The Economic Impacts of Trust and Altruism: An Experimental Approach to Social Capital*

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Abstract

This paper experimentally measures the 'social capital' of altruism, trust and reciprocity and empirically explores the impact of these norms on economic well-being. Using an experimental design that distinguishes trust and reciprocity from altruism, data were collected from individuals in a random sample of South African communities. Analyzed at the community level, these data suggest that while related, trust and reciprocity are clearly different from altruism. Moreover, the relatively strong correlation between trust and reciprocity indicates that communities are in a sort of normative equilibrium, with trust strongest where reciprocity norms are most active. Finally, analysis of household living standard data drawn from these same communities shows that these norms have real economic effects on households' well-being. The effects of both altruism and trust are significantly positive in urban communities, whereas the effects of these same norms are weaker or negative in more traditional rural areas.

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1. Introduction

The growing literature that identifies trust and norms as essential to economic interactions would not have surprised Adam Smith. Similar to Smith in his *Theory of Moral Sentiments*, this literature underscores the importance of norms that control the "self-regarding passions" and lead individuals to behave in a trustworthy fashion. This literature uses trust to explain why some Italian regions have better local governments than others (Putnam, Leonardi and Nanetti, 1993); why some countries are better suited to develop large organizations (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1996); why financial systems develop more easily in some regions than in others (Guiso, Sapienza, and Zingales, 2000); and, why some countries grow faster than others (Knack and Keefer, 1997). Trust might make cooperation possible while avoiding the cost associated with the enforcement of legal contracts (Putnam, 1995; Fukuyama, 1999). In less developed economies where the cost of legality is high (de Soto, 1989), and where financial markets are thin or missing, relations based on trust or informal enforcement mechanisms may provide the only avenue of access to the credit and insurance. Confirming this conjecture, Narayan and Pritchard (1998) and other studies find that a greater density of civic associations (which they interpret as an indicator of 'social capital' and trust) enhances households' ability to generate a livelihood.

The goal of this paper is to directly measure and empirically explore the effects of the social capital of altruism and trust on economic well-being. Sobel (2002) suggests that work on social capital that focusses on small group interactions is more compelling than studies that try to link social capital measures with national-level trends. Consistent with that suggestion, this paper relies on data collected from individuals in a random sample of South African communities, using an experimental economic design that isolates trust and trustworthiness from altruism. Analyzed at the community level, these data suggest that while related, trust is clearly different from altruism. To explore whether communities can be meaningfully typified by distinctive normative environments, we develop a social interactions model of norms that is designed to distinguish true social interaction effects from contextual and other spurious correlated effects. While preliminary, the results here indeed identify the sort of genuine social interaction effect that we would expect if indeed the notion of a distinctive community environment is meaningful. Finally, we report some preliminary estimates of the effect of local social norms on the capacity of households to generate a livelihood. Our regression strategy here is again sensitive to the identification problems that result

when norms are created in part by shared contextual interactions.

Trust and trustworthiness are complex concepts, and the recent literature contains multiple meanings and measures of them. At a conceptual level, trustworthy behavior sometimes appears as the stable equilibrium to a repeated game among passionately self-regarding individuals (as in Ghosh and Ray, 1996). Trustworthiness is also interpreted as an internalized moral norm that renders unthinkable untrustworthy actions, effectively removing them from the strategy set (Platteau, 2000).

At an empirical level, research on trust has either relied on associational density measures (*e.g.*, number and strength of civic associations), or on direct survey questions that ask respondents to self-report trust and trustworthiness (*e.g.*, respondents are asked how much they trust family, neighbors, and government.; how much they contribute to charities; how often they lend money to neighbors; *etc.*). Neither approach is entirely satisfactory. Associational density measures may conflate simple (incentive compatible) information sharing that flows through networks (what Fafchamps and Minten, forthcoming, call social network capital) with the operation of norms that stabilize time-sensitive exchanges. Self-reported trust measures, which ask people to report on their own virtues and those of their friends and neighbors have been criticized as suspect by Putnam (1995) and others. Different respondents might also understand such questions differently, or they may respond differently according to the identity of the interviewer. More importantly, even if these questions do reveal information about the person, it is difficult to understand what exactly we have uncovered. Finally, neither empirical approach offers any prospect of separating out the effects of different norms (*e.g.*, altruistic sharing norms versus norms of reciprocity), despite the fact that these different norms may have radically different economic impacts, as Platteau (2000) argues.[1]

Experimental economic methods offer a potentially more appealing way to measure behavioral norms. In recent papers, Camerer and Fehr (2001) advocate the use of economic experiments to measure the relative importance of social

[1] Theoretical analyses that suggest that different norms have different effects include studies that show that fiscal policy is neutral in the case of inter-generational altruism but not so if inter-vivos transfers are explained by exchange or reciprocity motives (see Bernheim, Shleifer, and Summers, 1985; Cox, 1987; Cox, Zekeriya, and Jimenez, 1998). Analogously, reciprocal behavior in the workplace might explain unemployment, as suggested by Akerlof (1982) and Akerlof and Yellen (1990). What local institutions a community has could also depend on whether altruism or reciprocity is prevalent therein. For instance, contracts might need to be incomplete in order to let reciprocity intervene (Fehr and Gachter, 2000).

norms, while Carpenter (2001) proposes the use economic experiments to measure social capital and trust. In prior work, experimental economists have used dictator games–in which an individual is given an endowment of money that they may either share with others or keep for themselves–to measure the strength of other-regarding, or altruistic norms. Altruistic norms are surely part of that package that helps cool the heat of Smith's self-regarding passions, and following the lead of prior work, we here employ a dictator game to measure and test the importance of these norms on the capacity of South African households to generate a livelihood.

The experimental measurement of trust is perhaps less straightforward. Glaeser *et al.* (2000) propose an experimental measure of trust and trustworthiness using a "trust game." The trust game consists of two players, one endowed with money, the trustor, and one without, the trustee. The trustor decides whether to keep the money for herself, or whether to 'invest' some or all of it by sending it to the trustee. Any money invested generates a return (*e.g.*, it is doubled or tripled.) The trustee, after receiving the multiplied money, decides whether to keep the money, or whether to return some to the trustor. A selfish trustor would send the trustee money only if she expects the trustee to return more money than was sent. Since, without such trust, a selfish trustor would be better off by keeping all the money for herself, Glaeser *et al.* consider the amount of money sent to the trustee as a measure of trust.

However, amounts invested in trust games do not necessarily isolate trust (nor would amounts returned by trustees cleanly measure the strength of reciprocity norms). Trust games reveal only how much purely *selfish* trustors trust—*i.e.*, measuring trust with this trust game assumes that no other motives explain acts of giving. But assuming that people are selfish (as trustors) and reciprocate (as trustees) is asymmetric. Moreover, this assumption is certainly at odds with the implicit notion that people trust because they are immersed in a normative universe. People can return money in the trust game out of fairness or inequality aversion rather than out of reciprocity. In the same manner, people can send money away as a trustor out of altruism as well as trust.[2]

Building on these insights, this paper attempts to disentangle norms of altruism, trust and reciprocity. Beyond its logical appeal, this decomposition of norms is potentially useful because different norms may have distinct economic impacts.

[2]Forsythe, Horowitz, Savin and Sefton (1994), Eckel and Grossman (1996), and Andreoni and Miller (2001) are among those who have shown that individuals will send money to others in similar experimental situations out of respect for these norms.

This paper then tests whether or not these different norms really matter (and matter differently) in terms of influencing people's capacity to get ahead economically, as the work on social capital has suggested. This matching of experimental data with real life data permits a deeper exploration of the meaning of norms, as well as of the meaning of experimental measures.

Several prior studies have implemented experiments designed to distinguish trust from altruism. Gneezy, Guth and Verboven (2000) analyze a modified trust game in which trustees' capacity to reciprocate is subjected to various limits. They find that trustors tend to send more money as constraint to the trustees' ability to reciprocate is relaxed. They infer from this result that amounts sent in the trust game reflect in some measure trust rather than exclusively altruism. In an approach related to that developed in this paper, Cox (2000) compares behavior in trust and dictator games. His finding that about 70% of the amount passed by trustors and returned by trustees can be explained by distributional or altruistic concerns ratifies our concern that amounts sent in trust games reflect altruism as well as trust.[3]

The remainder of this paper is organized as follows. Section 2 presents the experimental design and shows how trust and trustworthiness can be confused with altruism. We also show, in this section, how to use intra-personal comparisons of play in different games to measure the altruistic component of trustors' and trustees' decisions. Section 3 describes the experimental procedures, while section 4 presents the basic experimental results, derives measures of trust and altruism and tests for the presence of reciprocity norms. Section 5 looks at the relationships between normative behavior and economic performance. We conclude in the last section.

[3] Cox implemented several dictator games designed to duplicate elements of both trustor and trustee decisions. One dictator game had a price of giving equal to a third, reproducing a trust game in which the expectation of money being sent back is exactly equal to zero. A second dictator game included endowment for the receiver, reproducing the choice that a trustee has to make when he receives a positive amount of money, but effectively removing any motive for reciprocal behavior. Similarities between play in these dictator games with actual trustor and trustee play are the basis for Cox's conclusion that 70% of trust game behavior is the result of distributional concerns.

2. Altruism, Trust and Trustworthiness

We denote as 'purely selfish' the following representation of the trustor's decision in the trust game described in the introduction above:

$$\begin{aligned} \underset{x_s,x_o}{Max} \quad & \int_0^1 u(x_s + rx_o) f(r|\upsilon) dr \\ subject\ to & \\ & x_s + px_o \leq B^t \\ & p \leq 1 \end{aligned} \tag{2.1}$$

The trustor maximizes utility by allocating available funds between herself and her trustee partner. Here x_s is the amount of money retained by the trustor, and x_o is the amount of money that the trustor gives to trustee. The cost of keeping a unit of money is one, and the cost of passing one unit of money to the trustee is p. There is no enforceable contract that guarantees that any of the money passed to the trustee will be returned to the trustor. Let r, the return ratio, denote the (ex ante uncertain) percentage of funds that the trustee returns, and let $f(r|\upsilon)$ denote the probability function that describes the trustee's beliefs about the distribution of r, where υ denotes the parameters of that distribution.[4] Clearly the trustor will exhaust her budget, and substituting the budget constraint into the objective function permits the problem to be more compactly written as:

$$\underset{x_s,x_o}{Max} \int_0^1 u(B^t - \widetilde{p}x_o) f(r|\upsilon) dr \tag{2.2}$$

where $\widetilde{p} = (p - r)$ is the net cost of sending money to the trustee. If the return ration exceeds the gross price of giving ($r > p$), the $\widetilde{p} < 0$ and the trustor will earn a positive rate of return on money sent to the trustee.

The selfish trustee represented in (2.1) will only send money to the trustee if there is at least some chance that $\widetilde{p} < 0$. Under the simplifying assumptions of Cobb-Douglas utility ($u() = (1 - \alpha)\ln(B^t - \widetilde{p}x_o)$) and only two possible reciprocation levels (a high return, low price level $\widetilde{p}^L$, which occurs with probability ϕ^L; and, a low return, high price level $\widetilde{p}^H$, which occurs with probability $(1 - \phi^L)$, the altruistic trustor will choose the amount sent to the trustee according to the

[4]Note that ignoring non-game endowments ... up to a point will have symmetric influence on all games ....so not as horrible as sounds

following rule:

$$x_o^* = \begin{cases} 0 \ if \ E(\widetilde{p}) > 0 \\ \frac{B^T E(\widetilde{p})}{\widetilde{p}^L \widetilde{p}^H}, \ otherwise \end{cases} . \tag{2.3}$$

For a selfish trustor i, a measure of trust–understood as a high first and low second moment for the distribution of r–is the share of the budget that she sends to the other person, σ_i^t, defined as

$$\sigma_i^t \equiv px_o/B^t. \tag{2.4}$$

Interpersonal comparisons of σ^tbetween a person i and a person j would reveal reliable information on their expectations concerning $f(r|\upsilon)$ (assuming that the preferences of both individuals are adequately described by the Cobb-Douglas utility, or that differences in risk aversion are otherwise controlled for).

However, σ_i^t is not a good measure of trust if the trustor's preferences are not strictly selfish (*i.e.*, monotone in her own payoff). More precisely, σ_i^t no longer reflects expectations if trustors care about trustees, regardless of the possibility of reciprocation. To permit the possibility of altruism, we modify problem (2.1) by allowing utility to depend on own as well as other's payoffs:

$$\underset{x_o}{Max} \int_0^1 u(B^t - \widetilde{p}x_o, x_o(1-r))f(r|\upsilon)dr \tag{2.5}$$

Under this more general representation, an altruistic trustor who cares about the trustee might select $x_o > 0$ even if she expected no return from the trustee. In the simple Cobb-Douglas (where $u() = (1-\alpha)\ln(B^t - \widetilde{p}x_o) + \alpha\ln(x_o(1-r))$), $\sigma^t = \alpha$ when r is known to be zero. Inter-personal comparisons of trust measure (2.4) would in this circumstance confound trust with altruism.

Before developing an alternative measure that separates trust from altruism, it is useful to recast (2.5) in certainty-equivalence terms. In particular, not that the solution to (2.5) implicitly defines a certainty equivalent return ratio, $\widehat{r}(\upsilon, \alpha)$, defined as the return ratio which if known with certainty would lead to the same choices as problem (2.5) itself. In addition to depending on the moments of the probability distribution f as described by the parameters υ, this certainty equivalent return ratio will also depend on characteristics of the trustor's utility function denoted here by the parameter vector α. Using the certainty equivalent return ration, the trustor's problem can be rewritten as:

$$\underset{x_o}{Max} \ u(B^T - \widehat{\widetilde{p}}x_o, x_o(1-\widehat{r})),$$

where the certainty equivalent price of giving to the trustee is $\widehat{\widetilde{p}} = p - \widehat{r}$.[5] Note that $\widehat{r}$ (and $\widehat{\widetilde{p}}$) are attractive as trust measures as they capture how much an individual is willing to trust given expected returns, variance of returns and risk aversion.

2.1. An Intra-personal Comparison Measure of Trust Controlling for Altruism

In order to isolate the impact of trust on behavior, it would be useful to observe trustor behavior when no reciprocity is expected, *i.e.*, when the trustor assumes that $r(x_o) = 0$. Denote the budget share that trustor i would send conditional on an expectation of zero return as $\widetilde{\sigma}_i^t$. Using this conditional, or zero return budget share, a candidate measure of trust that controls for altruism would be:

$$\delta_i^t = \sigma_i^t - \widetilde{\sigma}_i^t. \tag{2.6}$$

While we will return later to consider the reasonableness of the simple budget difference (2.6) as a measure of trust that controls for altruism, (2.6) is an example of an intra-personal comparison measure which requires that we observe the behavior of person i under multiple scenarios. Also note that this measure presumes that the underlying preferences between her own material well-being and that of the other is not influenced by the game being played.[6]

While conceptually appealing, measure (2.6) requires that the trust game be played under the counterfactual expectation of zero-reciprocity so that $\widetilde{\sigma}_i^t$ can be measured. We here use a dictator game to approximate the situation in which trustors expect no reciprocity, and so estimate the degree of altruism on the part of trustors.[7] The dictator game is a simple allocation exercise that abstracts from the strategic considerations of the trust game (Forsythe et al. 1995; Andreoni and

[5] For a purely selfish, non-altruistic trustor this certainty equivalence reformulation of the problem breaks down as the selfish trustor under certainty will jump from one corner solution ($x_o = 0$) to the other ($x_o = B^t$) at $\widetilde{p} = 0$.

[6] It is possible that when playing the trustor role the individual adopts a less or more self-regarding attitude than they adopt when playing the dictator role. For example, if people are less self-regarding in the trust game (perhaps because they feel an obligation to help realize social gains), then (2.6) will overstate trust understood as a measure of expected returns. While this latter observation is interesting, if we are interested in characterizing norms that enhance a community's ability to take advantage of gains such as those presented by the trust game, it may matter little whether additional amounts sent reflect trust that the gains will be shared or simply a duty to help others realize potential gains.

[7] Some studies dispute whether amounts sent in dictator games capture altruism at all or

Miller, 2002). The dictator game consists of two players, a dictator and a receiver. The dictator is endowed with an initial endowment that she can either keep for herself, or allocate to the receiver at a price of giving, p. The receiver has to accept any decision made by the dictator.[8]

The dictator's decision can be represented as a restricted version of the trust game:

$$\underset{z_s,z_o}{Max} \quad u(B^d - \widetilde{p}z_o, z_o(1-r)) \tag{2.7}$$

$$subject\ to: \tag{2.8}$$

$$r = 0$$

Denote by σ_i^d the budget share that dictator (or restricted trustor) i allocates to the receiver, *i.e.*, $\sigma_i^d \equiv pz_o/B^d$. Since z_o itself depends on p and B^d, it follows that σ^d depends on p and B^d. Therefore, if the price of giving, p, and money available to the trustor, B^d, are the same in the dictator game as in the trust game (equation 2.1), σ_i^d would directly indicate how much a trustor gives to a trustee out of altruism alone, $\widetilde{\sigma}_i^t$. Adopting the difference measure (2.6), a possible implementable measure of trust free of altruism would be:

$$\delta_i^t = \sigma_i^t - \sigma_i^d. \tag{2.9}$$

As explained in section 3 below, the experimental evidence collected for dictator and trust games assumed different prices of giving and different budget constraints. In the dictator game, participants had a budget of 16 Rand (or

whether they reflect of the lack of experimental controls. Hoffman, McCabe, Sachat, and Smith (1994) show that an increase anonymity produces a sharp decline in the amount shared by dicators. Eckel and Grossman (1996) have shown that a likely reason for a decline in contribution is that double-blind treatments eliminate any social context that could justify sharing, not the lack of a desire to share. Research also shows that dictator games are very sensitive to the subject population. Carpenter *et al.* (2001) find that a group of workers shared on average half of their endowment, in contrast with one-third typically found in studies of university students. Our own research points out to the same fact, on average, people shared forty percent of their endowments.

[8]Since the maximum amount of money that the receiver can return is always zero, the dictator game is equivalent to a trust game in which no reciprocity is expected. There is a caveat, however, trustors could evaluate decisions based not only on trustee's choices but also on trustee's available choices (Sen, 1996; Rabin, 1993; Falk and Fischbacher, 1999; Rabin and Charness, 2000). Trustors would be more lenient with trustees that are not able to reciprocate than with trustess that choose not to reciprocate. If this is the case, measures of altruism may be biased upwards. In this paper, we abstract from this possibility.

approximately \$2) and faced a price of giving of $p = 1$. The budget for the trust game was 10 Rand and the price of giving was $p = \frac{1}{3}$. While the modest absolute difference in the budgets makes it unlikely that different income elasticities would influence amounts sent in the two game, the change in the price of giving is potentially more influential.

In the face of a changing price of giving, the pure altruism counterfactual trust share, $\widetilde{\sigma}_i^t$, can be therefore only be identified under an assumption about the elasticity of substitution, denoted here as ρ. To denote the dependence of this measure on both play in the dictator game and the elasticity of substitution, we denote the expected pure altruism trust share as $\widehat{\widetilde{\sigma}}^t(\sigma_i^d|\rho)$. Figure 2.2 displays $\widehat{\widetilde{\sigma}}^t$ as a function of amount sent in the dictator game for differing values of ρ, assuming that the dictator game is played with a price of one and the trust game is played with a price of one third. The solid forty-five degree line in the figure illustrates this relationship for the Cobb-Douglas case. In this case, any increase in the budget share sent in the trust game over the dictator game would be interpreted as a measure of trust purged of altruism.

If substitution were less elastic (*e.g.*, if preferences were Leontief such that $\rho = 0$), then the relation between $\widehat{\widetilde{\sigma}}^t$ and σ^d would be as shown by the flatter, dashed line in Figure 2.2. On the other hand, more elastic substitution ($\rho < -1$) would imply a steeper relationship than that implied by the Cobb-Douglas case. The uppermost dotted line in Figure 2.2 illustrates the case where $\rho = -3$.

As Figure 2.2 makes clear, an altruism-free measure of trust calculated using (2.6) is sensitive to assumptions about the elasticity of substitution. For example, observed budget shares of 40% in both the dictator and trust games would imply a trust measure of 25% under Leontief assumptions versus 0% under Cobb-Douglas assumptions. The assumption of even more elastic substitution would, in this hypothetical example, imply 'negative trust.'

While it may seem intuitively appealing to assume that the elasticity of substitution is no greater than one, Andreoni and Miller (2001) provide experimental evidence that the substitution is more elastic than the Cobb-Douglas case for a subset of the undergraduate students that they studied. These authors estimate that the actions of most of their experimental participants are consistent with one of three preference profiles. The behavior that would be predicted for each of these preference profiles in our dictator and counterfactual, zero reciprocity trust games are marked on Figure 2.2. Under the 'weak selfish' profile (which Andreoni and Miller estimate fits 47% of their sample), a person would exhibit an elasticity of substitution of -2.6 and dictator and trust shares of 5% and 22%, respectively.

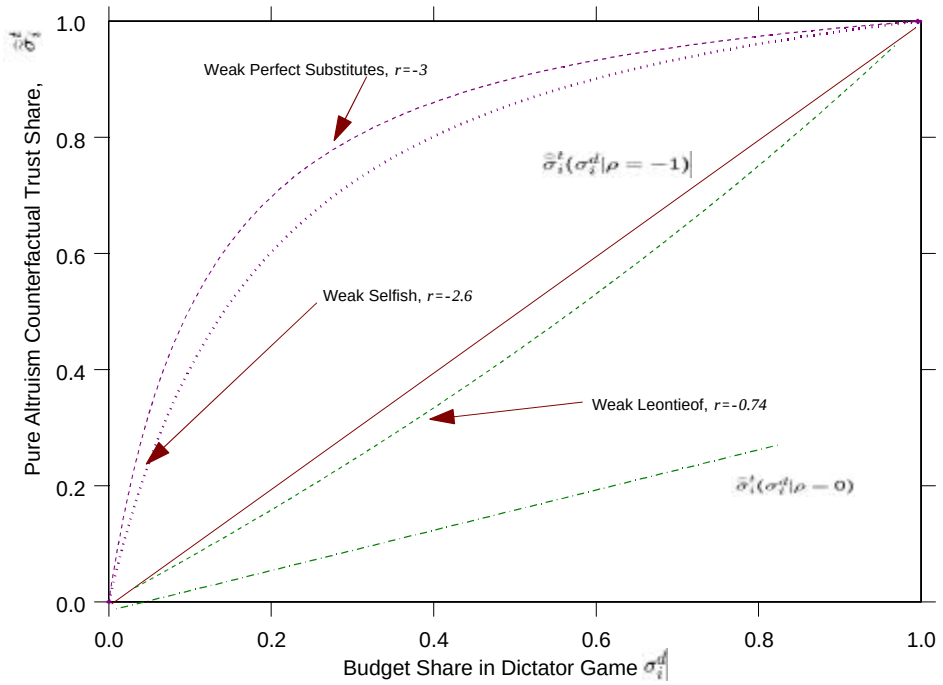

Figure 2.1: Expected Trustor Budget Shares under Pure Altruism Counterfactual

The 'weak Leontief' profile (30% of the Andreoni and Miller sample) has an elasticity of substitution of -0.7 and dictator and trustor shares of 39% and 32%. Finally, the 'weak perfect substitutes' profile ($\rho = -2.6$ and applying to 22% of the population) predicts dictator and trust shares of 27% and 78%. While these results indicate that some people substitute very elastically between themselves and others, the overall levels of altruism (as evidenced by the predicted dictator shares) are modest among Andreoni and Miller's undergraduate student population. As we shall see in Section 4, altruism is much higher in the South African participants in this study, making it difficult to infer preference parameters from the Andreoni and Miller results.

While the Cobb-Douglas, constant elasticity of substitution assumption is clearly non-trivial, it does yield a straightforward intra-personal comparison mea-

sure of trust. Defining the utility function as $u(B^T - \widehat{\widetilde{p}}x_o, x_o(1-\widehat{r}))$, the trust share will be $\sigma_i^t = \frac{p}{\widehat{\widetilde{p}}}\alpha$, implying that the difference trust measure (2.6) can be written as:

$$\delta_i^t = \begin{cases} \alpha(\frac{\widehat{r}}{\widehat{\widetilde{p}}}), \text{ if } \widehat{r} < \widehat{r}^{crit} \\ 1-\alpha, \text{ otherwise} \end{cases} . \tag{2.10}$$

where $\widehat{r}^{crit}$ is the certainty equivalent return rate that will lead the trustor to send the full amount of her budget to the trustee.[9]

2.2. An Intra-personal Comparison Measure of Trustworthiness

This section considers the impact of altruism on the trustee's decision that determine the return ratio, r. We propose that there are two types of norms that potentially regulate the trustee's 'self-regarding' passions and shape his return decision: norms of altruism and of reciprocity or trustworthiness. Specifically, we assume that the trustee chooses the amount to return to the trustor, R, in order to:

$$\underset{R}{Max}\ u(x_o - R, R + B^T - px_o - \beta B^T), \tag{2.11}$$

where the parameter β is between zero and one and measures the strength of norms that compel trustworthy behavior. Note that when these norms are high ($\beta = 1$), this mimics a Stone-Geary utility specification in which the trustee is minimally required to return px_o before he gains any positive utility ($\beta = 1 \rightarrow u(x_o - R, R - px_o)$). Such a strong norm of trustworthiness would be akin to saying that the trustee intrinsically respects the trustor's property rights over the amount sent him (px_o), and in effect is asking as if there he had a legally enforced obligation to repay those funds to the trustee (as he would under a formal loan contract).

At the other extreme, when norms of trustworthiness are weak ($\beta = 0$), the utility function in (2.11) reduces to $u(x_o - R, R + B^T - px_o)$ and the trustor would face a dictator problem where his partner (the trustee) is known to enjoy an endowment of $B^T - px_o$. Under this circumstance, the trustee's decision will be simply guided by his altruistic norms that guide his 'dictatorial' division of funds between himself and the trustee.

As these comments make clear, the budget share returned by the trustee to the trustor,

$$r_j \equiv R/x_o, \tag{2.12}$$

[9] Add more analysis here and, or graph.

will in general be influenced by both norms of altruism and trust. Paralleling the prior section's analysis of the impact of altruism on the trustor's decision, note that an altruistic trustee would be willing to return money to the trustor independent of the fact that he may feel obligated to return some of the money that was entrusted to him. While it may matter little to an individual trustee whether money is returned out of altruism or out of reciprocity, the larger economic impacts of these norms may be distinct. Analogous to prior section's analysis of trust, it is thus useful to define a purely altruistic counterfactual budget share, $\widetilde{r}_j$, that denotes the amount that the trustee would return to the trustor when no reciprocity norms were involved. Using this share, a candidate measure that would isolate the strength of norms of trustworthiness individual j, controlling for j's altruism would be:

$$\delta_j^r = r_j - \widetilde{r}_j. \tag{2.13}$$

Note that in environments of high altruism ($\widetilde{r}_j \to 1$), there is little scope for the operation of reciprocity norms to further enhance returns to the trustee. Like trust measure (2.6), (2.13) is also an intra-personal comparison measure.

In order to estimate the purely altruistic, counterfactual trustee budget share, we take advantage of the fact that (2.11) reduces to a dictator game with endowments when norms of trustworthiness are not operative ($\beta = 0$). The solution to this dictator game with endowments will not in general not be the same as the dictator game without endowments. If trustees care only about final payoffs, the fact that the trustor already has endowment of $B^T - px_o$ will reduce the amount of money that a trustee would otherwise allocate to the trustor. Consequently, the share sent by a trustee in pure dictator game will overstate the amount that trustee would return to the trustor under the counterfactual, zero reciprocity scenario. However, the amount that would be sent can be straightforwardly inferred from the pure dictator game under assumptions about the nature of the utility function.

The Cobb-Douglas case again gives a particularly straightforward representation of dictator play in the face of endowments. Assuming that trustee j's preferences can be represented by a Cobb-Douglas utility function of the form $u_j = (x_o - R)^{1-\alpha_j}(B^T - px_o + R)^{\alpha_j}$, the solution to problem (2.11) with $\beta = 0$ will take the following form:

$$R^*_{\beta=0} = \max\{0, [\alpha_j + (1-\alpha_j)p]x_o - (1-\alpha_j)B^t\}. \tag{2.14}$$

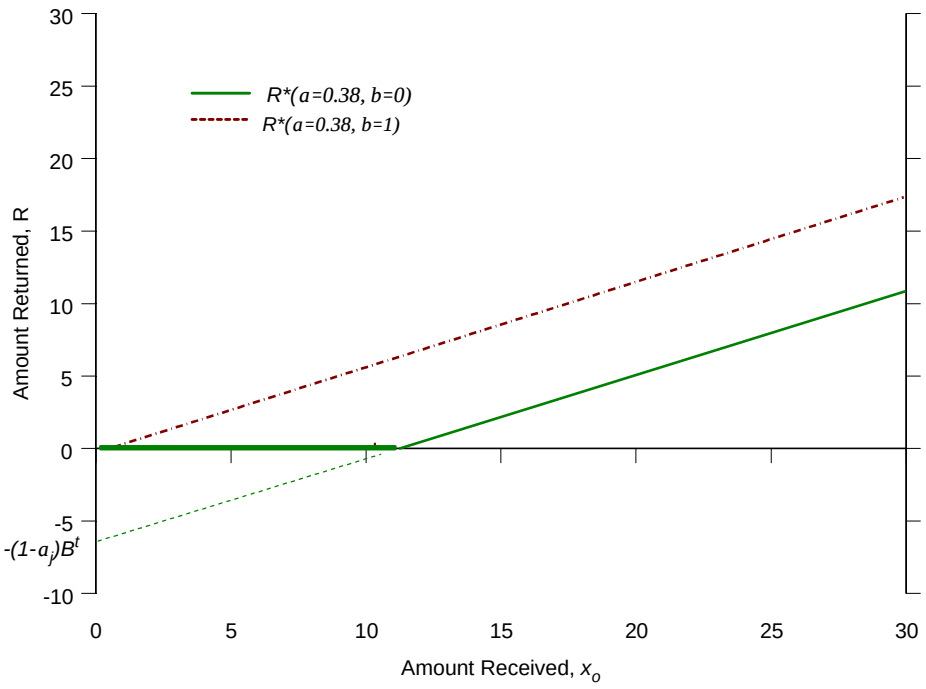

Figure 2.2: Trustee Decision under Pure Altruism Counterfactual

This pure altruism model of the trustee decision provides some interesting intuition. The solid line in Figure 2.3 graphs (2.14) assuming that $p = 0.33$, $B^t = 10$ and $\alpha_j = 0.38$.[10] First, as indicated by the intercept term $(-(1-\alpha_j)B^t)$ in both (2.14) and the figure, altruistic trustees will feel less compelled to redistribute to trustors the better endowed is the trustor. Second, the slope $(\alpha_j + (1-\alpha_j)p)$ is strictly greater than p (for $p < 1$), indicating that regardless of the trustee's altruism, he will always *marginally* repay more than the amount that the trustee sent to the trustor (px_o). The more expensive it was for a trustor to share with a trustee the kinder a trustee will be in returning funds at the margin.

The more general solution to (2.11) with unrestricted β yields the following

[10]The first two numbers are the parameters from the experimental design described below, whiel the third reflects the median level of altruism in revealed in our study.

solution for trustee j:

$$R^* = \max[0, [\alpha_j + (1 - \alpha_j)p]x_o + (1 - \alpha_j)(\beta_j - 1)B^T]. \tag{2.15}$$

As is clear from this expression, a norm of trustworthiness simply increases intercept of the return function. When those norms are strongest ($\beta = 1$), the return function has an intercept of zero. A purely selfish trustee ($\alpha_j = 0$) who was however bound by norms of trustworthiness ($\beta = 1$) would always return precisely what was sent to him ($R^* = px_o$). The return ratio will increase with altruism. The dashed line in Figure 2.3 displays the return ratio that would be chosen by a trustee with $\alpha_j = 0.38$ and $\beta = 1$.

Combining (2.15) with (2.14) permits us to define our desired intra-personal comparison measure of norms of trustworthiness:

$$\delta_j^R = r_j - r_{j\beta=0} = (1 - \alpha_j)\beta_j. \tag{2.16}$$

3. Experimental Procedures and Descriptive Results

As argued in the previous section, distinguishing trust and reciprocity from altruism requires intra-personal comparisons of behavior under different games. All experimental subjects were thus asked to play three games, one in the position of a dictator, one in the position of a trustor, and one in the position of a trustee. All data were collected in the province of KwaZulu-Natal in South Africa. An English version of the instructions can be found in the appendix. The experiments were conducted in Zulu except in the Indian community of Chatsworth.

The experiments were implemented in 14 separate South African communities, seven urban and seven rural. These communities were originally selected at random as part of the 1993 South African national living standards survey (PSLSD 1994 details the survey methodology). For the living standards study, approximately 20 households in each communities were randomly selected for an in-depth interview. In the KwaZulu-Natal province, these same households were re-interviewed in 1998. Forty percent of our experimental subjects were recruited from the respondents to the living standard surveys, while the other sixty percent were selected from other families in the same communities. Not more than one participant per household was allowed. All the participants were of 18 years of age or more and they were not told about experimental payments at the time of

recruitment.[11] The average age of participants was 43 years old, with 2 out of 5 being male. 25% of the sample was at least 57 years of age and 25% was at most 28 years of age. Participants had on average 6 years of education, with 25% of them having at most 2 years of schooling and 25% of them having at least 10 years of schooling. On average, there were 20 subjects per session. Two sessions were smaller (10 and 15 participants), and three sessions were larger (25 participants). All participants in each session belonged to the same neighborhood. On average, participants knew 30% of the people in the room by named. The average payment to a participant in the experiment was 37 Rand (R37, or around $5), which amounts to two-days wage in rural areas.

To play the dictator game, subjects were given 2 envelopes, one red and one blue. The red envelope contained R16 in R2 coins, and the blue envelope was empty.[12] To pass some of the R16 to another person in the room, subjects were instructed to pass it from the red envelope to the blue envelope. If a subject did not want to share any money, they were told to leave the blue envelope empty. To protect the privacy of subjects' decisions, they were given a 'privacy box,' a cardboard box that prevented other people from seeing their manipulation of envelopes. This 'privacy box' was used in all decisions thereafter. Before any decision was made, a flip chart was used to explain all the choices available to dictators. After everyone had a chance to make a decision, envelopes were collected,[13] shu- ed in front of everyone and assigned to new subjects. Careful attention was paid to delivering envelopes in a way that no subjects were able to know their content. The envelopes were not opened until the end of the session. Subjects did not know their payoff from previous decisions prior to making the next.[14]

[11] In two communities, people were aware that they would be paid a show-up fee for participating in the study.

[12] An appendix available from the authors reports the instructions read to participants and reproduces the various charts used to explain the game.

[13] Envelopes were collected in trails in order to minimize the contact that experimenters could have with them, and so minimize influencing subjects' decisions.

[14] The standard dictator game endows only the dictator, but not the recepient with money. In our game, everyone played both roles, raising the question as to why anyone would send money to another player who was also playing the dictator role. The fact that players as dictators did send significant amounts of money suggests that they were responding to a general norm that they should, and their neighbors would, share windfall gains with others in the community. Since they expected to receive money, dictators had to send money in order to achieve a desired payoff distribution. In their answers to a post-experiment questionnaire, many players further indicated that they sent money in the dictator game because they believed that other players needed the money more than they did.

To play the trust game, subjects were given 3 envelopes, one red, one blue and one green. The red envelope contained R10 in R2 coins, and the blue and green envelope were empty and stapled together. To pass some of the R10 to some other person in the room, subjects were instructed to pass it from the red envelope to the blue envelope. Subjects were told that any money put in the blue envelope was going to be tripled before being given to another subject. If the receiver wanted to return any of the tripled money in the blue envelope, they were instructed to use the green envelope to do so.[15] If a subject wanted to pass no money they were instructed to leave the blue envelope empty.[16]

Before any decision was made, a flip chart was used to explain the choices available to trustors.[17] Moreover, subjects were asked to fill out an empty chart expressing how much money they thought would be returned to them had they chosen to send each of the possible options shown there. After this exercise was completed, subjects were asked to make a decision. Envelopes were collected, money in them tripled and shu- ed in front of everyone to be assigned to new subjects. But before the blue and green envelopes were delivered, new flip charts were used to explain the possibilities available to trustees. In addition, an empty chart was given to everyone to be filled with the amount of money they thought they would have returned had they received any of the amounts listed there. After the charts were completed, subjects were given the blue and green envelopes with the tripled money. They were told to pass to the green envelope any money they wanted to return to the sender. Finally, decisions were recorded and the green envelopes returned to the senders. A post-experiment questionnaire was administered immediately after.

All subjects played as dictators first, then as trustors, and finally as trustees. This order of play could potentially bias results. Unfortunately, given the rigors of carrying out experiments in our South African field setting, we did not implement alternative orders and designs that could allows us to determine the size of this bias. The work of Harbaugh, Krause, and Liday (2000) with children suggests that dictator game giving would have been lower if the dictator game had been played after the trust game rather than before it. In an effort to insulate trustor

[15] Envelopes were coded to keep track of the origin and destination of an envelope. The coding was such that nobody knew which code was associated to the envelope sent or received.

[16] We should mention that our design differs with Berg et al. (1995) in that trustees act also as trustors. This is, all subject played the role of trustors. This should diminish the distributional concerns a trustor might have when deciding how much money to pass.

[17] An appendix that details the full experimental procedures and presents the visual aids used in the experiments is available from the authors.

decisions from play in the dictator game, our experimental protocol assures that the information that trustors acquired when playing the dictator game was the amount of money they themselves sent, not the amount of money that was sent to them (*i.e.*., participants could only check their earnings after the full set of games was completed). In addition, the price of giving and endowments were changed from the dictator game to the trust game. While these changes raise substitution elasticity issues as discussed earlier, we chose to make these changes to diminish the analogies between one game and the other and diminish the impact of order effects. However, in contrast to the trustor decision, it was impossible under our protocol to fully insulate trustees from possible order effects. In particular, trustees were in a position to compare their own behavior as trustors with that of the trustor who had sent them money.[18]

Our design included also an expectation elicitation stage. Eliciting beliefs about other players actions might have an impact on the way the game is played. Croson (2000) shows that in public good games and prisoner dilemma games people tend to play more accordingly to theoretical predictions when asked what they think their opponent will do. Croson's results imply that our measure of trust is biased downwards, since trustors would think more carefully about the incentives faced by trustees. Another potential problem of eliciting beliefs is that experimenters might lead subjects towards a particular way of playing the game. As shown in the appendix, we were careful to present multiple examples to minimize this possibility. Experimenters repeatedly stressed that decisions as well as responses were personal and that there was not a correct way to play the game. They also refused questions that were not a clarification of the instructions.

A third issue is whether or not the method of payment could have biased the results. Indeed, all subjects played all the roles making less salient the fact that some subjects have assets while others lack them. However, post-experiment questionnaires indicate that subject overwhelmingly regarded dictator's decision

[18] It might be worried, for example, that a trustee who had sent little money as a trustor would increase the amount sent as trustee if she discovered that her trustor had sent a much large share than she had sent as a trustor. Empirical analysis of this commonsense proposition in our data proves it to be false. The amount sent by a trustee actually decreases with the gap between what that individual had sent as a trustor and what she had received as a trustee. In fact, if we modify the reciprocity problem (2.8) to take into account that the trustee and trustor are both known to be playing two roles, we find that the amount sent by the trustee will decrease with the this gap, assuming that the trustee infers from the gap that others are more trusting and generous than she is. The empirical evidence is thus consistent with a distributional story, but not with a conditional cooperation story (nor with a social interaction story).

as an issue of equity. With regard to the trust game, subjects' main reasons explaining there actions divided evenly between issues of equity and reciprocity. In addition, if subjects felt less the urgency to give as dictators, we would argue that our measure of altruism is biased downwards. If so, our argument that issues of altruism may be confused with trust and reciprocity would remain valid.

As a prelude to subsequent econometric analysis, the remainder of this section will explore the basic results from a descriptive statistical perspective.

3.1. Trust and Altruism

As reported in Table 3.1, mean (median) budget share sent by trustors in the trust game was 53% (60%). Over 70% of the subjects sent between 40% and 60% of their budget to their trustees. At the aggregate level, we cannot reject the hypothesis that the share passed is equal to 50%. These results resemble previous experiments using the trust game (Berg *et al.*,1995; Gneezy, Guth, and Verboven, 2000). However, as Table 3.1 also shows, the average amount passed varied across the 13 communities where the experiments were conducted, with the median amount sent ranging from 40% to 60%.

Table 3.1
Altruism, Trust and Reciprocity Measures

		% Budget Shares Sent as:			Intra-personal Comp Measures	
	N	*Dictator* σ^d	*Trustor* σ^t	*Trustee* r	*Trust* δ^t	*Reciprocity* δ^r
Full Sample Measures	283					
Mean		42	53	38	11	13
Median		38	60	33	10	13
Medians by Community						
Umlazi	19	25	40	33	23	25
Mpumalanga	15	25	40	33	3	33
Imbali	18	38	40	33	15	25
Mpakama	21	38	60	42	10	17
Kwamashu	19	38	60	33	23	11
Madadeni	21	38	40	33	5	15
Umzumbe	10	38	40	33	3	30
Kwabrush	17	38	60	50	18	21
Emkimdini	25	38	60	33	23	8
Buxeden	25	38	40	33	3	15
Chatsworth	20	50	60	39	1	6
Dundee	25	50	60	42	5	4
Okhlahlamba	23	50	40	33	0	8
Nkandla	25	50	60	42	10	8
		Individual Correlation			Community Correlation	
$\rho(\sigma^d, \sigma^t)$		0.38			0.43	
$\rho(\sigma^d, \sigma^r)$		0.18			0.36	
$\rho(\sigma^t, \sigma^r)$		0.25			0.66	
$\rho(\delta^t, \delta^r)$		0.44			0.13	

However, these relatively robust shares sent in the trust game do not necessarily reflect the existence of trust, understood as an expectation that trustees will return funds to trustors. As discussed in Section 3 above, amounts sent in the trust game may in part reflect the trustor's altruistic regard for others rather than purely an expectation of reciprocal behavior by the trustee. Indeed, levels of altruism among this population appear quite high as measured by the dictator game. Figure 3.1 duplicates Figure 2.1 except that we have projected onto it

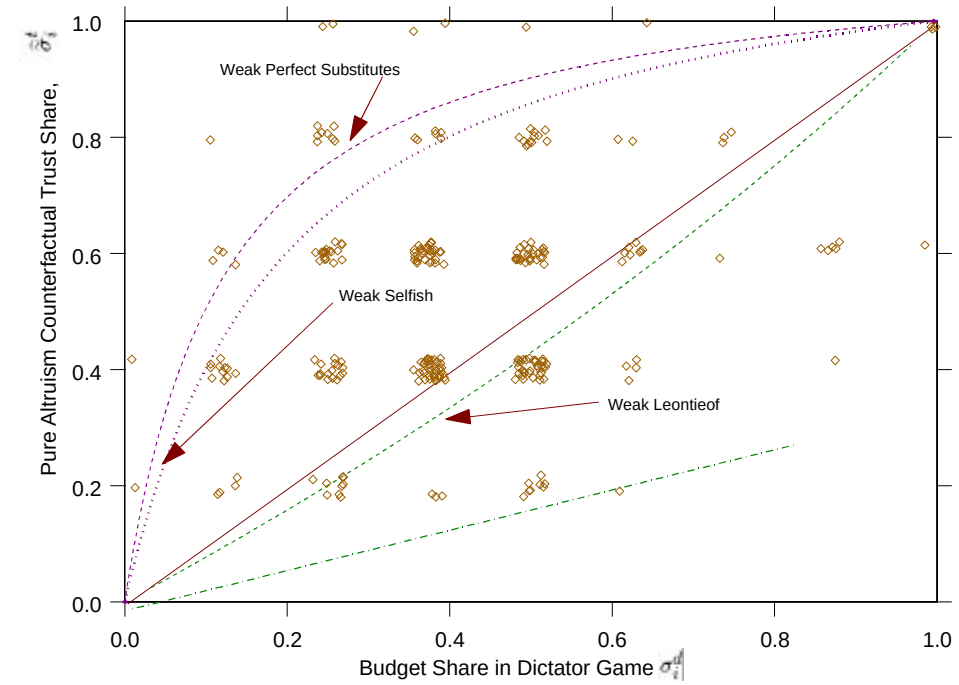

Figure 3.1: Behavior in Altruism and Trust Games

the actual budget share data points from the dictator and trust experiments.[19] The average share sent in the dictator game, σ^d, is 42% (versus 53% in the trust game). As can be appreciated from the figure, nearly all experimental participants sent larger dictator budget shares than would be predicted by any of the stylized Andreoni and Miller preference profiles discussed in section 2.1.

Under the assumption that trustors have a unitary elasticity of substitution between money for themselves and money for trustees, the 45-degree line in Figure 3.1 represents the predicted trust game shares that would be sent by a trustee who expected the trustee to return nothing to her. As can be appreciated visually, most observations lie above the 45-degree line. Fully 70% of the subjects sent

[19] Since choices in both games are discrete, the graph shows "jittered" data, i.e., a random component has been added in order to show graphically where the population is concentrated.

away a larger share in the trust game than in the dictator game.[20] Assuming unitary elasticity of substitution, our intra-personal comparison trust measure that controls for altruism, δ^t, averages 11% in the sample. We cannot reject the hypothesis that this measure is greater than zero.

Before looking more closely at further evidence on the veracity of this trust measure, it should be recalled that we would expect to see $\sigma^t > \sigma^d$ even in the absence of any trust if the elasticity of substitution were greater than one. The zero expected return trust shares, $\widetilde{\widetilde{\sigma}}^t$, that would be predicted under the higher substitution elasticity values identified by Andreoni and Miller are again displayed in Figure 3.1. As can be seen, under these higher substitution elasticity values, trust would not only be nonexistent for most of the sample, but it would actually have to be negative (*i.e.*., people give less when there is a possibility of return than they do when there is no possibility of return). On these grounds, higher substitution elasticities seem unlikely. Indeed, the only elasticity of substitution assumption envelopes the data from below, and rules out 'negative trust,' is a Leontief assumption. Further support for the notion that other norms beyond altruism are driving the trust results comes from the observation that the correlation between the share passed in the dictator game and the share passed in the trust game is a modest 0.38. While we cannot incontrovertibly rule out higher or lower substitution elasticity values, we will in the remainder of this analysis base our trust measure on a Cobb-Douglas, unitary substitution elasticity assumption.

3.2. Trustworthiness Norms and Altruism

The amount of money returned by trustees in the trust game is likely shaped by altruism and reciprocity. From a selfish trustor's point of view, however, this distinction is immaterial. A trustee is trustworthy if, for some trustor's investment, he returns as least as much as trustor original investment (i.e., $R > px_o$). Under our experimental design where $p = \frac{1}{3}$, if the trustee returns less than one third,

[20] It might be worried that the difference between trust and dictator shares is an artifact of the relatively limited number of discrete choices available in the trust game where trustees had to choose between sending 0%, 20%, 40%, 60%, 80% and 100% to trustees. Options were more varied in the dictator game where the available choices were 0%, 12.5%, 25%, etc. However, while 36% of subjects passed 20 percentage points of their endowments more as trustor than as dictators, only 8% of subjects sent 20 percentage points of their endowments more as dictators than as trustors. This asymmetry indicates that the increase in the share sent in the trust games cannot be explained solely by the experimental design.

than a selfish trustor would have been better-off by not sending any funds to the trustee.

Figure 3.2 shows the data points from our experiments projected onto Figure 2.2 (the data points have again been jittered–see note 18). Most of the data points lie above the break-even line, as 42% of the subjects chose to return more than $\frac{1}{3}$, while another 38% of subjects returned exactly a $\frac{1}{3}$ budget share to the trustors. Only 20% of trustees returned less to their trustor than she had originally sent, and the average budget share returned was 38%. This result is quite remarkable if we note that this intertemporal exchange is not incentive compatible. Trustees have no incentive to return any money, since unless everyone returns nothing to trustors, they remain anonymous.

While most trustees proved trustworthy, it is not clear whether this behavior results from the already noted high levels of altruism, or whether it reflects they are statistically different from each other as the hypothesis that they are equal is rejected by Fisher's exact test.[21] Consistent with the notion that norms other than altruism are operative is the modest 0.18 correlation between dictator (altruism) shares and trustor shares.

A more precise decomposition of the trustee behavior into altruistic and reciprocity components is possible using the prediction from the model of purely altruistic behavior (2.12). Overall, 71% of subjects returned more as trustee than the purely altruistic model of the trustee decision predicts according to equation (2.12).[22] This purely altruistic model predicts that 23% of subjects would have returned a zero share as trustee based on their revealed levels of altruism and the modest amounts sent to them by their trustors. (As can be seen in Figure 4.2, a trustee with a median level of altruism would have returned zero to the trustor anytime he received less than approximately 10 Rand.) In fact, only 3.5% of trustees returned zero budget shares to their trustee. The measure of reciprocity net of altruism measure, δ^r, has median and mean values of 13%. The correlation between this measure and the trust net of altruism measure, δ^t, is 0.43. The

[21] It is interesting to notice that the difference in distributions is explained by the behavior of trustees receiving less than R18 from trustors. Indeed, the distribution of budget shares of dictators and trustees for the subsample of subjects receiving R18 or more as trustees is statistically indistinguishable.

[22] We may again worry that this result is an artifact of the discrete choices avaialble to individauls. However, 46% of the subjects returned, as trustees, a budget share that was at least 20 percentage points more than the altruistic model would have predicted. Only 10% of subjects returned, as trustees, a budget share that was at least 20 percentage points less than the altruistic model would have predicted.

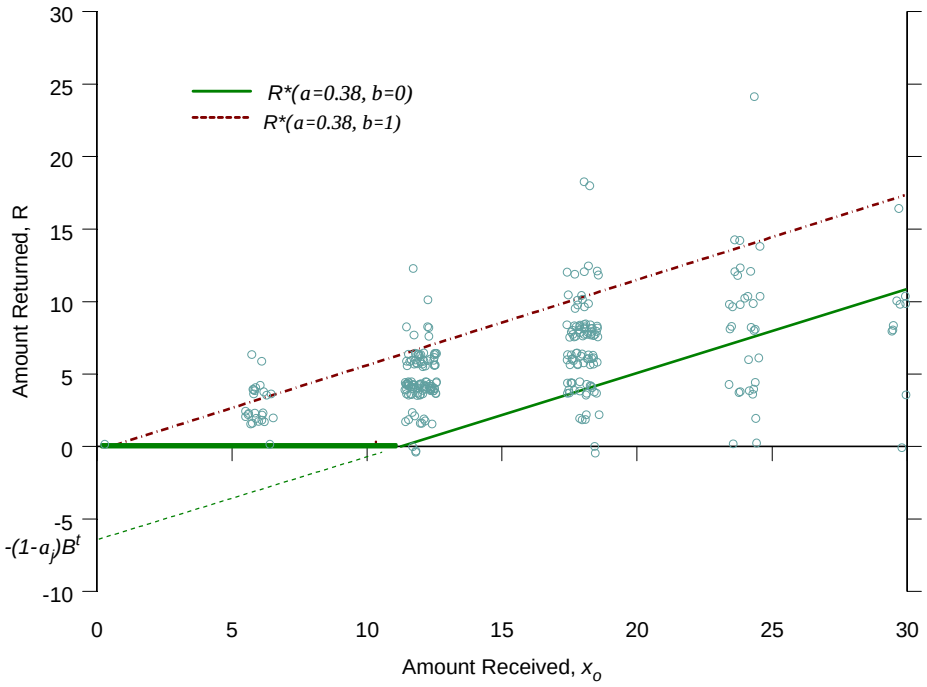

Figure 3.2: Trustee Decision

magnitude of this correlation, which exceeds that between the other pairs of norm measures, lends further support to the idea that in there is an effective norm of reciprocity that shapes individual's behavior in their roles as both trustees and trustors.

4. A Social Interactions Model of Norms of Altruism, Trust and Trustworthiness

A basic premise of this paper is that we can use experiments to measure the strength of different social norms. The measurement of the strength of social norms could then allow us to determine if these norms help understanding the

disparities of communities otherwise considered similar. Unlike economic experiments carried out with random groupings of college students, the games described in the prior section were played with groups of individuals drawn from the same community. This feature permits us to ask if communities are in fact typified by a distinctive normative environment such that we can meaningfully say that some communities are, say, more trusting than others. Support for such a statement would seem to be necessary before we can move on and ask the social capital of trust (and other norms) operates as an independent factor on the incomes and livelihood possibilities of people within communities. Finally, note that because our experiments were played without repetition and reputation effects, the results should reflect underlying and durable moral norms of behavior (see the discussion of Platteau in the introduction for the distinction between moral and social norms).

4.1. The Econometric Framework

In experimental sessions, people's behavior reflects not only personal characteristics and the norms one abides by, but also the characteristics and the norms others abide by. A priori, we do not know if experiments capture people's expectations of others' actions or simply the underlying socio-economic characteristics of those participating in the experiment. This problem is not an issue when experiments are performed with homogeneous populations (e.g., college students), but it is a problem when applied to heterogenous populations. This indeed weakens our capacity to make comparison across sessions.

For instance, a person playing the dictator game will likely not only take into account the endowment given to him to his household income, but also compare them to the income of the others participating in the experiment with whom he might share it. More generally, participants might want to assess their relative standing in the community before making a decision (perhaps, relative age or relative education). This suggests that even if people's propensity to share or help others is independent and identically distributed, we might expect that behavior in experiments correlate with socio-economic characteristics of the community in which the experiment takes place. Community income might be positively correlated to experiments results even if norms plays no role in the determination of income itself.

Norms, as measured by the average behavior in experiments at the community level, might be correlated to individual income because all participant face the

same environment, and not necessarily because all participants follow the same social norm. Or, because they share the same characteristics. The usefulness of experiments in determining the importance of social norms in people's ability to make a living therefore depends in determining whether behavior is due to a common unobserved environment or genuinely due to the action of social norms.

We use the econometric model below to present the identification problem common to the assessment of the impact of social interactions on economic outcomes (Manski 1993, Durlauf 2001).

$$
\begin{aligned}
A_i &= a_1 + x_i' b_1 + E[z_{g(i)}]' c_1 + \alpha_1 E[A_{g(i)}] + \delta_1 E[Y_{g(i)}] + u_1 \\
T_i &= a_2 + x_i' b_2 + E[z_{g(i)}]' c_2 + \alpha_2 E[A_{g(i)}] + \gamma_2 E[R_{g(i)}] + \delta_2 E[Y_{g(i)}] + u_2 \\
R_i &= a_3 + x_i' b_3 + E[z_{g(i)}]' c_3 + \alpha_3 E[A_{g(i)}] + \gamma_3 E[R_{g(i)}] + \delta_3 E[Y_{g(i)}] + u_3 \\
Y_i &= a_1 + x_i' b_1 + E[z_{g(i)}]' c_1 + \alpha_1 E[A_{g(i)}] + \beta_4 E[T_{g(i)}] + \gamma_4 E[R_{g(i)}] + u_4 \\
& E[u_i | x_i, g(i)] = e_{j,g(i)}, i = 1, 2, 3, 4
\end{aligned}
$$

We denote the amount sent by person i in the dictator game by A_i, and T_i and R_i, represent i's decision in the trust game as a trustor and as a trustee respectively. Y_i represents subject i's household per-capita income. The vector x_i represents the socio-economic variables affecting i's decision and income. The vector $E[z_{g(i)}]$ represents the expected value of exogenous socio-economic variables in i's reference group, $g(i)$. Accordingly, $E[A_{g(i)}], E[T_{g(i)}], E[R_{g(i)}]$, and $E[Y_{g(i)}]$, represent the expected value of the endogenous variables at i's reference group level. u_{ji} is an error term that could potentially be influenced by a common i's reference group characteristic, $e_{j,g(i)}$.

The model makes clear that subjects' behavior, or income, might replicate its own reference group behavior due to possibly three reasons: people try to emulate their reference group behavior (α_i, β_i, and γ_i are different from zero), people in a group interact with the same type of people (c_j and δ_j are different from zero), or people in a group face the same environment or possess similar characteristics ($e_{j,g(i)}$). In the presentation above, we have separated $E[Y_{g(i)}]$ from the other contextual variables to make explicit that income is an endogenous if the theory of social capital is valid. The level of altruism might depend on the expected income of the recipient, but it is also possible that the level of altruism affect the reference group ability to undertake common project or sustain informal agreements.

It is known from Manski (1993) that identification of endogenous social interactions (i.e., parameters α_i, β_i, and γ_i) might fail if the variables determining one's behavior also determine one's environment. That is, if the variables in vectors x_i and $z_{g(i)}$ coincide. Indeed, if we take expectations of the above equations with respect to i's reference group, $g(i)$, and solve for the variables on the left hand

side, we will find that:

$$E[A_{g(i)}] = \theta_1 + E[x_{g(i)}]'\phi_1 + E[z_{g(i)}]'\rho_1$$
$$E[T_{g(i)}] = \theta_2 + E[x_{g(i)}]'\phi_2 + E[z_{g(i)}]'\rho_2$$
$$E[R_{g(i)}] = \theta_3 + E[x_{g(i)}]'\phi_3 + E[z_{g(i)}]'\rho_3$$
$$E[Y_{g(i)}] = \theta_4 + E[x_{g(i)}]'\phi_4 + E[z_{g(i)}]'\rho_4$$

This means, that if the model above is true, it must be the case that the expectations of group behavior must be a linear combination of the expected value of contextual and individual variables. If the variables in vectors x_i and $z_{g(i)}$ coincide, then $E[A_{g(i)}], E[T_{g(i)}], E[R_{g(i)}]$, and $E[Y_{g(i)}]$, will be perfectly colinear with other regressors, making identification impossible. To identify social interactions we need to impose exclusion restrictions such that some variables affect the individual but do not determine the context in which decision are taken. Moreover, we will need as many exclusion restrictions as social interactions we want to identify. That is, at the aggregate level, we have a system of simultaneous equations, and different restrictions on x_i and $E[z_{g(i)}]$ for each equation amounts to exclusion restrictions for each of these equilibrium equations.

The system of equation above represent a natural first-stage estimation of the norms and expected per capita income at the community level [23]. This would require regressing expected norms and per-capita income at the community level on contextual and individual variables. In the context of this paper, this approach is impractical. The main reason is that by defining reference group by the community as a whole, we are restricting the analysis to a total of 14 communities [24]. More importantly, the sample of experimental subjects and households interviewed do not match exactly, which implies that not all variables of interest are available at the individual level [25]. An alternative approach, and the one we followed in this paper, is to instrument for the expected value of norms and income at the community level and use these estimates to assess the impact of different norms at the individual level. Additionally, we might want to control individual level variables for the value of $E[x_{g(i)}]$, since this will affect subjects' behavior if the model holds true. We will instrument the value of the community norms and community expected per-capita income with variables that affect each of these

[23] Indeed, a second stage, since the expectations at the reference group level are estimated by the sample mean.

[24] Alternatively, we can assume that subject's reference group is smaller than the community of residence at large. Indeed, most people interact in smaller groups, as churches, saving groups, burial societies, etc.

[25] We collected information after the experimetal session was over. But the information collected is not as detailed as the information from household surveys.

variables but not the others.

4.2. Instrumental Variable Regressions for Community Norms and Income

The estimation above required that the community average play in the experimental sessions as well as the community average expenditure be replaced by indicators free of the endogeneity problem. This was necessary not only to be able to make a claim on the impact of social capital on income but to assess the validity of the use of experiments to measure the strength of social norms. The table below show the regressions used to predict the value of norms and income. Altruism was instrumented by the average of people's trust on extended families and by the average size of family acquaintances. Both measured by household level data collected in 1998. Trust was instrumented by the average number of assaults a household suffered by people outside the household and by the standard deviation of income at the community level in 1993. Decisions by trustees was instrumented by the average perception of the increment in violence in the household and the number of assaults. Finally, per-capita income in 1998 was intrumented by the level of income in 1993.

Instrumental regression for norms and income	
Altruism	
Constant	0.068 (0.11)
No. of family and friends	0.02 (0.01) *
Trust on extended family	0.07 (0.03) **
	$Adj - R^2 = 0.4596$
Trust	
Constant	1.03 (0.55) *
Assaults by non-household members	-0.37 (0.26)
Variance of expenditure (93)	0.39 (0.19) *
	$Adj - R^2 = 0.3281$
Reciprocity	
Constant	0.518 (0.053) **
Frequency of assaults	-0.017 (0.009) *
Perception of violence at home	-0.0403 (0.021) *
	$Adj - R^2 = 0.2485$
Per-capita Income - 1998	
Constant	-0.34 (0.39)
Per-capita Income - 1993	1.101 (0.07) **
	$Adj - R^2 = 0.7780$

4.3. Econometric Estimates of the Social Determination of Norms

The descriptive analysis in the prior subsections suggests that while altruism is high amongst participants in our experiments, there are norms of trust and reciprocity that influence behavior above and beyond what would be expected based on altruism alone. This section solidifies this insight with econometric analysis of the trustee and trustor decisions.[26]

Table 4.2 shows the regression estimates of the share sent by participants in their roles as dictators, trustors and trustees. The estimation follows the discussion on identification above and section 3. For the trustor decision, the purely altruistic model (under the assumption that the trustor has a unitary elasticity of substitution between money kept for herself and money for the trustee) pre-

[26]We also investigated decisions taken in the dictator game. As in previous experimental research (Eckel and Grossman, 1998; Andreoni and Vesterlund, 2001, Croson and Buchan, 2001), we found that women tend to be less selfish than men. We also see that amounts passed in the dictator game were not affected by the familiarity of the subject with other participants. Market depedence as evidenced by food self-sufficiency does not significantly influence altruism.

dicts that the budget share sent to the trustee will equal the budget share the individual sent as dictator in the dictator game. This prediction implies that for trustor j, the intercept of the regression should be zero and that the coefficient on the term σ_j^d should be one. We can see that the intercept is significantly different from zero, and that the point estimate for the slope of the equation with respect to the decision as trustor is significantly different from 1. Same holds for the trustee's decision. More importantly, the coefficient associated with the term $(1-\sigma_j^d)(\frac{B_T}{x_o}-p)$ is significantly different from zero. This rejects the hypothesis that trustee's behaves according to the simple model of altruism developed in section 2, since the parameter should be one and minus one respectively.

Table 4.2a

	Money Sent to Other as:		
	Dictator	*Trustor*	
		Basic	*Augmented*
Altruism Variables			
Constant	-0.19 (0.18)	0.36 (0.03) **	0.73 (0.33) **
σ_j^d		0.39 (0.06) **	0.40 (0.07) **
Community Characteristics			
Altruism	0.88 (0.25)**		-0.55 (0.28)*
Reciprocity			0.01 (0.48)
Percapita expenditure	0.03 (0.03)		-0.05 (0.03)**
Reciprocity Expectations			
% who will Reciprocate	0.01 (0.04)		0.07 (0.04)*
Returns if send R8, $r(8)$	0.10 (0.07)		0.15 (0.07)**
Demographics			
Age	1E-3 (9E-4)		2E-3 (9E-4)**
1=Male, 0=Female	-0.07 (0.03)**		-5E-3 (0.25)
Years of Education	-5E-3 (4E-3)		9E-3 (4E-3) **
Social Assets			
% of Acquaintances	0.04 (0.04)		0.01 (0.05)
Economic Status			
Per Capita Income	0.021 (0.06)		0.008 (0.06)
Food self-sufficiency	0.000 (0.013)		-0.033 (0.013)**
Misunderstanding			
Mistakes' size	0.013 (6E-3)**		0.009 (0.006)
$Adj - R^2$	0.1263	0.1357	0.1900

Standard Errors in parentheses

Table 4.2b

Money Sent to Other as:

	Trustee	
	Basic	*Augmented*
Altruism Variables		
Constant	0.20 (0.04) **	0.11 (0.28)
σ_j^d	0.28 (0.06) **	0.25 (0.06) **
$(1-\sigma_j^d)(\frac{B_T}{x_o}-p)$	0.06 (0.02) **	0.06 (0.02) **
Community Characteristics		
Altruism		-0.11 (0.24)
Reciprocity		0.59 (0.4)
Percapita expenditure		-0.04 (0.02)*
Reciprocity Expectations		
% who will Reciprocate		0.07 (0.03)**
Returns if send R8, $r(8)$		0.11 (0.06)*
Demographics		
Age		3E-4 (7E-4)
1=Male, 0=Female		-0.02 (0.02)
Years of Education		6E-4 3E-3
Social Assets		
% of Acquaintances		0.04 (0.04)
Economic Status		
Per Capita Income		-0.04 (0.05)
Food self-sufficiency		0.01 (0.01)
Misunderstanding		
Mistakes' size		0.01 (5E-3)**
$Adj-R^2$	0.0833	0.1371

Standard Errors in parentheses

This implies that trustees will diminish share returned to trustors as the

amount received increases. This result contradicts any model of altruism if utility is monotone in own and others' payoff, or any model of reciprocity. As discussed above, we extended the model to include the possibility that behavior be affected by others behavior or other characteristics. The decision as dictator and as trustee, the measure of altruism and reciprocity, seems to be clearly influenced by the expectations of others actions. The decision as trustor seems not to follow closely the community expected behavior. It is interesting to notice, that subject actions are negatively correlated with the expected income of others. This result is consistent with a model of altruism as the one presented in section 2.

These results support the idea that altruism and reciprocity acts as a social norm, in the sense that it responds to the expectations of others level of altruism and reciprocity[27]. The evidence for the norm of reciprocity is much weaker though. It suggests also, that trust decision correspond more to subjects' expectations of other actions than to the actual level of reciprocity shown by others. Indeed, after we control for the expectations of others actions, the estimated level of reciprocity play little role in the determination of how much money trustors return. This means that subjects' guesses of others' actions are probably out of equilibrium (which would make the identification problem detailed above less severe).

5. The Economic Value of Norms and 'Social Capital'

Interest in the economic value of social capital—which Robert Putnam (1995:67) defines as "...features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit"—has grown with the accumulating evidence that intertemporal markets are systematically weak, missing or non-price rationed in many low and middle income countries, and that the absence of these markets can severely retard and distort the distributional consequences of economic growth.[28] While Putnam's and other similar definitions have been criticized because they tautologically define social capital in terms of its effects (*e.g.*, see Durlauf 1999 and Portes 1998), quantitative empirical efforts have had to struggle with the problem of measuring social capital separately from its putative good effects.

As described in the introduction to this paper, prior empirical efforts have

[27] This result does not change if we control for the expected value of the individual characteristics in the regressions. That is, if we include $E[x_{g(i)}]$ in the regressions presented above.

[28] Bannerjee and Newman (1992) and Eswaran and Kotwal (1986) are among the classic theoretical demonstations of this point.

either relied on social associational density indicators as signals of the depth of trust, or they have relied on surveys that ask respondents to self-report trust in neighbors, local institutions, *etc.*. While both these approaches suffer from fundamental weaknesses, our use of economic experiments to characterize the normative environment in different South African communities opens the door to novel microeconometric analysis of the impact of norms on the ability of individuals to succeed materially in South Africa's liberalized, post-apartheid economy.

5.1. Meaning and Measurement of Social Capital

While there is considerable controversy over Putnam's and other broad definitions of social capital (and indeed, over whether social capital is even a useful concept—Bowles, 1999), a less ambitious approach is to define social capital as norms that enhance the incentive compatibility of non-contractual or legally unenforceable exchange. Prime examples of such exchanges include time-sensitive transactions such as informal loans and mutual insurance arrangements. In such transactions, a good (credit or insurance) is delivered today without legal recourse should the recipient fail to repay the loan or reciprocate with mutual aid when the need arises in the future.

The trust game used in this study is in an analogue for legally unenforceable, time-sensitive exchange. If we were to rewrite the first constraint in problem (2.1) as:

$$x_o = (B^t - x_s^t)\pi, \tag{5.1}$$

then the trust game would appear as a loan of amount $B^t - x_s^t$ from trustor to trustee; $\pi = 1/p > 1$ would be the gross rate of return on the trustee's investment project; and, the return function, $r(x_o)$, would be the legally unenforceable loan repayment from trustee to trustor. Put this way, we might indeed expect that communities in which trust is high as revealed by our experiments, would also be communities in which norms of trust and reciprocity facilitate real non-contractual loans and other time-sensitive exchanges that facilitate households' ability to generate economic livelihood in the presence of imperfect markets. Moreover, as Platteau (2000) argues, strong sharing norms akin to our altruism measure, may actually act as a tax and diminish the ability of households to generate livelihood.[29]

[29] It can also be that altruism will underwrite risk-taking and hence improve the investment and livelihood climate.

In order to investigate these propositions, we follow the basic approach suggested in Narayan and Pritchett's (1998) study of Tanzanian households. Narayan and Pritchett regress household per-capita expenditures (as a measure of material well-being) on a set of basic control variables (household size, location and human capital) and on social capital variables. They measure the latter with an index meant to capture the quantity and quality of associational life (the number of social groups and how well they function). In order to test whether social capital is an individual or community level phenomenon, they include both a household-specific measure as well as a community average measure in their regression specification.

Narayan and Pritchett's OLS estimates show that the community social capital measure has a strong positive effect on a household's realized level of per-capita expenditures. Worried about simultaneity bias (*i.e.*, higher expenditures may explain greater participation in groups and association, rather than vice versa), Narayan and Pritchett employ a two-stage regression procedure in which they instrument for their associational density social capital measure using self-reported trust measure.[30] They find that even after controlling for the endogeneity of associational life in this fashion, community level social capital continues to have a significant effect on households' material well-being.

For the analysis here, we use the KwaZulu-Natal Income Dynamics Study (KIDS) data that were collected from households in the same communities where we undertook our economic experiments. Prior analysis of KIDS households has shown that financial market constraints appear to strongly limit the ability of households to generate a livelihood (see Carter and May, 1999), suggesting that there is indeed space for social capital to make a difference by enhancing households' ability to access credit and insurance. Indeed, two prior studies of social capital using the KIDS data (Maluccio *et al.*, 1999, and Haddad and Maluccio, 2000) find that social capital indeed appears to significantly enhance households' ability to generate livelihood. The first of these studies uses a social association index akin to that used by Narayan and Pritchett, while the latter study uses self-reported trust measure. For reasons discussed in the introduction, both of these measures are problematic, and neither is likely to have isolated the effects of trust and other norms per se.

[30] In using these instruments, argue that the norms of trust are econometrically exogenous to any individual household's level of well-being.

Table 5.1
OLS Estimates of the Economic Impact of Norms
Dependent Variable: Logarithm of Household Per Capita Expenditure

Community Norms	
Altruism	1.373 (0.706) *
Trust	1.479 (0.854) *
Reciprocity	0.454 (1.25)
Economic Assets	
Education of Household Head	0.076 (0.012) **
Productive Assets 1993 (log)	0.0262 (0.009) **
Demographic Characteristics	
Household Size (log)	-0.69 (0.06) **
Gender of Household Head (male=1)	0.116 (0.072)
Age of Household Head (log)	0.013 (0.003) **
Community Characteristics	
Location (urban =1)	0.64 (0.093) **
Constant	3.82 (0.78) **
Adjusted R^2	0.5543

* Significant at the 10% level
** Significant at the 5% level

5.2. Econometric Estimates of the Effects of Trust in South Africa

Finally, we would like to investigate the role that social norms, as measured by experimental data, have on the determination of income. The regression below shows a regression of expenditure on assets and on norms, where the last ones are the same estimates used in the analysis of experimental data. The interpretation of the model below is direct since the measure of the strength of norms are not correlated among them by construction.

Following the poverty and living standards literature, we use per-capita household expenditures as a measure of livelihood and material well-being. Table 5.1 displays OLS estimates of three alternative models of household living standards.

6. Conclusions

Empirical analysis of the economic significance of trust and reciprocity has been hampered by the difficulty of measuring these norms. Consistent with the suggestions of Camerer and Fehr (2001) and Carpenter (2001), this paper has turned to experimental methods to solve this measurement problem. However, we have argued that to measure trust and reciprocity with experimental methods, we first need to know how much people intrinsically care for others. We have thus utilized a multi-stage experimental design that permits us to form intra-personal comparison measures that allow us to distinguish trust and reciprocity from altruistic caring for others. Application of this experimental design in a set of South African communities reveals that altruism, trust and reciprocity are distinguishable and that the proposed measures are sensible in that they reveal a normative consistency at both the level of individuals and communities.

In taking experimental methods out of the lab and into the field presents a number of problems and limitations. Our measures of trust and reciprocity purged of altruism have depended on specific assumptions about the structure of utility functions. While this structure can in principle be estimated (as Andreoni and Miller, 2002 demonstrate), the challenge of experimentation in the field makes this more difficult. But, in taking this design outside the laboratory, we have also probed the usefulness of experimental methods to inform ongoing debates about the ability of social capital and relations of trust to substitute for imperfect markets in poor communities. Taking advantage of a recently conducted living standards survey conducted in the communities where we carried out our experiments, we were able to explore the impact of norms on the ability of households to generate livelihoods.

While our econometric findings are still preliminary, we do find that while individuals' play in trust game is shaped by their level of altruism, independent norms of trust and trustworthiness clearly are also clearly operative and can be distinguished from altruism using what we call intra-personal comparison measures. We also find evidence that local communities share a normative environment in the sense that community norms shape individual norms, controlling for shared contextual effects. Finally, we find at best weak evidence that the social capital of community norms enhance the capacity of households to generate livelihoods.

In the final analysis, we hope that these findings will motivate further use of experimental methods to explore questions of social capital. By learning to measure trust and related concepts more clearly, we can begin to make better

progress on understanding the determinants of trust and ultimately understand the factors that shape access to social capital.[31]

[31] If access to the social capital of trust is stratified by class, linguisitic group or ethnicity, then social capital may work poorly as an avenue of upward mobility in 'corellated societies' such as South Africa in which economic status and ethnic identity are strongly related (see Figueroa, 2001). In this case, what Stewart (2001) calls horizontal inequality (inequalities between culturally formed gropus) will tend to perpetuate conventional economic (vertical) inequality.

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