

The Role of Community and Individuals in the Formation of Social Capital

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Abstract Because social capital shapes many desirable socioeconomic outcomes, we ask what incentives drive private investments in social capital. We estimate the association between private investments in social capital (outcome variable) and the following explanatory variables: (a) individual-level variables from an optimal investment model, (b) spillovers from group social capital, (c) village income inequality, and (d) market openness. We draw on information from Tsimane', a native Amazonian society of foragers and farmers in Bolivia, and equate social capital with gifts, help given, and communal labor offered by the household. Age bore an inverted U-shaped and income bore a positive association with social capital, but geographic mobility, wealth, and schooling bore no significant association with social capital. We found strong group-level associations even after instrumenting social capital; the association probably stems from strong kinship ties which tend to blur the line between the group and the individual. Village measures of social capital were positively and significantly associated with private investments in social

capital. We found some evidence that village income inequality and market openness were negatively associated with private investments in social capital.

Key words Social capital · generosity · pro-social behavior · Bolivia · Tsimane'

Introduction

The last decade has seen a slew of studies addressing how social capital—trust, safety nets, membership in local organizations, and other expressions of pro-social behavior that enable people to act collectively (Coleman, 1990; Ostrom, 2000)—shapes many desirable socioeconomic outcomes, such as democracy (Brehm and Rahn, 1997; Putnam *et al.*, 1993), health (Kawachi and Berkman, 2000; Kawachi *et al.*, 1997), rural poverty (Narayan and Prichett, 1999; Woolcock and Narayan, 2000), school achievement (Goldin and Katz, 1999; Israel *et al.*, 2001), and economic growth (Dasgupta and Serageldin, 2000; Knack and Keefer, 1997). If social capital enhances so many desirable socioeconomic outcomes, then what determines social capital? Researchers have offered several explanations. Some trace back the formation of social capital to historical particularities. Best exemplified by Putnam's work in Italy and the United States, they argue that social capital accumulates at a geologic tempo and that it takes forms specific to a place and culture. For example, in Italy social capital accumulated faster in the north than in the south owing to civic norms and to social structures that in some regions went as far back as the twelfth century (Putnam *et al.*, 1993). In the United States, Putnam (2000) says, social capital measured through membership in formal and

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informal associations or clubs declined during the twentieth century owing to a breakdown in civic mindedness between generations reared before and after WWII, and to an increase in the amount of television people watch.

The approach, exemplified by the work of Glaeser and his colleagues (Glaeser *et al.*, 2000, 2002), sees the accumulation of social capital as an individual phenomenon (Brehm and Rahn, 1997). Much like the accumulation of physical or human capital, people invest in social capital because it presumably yields tangible private returns on market (e.g., income, wages) and on non-market (e.g., health, social status) outcomes.

Another two approaches—one from social epidemiology and economics and one from anthropology—focus not on the formation of social capital, but on its dissolution. In several influential articles and books, Wilkinson (1996, 1997a, 1997b) and others suggest that in industrial nations income inequality erodes social capital, thereby hurting health, particularly among the poor (Egolf *et al.*, 1992; Kawachi and Kennedy, 1997, 1999, 2002; Kawachi *et al.*, 1997, 1999; Macinko and Starfield, 2001). Economists have echoed the finding of social epidemiologists that income inequality undermines social capital. Results of international comparisons and historical analyses of the United States suggest a negative association between participation in civic organizations and income inequality (Alesina and La Ferrara, 2000; Costa and Kahn, 2001). Knack and Keefer (1997) found that people in nations with narrower income disparities had more trust in other people and followed civic norms more closely than people in nations with wider income disparities. Bowles and Gintis (2002) review results of experimental and observational studies and found that socioeconomic and racial heterogeneity—proxies of income inequality—increased transaction costs, making it harder for people to agree on the provision of public goods.

The approach best exemplified by cultural anthropologists stresses the adverse consequences of market openness on traditional forms of social capital, such as reciprocity and mutual help (Escobar, 1996; Hymes, 1972; Ortner, 1984). For example, some have argued that increased exposure to the market economy makes people work harder and erodes leisure time spent with others, thus weakening the strength of social bonds in the community (Gross *et al.*, 1979).

Here we test the last three hypotheses. Drawing on information from a small-scale, highly autarkic, pre-industrial society of foragers and farmers in the Bolivian Amazon, the Tsimane', we test whether individual incentives stressed by Glaeser and his colleagues drive private investments in generosity, and the results suggest that they generally do not. We then focus on two topics that have received less attention. First, we estimate the strength of the

association between the social capital of the group and private decisions to invest in social capital. We find a positive association. After instrumenting social capital, we find that social capital embodied in village-wide gift giving, communal labor, and labor help link positively with private investments in social capital or generosity. Second, we explore whether market openness and income inequality harm social capital, and we find that market openness is not associated with private expressions of generosity, but that income inequality is. As income inequality in the village grows, private generosity declines.

As anthropologists and economists have taught, in small-scale, pre-industrial societies people invest in social capital to avoid envy, mistrust, and gossip from neighbors, often kin (Abraham and Platteau, 2001; Henrich and Boyd, 2001). Some of the investment may stem from altruism (Boyd *et al.*, 2003), and come with uncertain pay-offs (Wilk, 1993). We find that among the Tsimane', the fear of gossip ranked third—after illness and insufficient food—as a cause of sadness. Tsimane' give gifts and offer help to avoid envy, mistrust, and gossip, and, in so doing, strengthen the bonds of the group. Gifts and help form the cultural glue that binds together people in small-scale rural societies.

One might read this side of the ledger as evidence of private incentives to invest in social capital. However, the ethnographic record also suggests that in small-scale, pre-industrial societies, the growth of inequality triggers generosity to undue excess. An orthodox ethnographic reading of the *potlach* of the Northwest coast, the *cargo* system of Mesoamerica, and the ritual slaughter of pigs in the highlands of Papua New Guinea would explain generosity as a form of private redistribution to alleviate socioeconomic inequality. The parvenus of the community invest in social capital by giving away part of their riches to the underlings to reduce the stresses of inequality, such as envy, mistrust, witchcraft, and gossip.

Social Capital Defined

Coleman (1988) and Bourdieu (1977) were among the first scholars to introduce the concept of social capital, but it gained prominence with the writings of Putnam cited earlier. Owing to its recent formulation, it should not be surprising to find that researchers still disagree on how to define or measure social capital (Durlauf, 2002; Durlauf and Fafchamps, 2005; Foley and Edwards, 1999; Kawachi and Berkman, 2000; Lynch *et al.*, 2000; Narayan and Cassidy, 2001; Portes, 1998; Warde and Tampubolon, 2002). People have equated social capital with social networks, cultural norms, and various types of pro-social

behaviors. We take a pragmatic approach and define social capital so that we can compare our results with those of other researchers.

When used as a dependent variable, we equate social capital with gift giving and with communal work or with work done for others by a household. We focus on behavior rather than on attitudes or on norms because behavior is a more objective and reliable measure of social capital than norms (Glaeser *et al.*, 2000). We highlight two forms of social capital—gift giving and communal work or labor help given to other households—because they represent the main expressions of generosity in small-scale, pre-industrial societies (Godoy, 2001).

When used as an explanatory variable, we equate social capital with the average expression of generosity in the village excluding the participant's household, and use instrumental variables for the estimation. We focus on the village when computing indices of social capital for the group because most daily interactions take place in the village in Amazonian and in other pre-industrial rural societies. The details differ because we worked in different cultures, but our definition and measure of social capital as an explanatory variable resembles the definition and measure of social capital used by Glaeser *et al.* (2002).

What Drives the Formation and Breakdown of Social Capital?

We start by reviewing the work of Glaeser and his colleagues (2002) because they explicitly try to answer the question of what drives private incentives to invest in social capital. Drawing on a standard optimal investment model, they make and test the following six hypotheses:

- (1) social capital first rises and then falls with age, (2) social capital declines with expected mobility, (3) social capital rises in occupations with greater returns to social skills, (4) social capital is higher among homeowners, (5) social connections fall sharply with physical distance, (6) people who invest in human capital also invest in social capital (Glaeser *et al.*, 2002, p. 437).

To test the hypotheses they used questions about membership in organizations from the General Social Survey (1972–1978) of the USA. They find support for most of their predictions, but they also find that schooling bore no statistically significant association with social capital. They use instrumental variables for peer-group participation to test whether group-level effects influence private investments in social capital, and they found that—regardless of how they define a peer group—group levels

of social capital bore a weak association with private investments in social capital. They conclude:

The apparent absence of a social multiplier reinforces the broad themes of this paper: individual incentives, not group membership, drive social capital accumulation decisions (Glaeser *et al.*, 2002, p. F456).

The conclusion that private incentives overshadow group membership in private investments in social capital needs refinement when applied to small-scale, pre-industrial societies. In modern economies group-level effects play a modest role in the accumulation of social capital probably because households break up and move often, and because one cannot see the investments or consumption of one's neighbors (Heffetz, 2004), immured as they are in their homes. Nevertheless, in simpler, smaller, pre-industrial rural societies kinship permeates social life. Because of scale, repeated interactions, preferential marriage rules, and kinship links, people in small-scale societies often know who does what in the village most of the time (Godoy *et al.*, 2006). People in small-scale societies form part of kin-based clusters, clusters form part of lineages, lineages of moieties, and moieties of still larger segments of consanguineal and affinal ties that make it difficult to point to where the private ends and where the group begins. The web makes it easier to find out and to know what the rest of the group does. With fuzzy social boundaries and with daily repeated interactions between neighbors, one should expect stronger effects between what the rest of the community, kin, or peer group does and what the individual does (Abraham and Platteau, 2001). The strength of group effects on private investments in social capital will depend on the type of society and economy: group-level effects should wane as economies and societies grow in complexity.

The conclusion that groups influence individual decisions at low levels of income meshes with the thinking of institutional economists (Chwe, 2001; Greif, 1993, 1994; Norton, 1990). Institutional economists view culture as a way of solving coordination problems in small-scale, low-income societies where people have frequent face-to-face interactions. Owing to low income, such societies cannot afford a fine-grained division of labor, achieve economies of scale in production, or create formal institutions to solve coordination problems, prevent free riders, and achieve coordination. As a result, rules or informal institutions emerge to encourage trust and solidarity and constrain individual behavior to favor the interests of the group. Forced redistribution of riches, preferential systems of marriage, sharing and gift-giving, and institutionalized honor, envy, and shame, form part of the cultural tapestry that helps keep society together. As economic development

unfolds, people exit the arrangements because they have other options, as discussed later. Our point is that the influence of the group's social capital on private decisions to invest in social capital are likely to be more direct, simple, marked, and readily visible in small-scale, highly autarkic economies than in larger, more complex economies. We next explore two other paths by which group-level processes might affect private investments in social capital in simpler economies.

The first group-level process is market openness. Social capital will likely weaken as relatively autarkic economies open to trade with the rest of the world. Traditional forms of social capital likely protect consumption, health, and nutritional status in small-scale pre-industrial societies (Johnson and Earle, 2000; Knauff, 1991), but weaken once people gain access to market economies (Besley, 1995). Increases in income, consumption, and in wealth from trade allow people to reduce private investments in group membership since they can find other, often more inexpensive forms of self insurance (Carter, 1997; Fafchamps, 1992). For example, Morduch (1995) and Rosenzweig (1988) find that although poor people in rural south India could have reduced risks through more gifts and exchanges, they showed a growing preference to use credit to cope with the aftermaths of misfortunes.

The second group-level process affecting private investments in social capital is community income inequality. Studies by social epidemiologists and economists discussed earlier show a negative association between income inequality and social capital. Income inequality proxies for social stratification and for socioeconomic and ethnic heterogeneity, which makes it harder for people to agree on the provision of public goods and to cooperate in solving common problems (Deaton, 2001; Knack and Keefer, 1997; Platteau, 1994; Putnam *et al.*, 1993).

We now turn to an empirical test of the hypotheses. In particular, we test the hypotheses from the optimal investment model of Glaeser *et al.* (2002,) summarized earlier, except for the third hypothesis that “social capital rises in occupations with greater returns to social skills”. We exclude their third hypothesis because we find little variance in occupations; most of the people in our sample forage and farm for a living. We pay particular attention to how group-level effects link with private investments in social capital and to how village income inequality and village openness to markets link with private investments in social capital.

Sample

Data for this article come from a long-term biological and cultural study of the Tsimane', a foraging and farming

society of native Amazonians in the department of Beni at the foothills of the Andes in Bolivia. We draw on two waves of surveys collected from the same participants during February–April of 2001 and 2002. The baseline survey of 2001 contained 37 villages and 387 households. One village refused to participate in 2001, so we replaced it with another village of similar socioeconomic characteristics. Villages differed in market openness and in distance to the closest market town. On average, 39% of the monetary income in a village came from market transactions in cash with the outside world (std dev=0.17). In each village we selected at random an average of eight households for the survey (std dev=3.25). In each household, we selected at random either the female or the male head of the household to answer survey questions. For questions about the entire household, we allowed other household members present to contribute to the answer provided by the household head who was answering the questions.

Between 2001 and 2002 the sample of households shrank by 18%, from 378 to 311. Households and people left the sample because they moved to another village to visit relatives or to hunt, or because they moved to logging camps, cattle ranches, or to towns in search of employment. Nine participants died during the study. We tried to find individuals when they returned to the village or when they moved to another village, but we did not try to find people who left Tsimane' territory. Elsewhere we show that those who dropped out did not differ from those who remained in the sample in observed socioeconomic or demographic variables (Godoy *et al.*, 2005) so it is possible that attrition might not bias the estimates we present.

The most recent Bolivian census (2002) puts the Tsimane' population at about 8,000 people. If we use the 2001 survey to estimate the average household size (mean=6.02; std dev=2.60), the Tsimane' population would contain 1,329 households. Since we surveyed 378 households in 2001, we covered 28.44% of all Tsimane' households.

Definition and Measure of Variables

Social Capital

The individual expression of social capital is the dependent variable, and the average household social capital in the village (excluding the household supplying the information) is the endogenous explanatory variable. Social capital consists of gifts given, labor help offered, and communal work done by adults in the household.

To collect information on gift giving we asked how often the household had given gifts of fish, meat, rice, manioc,

plantains, maize, home-brewed drinks or *chicha* (typically made from manioc), cooked food, and medicines to kin or to other Tsimane' inside or outside the village during the week before the day of the interview. Most of these goods are food staples for the Tsimane'. To elicit information on labor help or on communal labor, we asked how often they had done unpaid work for or communal work with others during the week before the day of the interview. Questions on labor help centered on hunting, fishing, farming, curing, errands done for others, and on miscellaneous forms of labor help. For each type of gift and for each type of labor help or communal work done by the household (dependent variable) we estimated the village average excluding the household providing the answer, and used the household-specific village average as an explanatory variable.

Instrumental Variable for Village Social Capital

We follow Glaeser and his colleagues in using the village-average age, schooling, and income, excluding the participant's household as instrumental variables for social capital (Glaeser *et al.*, 2002). We do so not because we think the instruments are valid—they are not—but to make our results comparable to those of Glaeser and his colleagues. The average social capital in the village (excluding the household supplying the information) is unlikely to be truly exogenous if the social capital of the individual and the average social capital of the village both reflect a third unmeasured attribute (Durlauf and Fafchamps, 2005). For instance, some villages might enjoy a greater abundance of natural resources or greater agricultural productivity, which would make it easier for all villagers—not just the target villager being interviewed—to display generosity.

Individual-level Explanatory Variables

We selected the individual-level covariates from the optimal investment model of Glaeser and colleagues discussed earlier. The covariates include: (a) age and age squared (hypothesis 1), (b) years of continuous residence in the village, a proxy for mobility (hypothesis 2), (c) net worth, a proxy for homeownership (hypothesis 4), (d) population size of the village, a proxy for physical distance between people (hypothesis 5), and (e) maximum formal school attainment (hypothesis 6). Control variables include the year of the survey, income, and sex. For reasons noted earlier we do not test the third hypothesis of Glaeser *et al.*

The variable age contains measurement error. Over half of the participants (55.32%) said they were uncertain of their age. The variable for continuous residence duration in the village contains less measurement error; only 9.64% of

participants said they could not remember well how long they had lived in the village.

We estimated net worth by subtracting the value of liabilities from the value of wealth. We equate wealth with the value of a basket composed of 19 physical assets that captured the range of assets likely owned by a household. We limit liabilities to the financial debts owed by the household to the rest of the world at the time of the interview. We divided household net worth by the number of people in the household or by the adult-male equivalents and found that both measures correlated highly ($r=0.98$). We opted to express wealth per person rather than per adult-male equivalent because of measurement error with the age variable and, by extension, with the adult-male equivalent figures.

We estimated village population size by counting the total number of households in the village and by multiplying the number of households by the average household size for the village from the survey. Household income included the sum of the value of the following three items for the 2 weeks before the day of the interview: (a) cash earned by adults from wage labor and from the sale of farm and forest goods, (b) goods received through barter, and (c) consumption of maize, rice, and manioc. We divided household income by either the number of people or by the male-adult equivalents in the household and found moderately high correlation ($r=0.63$); we opted to use income per person rather than income per adult-male equivalent because of measurement error with the age variable discussed earlier.

Income Inequality and Market Openness

To measure village income inequality we estimate village-level Gini coefficients. We do the core analysis using Gini coefficients of income, but we also present analysis with Gini coefficients for the consumption of specific crops. We do so because it might be the perceived inequality of specific goods that triggers generosity, but only generosity in the goods marked by high inequality in consumption. For instance, if maize production and consumption differ widely across households, then households with abundant maize might be more likely to share maize, but not necessarily share other crops with a more equitable distribution. We constructed the variable on market openness by dividing the amount of total monetary earnings in the village by the total income of the village.

We transformed income, village population size, residence duration in the village, and wealth into logarithms to facilitate the interpretation of results. Dependent variables were censored at zero, as the last rows in Tables II and III show, so we left dependent variables in raw values (rather than in logarithms) and used lowered-censored Tobit

regressions to avoid reducing the sample size. Table I contains definition and summary statistics of the variables used in the regressions.

Three topics deserve mention before turning to the ethnographic and econometric evidence. First, since dependent variables were censored at zero, we might have selectivity bias. We did not find a convincing instrument to correct for selectivity. Second, although we used instrumental variables to correct for the endogeneity of village social capital, the instruments might still produced flawed parameter estimates for the reasons discussed earlier. Last, we control for other village-level variables to parse out the net effect of village social capital; the other village-level variables include measures of village income inequality and market openness, but their inclusion does not guarantee that the parameter estimate of village social capital does not pick up the effect of other forms of unobserved heterogeneity in the village. For all these

reasons, the relations between private and village social capital that we present stand for associations.

The Setting and the People

The Tsimane' have been in contact with Westerners since colonial times, but they started to come into more frequent and prolonged contact in the 1970s, when the government built roads crossing the Tsimane' territory and loggers, ranchers, highland colonists, and merchants entered the Tsimane' territory more systematically (Chicchón, 1992; Ellis, 1996; Reyes-García, 2001). The Tsimane' are linked with the regional and with the national economy through the sale of forest goods and rice, the principal farm crop (Vadez *et al.*, 2004). They sell to merchants who come to their villages, but they also take goods to nearby towns to sell. They sell timber to logging firms and work as

Table I Definition and Summary Statistics of Variables Used in Regression Analysis

Name	Definition	Obs	Mean	Std dev
Dependent: Frequency of gifts given last week to Tsimane' outside household				
Chicha	Home brewed beer (<i>chicha</i>)	559	4.161	5.428
Food	Cooked food	559	2.372	4.164
Maize	Maize	559	0.550	1.258
Rice	Rice	559	0.751	1.464
Manioc	Manioc	559	0.610	1.343
Fish	Fish	559	0.751	1.618
Meat	Meat	559	0.838	1.377
Seeds	Seed	559	0.218	0.806
Medicines	Medicine	559	0.237	0.862
Plantain	Plantain	559	0.957	1.697
Dependent: Communal labor and help given last week to Tsimane' outside household				
Hunt	Frequency of communal hunt	559	0.608	1.409
Fishing	Frequency of communal fishing	559	0.559	1.925
Farm	Frequency of communal farm work	559	0.665	1.759
Cure	Frequency of help curing	559	0.127	0.521
Buy	Frequency of buying for others	559	0.166	0.507
Work	Frequency of miscellaneous labor help	559	0.558	1.345
Explanatory: Personal and household level				
Age	Age of participant in years; in regression square term, Age ² , also entered	562	34.297	12.608
Sex	Sex of participant; 1=male, 0=female	562	0.693	0.461
Residence*	Village residence duration of subject in years	558	19.982	14.692
Income*	Income/person in last 2 weeks (in <i>bolivianos</i>). Income=cash+value of goods received in barter+value of maize, rice, and manioc consumption	559	50.753	108.315
Education	Maximum schooling of participant	554	1.517	2.198
Wealth*	Net worth (value of 19 physical assets minus debts outstanding); <i>bolivianos</i> per person	559	417.240	407.362
Explanatory: Village level				
Population*	No. of households in village*average household size	72	109.879	69.819
Gini-income	Village Gini coefficient of household income/person	72	0.336	0.141
Openness	Cash income as % of total village income; total village income=cash+value of goods received in barter+consumption of maize, rice, and manioc	72	0.399	0.172

Note. Variables with asterisk entered as logarithms in regressions. 1 US dollar \approx 6.31 *bolivianos* during 2001–2002.

unskilled laborers for cattle ranchers, logging firms, and for colonist farmers who have moved into or next to their territory. Despite contact with Westerners, the Tsimane' have low incomes and are highly autarkic. Mean annual personal income from cash earnings and from the imputed value of farm and forest consumption is US\$332, a third of the average income in Bolivia (\$US980/person). Goods bought in the market accounted for only 2.68% of the total value of household consumption.

At first sight the Tsimane' resemble an egalitarian society. Like other native Amazonians, the Tsimane' have a preferential system of cross-cousin marriage (a man marries his mother's brother's daughter), which creates a tight web of relatives linked by descent and marriage. Households visit each other often within and between villages to enjoy each other's company, or to exchange goods and information (Ellis, 1996). An earlier survey in 2000 with 509 participants in 58 villages showed that only 10% of adults lived in their village of birth, hinting at the prevalence of movement.

Like other native Amazonian populations, the Tsimane' routinely share the ubiquitous home-brewed drink called *chicha*, typically made from manioc, but also from plantains or maize. Any Tsimane' can walk into a household serving *chicha* and expect to be served. In the smaller villages, people cook in open courtyards and shout when the meal is ready so all can join in communal eating. Successful hunters share game with others. In an earlier (1999–2000) study over five consecutive quarters done in two villages, we found that 11% of all goods entering households from morning until dusk on days chosen at random came as gifts or as transfers from friends or relatives; those goods accounted for 6.70% of the total value of household consumption. Tsimane' work in groups to set up traps to fish with plant poison; people in the fishing expedition take the fish they catch with their own nets (Pérez, 2001). In the 1999–2000 panel study, we found that group fishing accounted for about a quarter of all fishing events. Communal work prevails in the construction and in the maintenance of schools, in hunting expeditions, in the cleaning of public places, and in preparations for village festivities. In the more isolated villages, people work together at the more arduous tasks, such as felling large trees at the start of the farming cycle, but only for subsistence crops, not for cash crops.

As in other small-scale, pre-industrial societies, among the Tsimane' gift giving, communal labor, and labor help permeate daily interactions. Information from the two waves of panel data used for this article suggest that the share of households that made gifts during the week before the day of the interview were as follows: 71% of household gave home-brewed drinks, 58% cooked food, 45% plantains, 42% meat, 37% rice, 32% fish, 31% manioc, 28% maize, and 12% gave medicines and seeds. During the

week before the day of the interview, 22–26% of households helped others in chores, or engaged in communal hunting, fishing, miscellaneous work, and farming, 13% of households did errands for others, and 8% offered medical help. Only 7.5% of households did not make any gifts, 39.0% of households did not do any communal work or offer any labor help during the week before the day of the interview, and only 4.45% of households did not either make any gifts or offer any help. The figures suggest that Tsimane' practice extensive reciprocity.

But offsetting public expressions of generosity we also found evidence of accumulation and economic inequalities. The presence or lure of public schools, the territorial circumscription from the expansion into the Tsimane' territory of loggers, cattle ranchers, and colonist farmers (Godoy *et al.*, 1998), and the debt peonage into which some Tsimane' have fallen with outside merchants—create incentives to move less and to accumulate more material possessions. With a more sedentary lifestyle the possibilities for accumulating wealth rise. Even without the presence of markets, one finds a strong ethos of economic independence among households, reflecting the fact that most of the diet comes from farm and forest goods produced or extracted by each household, rather than from goods produced by the village or by groups larger than the household. People in villages closer to towns build walls to enclose their homes and even put fences around their courtyards. To guard their material possessions, some Tsimane' put locks on their doors when they leave the village (Byron, 2003). Even in meals one finds stinginess. Although one finds commensal meals in smaller villages, with people from the same household or hamlet literally eating from a common pot, people do not go out of their way to invite others to share in their meals. Tsimane' often turn their backs to others when they eat (Ellis, 1996), and people in the more modern villages or in villages more exposed to Westerners complain that neighbors do not share meat and so violate expectations of proper social norms. The practice of eating from a common pot gives way to the practice of eating from individual dishes. In the panel study over five quarters done in 1999–2000 we investigated how households had coped with unforeseen income shocks (e.g., crop loss), and found that only 5% of the sample received help from kin or neighbors after a misfortune. Though reciprocity and gift giving permeate Tsimane' society, prudential generosity does not gain salience after an individual suffers personal misfortune.

The stingy side of the Tsimane' also comes across in some of their myths we have been collecting. In mythical times, ancestral spirits owned many of today's staples and refused to share them with humans. Humans had to steal some of those crops, many of which at present form the core of Tsimane' subsistence.

Results

Tables II and III contain the regression results with household measures of social capital as dependent variables. In Table II we use gifts given and in Table III we use labor help or participation in communal labor as dependent variables. Recall that we define village social capital in two different ways so they match each of the outcomes. In Table II the row “Social capital: Gift” stands for the amount of the gift under the column heading given out by the rest of the community excluding the household of the participant; for instance, in the cell where the row “Social capital: Gift” and the column “Chicha” intersect one would find the regression coefficient for the frequency of home-brewed drinks given out by the rest of the village excluding the participant’s household gifts of *chicha*.

Individual Incentives

Among individual-level variables, only age bore the effect predicted by the optimal investment model, but only when using gifts as a dependent variable. Gifts and age bore an inverted U-shaped relation that was statistically significant at the 90% confidence level or higher in most of the regressions (Table II). Since the variable age contained random measurement errors, the true relation is stronger than our estimates suggest. The age at which gift giving peaked varied by commodity, but it typically hovered at 40 years of age, about the same age at which membership in organizations peaks in the United States (Glaeser *et al.*, 2002, p. F448).

Besides age, the only other individual-level explanatory variable associated with individual social capital was income. The coefficient of income was positive and

Table II Instrumental-variable Tobit Regressions: Correlates of Gift Giving Last Week ($n=542$)

Explanatory variables:	Dependent variables—gifts given of:				
	Chicha	Food	Maize	Rice	Manioc
Social capital: gift	0.647 (0.453)	1.373** (0.628)	1.773*** (0.616)	1.694*** (0.500)	0.863 (0.609)
Age	0.197* (0.119)	0.188 (0.122)	0.174*** (0.070)	0.069 (0.058)	0.227*** (0.063)
Age ²	-0.001 (0.001)	-0.002* (0.001)	-0.001** (0.0008)	-0.0004 (0.0006)	-0.002*** (0.0007)
Population	1.099 (0.855)	-0.107 (0.591)	-0.281 (0.427)	0.263 (0.364)	-0.075 (0.386)
Residence	-0.011 (0.277)	0.061 (0.278)	-0.164 (0.150)	-0.330** (0.141)	-0.049 (0.147)
Wealth	0.156 (0.400)	0.313 (0.405)	0.095 (0.218)	0.348* (0.197)	-0.017 (0.206)
Income	1.199*** (0.324)	0.556* (0.314)	0.782*** (0.195)	0.692*** (0.168)	1.036*** (0.186)
Education	-0.212 (0.155)	0.070 (0.147)	-0.091 (0.088)	-0.068 (0.077)	-0.131 (0.080)
Openness	-1.858 (2.051)	-0.361 (2.081)	0.409 (1.329)	-1.693* (1.057)	0.739 (1.237)
Gini	-2.207 (2.849)	-0.338 (2.793)	0.625 (1.280)	0.846 (1.183)	1.698 (1.249)
Year	-0.167 (0.608)	0.307 (0.868)	0.035 (0.324)	-0.003 (0.292)	-0.034 (0.303)
Male	-0.755 (0.654)	-0.045 (0.654)	0.108 (0.367)	-0.095 (0.352)	-0.052 (0.382)
Test age & age ² : χ^2 & ($p > \chi^2$)	6.42 (0.040)	2.61 (0.271)	6.59 (0.037)	5.95 (0.051)	16.98 (0.0002)
Observations: Left censored	150	229	385	336	369
	Fish	Meat	Seeds	Medicine	Plantain
Social capital: gift	3.214*** (0.932)	1.471*** (0.444)	2.146 (2.532)	6.504** (2.543)	1.031** (0.475)
Age	0.057 (0.091)	0.091* (0.052)	0.347*** (0.130)	0.212 (0.131)	0.032 (0.058)
Age ²	-0.0005 (0.001)	-0.001* (0.0006)	-0.003** (0.001)	-0.002 (0.001)	-0.0001 (0.0006)
Population	-1.755*** (0.494)	0.209 (0.289)	-0.044 (0.647)	-0.027 (0.687)	-0.051 (0.367)
Residence	0.011 (0.212)	-0.152 (0.121)	-0.176 (0.247)	-0.324 (0.270)	0.209 (0.139)
Wealth	0.321 (0.310)	0.347** (0.173)	0.297 (0.383)	0.102 (0.388)	0.196 (0.198)
Income	0.848*** (0.249)	0.361** (0.145)	0.779** (0.331)	0.672** (0.333)	0.624*** (0.172)
Education	-0.238* (0.131)	-0.184** (0.073)	-0.316* (0.168)	0.268* (0.138)	-0.091 (0.075)
Openness	1.986* (1.544)	0.033 (0.939)	-0.292 (1.869)	-0.635 (2.005)	0.207 (1.125)
Gini	3.113* (1.840)	-0.052 (1.002)	1.691 (2.090)	1.305 (2.306)	0.647 (1.188)
Year	0.581 (0.455)	-0.021 (0.254)	-0.042 (0.548)	0.070 (0.602)	0.065 (0.285)
Male	-0.122 (0.508)	0.130 (0.287)	0.704 (0.684)	-0.244 (0.673)	0.316 (0.328)
Test age & age ² : χ^2 & ($p > \chi^2$)	0.68 (0.710)	3.03 (0.219)	8.44 (0.014)	3.95 (0.138)	3.15 (0.207)
Observations: Left censored	366	313	481	477	294

Note. Standard errors are shown in parenthesis. Regressions are lowered-censored Tobit with constant (not shown). Regressions include instrumental variables (IV) for social capital. IV = average age, education, and income of village excluding participant’s household. *, **, *** are significant at 90, 95, and 99% confidence level.

Table III Instrumental-variable Tobit Regressions: Correlates of Labor Help and Communal Help Given Last Week ($n=542$)

Explanatory variables:	Dependent variables—help offered with:					
	Hunt	Fishing	Farm	Cure	Buy	Work
Social capital: labor	0.551 (1.102)	2.181* (1.128)	2.846** (1.229)	5.105 (6.883)	4.668** (2.024)	2.429** (0.998)
Age	0.070 (0.090)	0.170 (0.132)	0.100 (0.128)	0.150 (0.106)	0.080 (0.066)	0.069 (0.083)
Age ²	−0.001 (0.001)	−0.002 (0.001)	−0.001 (0.001)	−0.001 (0.001)	−0.0008 (0.0007)	−0.0006 (0.0009)
Population	0.541 (0.393)	−0.564 (0.629)	0.026 (0.601)	0.790 (0.560)	0.034 (0.354)	0.416 (0.418)
Residence	−0.339* (0.177)	−0.133 (0.266)	0.304 (0.281)	−0.055 (0.237)	−0.102 (0.150)	−0.224 (0.191)
Wealth	−0.170 (0.274)	−0.246 (0.383)	−0.482 (0.402)	0.314 (0.357)	0.191 (0.228)	−0.059 (0.285)
Income	0.485** (0.237)	0.354 (0.297)	0.610* (0.313)	0.992** (0.328)	0.415** (0.194)	0.343 (0.248)
Education	−0.287** (0.116)	−0.177 (0.161)	0.010 (0.139)	−0.054 (0.145)	−0.081 (0.087)	0.046 (0.117)
Openness	0.979 (1.444)	−0.564 (2.011)	0.247 (2.012)	−1.813 (1.895)	0.487 (1.168)	−0.253 (1.499)
Gini	−2.461 (1.640)	2.616 (2.365)	−1.015 (2.789)	−2.403 (2.249)	0.183 (1.304)	−0.786 (1.954)
Year	−0.632 (0.526)	−0.739 (0.583)	−0.094 (0.995)	−0.240 (0.532)	−0.064 (0.331)	0.348 (0.436)
Male	1.623*** (0.537)	2.821*** (0.725)	1.186 (0.777)	−0.726 (0.615)	0.186 (0.373)	−0.142 (0.524)
Test age & age ² : χ^2 & ($p > \chi^2$)	3.43 (0.179)	2.94 (0.229)	2.01 (0.365)	2.64 (0.266)	1.96 (0.374)	1.08 (0.582)
Observations: Left censored	400	418	425	498	475	412

Notes. Same notes as Table II. The row “Social capital: Labor” here refers to communal labor or labor help given instead of gifts.

statistically significant in most of the regressions of Tables II and III. A 1% increase in income was associated with a 1.03–1.19 increase in the number of times a household gave gifts of manioc or home-brewed drinks (*chicha*) (Table II). For other commodities the magnitude ranged from a low of 0.36 (meat) to a high of 0.77–0.84 (seeds, maize, fish). If we focus on communal labor or on labor help offered to other households as a dependent variable (Table III), we again see a positive and significant association between these forms of social capital and income. A 1% increase in income was associated with a 0.41–0.48 increase in the number of times a household helped other households to buy or to hunt and with a 0.61–0.99 increase in the number of times a household helped other households to farm or to obtain medical help.

Income Inequality and Market Openness

The data in Tables II and III suggest that market openness and village income inequality did not bear a strong association with individual social capital. In Table IV we replace the Gini coefficient of income inequality by commodity-specific Gini coefficients of consumption of maize, rice, or manioc inequality, all estimated at the village level. Recall that the reason for using commodity-specific Gini coefficients comes from the intuition that it might be the perceived inequality in the consumption of particular

crops in the village that motivates people to share those crops, but not necessarily to share other crops or to share income. For example, in the second regression with gifts of maize as a dependent variable, we use the Gini coefficient for maize consumption in the village. For the regression with *chicha* as a dependent variable we use the Gini coefficient of manioc consumption since Tsimane make *chicha* chiefly from manioc.

The results of Table IV confirm the results discussed in the previous section on individual incentives. Age continues to bear the inverted U-shape relation found earlier and income continues to be positively and significantly associated with gift giving. In contrast to earlier regressions, however, now we find that the sign of the Gini coefficient is negative and significant. A one-point increase in the Gini coefficient of manioc consumption was associated with 10.47 fewer offerings of *chicha* and with 5.16 fewer gifts of manioc itself. A one-point increase in the Gini coefficient of maize consumption was associated with 2.65 fewer gifts of maize. The results lend support to studies reviewed earlier from industrial nations that income inequality tends to be associated with lower levels of social capital, but they do not support the view of anthropologists that reciprocity stems from a wish to reduce excess in the group. If people in relatively autarkic economies increased reciprocity to reduce economic inequality, then we should have seen a positive rather than a negative association between generosity and economic inequality.

Table IV Instrumental-variable Tobit Regressions: Gifts Given with Gini Coefficients of Specific Commodities ($n=542$)

Explanatory variables:	Dependent variables—gifts given in:			
	Chicha	Maize	Rice	Manioc
Social capital: gift	-0.379 (0.767)	1.486** (0.670)	1.664*** (0.525)	-0.030 (0.860)
Age	0.203 (0.129)	0.172** (0.068)	0.067 (0.058)	0.196*** (0.063)
Age ²	-0.001 (0.001)	-0.001** (0.0008)	-0.0004 (0.0006)	-0.001** (0.0007)
Population	2.433** (1.149)	-0.101 (0.351)	0.350 (0.322)	0.033 (0.347)
Residence	-0.043 (0.300)	-0.151 (0.149)	-0.327** (0.140)	0.020 (0.152)
Wealth	0.214 (0.433)	0.038 (0.220)	0.350* (0.201)	-0.100 (0.211)
Income	1.260*** (0.351)	0.856*** (0.198)	0.695*** (0.168)	1.046*** (0.185)
Education	-0.198 (0.166)	-0.072 (0.085)	-0.065 (0.077)	-0.107 (0.078)
Openness	-4.511* (2.633)	0.517 (1.265)	-1.727* (1.078)	0.536 (1.181)
Gini	-10.476** (5.013)	-2.658* (1.476)	-0.247 (1.332)	-5.161** (2.201)
Year	0.815 (0.829)	0.164 (0.330)	0.004 (0.297)	0.258 (0.321)
Male	-1.191 (0.744)	0.053 (0.362)	-0.110 (0.353)	0.034 (0.395)
Test age & age ² : χ^2 & ($p > \chi^2$)	5.49 (0.064)	7.02 (0.029)	5.89 (0.052)	13.06 (0.001)
Observations: Left censored	150	385	336	369

Notes. Same notes as in Table II, except that the Gini here is the Gini coefficient of consumption of specific commodities that match the dependent variable. See text for explanation.

The coefficient for the variable for market openness was also negative and statistically significant in two of the four regressions, lending partial support to the view of anthropologists that integration to the market economy might undermine traditional safety nets. A 1% increase in market openness was associated with 4.51 fewer offerings of *chicha* and with 1.72 fewer gifts of rice.

Group Effects

The most striking finding (Tables II, III, and IV) is the strong positive association between village-level and individual-level social capital. In virtually all the regressions, the village-level amount of social capital was positively and significantly associated with individual measures of generosity. For example, if the rest of the households in the village made, on average, an additional gift of rice, the participant's household gave 1.69 additional gifts of rice (Table II). The same applies to labor help. Every time the rest of the households in the village made, on average, one more communal fishing expedition, the excluded household engaged in communal fishing on at least 2.18 additional occasions (Table III). The results hold even when using Gini coefficients for consumption of specific crops and expressions of generosity for those same crops (Table IV).

Sensitivity Analyses

We did sensitivity analyses to decide whether the results held up after changing some of the assumptions of Tables II

and III. First, we re-estimated the regressions using Gini coefficients for wealth inequality instead of using Gini coefficients for income inequality because the wealth variable might be less endogenous than income. We found that the results (not shown) held up. We also tested whether including a quadratic term for income in the regressions of Table IV affected the coefficients of village income inequality and market openness—it did not. We redefined the geographical area covered by the peer group to decide whether group effects persisted if the peer group covered a wider area (Helliwell and Putnam, 1999). We tested whether the average of the entire ethnic group (rather than just the village) excluding the participant's village (rather than just the participant's household) bore a significant association with individual expressions of generosity. As instruments we used the average education, income, and age of the ethnic group excluding the participant's village. We found that when we re-defined the peer group in this way, the association between the expressions of social capital of the individual and the group vanished. The result fits with our intuition that group-level effects are stronger over smaller areas than over larger areas.

Conclusions

Throughout the paper we have identified possible biases in the estimates, so in this section we highlight conceptual limitations of our approach and pull together the strands of our argument. First, we have compared group and individual incentives to invest in social capital in a small-scale, pre-industrial society, and compared our results against

those of Glaeser *et al.* from the USA. The comparison may be unfair because the two types of society display such striking differences that the motivation to invest in social capital may differ as well. In a pre-industrial society, investing in social capital enhances survival, whereas in industrial societies the motivation to make personal investments in social capital wanes. In a pre-industrial setting individuals likely invest in neighbors or people they see every day because those are the people that are most likely to offer help, whereas in an industrial setting one likely invests in people of one's occupation, trade, or religious group irrespective of their residential proximity.

A second conceptual limitation has to do with a strong simplifying distinction we made. We split societies along an idealized autarky-market/industrial continuum, but reality is more complex. As societies grow in economic complexity one sees changes in the forms of social capital, from, say, day-to-day cooperation in subsistence and other activities, to greater participation in formal political or religious organizations that might have little to do with survival. Social capital may be universal, but the forms it takes are clearly shaped by place, culture, and history.

Like Glaeser and his colleagues, we see social capital as an individual-level attribute that people accumulate or deplete because it yields tangible pay-offs to them, but unlike Glaeser *et al.* we find that in relatively autarkic, small-scale, pre-industrial societies individual-level explanatory variables do not explain much of the variation in expressions of social capital. Besides age and income, none of the other individual-level variables of the optimal investment model bore a significant association with individual investment in social capital. In none of the regressions did we find that length of residence duration in the village bore the expected positive association with investments in social capital found in industrial nations. We have no convincing explanation for the puzzle. Perhaps in a small-scale society where many people have known each other since childhood, length of residence duration in a village gets eclipsed by kinship bonds as a motivation to express pro-social behavior. On the other hand, village-level expressions of generosity were associated with individual expressions of generosity, probably from the thick web of kin binding people in small-scale societies. We also found evidence that village income inequality and trade expansion mattered in the direction predicted by prior case studies from economics. The results only held when using Gini coefficients of consumption of specific commodities and expressions of generosity of those commodities. More inequality and greater trade expansion went along with less generosity. The results hint at the importance of group effects in a pre-industrial setting. Note, in passing, that village population size did not bear a statistically significant association with individual invest-

ments in social capital, probably because village population size overlaps with other village-level variables (e.g., Gini), thereby producing multi-collinearity.

Besides getting improved causal identification, the obvious next step in the empirical analysis of what makes people invest in social capital will be to explore the role of preferences and expectations in linking group with individual behavior (Manski, 2000) and to understand how modernization's weakening of social capital might affect canonical indices of quality of life, such as health, longevity, consumption, and happiness.

We conclude with a final thought on the future role of economic theory in informing empirical research anthropology and in the overlap between the approaches to social capital. The strength and inspiration of the economic approach lies in having set out formal tests of hypotheses and a replicable procedure for testing the hypotheses in other settings. The limitation comes from working only in industrial societies and from a stress on the role of individuals (rather than groups) in shaping the formation of social capital. The strength of the cultural anthropological approach stems from the ethnographic understanding—often built over many years—of individual motivations, but the limitation lies in a reluctance to develop theoretical models and transparent methods for others to test hypotheses. Clearly, significant advances in the empirical understanding of the different forms that social capital takes and its determinants will only emerge when the best empirical approaches from economics and anthropology merge.

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