Social Capital and Contributions in a Public Goods Experiment

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Empirical studies from across the social and behavioral sciences find that social capital is associated with various measures of well-being, including economic growth (Stephen Knack and Phillip Keefer 1997) and mortality (Ichiro Kawachi, Bruce P. Kennedy and Kimberly Lochner 1997). However, such evidence is plagued by concerns that survey-based measures of trust and participation (i.e., social capital) are not meaningful; in particular, recent experimental evidence from trust games conducted by Edward L. Glaeser, David I. Laibson, Jose A. Scheinkman and Christine L. Soutter (2001) calls into question the efficacy of the most prevalent measures of social capital employed in the literature.

Glaeser, et al. find that attitudinal measures of trust of the sort used in the General Social Survey (e.g., agreement with "most people can be trusted") are not significantly related to trusting behavior, nor are common measures of participation (e.g., membership in voluntary groups). Because such measures are standard, this is a potentially strong indictment of much of the existing empirical literature on the causes and consequences of social capital. However, it is not apparent whether these findings generalize to public goods experiments.[1]

Elsewhere we present unique evidence of the importance of group cohesion in an experimental analysis of contributions in a public goods game. In Anderson, Mellor and Milyo (2003), we vary fixed payments in an experimental analysis of a public goods game; we find that the treatment effect of inequality reduces contributions by all members of the affected group, regardless of their relative standing within the fixed payment distribution. This is novel evidence

for the proposition that inequality, a determinant of group cohesion, undermines the ability of groups to cooperate. We analyze data from that same experiment here, but now incorporate information from surveys completed by the experimental subjects.

Below, we demonstrate that the most frequently employed measures of social capital are significant determinants of contribution levels in a canonical public goods experiment. This finding, together with our earlier work on inequality and group cohesion in public goods games (Anderson, Mellor and Milyo 2003), provides novel support for the contention that social capital influences well-being through its effect on public goods provision (Robert Putnam 2000).

I. Methods

The public goods experiment used in this study is a variation of the game first introduced by Marwell and Ames (1979). Each individual in a group of N members is given a number of tokens to divide between a private account and a group account (i.e. the public good). The private account earns a return of P per token to the individual. The sum of all contributions made to the group account, denoted G, is multiplied by some amount M and shared equally by all members of the group. Hence, each group member earns $(M/N)*G$ from the group account. In the standard design of this game, the return to the group account is a linear function of the total number of tokens in that account. If $P > M/N$, it is individually optimal to put all tokens in the private account. Additionally, if $P < (M/N)*G$, it is socially optimal for all subjects to put all tokens in the public account, making this a prisoner's dilemma game. We adopt this standard linear framework, with P=1, M=2 and N=8, so that the return for allocating one token to the public account is \$0.25 (versus \$1 for the private account). We also vary the fixed payments to subjects for the purpose of our analysis of the effects of inequality on group cohesion.

A total of 48 students were recruited from undergraduate classes at the College of William and Mary to participate in 6 sessions of the experiment. Each session consisted of 30 decision-making periods divided into three blocks of ten rounds; the blocks differed only in the "fixed payment" distribution (equal or unequal). Additional details on the experimental design, including the instructions given to subjects are described in Anderson et al.

After the experiment, we administered a survey with 42 questions covering demographic characteristics, political attitudes and three sets of social capital measures.[2] The first set is composed of attitudinal trust measures of the sort used in the GSS; subjects are asked if they agree that "most people can be trusted," "most people try to be fair," "most people try to be helpful," "you can't trust strangers anymore," and "I am trustworthy." The second set is composed of behavioral trust measures suggested by Glaeser et al., including whether subjects leave their doors purposely unlocked, loan money to friends or strangers, have been a crime victim, or lie to different categories of persons (parents, friends, acquaintances, etc.). The latter question is transformed into an index ranging from 0 to 1; all other trust measures are binary indicators. The final set of social capital questions measures participation in voluntary activities, including hours spent volunteering, membership in voluntary groups, attendance at religious services, political volunteering, voting and the subject's number of friends. Means for all of our social capital variables are listed in Tables 1 and 2.

In order to measure the association between social capital measures and group account contributions holding all else equal, we use data from the experiment and survey to conduct multivariate analysis. This also allows us to test whether the effects of group inequality we previously observed are explained by differences in individual social capital attributes within

groups. We let contributions in each round of the experiment be a linear function of indicators for round, reset effects at the start of each block, fixed payment amount, inequality treatment, and the order of such treatments across blocks. We then estimate the marginal effect of social capital by introducing one social capital measure at a time to this base specification.

Because individual contributions to the group account are bound between 0 and 10, we estimate these models using a two-limit Tobit with random subject effects. We report the means and marginal effects of each social capital measure, where the marginal effect is calculated as the tobit coefficient multiplied by the probability that the dependent variable is uncensored.

II. Results

The mean contribution for all rounds of the experiment was 2.75 tokens, with a standard deviation of 2.85 tokens. Contributions declined over the ten rounds within each block, and also declined across blocks (albeit with a positive reset effect). Controlling for these factors, we find a strong depressing effect on contributions from inequality in the fixed payments given to subjects (Anderson, Mellor and Milyo 2003). These patterns are robust to the inclusion of controls for subject demographics, political ideology and social capital. We now make a closer examination of the relationship between individual social capital measures and contributions to the public good in this experiment.

The results for the trust measures of social capital are shown in Table 1. All of the attitudinal measures of trust are statistically significant, although the "helpful" and "trustworthy" measures are negatively associated with contributions (the latter result is also reported by Glaeser, et al.). Trust in strangers has the largest marginal effect (equivalent to two-thirds of the mean contribution), while the most common attitudinal measure of trust ("most people can be

trusted") has a more modest impact (equivalent to just under 30% of the mean contribution). Despite these mixed results, the key finding here is that the most frequently employed measure of trust is significantly related to contributions, which should alleviate the serious concerns about this measure raised by Glaeser, et al. and others.

The behavioral trust measures in Table 1 are also all significant (or marginally so); Glaeser, et al. argue that such measures are more meaningful and reliable than those derived from vague attitudinal questions about trust. However, in contrast to Glaeser, et al., we find that subjects who report loaning money to friends or leaving doors unlocked contribute significantly less to the public good. Therefore, while some measures of trusting behavior are strongly and positively associated with contributions, the same is also true for attitudinal measures. Consequently, we find no reason to prefer behavioral measures to the more common attitudinal measures of trust.

In Table 2, we report the estimated marginal effects from measures of participation in voluntary associations; except for volunteering in a political campaign, these measures have much more muted effects. Hours volunteering is only weakly associated with increased contributions, while number of friends is negative and significant. Otherwise, the other participation measures are positively and significantly associated with contributions, including the most common survey-based measure of participation, membership in voluntary groups. This finding also contradicts the results in Glaeser, et al, although those authors devote much less attention to the efficacy of participation-based measures of social capital vis-a-vis trust-based measures.

III. Discussion

This is the first examination of the efficacy of common survey-based measures of social capital measures for predicting contributions in a public goods experiment. We find that the most familiar measures of individual social capital, agreement with the statement that "most people can be trusted" and membership in voluntary associations, are strongly associated with higher contributions in the public goods experiment. However, not all measures of social capital are significant or have the expected sign. Nevertheless, we do not find any reason to prefer behavioral measures of trust to attitudinal measures.

These findings contradict those in Glaeser, et al. One reason may be the choice of a public goods game rather than a trust game, although there is no theoretical rationale to expect the effect of social capital to differ across these experimental settings. Another important difference is that Glaeser et al. chose to pair individuals that were already friendly or acquainted with one another in their trust games, while our subjects were paired anonymously. It may be that existing relationships among subjects swamp the observable effects of individual social capital traits; in light of this, we will next examine the efficacy of social capital in trust games with anonymous pairings of subjects.

Finally, including controls for individual social capital does not explain the effect of inequality on group cooperation that we have previously observed. Consequently, we find evidence to support the conceptualization of social capital as both a group attribute and as an individual attribute. Future research on social capital should further investigate the relative importance of both group and individual attributes.

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1. Jeffrey Carpenter, Amira G. Daniere and Lois M. Takahashi (2003) examine the relationship between social capital and cooperation in public goods experiments and obtain decidedly mixed results. However, they allow subjects to communicate disapproval to free-riders and, more importantly, employ unconventional measures of trust and membership. Therefore, this work does not address the question of the efficacy of typical social capital measures.

2. Following Carpenter et al., we administer our survey after the experiment; in contrast, Glaeser et al. administer their survey prior to the experiment. Future work should test whether the sequencing of experiment and survey matter.

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Table 1: Survey responses regarding trust and tokens contributed in a public goods experiment

	Mean	Marginal Effect
Attitudinal measures of trust		
Most people can be trusted	.313	0.697 (2.63)
Most people try to be fair	.333	0.588 (3.36)
Most people try to be helpful	.313	-0.918 (3.71)
You can't trust strangers anymore	.521	-1.791 (5.96)
I am trustworthy	.917	-1.036 (4.21)
Behavioral measures of trust		
Often leave door unlocked	.438	-1.200 (5.65)
Ever loan money to strangers	.188	0.935 (3.91)
Often loan money to friends	.646	-0.789 (1.77)
Ever victim of a crime	.313	-1.607 (4.48)
Never lie to parents, friends, etc. (index)	.596	0.866 (3.89)

Marginal effects are calculated as the Tobit coefficient of the explanatory variable multiplied by the probability that the dependent variable is uncensored (evaluated at the mean of the explanatory variables); separate models are estimated for each trust measure.

Table 2: Voluntary participation and tokens contributed in a public goods experiment

Participation measures	Mean	Marginal Effect
Hours volunteering in an average week	5.598	0.163 (1.62)
Hours volunteering in the last week	1.792	.033 (0.88)
Number of voluntary groups	2.479	0.210 (5.35)
Attend religious services (times per month)	1.77	0.330 (6.47)
Ever volunteer for a political campaign	.85	1.894 (7.96)
Voted in 2002	.521	0.642 (2.29)
Number of friends	6.304	-0.077 (2.71)

Marginal effects are calculated as the Tobit coefficient of the explanatory variable multiplied by the probability that the dependent variable is uncensored (evaluated at the mean of the explanatory variables); separate models are estimated for each trust measure.