New Methods in Quantitative Ethnography

Economic Experiments and Variation in the Price of Equality

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A new method for quantitatively documenting concerns for economic fairness has the potential for identifying variation in prosociality within and across societies. Multiple dictator games conducted in two small-scale societies presented decision makers with a choice between an equitable and an inequitable payoff distribution. The games varied in terms of the type of inequality the decision maker faced and the cost to the decision maker of eliminating inequality. A novel set of statistical models directly links experimental results and player heterogeneity with the formal theory of inequality aversion. The experimental method can be generalized to allow maximum flexibility in data analysis.

Relative to many other animals, including other primates, humans appear to be radically prosocial (Camerer 2003; Jensen et al. 2006; Richerson, Boyd, and Henrich 2003; Silk et al. 2005), a fact that allows humans to realize the benefits of cooperative interactions in ways unavailable to other species (Alvard 2003; Bowles 2004). The study of human prosociality often involves two separate but related phenomena. On the one hand, people show preferences regarding the distribution of resources in a social group (Dawes et al. 2007). On the other hand, in sufficiently complex social settings these preferences are often conditional. People care about the past behaviors of other people, and they care about the social processes that went into producing a particular distribution of resources (Fehr and Fischbacher 2004). As a result, the same distribution can be more or less preferred in different situations according to the way it is interpreted (Falk, Fehr, and Fischbacher 2003).

Here we focus on variation in distributional preferences. Experimental work in small-scale societies indicates that humans are not all prosocial in the same way. Variation in prosociality within and across societies is pronounced, and experimental behavior often relates in intriguing ways to ethnographic details (Henrich et al. 2004). Such variation is important because theoretical and experimental work shows that variation in prosociality interacts with social institutions to affect economic outcomes (Bowles 2004; Camerer and Fehr 2006; Fehr and Fischbacher 2003; Fehr and Schmidt 1999; Guererk, Irlenbusch, and Rockenback 2006).

Experimental games have recently demonstrated great usefulness as a tool for measuring prosocial behaviors and norms in small-scale societies (Camerer and Fehr 2004; Efferson and Richerson 2007; Henrich et al. 2001, 2004, 2005, 2006; Paciotti and Hadley 2003). This research has relied on classic games like dictator, ultimatum, and public goods to measure concerns for fairness and the propensity to cooperate within and across societies. Here we present a new method for documenting variation in prosociality that combines a measurement instrument from social psychology with a style of statistical analysis from economics. The result allows us to quantify distributional preferences in terms of an unambiguous theory and to identify which sources of preference heterogeneity (e.g., age, income, group membership) the data justify discussing.

We apply the instrument and statistical method to results from two independent studies conducted in small-scale societies in Bolivia and Tanzania. The experiments used in these studies allow us to estimate and decompose aversion to inequality in our experimental populations in a precise fashion directly linked to theory. The question addressed is what price one is willing to pay for equality and how that price varies within and among societies. The methods we present provide a unified approach to this problem by directly integrating theory and empiricism. These methods are not a replacement for more traditional ethnographic work. Rather, they provide an effective quantitative complement. They support both predictive and descriptive research programs. For example, on the basis of earlier research (Henrich et al. 2001, 2005), one might predict that market integration is associated with more aversion to inequality. One could use the methods described below to test this prediction wherever one pleases. Alternatively, a researcher who has a strong qualitative understanding of the fairness norms in a particular society could use the methods to quantify this knowledge precisely. This latter notion is an example of what we mean by "quantitative ethnography."

Methods

We focus on a use of dictator games that documents the distributional preferences mentioned above with little or no scope for conditionality (but see Haley and Fessler 2005 for a different view). These experiments are called dictator games because one player simply chooses a binding distribution of resources in an experimental social group. Other players re-

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ceive payoffs from dictator choices but can do nothing to affect the outcome. The decision maker is thus, within the confines of the experiment, a dictator.

To analyze the data, we developed a novel set of statistical models derived from the inequality-aversion model of Fehr and Schmidt (1999). Other empirically successful models of social preferences exist in the economics literature (Bolton and Ockenfels 2000; Charness and Rabin 2002; Falk and Fischbacher 2006), and we encourage their use in anthropological settings. Nonetheless, our experience suggests that the Fehr-Schmidt model is especially amenable to developing statistical models of the sort we present below. Its simple piece-wise linear form makes it easy to estimate and extend.

Theory

Consider a two-person interaction in which the participants may be concerned with one another's payoffs but not with the payoffs of others outside the pair. Call the payoff of the first person x and the payoff of the second y. Denote an outcome (x,y). In this simple case the Fehr-Schmidt model says that the utility for the first person is

$$U_1(x, y) = x - \alpha \max\{y - x, 0\} - \beta \max\{x - y, 0\},$$

where $\max\{w, z\} = w$ if $w \geq z$ and $\max\{w, z\} = z$ otherwise. The parameter α measures the first person's aversion to disadvantageous inequality, which is a situation in which the second person has more, and the parameter β measures the first person's aversion to advantageous inequality, which is a situation in which the first person has more. When the second person has more, $y - x > 0$, which implies that $\max\{y - x, 0\} = y - x$ and $\max\{x - y, 0\} = 0$. In this case the model reduces to $U_1(x, y) = x - \alpha(y - x)$. Alternatively, when the first person has more, $x - y > 0$, which means that $\max\{x - y, 0\} = x - y$ and $\max\{y - x, 0\} = 0$. The model in this situation becomes $U_1(x, y) = x - \beta(x - y)$. Both α and β are unitless quantities that measure aversion to inequality in terms of an equivalent reduction in own payoffs without the inequality. For example, if $\alpha = 0.5$, two units of disadvantageous inequality are equivalent to one unit less in the first person's own payoff without the disadvantageous inequality. A distribution of (1, 1) would therefore be equivalent to (2, 4). This holds because (2, 4), though it brings a higher absolute payoff for player 1 than (1, 1), also brings two units of disadvantageous inequality for player 2. Formally, $U_1(1, 1) = x = 1$, while $U_1(2, 4) = x - \alpha(y - x) = 2 - (0.5)(4 - 2) = 1$.

Figure 1 provides a graphical representation of the Fehr-Schmidt model. The horizontal axis measures payoffs and the vertical axis utility. Player 1's payoff, x, is fixed for purposes of this illustration and is indicated by the vertical dashed line. Player 2's payoff, y, is then allowed to vary along the horizontal axis, and the corresponding utility of player 1 is shown as a function of variation in y. To the left of the vertical dashed line, $x > y$. Advantageous inequality is thus the relevant concept, and β is the relevant measure of inequality version. Advantageous inequality gets *smaller* in magnitude as we move from left to right and so move closer to the vertical dashed line. The slope of the utility function in this region is β. To the right of the dashed line, $y > x$, and player 1 faces disadvantageous inequality. The inequality here gets *larger* in magnitude as we move from left to right and thus farther from the dashed line. The slope of the utility function in this region is $-\alpha$. In figure 1 we have assumed that both types of inequality reduce utility and that having less than someone else reduces utility more than having more than someone else. These are typical assumptions for Fehr-Schmidt, but they are not necessary. Technically, the model does not preclude other possibilities such as liking having more but hating having less. This would imply that $0 < \alpha$, $\beta < 0$, and the utility would decline both to the right and to the left of the dashed line.

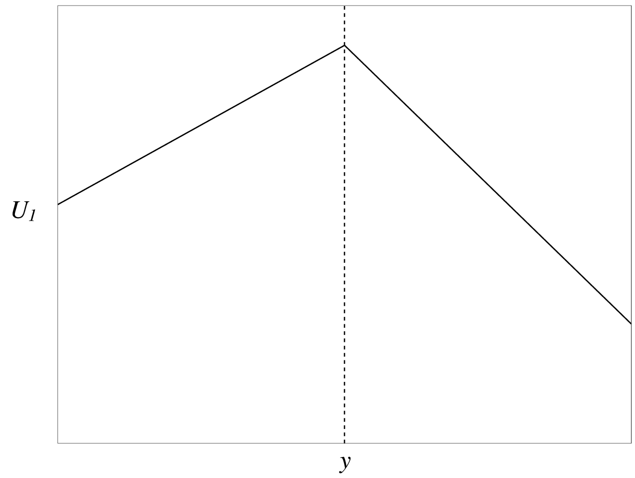

Figure 1. Graphical illustration of the Fehr-Schmidt model. The horizontal axis shows variation in y, the payoff of player 2. The vertical axis shows player 1's utility, U_1. The payoff of player 1, x, is held constant at the value indicated by the dashed vertical line. To the left of the dashed line, player 1 faces advantageous inequality, the relevant utility function is $U_1(x, y) = x - \beta(x - y)$, and thus the slope is β in this region. To the right of the dashed line, inequality is disadvantageous for player 1, $U_1(x, y) = x - \alpha(y - x)$, and the slope is $-\alpha$. This example assumes $0 < \beta < \alpha$, and consequently utility reaches its maximum when $y = x$.

Experimental Data and Statistical Modeling

By pairing players anonymously and allowing player 1 to play multiple dictator games in each of which he or she chooses between an equitable distribution and an inequitable distribution, one can estimate the player's aversion to the two different kinds of inequality. This is exactly our approach, and table 1 shows the 16 dictator games played by each player 1 in our two study populations.

Table 1. Payoffs for Players 1 and 2 in Experiments Conducted in Tanzania and Bolivia

	Equitable		Inequitable	
Choice	Player 1	Player 2	Player 1	Player 2
1	10	10	15	10
2	10	10	10	15
3	15	15	15	10
4	15	15	10	15
5	10	10	15	5
6	10	10	5	15
7	10	10	18	13
8	10	10	13	18
9	8	8	15	5
10	12	12	15	5
11	8	8	5	15
12	12	12	5	15
13	12	12	18	13
14	8	8	18	13
15	12	12	13	18
16	8	8	13	18

The central concept behind the design of these games may be illustrated as follows: Imagine a hypothetical player 1 who, when facing choice 9, chooses (15, 5) over (8, 8). This choice means that $U_1(15, 5) = 15 - \beta(15 - 5) > U_1(8, 8) = 8$, which further indicates that $\beta < 7/10$. Imagine now that the same player chooses (12, 12) over (15, 5) when facing choice 10. In this case, $U_1(12, 12) = 12 > U_1(15, 5) = 15 - \beta(15 - 5)$, and thus $\beta > 3/10$. Together these two choices show that $3/10 < \beta < 7/10$. Additional choices would allow us to refine the estimate further. The same reasoning applies for estimating α. If our player 1 chooses equitably for choice 15, $U_1(12, 12) = 12 > U_1(13, 18) = 13 - \alpha(18 - 13)$. If player 1 chooses inequitably for choice 16, $U_1(13, 18) = 13 - \alpha(18 - 13) > U_1(8, 8) = 8$. Together these choices imply that $1/5 < \alpha < 1$.

Unlike our hypothetical player 1, real players exhibit noise in their choices, and data never match predictions perfectly. For example, players may from time to time make a choice that is inconsistent with their other choices. If so, some subset of choices will violate the preferences specified by the utility function. Also, because a model is only a representation of a decision-making process and not the decision-making process itself, choices may be subject to forces outside the model. These outside forces are modeled as noise. Apart from noise, individuals also exhibit heterogeneity in their notions of fairness and in their aversion to inequality. We would like to identify a parsimonious and effective way of summarizing this heterogeneity.

Incorporating noise and heterogeneity are the principal motivations behind the statistical models we developed to analyze our data. [The details of these models are described in the electronic edition of this issue on the journal's web page.] The basic idea is intuitive. As figure 1 shows, the α and β values specify the slope of the utility function for disadvantageous and advantageous inequality respectively. Equivalently, α and β specify the magnitude of aversion to inequality. Simply put, we model these quantities as functions of predictor variables of interest. This technique is what permits the incorporation of heterogeneity. For example, one might model α and β as functions of household wealth to see if wealthier households tend to have individuals with more or less aversion to inequality.

We do not treat the resulting model as a deterministic predictor of choices in the experiment. Rather, a utility function and a set of alternative payoff distributions from which to choose jointly produce a probability distribution over choices (i.e., alternative payoff distributions). This probability distribution depends on both the properties of the alternative payoff distributions and the modeled characteristics of the decision maker. For a given dictator game, our statistical version of Fehr-Schmidt will place some positive probability on each available option. As a result, a specific wealthy individual might make a choice that is very different from the choice most wealthy people make in that situation, but the choice cannot be incompatible with the statistical version of Fehr-Schmidt in absolute terms, It can be at odds with the model only in a statistical sense. Such an observation would be a kind of "outlier."

Importantly, the two types of inequality are not linked in the theoretical Fehr-Schmidt model, nor are they linked in our statistical modification of it. For this reason, estimated effects can be asymmetric. If wealthy families, for example, tend to produce individuals averse to disadvantageous inequality but not averse to advantageous inequality, the statistical version of Fehr-Schmidt can pick that up. It does not require that a class of individuals who are averse to one type of inequality also be averse to the other type of inequality. Moreover, as mentioned above, the model also does not require that people be averse to inequality at all. Both theoretically and statistically, negative values of α and β are possible.

The remaining question concerns the best way to model α and β. In particular, which predictor variables provide an effective means of summarizing variation in aversion to inequality? To address this question, for each of our two study sites we developed an a priori set of models that varied the combination of covariates included, fit the models using maximum likelihood, and then used an information theoretic approach to selecting the best model from the set. A derivative form (AIC_c) of Akaike's criterion (Akaike 1973) served as a model selection criterion. Akaike's criterion extends likelihood theory to the question of model selection (Burnham and Anderson 2002). More precisely, when one fits a model to data using likelihood, one loses information because the model does not account for all the processes that generated the data. Akaike's criterion selects the model estimated to lose the least amount of information relative to the other models under consideration. It thus has an intuitive and compelling interpretation (Burnham and Anderson 2002; Efferson and Richerson 2007; Forster and Sober 1994). Moreover, this interpretation does not rely on the use of arbitrary and purely conventional thresholds (e.g., $p < 0.05$) as in null-hypothesis testing.

Study Sites and Results

Bolivia

Experiments were conducted with adult residents of the Sama Biological Reserve in southern Bolivia. Sama is on the semi-arid altiplano of the Bolivian Andes. Elevations range from about 3,600 to 3,900 m. The residents of Sama focus on subsistence pastoralism and primarily raise sheep and llamas. They also do a limited amount of farming, and many families have at least one or two members who migrate seasonally in search of wage-paying jobs in agriculture.

Experiments were conducted privately with only the subject and the experimenter present. The experimenter read a set of prepared instructions with examples for each player 1. The experimenter would then test the subject's comprehension by presenting different scenarios and asking the subject how much each player would receive in each.

To improve understanding, the experimenter always used four piles of money on a table to represent a particular choice. The four piles represented the payoffs for each of the two players under the two alternative payoff distributions. To simplify matters further, the two distributions were placed at opposite ends of the table, and players were told that they could choose the two piles at one end of the table or the two piles at the other end. All players were told that they were playing for real money. Because of previous experiments in the same communities and because of the high turn-out rate, we strongly suspect that the players expected to be paid. Actual payoffs were determined by randomly selecting one of the 16 choices made by each player 1. All players responded to extensive questionnaires after participating, and these questionnaires provided the social, economic, and demographic data used in data analysis. Four players 1 did not pass the comprehension test and were removed from consideration. The final data set had 110 players in all, half of whom were players 1. Players 1 and 2 were randomly paired within a community. Moreover, players 1 who had played, players 1 waiting to play, and players 2 were kept separated throughout the experiment. All interactions between paired players were anonymous.

To analyze the data, we developed a set of ten models using several independent variables in various combinations. The full set of independent variables under consideration includes sex, age, education level, the number of sheep owned by the individual's household, and three index variables. The first index variable is the frame of reference (FR), and it summarizes the individual's beliefs about consumption norms. Specifically, we asked individuals to specify how many sheep (the primary measure of wealth in this society) their households would need to live (*a*) poorly, (*b*) normally, (*c*) well, and (*d*) very well. We averaged these four numbers and, as with all quantitative variables in the analysis, normalized the resulting variable to have a mean of 0 and a standard deviation of 1. Our market integration (MI) index for Bolivia is based on the number of different market-oriented productive activities (e.g., collecting guano for sale) pursued by the household in the previous year. Households with more diverse suites of productive activities aimed toward sale in markets scored higher using our MI index. The final index variable records the number of cooperative activities (e.g., maintenance of the school building) of various sorts the individual participated in with unrelated individuals in the past year (CAY).

Our analysis indicates that, of the independent variables under consideration, our market integration (MI) and cooperative activity (CAY) variables are the most important, but the number of sheep in the household and the frame of reference (FR) are also important. Figure 2 shows the estimates and confidence intervals for the model with these four predictor variables. As with all the models fit to the data, the model includes estimated intercepts for α and β, which are analogous to the intercept in a linear regression. Also analogous to the intercept in a linear regression, the intercepts in the statistical Fehr-Schmidt model specify reference levels of inequality aversion in the sample. Estimated coefficients for the predictor variables in turn specify deviations from these reference levels. In this particular case, all predictor variables are quantitative variables normalized to have a mean of zero. Consequently, the intercepts quantify a kind of average α (0.573) and β (0.625) values in the sample and by extension the average price one is willing to pay to eliminate disadvantageous and advantageous inequality respectively. Precisely,

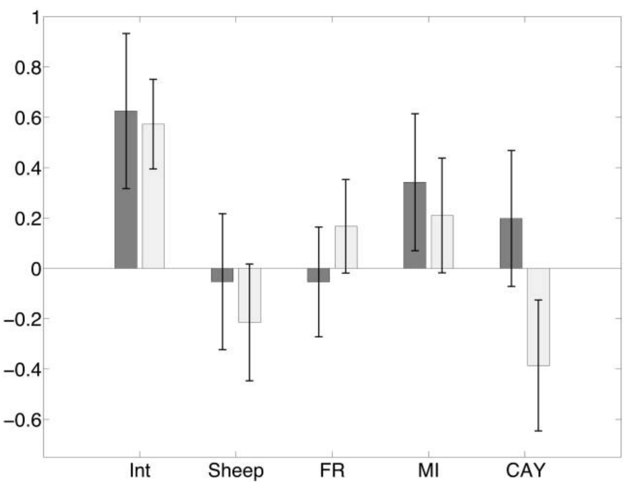

Figure 2. Parameter estimates with approximate 95% confidence intervals for the four important independent variables in the analysis of Bolivian data. Estimates for α are shown in dark gray and estimates for β in light gray. The covariates include the intercept (Int), the number of sheep, the frame of reference (FR), market integration (MI), and the number of cooperative activities with unrelated individuals in the previous year (CAY). The 95% confidence interval for ϕ is [0.106, 0.186].

the expected willingness to pay for equality is 62.5 centavos to eliminate 1 boliviano of disadvantageous inequality and 57.3 centavos to eliminate 1 boliviano of advantageous inequality.

Two effects are unambiguous. Individuals with a higher market integration score are more averse to disadvantageous inequality (i.e., have higher α values) and individuals who participated in more cooperative activities with unrelated individuals in the previous year are less averse to advantageous inequality (i.e., lower β values). Three additional effects are close to unambiguous in the sense that the confidence intervals just barely overlap 0. These effects are an increase in β values with more market integration, an increase in β values with an increase in the frame of reference, and a decrease in β values with more household wealth in the form of sheep.

Tanzania

Experiments were conducted among adults in the village of Isanga in the Southern Highland region of Tanzania. This region is semiurban, and most households are economically specialized. Many residents, however, also produce food and other items for consumption in the household. Isanga is an ethnically diverse village, a fact that informed our model selection exercise, but the majority of people are Nyakyusa, a Bantu group originating south of Isanga.

The methods used in Tanzania were similar to those in Bolivia. Instead of piles of real money, however, the experimenter used preprinted cards with payoffs printed on them. Cards were shuffled before play, so choices were presented in random order. Additionally, all Tanzanian players took the roles of both player 1 and player 2. First they made their 16 choices as players 1, and then as players 2 they were paired with previous players and shown the choices of the other players. Of the 16 cards, one was chosen randomly to determine actual payoffs. The entire procedure was explained to each player before participating, and a prescreening was performed to ensure comprehension.

We developed a set of 14 models using several independent variables in various combinations. These variables were chosen because they are classic controls for heterogeneity or because of specific hypotheses applicable in this context. The independent variables are sex, age, level of education, wealth, ethnicity, and market integration. Because too many ethnic groups are present in the area to estimate reliable parameters for each, each individual was assigned to one of the following four ethnic branches: Southern Highland (SH), Central Highland (CH), Nyamwezi (NY), and Makonde (MA). Bernard (2006) provides a detailed description of the card-sorting procedure used to assign individuals to these branches. With four ethnic branches, we have three indicator variables as predictors for ethnicity (MA, NY, and CH), and the intercepts absorb the fixed effect for the remaining ethnic branch (SH). The market integration index combines the following into a single variable: (*a*) percent of household diet purchased at the market, (*b*) income from wage labor, (*c*) frequency of wage labor in the previous month, (*d*) trips to the market in the previous week, and (*e*) frequency of profit-oriented trading in the previous month.

The analysis shows that sex, age, education, and ethnicity are the important predictors. Figure 3 shows the results for the best-fitting model. The best model includes two interaction terms. Most of the effects are not unambiguously positive or negative, suggesting that at least some of the variables are important controls that cannot be estimated very precisely. Age, however, is weakly associated with an increase in aversion to advantageous inequality, and a weak positive interaction between age and education predicts more aversion to disadvantageous inequality. The big effect, however, is the dramatically higher level of aversion to advantageous inequality among individuals in the MA ethnic branch. These are the Makonde, originally a coastal and matrilineal group quite different linguistically from the others. They are famous carvers (any tourist to Tanzania has seen their ebony carvings), and historically they lived in semi-independent villages. The Makonde may be the only ethnic group in the sample that did not have chiefs of some kind at the time of European colonization.

Discussion and Methodological Implications

Variation in prosociality is critical to an understanding of aggregate economic phenomena when the contracts governing social interactions are incomplete (Bowles 2004; Camerer and Fehr 2006; Fehr and Fischbacher 2003, 2004; Fehr and Schmidt

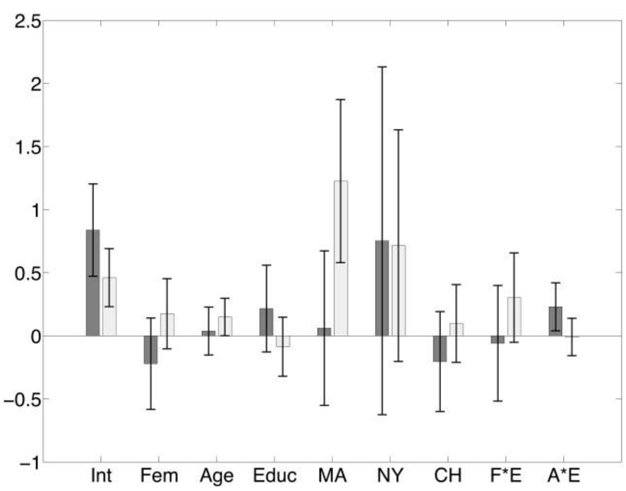

Figure 3. Parameter estimates with approximate 95% confidence intervals for the best-fitting model in the analysis of Tanzanian data. Estimates for α are shown in dark gray and estimates for β in light gray. The covariates include the intercept (Int), a female indicator variable (Fem), age, education level (Educ), and three indicator variables for ethnicity (MA, NY, and CH). The last two variables are interactions: female and age × education. The 95% confidence interval for ϕ is [0.154, 0.234].

1999; Guererk, Irlenbusch, and Rockenback 2006), a situation that applies to a greater or lesser extent in all human societies. Richard, Masanori, and Charles, for example, may be able to engage in a productive and mutually beneficial social interaction, but if they cannot commit to a fully enforceable contract that stipulates the appropriate behaviors under every possible contingency then some degree of mutual vulnerability is involved. Shared expectations about the likely prosocial inclinations of the others can help the trio take the leap of faith necessary for the interaction to happen. Such a setting is ubiquitous because until recently most human societies lacked the formal institutions that might provide complete or nearly complete contracts. Even now, a truly complete contract has probably never existed, and thus social interactions inevitably involve some level of risk. Equality norms constitute only one part of prosociality, but that part is an important one that can reduce risk and encourage social exchange.

Although early experimental work in psychology addressed quantitative variation in prosociality across individuals (Messick and McClintock 1968; McClintock 1972), apart from the work of Henrich and colleagues (2001, 2004, 2005, 2006) little attempt has been made to survey this variation in a way that even begins to tap the full measure of human behavioral diversity. Part of the problem is methodological. While experimental economists tend to implement experiments motivated by formal theory, anthropologists, the social scientists with probably the deepest understanding of human behavioral diversity, are more likely to find raw cultural variation interesting. From a nondisciplinary perspective, the resulting space of all experiments in all societies is too large to explore. The experiments that economists find compelling may or may not be generally useful to fieldworkers in anthropology, and this may limit the appeal of experiments as a standard complement to other ethnographic methods. Nonetheless, the variation in prosocial tendencies within and among societies represents a basic empirical question. The methods we outline here would allow for an efficient point of departure, especially if implemented in conjunction with other ethnographic methods and the classic economic experiments used by Henrich and colleagues.

In our studies, two results stand out. In Bolivia, both market integration and participation in cooperative activities were related to inequality aversion within the study population. Henrich et al. (2005) found that market integration and cooperative activities were positively associated with prosocial behavior *across* societies. Their variables and our variables are quite different, and our result holds *within* a society, but the market integration findings can be viewed as complementary. In Tanzania, one ethnic branch stood out as dramatically more averse to advantageous inequality than the other three branches. This result suggests a type of cultural inertia and limited cultural mixing in the sense that people with different cultural histories often long maintain their differences even in the face of ongoing contact and similar economic circumstances (Edgerton and Goldschmidt 1971; McElreath, Boyd, and Richerson 2003; Nisbett and Cohen 1996; Richerson and Boyd 2005).

We do not wish to make excessive extrapolations from our modest evidence. Nonetheless, we think that these results demonstrate the plausibility of incorporating causal variables of many scales and types into the analysis of individual prosocial preferences. For example, anthropologists of a previous generation were concerned with the extent to which economic decisions in agricultural societies might be motivated by a concept of "limited good," a belief in a finite or only slowly growing amount of "good" in the world (Foster 1965). Under limited good, one community member's gain is necessarily another's loss. This notion has been implicated in the lack of entrepreneurship among small-scale agriculturalists because getting ahead can be seen as immoral if it necessarily hurts others. The clear prediction that follows is that social preferences as measured in our model will vary both within and among communities in relation to a belief in limited good. Communities professing a belief in limited good should be more averse to inequality of both kinds. Individuals within a community for whom the idea of limited good is least salient should be the most entrepreneurial and the least averse to inequality, especially advantageous inequality. In the final analysis both group variables (community) and individual variables (market income, education, adoption of new crops) could be folded into the analysis to address hypotheses of broad anthropological interest.

Apart from the specific results, our primary interest is to illustrate the method. Importantly, however, our model selection exercise did not consider models with individual fixed effects for each player 1 (i.e., models that effectively estimate unique α and β intercepts for each player 1). We chose to proceed this way because numerous individuals in both societies always chose the equitable distribution. One cannot estimate a fixed effect for individuals who exhibited no variation in their observed choices because maximizing the likelihood function drives the relevant α or β fixed effect to positive or negative infinity. The use of Akaike's criterion requires that all models be fit to the same data. Thus a model selection exercise with (or even without) individual fixed effects would have required us to drop all individuals exhibiting no variation in their choices. We chose instead to model variation purely in terms of social and economic predictors. As a consequence we potentially overlooked some idiosyncratic dependence among observations that was unaccounted for in our models. We evaluated this possibility using the method described for this purpose by Burnham and Anderson (2002, 67–70) and did not find any obvious problems.

Nonetheless, a superior approach would be to estimate several models with individual fixed effects, compare them with similar models without the fixed effects, and let Akaike's criterion indicate whether the data justify estimating the additional parameters. This requires variation in choices for all subjects, and we correspondingly recommend generalizing the idea behind table 1 to allow greater flexibility in the set of

Table 2. Finding the β Switching Point for a Hypothetical Player 1 with Deterministic Choices

		Equitable		Inequitable		
Choice		Player 1	Player 2	Player 1	Player 2	
1	✓	10	10	10	0	
2	✓	10	10	11	1	
3	✓	10	10	12	2	
4	✓	10	10	13	3	
5	✓	10	10	14	4	
6		10	10	15	5	✓
7		10	10	16	6	✓
8		10	10	17	7	✓

Note: In this example, the player does not accept 4 monetary units as compensation for 10 units of advantageous inequality but does accept 5 units. This result means that $0.4 < \beta < 0.5$.

choices presented to a given player 1. Specifically, we suggest the need to find the point where each player switches from choosing equitably to choosing inequitably or vice versa. Table 2 shows how this might work with respect to estimating β for a hypothetical player 1.

In this example the level of advantageous inequality is constant at ten units. The absolute cost of reducing this inequality, however, increases incrementally with each subsequent choice. Eventually, the absolute cost is too high, and our hypothetical dictator switches to choosing the inequitable distribution. In this fashion we identify the price for accepting advantageous inequality. The approach to disadvantageous inequality is analogous, but instead choices would be between an equitable distribution (e.g., [10, 10]) and a distribution involving disadvantageous inequality for player 1 (e.g., [14, 24]).

The sequence of choices in table 2 is too transparently systematic for an actual experiment and could introduce artifacts as a result. Nonetheless, finding each individual's switching point implies the following key point: the experimenter should be able to adjust the game for each player 1 contingent on that individual's play up to a particular point in time. We put the following proposal forward as a technique that should be practical under the sometimes difficult conditions of experimental fieldwork (the example focuses on estimating β, but the approach is easily generalized for α):

Present a block of, say, six choices that range from (10, 10) versus (10, 0) to (10, 10) versus (15, 5), as in table 2, to the player in random order. If the player does not show the desired level of variation in play, move to the next block of six choices, also presented in random order, from (10, 10) versus (16, 6) to (10, 10) versus (20, 10). One could also alternate blocks for estimating α with blocks for estimating β to reduce the potential for a transparent pattern further. One may also want to prepare for the possibility that some players may prefer inequality, especially advantageous inequality. Such players would opt for (10, 0) over (10, 10). The objective in this case would not be to find the price the player will pay for equality but rather to find the price the player will pay for inequality. Will the player take (14, 14) over (10, 0) or, not, (15, 15) over (10, 0)? This example highlights the possibilities of the method more generally. Whether estimating a preference for or against inequality, the general question is the same, namely, how much will an experimental dictator with a distinctive set of characteristics pay to accomplish his or her distributional objectives?

Acknowledgments

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