLIML ordered probit model: Participation and Trust, Individual variables with Institutional-Political factors

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
male	-0.40***	-0.68***	-0.18***	0.038	0.051	0.014
	(0.071)	(0.080)	(0.053)	(0.079)	(0.089)	(0.041)
married	0.16***	0.47***	0.14**	0.14*	-0.091	0.077
	(0.054)	(0.054)	(0.058)	(0.083)	(0.089)	(0.056)
partner	-0.12	0.44***	0.17*	0.072	0.11	0.056
	(0.086)	(0.094)	(0.10)	(0.11)	(0.15)	(0.078)
catholic	-0.17***	0.13**	0.066	-0.051	-0.25***	0.10**
	(0.055)	(0.062)	(0.064)	(0.077)	(0.093)	(0.043)
urban	0.052	0.0013	0.34***	0.32	-0.16	0.29***
	(0.10)	(0.086)	(0.13)	(0.22)	(0.19)	(0.091)
y08	-0.092	-0.057	0.087	0.13	0.047	-0.16**
	(0.076)	(0.062)	(0.11)	(0.11)	(0.10)	(0.073)
age	0.022**	0.12***	0.032***	0.032***	0.036**	-0.0087
	(0.0085)	(0.014)	(0.0090)	(0.012)	(0.017)	(0.0061)
age2	-1.0E-4	-1.6E-3***	-2.4E-4**	-3.7E-4***	-4.0E-4**	1.8E-4***
	(9.1E-5)	(1.8E-4)	(9.6E-5)	(1.3E-4)	(1.7E-4)	(6.6E-5)
educ	-0.0025	-0.033	0.048	-0.10**	-0.031	-0.055**
	(0.030)	(0.032)	(0.035)	(0.047)	(0.054)	(0.022)
educ2	9.4E-4	1.5E-3	-2.0E-3	7.5E-3**	2.7E-3	4.6E-3***
	(1.6E-3)	(1.7E-3)	(2.0E-3)	(3.4E-3)	(2.9E-3)	(1.0E-3)
trust	-0.50***	-0.33	-0.29	0.29	0.61***	
	(0.19)	(0.20)	(0.28)	(0.52)	(0.22)	
org supply	-0.0034	0.0026	0.0056	-0.0047	-0.0017	0.000063
	(0.0042)	(0.0023)	(0.0040)	(0.0033)	(0.0056)	(0.0028)
exp supply	0.94	-3.24	-11.1*	-0.51	0.82	4.20
	(6.96)	(5.36)	(6.15)	(5.63)	(6.15)	(4.83)
avg subs	8.04***	1.90	1.51	5.94*	-2.23	3.30
	(2.73)	(1.91)	(2.60)	(3.59)	(3.15)	(2.01)
% own revenue	-0.034	0.24	-0.25	-0.27	-0.14	0.21
	(0.20)	(0.20)	(0.26)	(0.29)	(0.30)	(0.20)
pop dens	-1.3E-2	3.7E-3	-2.9E-2**	-1.1E-2	-6.5E-3	-8.4E-3
	(8.5E-3)	(8.6E-3)	(1.1E-2)	(1.5E-2)	(1.4E-2)	(1.0E-2)
Herfindahl	0.30	-1.34	-1.73	0.26	-3.35**	1.24
	(1.18)	(0.84)	(1.27)	(1.38)	(1.62)	(1.04)
UDI major	-0.087	-0.099	0.19*	0.0048	0.039	0.046
	(0.12)	(0.082)	(0.10)	(0.13)	(0.14)	(0.12)
RN major	0.12	-0.025	0.26*	-0.057	-0.30*	0.28**
	(0.12)	(0.10)	(0.14)	(0.22)	(0.16)	(0.11)
PDC major	0.015	0.021	0.13	0.038	0.021	0.17
	(0.12)	(0.081)	(0.12)	(0.19)	(0.14)	(0.11)
PPD major	0.055	-0.19*	0.23	-0.19	-0.15	0.19
	(0.20)	(0.11)	(0.18)	(0.21)	(0.24)	(0.13)
PS major	-0.022	-0.0021	0.20	-0.21	-0.36***	0.37**
	(0.13)	(0.11)	(0.16)	(0.24)	(0.13)	(0.15)
% vote major	-0.40	0.96	1.25	-0.027	2.62**	-1.01
	(0.91)	(0.71)	(1.04)	(1.21)	(1.33)	(0.81)
Chg SIMCE	-2.86*	-1.72	-3.72**	-2.90	-1.59	-1.15
	(1.51)	(1.38)	(1.45)	(1.93)	(2.16)	(1.30)
crime vic						-0.22***
						(0.041)

Residual Correlations

	resid 2	resid 3	resid 4	resid 5	resid 6
resid 1	0.31***	0.34***	0.043	-0.17	0.53**
	(0.080)	(0.12)	(0.25)	(0.14)	(0.23)
resid 2		0.32***	0.12	0.12	0.27
		(0.060)	(0.16)	(0.14)	(0.21)
resid 3			0.38	0.24	0.36
			(0.30)	(0.20)	(0.29)
resid 4				0.75**	-0.29
				(0.33)	(0.54)
resid 5					-0.64**
					(0.32)
Obs	3061				
LL	-12446				

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4)"crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

Table 4: Multivariate SLIML ordered probit model: Participation and Trust, Individual variables with Municipal Fixed Effects

	(1) religion	(2) parental	(3) community	(4) professional	(5) political	(6) trust
male	-0.41***	-0.70***	-0.19***	0.041	0.047	0.016
	(0.073)	(0.084)	(0.062)	(0.089)	(0.098)	(0.041)
married	0.17***	0.50***	0.13**	0.17	-0.11	0.087
	(0.057)	(0.058)	(0.064)	(0.11)	(0.096)	(0.056)
partner	-0.13	0.45***	0.19*	0.063	0.058	0.064
	(0.089)	(0.098)	(0.11)	(0.14)	(0.17)	(0.082)
catholic	-0.16***	0.13**	0.059	-0.018	-0.31***	0.074*
	(0.054)	(0.064)	(0.069)	(0.096)	(0.12)	(0.043)
urban	0.13	-0.057	0.47**	0.36	-0.28	0.33**
	(0.11)	(0.12)	(0.20)	(0.33)	(0.30)	(0.14)
y08	-0.19**	-0.056	0.073	0.048	0.11	-0.17***
	(0.077)	(0.062)	(0.11)	(0.15)	(0.10)	(0.065)
age	0.018**	0.13***	0.032***	0.028*	0.039**	-0.013**
	(0.0087)	(0.014)	(0.011)	(0.015)	(0.018)	(0.0065)
age2	-5.8E-5	-1.7E-3***	-2.3E-4*	-3.4E-4*	-4.3E-4**	2.2E-4***
	(9.2E-5)	(1.8E-4)	(1.2E-4)	(1.9E-4)	(1.8E-4)	(6.8E-5)
educ	0.0098	-0.038	0.057	-0.099	-0.0089	-0.053**
	(0.031)	(0.033)	(0.043)	(0.061)	(0.060)	(0.023)
educ2	1.5E-4	1.6E-3	-2.4E-3	7.6E-3*	1.8E-3	4.2E-3***
	(1.7E-3)	(1.7E-3)	(2.6E-3)	(4.6E-3)	(3.5E-3)	(1.1E-3)
trust	-0.46**	-0.27	-0.23	0.27	0.68**	
	(0.20)	(0.25)	(0.45)	(0.84)	(0.27)	
crime vic						-0.22***
						(0.051)
			Residual Correlations			
		resid 2	resid 3	resid 4	resid 5	resid 6
resid 1		0.28***	0.30*	0.092	-0.19	0.48**
		(0.092)	(0.17)	(0.37)	(0.16)	(0.23)
resid 2			0.29***	0.14	0.12	0.21
			(0.081)	(0.23)	(0.14)	(0.24)
resid 3				0.44	0.25	0.28
				(0.45)	(0.25)	(0.44)
resid 4					0.70	-0.26
					(0.59)	(0.83)
resid 5						-0.76*
						(0.46)
Obs			3061			
LL			-12029			

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) "crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

Table 5: Multivariate SLIML ordered probit model: Participation and Trust, Individual variables with Municipal Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	religion	parental	community	professional	political	trust
male	-0.40***	-0.66***	-0.18***	0.037	0.045	0.020
	(0.064)	(0.078)	(0.056)	(0.079)	(0.089)	(0.041)
married	0.15***	0.46***	0.13**	0.12	-0.090	0.079
	(0.056)	(0.053)	(0.060)	(0.090)	(0.095)	(0.056)
partner	-0.12	0.45***	0.18*	0.064	0.11	0.062
	(0.085)	(0.095)	(0.11)	(0.11)	(0.15)	(0.080)
catholic	-0.19***	0.13**	0.038	-0.070	-0.24**	0.10**
	(0.054)	(0.059)	(0.068)	(0.082)	(0.10)	(0.045)
urban	0.27***	0.042	0.51***	0.47	-0.20	0.36***
	(0.087)	(0.082)	(0.12)	(0.34)	(0.16)	(0.083)
y08	-0.16**	-0.067	0.082	0.093	0.073	-0.15**
	(0.070)	(0.051)	(0.079)	(0.10)	(0.098)	(0.060)
age	0.022***	0.12***	0.033***	0.033***	0.038**	-0.0093
	(0.0086)	(0.014)	(0.0088)	(0.012)	(0.017)	(0.0062)
age2	-1.2E-4	-1.6E-3***	-2.5E-4***	-3.7E-4***	-4.1E-4**	1.8E-4***
	(9.4E-5)	(1.7E-4)	(9.3E-5)	(1.4E-4)	(1.7E-4)	(6.7E-5)
educ	-0.0049	-0.037	0.041	-0.099*	-0.031	-0.060***
	(0.029)	(0.030)	(0.035)	(0.060)	(0.055)	(0.022)
educ2	7.6E-4	1.6E-3	-2.1E-3	7.1E-3	2.9E-3	4.8E-3***
	(1.6E-3)	(1.5E-3)	(2.0E-3)	(4.3E-3)	(3.0E-3)	(9.8E-4)
trust	-0.44**	-0.37**	-0.28	0.36	0.57**	
	(0.19)	(0.16)	(0.26)	(0.61)	(0.23)	
crime vic						-0.23***
						(0.042)
			Residual Correlations			
		resid 2	resid 3	resid 4	resid 5	resid 6
resid 1		0.32***	0.34***	0.045	-0.12	0.46**
		(0.066)	(0.098)	(0.26)	(0.14)	(0.21)
resid 2			0.32***	0.092	0.11	0.31*
			(0.058)	(0.20)	(0.13)	(0.17)
resid 3				0.35	0.26	0.35
				(0.35)	(0.18)	(0.27)
resid 4					0.79**	-0.36
					(0.33)	(0.67)
resid 5						-0.60*
						(0.33)
Obs	3061					
LL	-12537					

Notes: (1) Coefficients and standard errors are multiplied by 100; (2) Robust municipality-clustered standard errors in parentheses; (3) $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$; (4) "crime vic" is a dummy variable that takes value 1 if the interviewed person has been a crime victim during the last 12 months, and 0 otherwise; (6) LL is the log likelihood of the model.

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