The development of trust and social capital in rural Uganda: an experimental approach

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Abstract. Trust is important for development but can be hard to build. In this paper, we report on experiments designed to understand the determinants of trust in villages in eastern Uganda, and in particular whether trust can be 'built' by offering insurance to people as a protection against the possibility that the trust they offer will not be reciprocated. We find, firstly, that the effects of income and wealth on trust are ambiguous: trust is higher in the richer than the poorer village, but once association and female education are added as explanatory variables, the wealth effect disappears. Secondly, although the offer of insurance is taken up by a majority of players, this is in most cases not an 'effective demand' in the sense of incentivising higher levels of trust. Effective demand for insurance, defined in this way, however responds positively to high levels of risk efficacy, microfinance membership and female education. Insurance offered in this form, therefore, is by no means a reliable technology for building trust; but its effectiveness as a trust-building instrument appears to increase if certain complementary institutions are in position.

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1. Introduction

Trust is valuable, notably in low and middle income countries where its absence may lead into a lethal vicious circle of impoverishment[1]; but unlike physical and indeed human capital, it cannot be bought in any market. How then can it be created?

Experimental games between human beings have been quite widely used to demonstrate the existence of trust even in low-income communities, but they have not yet tackled the problem of how to bring it into being, other than by the standard social-capital route of facilitating association within networks. The global set of experiments from fifteen developing countries reported in Henrich et al. (2000) between them fundamentally undermine the axioms of the self-interested Rational Economic Man[2], but do not speculate concerning how the more altruistic rationality which they discover shrinks and expands – or could be made to expand. But in principle the possibility for understanding this exists, either by correlating the levels of trust which are discovered with their potential causes, or by varying the experimental procedure so as to provide incentives to higher trust. In this paper, we adopt both approaches.

The point of departure is provided by a trust experiment originally carried out by Abigail Barr, who modified the original Henrich procedures for use in Zimbabwe. Specifically, Barr's trust game (Barr 2003) is adapted for the conditions of Zimbabwean villages from a prototype developed by Berg, Dickhaut and McCabe('BDM',1995) whose purpose was to study the determinants of willingness by individuals to make investments in others; both authors use the game to study the influence of experience of social interaction on trust. The structure of the trust game is very simple: individuals play in pairs selected by the experimenter. Within each pair, player 1 is allocated a stake, of which s/he can if she chooses invest a proportion in the other player, whose identity is not known to her. The amount invested by the first player is then tripled and handed over to the second player. The second player then decides whether she wishes to hand anything back to the first player. That is the end of the game. Because the game is as short as this and because players do not know who they are playing with, there is no possibility for people's reputations or knowledge of one another to contaminate the results. All first players who venture an investment in the other player are aware that they are open to exploitation by that player, but also that they are

[1] Some of the starkest claims made for social capital relate to the recent experience of recession and *perestroika* in Russia, in which, it has been alleged, 'those who have access to social capital get ahead; those who do not get sick and die' (Kennedy et al 1998: 2039).

[2] 'The canonical model (i.e. that individuals are entirely self-interested) is not supported in any society studied. Second, there is considerably more behavioural variability across groups than had been found in previous cross-cultural research, and the canonical model fails in a wider variety of ways than in previous experiments' (Henrich et al. 2000:73)

increasing the size of the common pool which is available for redistribution (Barr, 2003).

2. Replication of the 'trust game'

The trust experiments: design

The data for this study are from Uganda, a country with similar per capita GDP to, although a very different historical background and productive structure to, Zimbabwe; and were collected In August 2003 from fifteen groups of twelve or thirteen people (a total sample size of 186) in two villages on which we already hold extensive data on economic characteristics, risk attitudes and social histories (Horrell et al 2003) which potentially might offer insight into the correlates and determinants of trust . Salient features of these villages, Sironko and Bufumbo, are reported in Table 1:

Table 1. Characteristics of the research locations

	Sironko	**Bufumbo**
Height above sea level	1100m	1600m
Type of agricultural land	Lowlands at the foot of Mount Elgon, marshy plain in the South, savannah grassland in the North, few volcanic soils	Highlands on the slopes of Mount Elgon, volcanic soils
Agricultural calendar:		
Major rains	March-June	March-June
Major harvest	July	July
Minor rains	Aug-Sept	Aug-Oct
Minor harvest	October-November	November
Average rainfall	1580mm/year	2168mm/year
Population size	6400	15285
Population density	300/km^2	550/km^2
Casual agricultural labourers (% of population)	27.3%	1.3%
Main crops	Bananas, maize, groundnuts, beans	Bananas, maize, beans, coffee, tomatoes, cabbages, onions
Typical plot size	2-3 acres (see further Table 7.)	1-2 acres (see further table 7.)
Large farms (>20 acres)	5%	0%
Average household income (monthly per equivalent adult)	Sh 83039($43)	Sh 43492($22)
Tribes	Iteso (immigrants from Kumi) and Bugisu (indigenous)	Bugisu (also called Bamasaba in Bufumbo)
Religion	Predominantly Christian (Catholic, Protestant, pentecostal)	Islam(80-90%)
Roads	Good quality tarred motor road south to Mbale and north to Kapchorwa, poor quality dirt roads otherwise	Dirt roads, often steep, four-wheel drive only in bad weather
Schools	One secondary school, four primary schools	One secondary school, eight primary schools
Clinics	Two private health centres in Sironko.	
Electricity	85%	0%
Extension services	Uganda National Farmers' Association, Mbale (not very active in Sironko)	Uganda National Farmers' Association, Mbale (very active in Bufumbo)

Non-agricultural employment opportunities	Trade, hotels and bars in trading centre, ginnery, processing plant for maize, abattoir, mechanics	Trade (mostly in Mbale town), beekeeping
Access to credit	Centenary Bank (individual loans) PRIDE, FOCCAS (group micro-credit for women)	Restricted access to credit. Group microcredit only (Centenary Bank has withdrawn)

Source: Muzaki 1998; background reports compiled on request by Mbale local government officers. Particular thanks to Patrick Natanga (formerly extension officer in Bufumbo)

Within these settings, we organised eight sessions of the trust game involving 67 pairs of players (33 in Sironko and 34 in Bufumbo)[3]. The Bufumbo sessions were on Wednesday 27 and the Sironko sessions on Thursday 28 August, 2003. As previously explained, the identity of each Player 1 was secret to each Player 2 and vice versa, and all players were mandated to inform nobody, not even their families, how they had played. A full rubric for the games we organised is provided in the appendix to this paper.

Table 2 presents an overall picture of the decisions of first and second players in our trust game in relation to those designed by BDM in the United States and by Barr in Zimbabwe.

[3] A remaining 52 members of the sample (26 pairs) played an 'insurance game', a modification of the trust game, on which we report below.

Table 2 Trust game: Responses by first and second players in the United States, Zimbabwe and Uganda

	US: Berg et al. 1995	Zimbabwe: Barr 2003	Uganda: This study
Number of playing pairs	32	141	67
Initial endowment size	10 US $	20 Zimbabwe dollars	4000 Ugandan shillings (c.$2)
Proportion of first players who invested zero	0.06	0.09	0.07
Mean investment for first players	5.16US$	8.58 Zim$	0.9 US$
Mean investment as proportion of stake	0.52	0.43	0.49
Mean response (expressed as a proportion of investment)	0.89	1.28	0.99

We can first of all report, almost routinely, that trust is alive and well in Eastern Uganda as in the locations of the other surveys reported by Hemrich et al –. Both the mean investment of first players (49% of the available stake) and the mean response by second players (99% of the first player's initial investment) are in between those observed by Barr in Zimbabwe and those observed by BDM in the United States.

Determinants of trust

In seeking to understand the determinants of trust, BDM and Barr both use the trust game to investigate the influence of 'social history' on trust – in the Barr case by comparing first and second player responses as between communities who had lived together a long time and communities which were recently resettled and thus lacked a social history. Our own interest is at this stage focussed on the influence not only of social history but specifically of the experience of poverty – since if that inhibits the formation of social relations that is an additional twist in the spiral – and also of policy variables which may incentivise mutual trust, and in particular insurance. A fuller discussion of trust-building is provided by Mosley et al.(2003), chapter 6.

Our point of departure is the distinct patterns of response which are observable *within* the Uganda sample as between the richer village (Sironko) and the poorer village (Bufumbo), as portrayed in Table 3. In Sironko, people are more trusting, and their responses cluster around a modal interaction in which the first player invests Sh2000, and the second player reciprocally gives back also Sh 2000, or one-third of this amount tripled. In Bufumbo, the poorer village, people are less trusting and their responses cluster around a modal interaction in which the first player invests Sh1000, and the second player reciprocally gives back also Sh 1000, or one-third of this amount tripled. In Bufumbo first players are much more willing to insure themselves against the possibility of being exploited by the second player, in a manner to be described later in the paper.

Table 3. Sironko and Bufumbo: initial conditions and behaviour in the trust game

	Whole sample	*Sironko*	*Bufumbo*	*t-stat for difference between sample means* (and associated significance level)
Initial conditions				
Risk efficacy (assets) index	1.06	1.10	1.02	0.91
Average landholdings in acres	2.45	2.89	1.90	3.12*** (0.002)
Mean income per equivalent adult (Ushs; 1$ = 1,850 Ushs)	61,613	83,039	43,492	3.04*** (0.003)
Average trust game scores(proportions of Sh4000 initial stake) (N = 134 or 67 pairs of players)				
Player 1(s)	0.49	0.54	0.44	1.69* (0.096)
Player 2(r)	0.47	0.78	0.26	5.02*** (0.000)
Proportional response(r/s) for all $s_i > 0$	0.99	1.43	0.66	5.27*** (0.000)

Source: trust experiments 27 and 28 August; for interview protocol see Appendix.

. All this points to a possibility that higher levels of income may be not only (as argued for example by Narayan and Pritchett (1999) a consequence of higher levels of trust but also a cause of them. Indeed, although what matters for risk-aversion, on the analysis of Mosley et al (2003), is vulnerability, what appears to matter for trust, on the basis of the *prima facie* evidence presented in Table 3, is income, which along with land-holdings is the key discriminator between the two villages. *Average* vulnerability is not very different between the two villages; essentially, as illustrated by Table 1, Sironko is a more developed and differentiated economy, with, in particular, a much larger underclass of casual, extremely vulnerable unskilled labourers,

and as a consequence its average vulnerability score is marginally *higher* than Bufumbo's, even though average levels of income and landholding are also much higher.

In order to better understand the various influences bearing on trust, we consider the following determinants of trusting and trustworthy behaviour in a regression analysis.

- Measures of well-being, in particular income and physical assets. As we have noted, Narayan and Pritchett (1999) assume that the link between trust and income is exclusively one from trust to income. By contrast, our experimentally obtained data, in which income and assets are in effect pre-determined variables (see below), allow us to isolate a direction of influence the other way about.

- Measures of human capital. That education helps to create social capital is a finding so far mainly examined and confirmed in industrialised countries. Appleton (2001) quantifies the individual return on education for Uganda. In a portfolio model of capital accumulation, human and social capital are likely to be complementary: it pays more to invest in networks when one's level of education gives access to more rewarding employment opportunities (Glaeser et al. 2002). There may therefore be an important indirect payoff from the enormous investment put into schooling by the Ugandan government in recent years.

- Measures of association. The large database on our subjects compiled in the two years preceding the experiments on which we currently report contains various indicators of the degree in which households and individuals are linked with other households and individuals and with society at large. The indicator most relevant for our present purposes is a measure of *bonding social capital*. It captures the number, nature and intensity of reciprocal links between households. For details of its construction see Horrell et al. (2003).

- Measures of incentivised trust. A reasonable expectation of reciprocity – Player 1's expectation of Player 2's response – would increase the likelihood of trusting behaviour. We will explain below in what way we consider this reasonable expectation to be formed by determinants from the previous three categories. By contrast, in the next section we examine what happens to trust and trustworthy behaviour when, through an external intervention, a *guarantee* of reciprocity is substituted for a reasonable expectation.

Econometric identification in this type of analysis requires careful estimation. With social capital (trusting and trustworthy behaviour; intensity of association) and 'effort' (risk-taking and thence income, expenditures and assets) contemporaneously determined, recovering model parameters is seldom achieved (cf. Durlauf 2002). However, experimentally obtained data

permit a convenient short-cut (cf. Glaeser et al. 2000). Subjects' outside-the-laboratory circumstances and characteristics, though still as a matter of course *influencing* their behaviour once inside the laboratory, become fully contextual, therefore pre-determined, and may be treated as exogenous for estimation purposes[4]. But the short-cut should not be taken too hastily. Whilst trustworthy (Player 2) behaviour responds to a known initiative, trusting (Player 1) behaviour second-guesses a response. Player 1's beliefs about Player 2's secret preferences for reciprocity will in part be based on levels of actual reciprocity she has observed in her village, and in part – because the experiment is unlike anything she has ever experienced in her village – on her knowledge of what she herself would do in secret: in other words, trusting behaviour is in part a projection of one's own trustworthiness (cf. Orbell and Dawes 1993), and in part the sort of *leap of faith* required when 'mere prediction' is an inadequate basis for action (cf. Lewis and Weigert 1985: 970, 976). Econometrically this boils down to using the coefficients obtained from a regression of Player 2 behaviour in order to form an empirical analogue of the unobserved Player 1's expectation of Player 2 behaviour. Trust in the sense of 'projecting one's own trustworthiness' is then imputed by inserting Player 1 characteristics (naturally apart from her actual offer) into the Player 2 regression equation: this exercise tells us what our model predicts a typical Player 1 with precisely these characteristics would do if she were in Player 2's shoes. The regression of Player 1 behaviour then becomes a second-stage regression with as its only argument the *expectation* of reciprocity constructed as just described, an expectation which itself depends on the individual-specific determinants of trustworthy behaviour that we have postulated. Trusting behaviour in the sense of 'a leap of faith exceeding mere prediction' corresponds with the (positive) residuals that this regression implies.

Table 4 reports the results of this regression analysis, with the first player offer (s), the second player response (r) and the ratio of the two (r/s), as in the Barr analysis, as dependent variables. Contrary to what we had surmised when comparing Bufumbo and Sironko in Table 3, income and assets now appear, once associational social capital and education are held constant, as *negative* influences on trustworthy behaviour and therefore, through Player 1's expectation of Player 2's behaviour – itself significantly positive – as a negative influence on trusting behaviour. This evidence on its own does not permit one to conclude that one success factor in becoming rich in this society is a willingness to take advantage of others, but nor is such a reading of the evidence ruled out. Our measure of bonding social capital, as expected, is a positive influence on trust and reciprocity, and so is *female* education (but not male education – tried but not reported on here). It is possible that female education proxies for a social capital indicator that captures membership of self-help groups: educated women tend to belong to these more often. When we included both female education and a self-help group membership dummy neither was significant, and when we included this dummy on its own, it was significant. Because of our priors we report female education in the table. The

[4] The downside of the *de facto* exogeneity of certain choice variables is that experimentally obtained trust data are not particularly suitable for explaining the formation of associations. In Section 4 we therefore complement the analysis with questionnaire-based trust data – which of course come with their own limitations (cf. Glaeser et al. 2000).

difference between Bufumbo and Sironko that we noted in a more superficial comparison in Table 3 survives a more rigorous comparison: the coefficient on the Bufumbo = 1 dummy is large and hugely significant.

Table 4. Correlates of trust: regression analysis

	Dependent variable and estimation method					
	Player 1 offer (s)		***Player 2 response (r)***		***Proportional response (r/s)***	
Independent variables	***2SLS***		***OLS***	***OLS***	***OLS***	***OLS***
Constant	1626.3*** (9.533)		1963.4*** (3.382)	1982.7*** (3.768)	1.996*** (7.333)	1.932*** (7.659)
Bufumbo = 1			-1967.1*** (-5.375)	-2207.4*** (-6.158)	-0.798*** (-5.124)	-0.868*** (-5.617)
Player 1 offer			0.585*** (3.136)	0.527*** (2.918)	-0.000* (-2.136)	-0.000* (-2.378)
Expectation of Player 2 response	0.276*** (2.693)					
Assets: Total (risk efficacy index)			-636.9 (-1.582)		-0.297* (-1.764)	
Income per equivalent household member				-0.005** (-2.432)		-2.03E-06* (-2.082)
Bonding social capital			410.8** (2.141)	352.4** (2.067)	0.147* (1.821)	0.123 (1.647)
Female educational level			1494.7*** (2.680)	1321.5** (2.510)	0.377 (1.640)	0.291 (1.316)
R^2	0.117		0.592	0.620	0.474	0.489

N	67		67	67	67	67

Source: data from trust experiments, August 2003, in association with Uganda database.

Note: *the variable 'Player 1 expectation of Player 2 response' is computed as: 1982.7 – 2207.4*(Bufumbo =1; Sironko = 0) – 0.005*(monthly income per equivalent adult) + 352.4*(bonding social capital) + 1321.5*(female education), inserting Player 1 characteristics into the best-performing Player 2 regression. For details of and the rationale behind this procedure see the text.*

3. The 'insurance game'

Many of these apparent determinants of trust are not easy for policy-makers or outside authorities to influence, and it is therefore natural to look for expedients which might augment people's degree of trust. One obvious possibility is insurance: if first players were protected in some way against the possibility of exploitation by the second player, they might have more incentive to invest in her, and such protection is what insurance, in principle, provides. Accordingly, for some groups of players (who did not play the trust game and are kept separate from those who do) we modify the Barr/BDM game into an *insurance game:* first players are told that if and only if they commit to investing Sh1000 or more in the other player, they can lay off some of the potential loss by paying a Sh 1000 premium to an 'insurance company' (the administration of the game), in the event that any amount invested in the second player and not returned is guaranteed to come back to them – net, of course, of the insurance premium. The existence of an insurance facility thus potentially acts as an incentive to first players to increase their trust in others[5], much as tax exemptions are used to incentivise charitable donations. Does this form of incentive work in practice?

The initial results, as illustrated in table 5, are unexpected and somewhat depressing. There is plenty of willingness to insure, but across the sample as a whole, greater trust (in the sense of first-player offers) is shown by those who are not offered insurance! For anyone whose purpose is to incentivise mutual trust it is important to understand this paradox.

[5] Note that if the first player chooses to buy insurance s/he sacrifices not only a 'tax' on gains, in the shape of the insurance premium, but also the possibility of maximum gains, since it is no longer possible to invest the maximum stake of Sh 4000 in the second player – Sh 1000 must be sacrificed to pay the insurance premium.

Table 5. Insurance game: the impact of insurance (first player offers as a proportion of initial stake).

	Overall	Sironko	Bufumbo
Pure trust game (no insurance available) N = 134 (67 pairs of players)	0.49	0.54	0.44
Insurance game (insurance available) N = 104 (52 pairs of players)	0.43	0.51	0.34
t-stat for difference between sample means (and associated significance level)	2.193** (0.035)	1.720 (0.105)	2.136** (0.049)

Insurance game background data:

Number of players: 104 individuals, 52 pairs of players: 26 in Sironko, 26 in Bufumbo

Takers of insurance: 52% in Sironko, 82 % in Bufumbo

First players offering zero: 5.9 %

Again we begin the search for a solution by making the contrast between the 'less developed' and the 'more developed' village. We observe that in the poorer village, Bufumbo, the *demand* for insurance is higher but what may be called the *effective demand* (its ability to elicit higher levels of trust in the players) is lower, with player 1 offers in the presence of insurance being considerably and significantly lower than what they are in its absence: so in Bufumbo, by contrast with Sironko, the offer of insurance appears to act as a perverse incentive. Is it poverty, or risk-aversion or some descriptive effect which is bringing this about? Note first that once insurance is taken out, less is available for Player 1 investment (cf. footnote 5 above). In the second place, incentivising trust gives rise to complex motivational dilemmas with possibly detrimental effects for the society's moral fabric (cf. Titmuss 1970), for example as follows. At a superficial glance it would appear that the rational strategy for a Player 1 who has taken out insurance is to invest the full

remainder (Sh 3,000) of his initial endowment, since this can be done without taking any risks. However, such a strategy acts as a signal to Player 2 that probably insurance has been taken out, and that therefore she need not return any of the money offered. By investing Sh 3,000 Player 1 therefore reduces the likelihood that she will obtain a return on her investment rather than just her money back. By implication, Player 2, guessing that Player 1 may well reason like this, may even interpret a lower offer as an albeit weaker signal that probably insurance has been taken out[6]. Moreover, as is routinely found in ultimatum games (Guth and Tietz 1990, Roth et al. 1991, Henrich 2000), subjects dislike being taken advantage of to such an extent that they tend to forfeit even certainties of individual gain when this implies a perceived unfair distribution of gains among players. The notion that Player 2 may free-ride on her taking out insurance may therefore further suppress Player 1's offer. The risk of exploitation is much higher in Bufumbo than in Sironko: approximately 30% of Players 2 in Bufumbo and less than 5% in Sironko returned zero, both in the trust game and in the insurance game. The similarity of these percentages across the two games suggests that Players 1 have overall been effective in avoiding signalling that they had taken out insurance. The way giving this signal was avoided in Sironko was that all Players 1(100%) who took out insurance offered Sh 2,000 to Player 2. In Bufumbo 50% of Players 1 who had taken out insurance only offered Sh 1,000! All the others offered 2,000, with one brave exception offering 3,000, who, true to form, was duly returned zero by his Player 2 counterpart. All of this suggests that the ability of insurance to elicit trusting behaviour is particularly tricky in a context in which the hazard one is insured against is other people's non-cooperation, and that insurance may crowd out people's pure preferences for altruism and reciprocal behaviour (cf. Titmuss 1970).

In Table 6, we therefore run regressions with 'effective demand', our measure of the leverage of insurance (the player 1 offer in the insurance game, net of the average player 1 offer in the absence of insurance) as the dependent variable. Income and assets, as we had surmised, are weakly significant influences on insurance leverage – the offer of insurance only begins to elicit higher levels of trust once a certain income threshold is crossed[7]. But, interestingly, social capital in the sense of associational membership *detracts from* and does not add to the effectiveness of insurance. As illustrated by the bar chart of Figure 1, those individuals who were most strongly incentivised by insurance had very few associational memberships, whereas those who were strongly networked often had many. Interviews with the 'outliers' strongly supported the initial impression that (experimentally offered) insurance and (actual) social capital might be acting as substitutes for one another. Respondent 235, for example (who appears as a highly incentivised outlier on Figure 1), told us, 'I can only be trusting if I know there is an [insurance] organisation behind me, *because I cannot rely on any [informal] association to*

[6] These considerations are not far-fetched. Anyone supposing that illiterate and semi-literate small farmers in a poor-country context do not engage in such mind games would be mistaken: from the debriefing interviews we know that our subjects reasoned precisely along these lines (Paul: Sara told me this when we phoned her from your office).

[7] Indeed, effective demand for insurance appears to be kinked (Figure 2 below) – there is very little demand for it at low levels of income.

protect me (interview 28.08.03;emphasis added). The implication would appear to be, firstly, that one cannot rely on insurance as a magic lubricant for markets which have seized up to break into the vicious circle of poverty – even if the pent-up demand for it is considerable, it would not appear to automatically increase trust and investment rates, particularly among the poor. And secondly, the effectiveness of this lubricant is apparently *diminished* and not increased by high levels of social capital – which, in a way, can be seen as a substitute for formal insurance.

Figure 1: mean values of insurance-induced trust by number of associational memberships

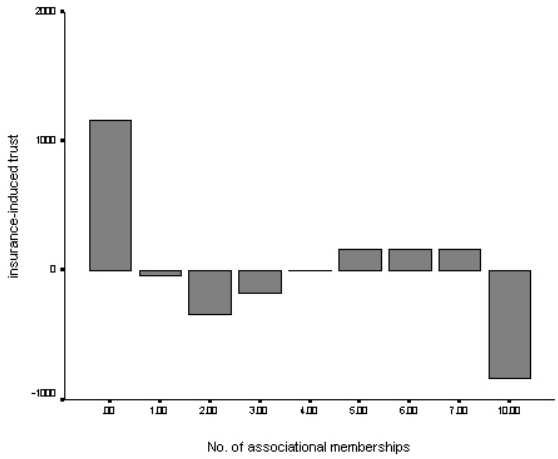


Figure 2: mean values of insurance-induced trust by income category

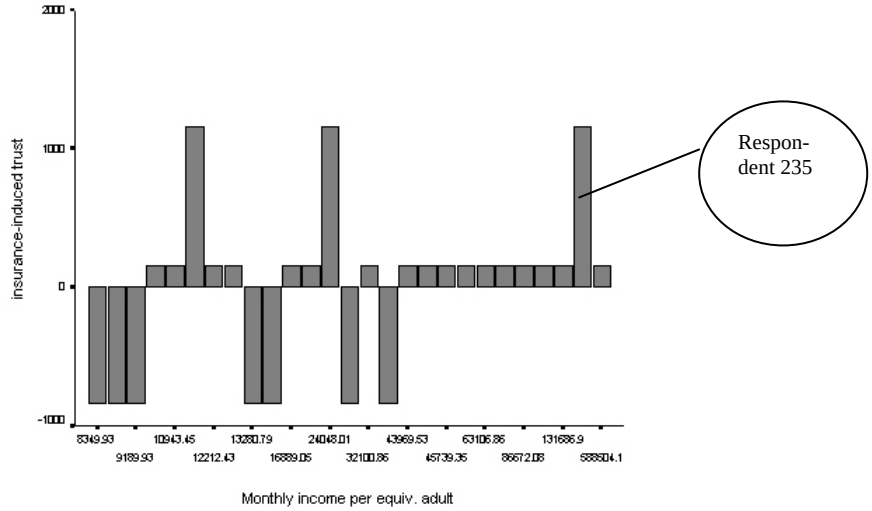


Table 6. The 'leverage' of insurance in the insurance game: regression analysis

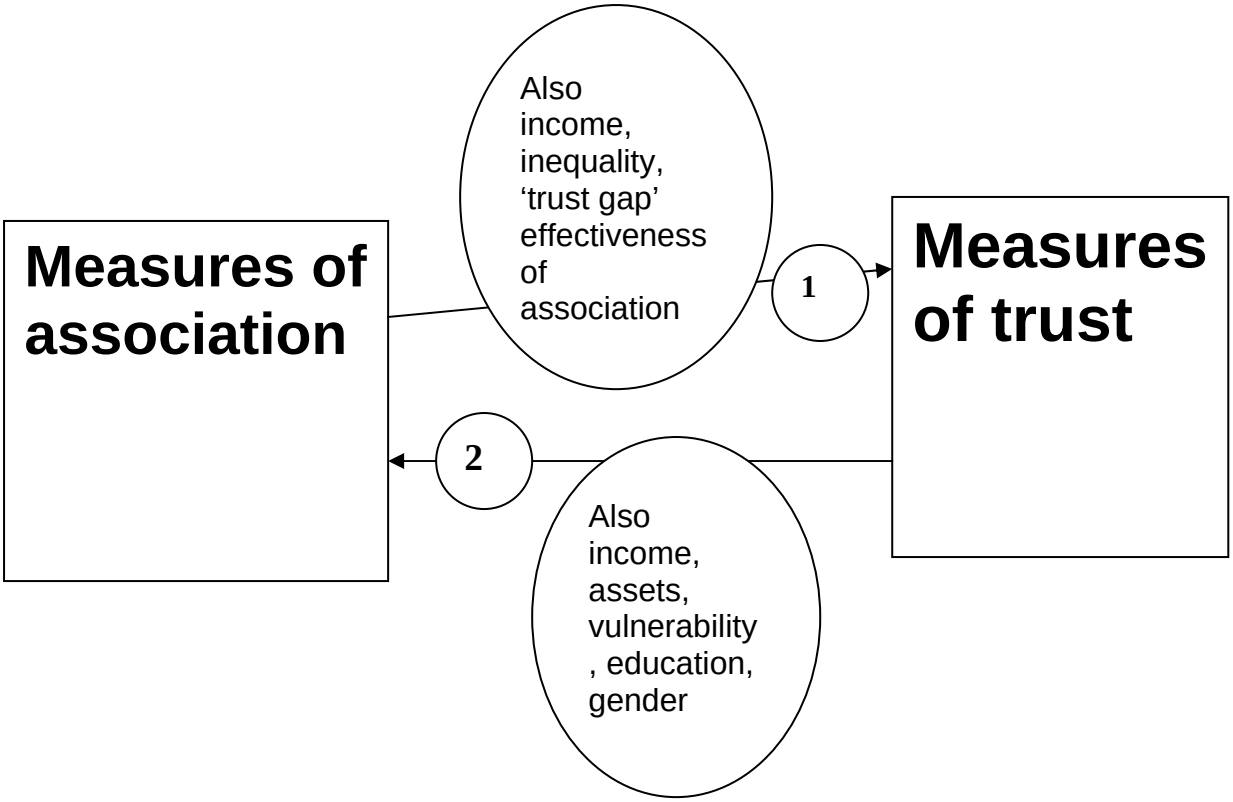
Regression coefficients on independent variables:	*Dependent variable: 'insurance effectiveness' (player 1 offer under insurance, less mean of player 1 offers under no insurance). OLS analysis; Student's t-statistics in brackets. * denotes significance at 5% level. Number of observations = 34 (i.e. those taking out insurance within insurance game)*			
Constant	-45.5 (0.34)	-98.4 (0.54)	-116.7 (0.53)	187.5 (0.91)
Monthly household income per equivalent adult	0.0009 (0.89)			0.001* (2.02)
Risk efficacy measure (composite asset index)		90.10 (0.80)	151.9 (1.33)	
Composite social capital (associational membership) index			-88.1* (1.95)	-75.9 (1.47)
R^2	0.031	0.013	0.126	0.141

Source: 'insurance games' 27/8/03 and 28/8/03 (for rubric see Appendix)

4. Trust and association measures of social capital: potential policy implications

It is now necessary to consider the link between the trust definition of social capital and the associational definition. Figure 3 illustrates a simple picture of the two-way interaction between these concepts. How far association within organisations breeds trust depends on the evaluation which association members make of that organisation, and in particular of its leadership. But it also, on the evidence of the table above, appears to depend on income and assets. Meanwhile there is a feedback in the opposite direction from trust to association: people who trust one another more have a predisposition to form associations. The *a priori* influence of income is ambiguous: richer people are freer to invest their cash resources in associations with trusted people, but against this, partnerships formed in adversity generate strong bonding social capital.

Figure 3. A simple two-way relationship between association and trust



We now (Table 7) estimate this two-way relationship, by OLS and instrumental-variables methods. 'Association' is measured as an average of 'bonding social capital' (membership of affinity groups whose membership is concentrated within the village), 'bridging social capital' (membership of associations extending beyond the village) and 'linking social capital' (social or professional linkages with government officials, NGOs and private companies). The strength of experimentally obtained data in their ability to facilitate a one-way analysis of the influence of otherwise endogenous but with respect to behaviour in the laboratory pre-determined and therefore practically exogenous variables (such as association) is also a weakness when one is interested in the formation of such variables. For 'trust' there are therefore two kinds of estimate – a straightforward *World Values Survey*- type question about the extent to which the respondent trusts individuals within the community, and also the measure derived from our 'trust game' . We shall call these, respectively, the *experimental* and the *questionnaire-based* indicators.

In the 'trust to association' relationship, we observe a fairly orthodox positive influence of risk efficacy (assets) on associational membership for a given level of trust - in defiance of the Narayan and Pritchett view, quoted above, that social capital uni-directionally determines income and expenditure; no other variables are significant. In the relationship running in the opposite direction, the story becomes more complex. Risk efficacy is always a positive influence, robust to variations in the trust measure and the estimation procedure used. So is the evaluation of the effectiveness of group organisation and leadership: if these are ranked highly, trust increases, and if they slacken, trust falls away. Other influences vary according to the type of trust indicator selected. Female education (not male) is an important positive influence on the experimental indicator, but loses significance completely in relation to the questionnaire-based indicator. Intragroup equality, by contrast, is a significant positive influence in relation to the questionnaire-based indicator, but insignificant in relation to the experimental indicator. Perhaps most intriguing of all, the questionnaire indicator of trust is strongly responsive to what we call the 'trust gap' – the difference between the degree of trust evinced between 'members of one's immediate community' – typically the village – and 'Ugandans as a whole'. The higher this gap, the greater the rate at which associational membership converts into trust. In other words, trust within the communities of Sironko and Bufumbo is fed by *distrust* of Ugandans as a whole; trust, on this view, is not a homogeneous asset which can be infinitely extended, but rather a positional good which thrives through distrust of others – and potentially by creating distrust of others. This is not a new insight – it has been developed in relation to the Sicilian Mafia, for example, by Diego Gambetta[8] – but it has important implications for those wishing to understand trust-building mechanisms, which we develop in the concluding section.

[8] 'It is by offering trust *in conjunction with* discouraging competition that the mafioso ends up selling trust as… a good that one seller can consume only of other sellers do not. And this is why competition develops in harmful ways.. by throttling the market rather than letting it work freely'. Gambetta 1988, p. 172.

Table 7. Uganda sample: estimates of the two-way relationship, using alternative concepts of trust

Relation (1) (trust to association)

Dependent variable: composite social capital (a mixture of bonding, bridging and linking associational memberships)

Regression coefficients on independent variables:

Independent variables	OLS	2SLS
Constant	1.10 (1.03)	4.36 (0.41)
'risk efficacy' (composite asset measure)	1.94** (4.95)	1.22* (2.20)
Income	0.0005 (0.06)	4.80 (0.69)
female education	0.032 (0.004)	
trust in affinity group	0.003 (1.95)	
'trust gap' between affinity group and Ugandans as a whole	-0.004 (0.31)	
R^2	0.207	0.105

Relation (2) (association to trust)

	Measure of trust (dependent variable)		
	Trust in affinity group		**First player offer in trust game**
Independent variables	OLS	2SLS	**OLS**
Constant	1.85** (3.90)	-0.77* (0.87)	1692 (1.68)
'risk efficacy' (composite asset measure)	2.57 (0.18)	0.88* (2.03)	307.6* (1.99)
Female education	0.38* (1.95)		1008.3** (2.90)
'trust gap' between affinity group and Ugandans as a whole	0.27** (5.17)		84.3 (0.95)
Member's evaluation of group *effectiveness*	0.19* (2.01)	1.39 (1.10)	58.9* (2.28)
Member's evaluation of intragroup	0.30** (3.66)		-113 (0.74)

Equality			
R^2	0.36	0.043	0.29

Some tentative policy implications thus begin to appear from the quantitative evidence so far. Levels of trust are responsive to higher levels of female education, better-functioning institutions and higher levels of intragroup equality, as well as (controversially and not yet robustly demonstrated) through creating suspicion of others. It may not be possible to create experiential trust[9] through a market process, but it appears to be possible to create it by creating institutions in which members have confidence, as well as by institutional developments which have a bearing on education and on perceptions of equality.

However, other mechanisms are important. External agents can influence experiential trust only indirectly, but they can create incentivised trust if they are able to design incentives which reduce the costs of being exploited. As we have already discovered , this is not a simple mechanical process. In our experimental 'insurance game' , we showed that there exists a substantial demand for insurance in Sironko and Bufumbo, but that insurance elicits higher levels of trust only within the higher-income village, and that the 'effectiveness' of insurance in general is positively associated with income and negatively with social capital. Mosley et al. (2003), in Chapter 4, show that all kinds of benefits for lower income groups can be extracted from microinsurance, many of them in the form of externalities; but getting these benefits to materialise does not appear to be easy. What can be done?

In Table 8 we examine the influence of particular potential policy handles on our measure of the effectiveness of insurance. The dependent variable, as in Table 7 is the offer (the degree of revealed trust) of player 1 in the insurance game, less the mean of player 1 offers under the situation of no insurance. The effectiveness of insurance, in this sense, is responsive to female (but not male) education, microfinance membership and (without statistical significance) to extension contact. The apparent lesson from this is once again that *complementarities matter* in determining the effectiveness of assets within the anti-risk portfolio, and specifically in enabling insurance to create trust.

[9] From here onward: 'experiential trust' = trust which is created by interactions between people, 'incentivised trust' = trust which is created by devices or institutions which reduce the loss resulting from misplacing trust (Mosley et al 2003, Ch.3) . Insurance is, in principle, an example of an institution capable of creating incentivised trust.

Table 8 Policy determinants of experimental effectiveness of insurance

Regression coefficients on independent variables:	*Dependent variable: 'insurance effectiveness' (player 1 offer under insurance, less mean of player 1 offers under no insurance). OLS analysis; Student's t-statistics in brackets. * denotes significance at 5% level. Number of observations = 34 (i.e. those taking out insurance within insurance game)*		
Constant	-174.6 (0.87)	-116.7 (0.53)	187.5 (0.91)
Monthly household income per equivalent adult			0.001* (2.02)
Risk efficacy measure (composite asset index)	127.8* (2.20)	151.9 (1.33)	
Composite social capital (associational membership) index		-88.1* (1.95)	-75.9 (1.47)
Microfinance membership	248.4** (2.86)		
Extension access	895.4 (1.52)		
Male education	-364 (1.28)		
Female education	571.5** (2.78)		
R^2	0.282	0.126	0.141
Number of observations	34	34	34

Source: 'insurance games' 27/8/03 and 28/8/03 (for rubric see Appendix)

Thus, trust cannot be bought, but it can be created by factors other than ‘social history’, under certain circumstances. Firstly, it appears, in some experiments and very unrobustly, to respond to increased well-being (as well as the other way about). But secondly, the trust which people place in others ought in principle to be increased by reducing the costs which result if that trust is abused or exploited – which insurance does, if properly implemented. Using experimental methods we find that the offer of insurance may indeed have this effect, but it is not certain to. It will only elicit higher trust, it seems, if certain complementary factors are present – the most important of which appear to be education and membership of microfinance groups; what makes insurance work is not only how it is designed but whether it is ‘joined up’ with other characteristics. These are mere statistical correlations: additional research is needed particularly to assess what the chemistry is which causes trust to be built on when these catalysts are present.

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Appendix. Instructions for the 'insurance game'

(NB: to visualise the original 'trust game', simply omit the portions in bold. The rubric for the original trust game is deliberately as close as possible to that used by Abigail Barr and Michael Shambare in Zimbabwe (see Barr 2003), and we are grateful to Dr Barr for the use of her field notes.)

Note to researchers – Players 1 and 2 once selected should be separated in two rooms/locations before you begin this game. The risk of collusion is greater due to the tripling effect which makes this worth while. First instruct the player 1's in a group, then take all of their offers. Ask them to wait while you play with the Player 2's and then call back the Player 1's to pay them off.

General instructions

Thank you all for taking the time to come today. This game may take up to an hour, so if you think you will not be able to stay that long without leaving please let us know now. Before we begin I want to make some general comments about what we are doing here today and explain some rules that we need to follow. We will be playing a game for real money that you will take home. You should understand that this is not our own money. It is money given to me by my university/ the University of Sheffield in England to do a research study. This is research – which will eventually be part of a book; it is not part of a development project of any sort. Before we proceed any further, let me stress: if at any point you decide you do not wish to participate in the game for any reason, you are of course free to leave whether we have started the game or not.

If you have heard about a game that has been played here in the past you should try to forget everything that you have been told. This is a completely different game. We are about to begin. Please listen as carefully as possible, because only people who understand the game will actually be able to play it. I will run through some examples here while we are all together. *You cannot ask questions of one another or talk about the game while we are here together.* This is very important and please make sure that you obey this rule, because it is possible for one person to spoil the game for everyone, in which case we would not be able to play the game today. So not worry if you do not completely understand the game as we go through the examples here in the group. Each of you will have a chance to ask questions in private with (me/Paul) to be sure that you understand how to play.

Insurance game instructions

The game is played by pairs of individuals. Each pair is made up of a Player 1 and a Player 2. Each of you will play this game with someone from your own village. However, none of you will know exactly with whom you are playing.

Only (Sarah)[10] knows who is to play with whom and she will never tell anyone else.

Sarah will give Sh 4000 to each Player 1 and another Sh4000 to each Player 2. They could give Sh 4000, or 3000, or 2000, or 1000, or nothing. Whatever amount Player 1 decides to give to Player 2 will be tripled by Sarah before it is passed on to Player 2. Player 2 then has the option of returning any portion of this tripled amount to Player 1. To protect her/himself against the possibility that the money will not come back, Player 1's are allowed to pay an insurance premium of Sh1000 to us *if they decide to make a payment to Player 2,*and if that payment does not come back, we will refund that payment, net of the premium. Then the game is over.

Player 1 goes home with whatever he or she kept from their original Sh4000, ***plus*** *anything returned to them by Player 2,* ***plus*** *any payouts from the insurance fund,* ***less*** *any insurance premium paid. Player 2 goes home with their original Sh4000,* ***plus*** *whatever was given to them by Player 1 and then tripled by Sarah,* ***minus*** *whatever they returned to Player 1.*

*Here are some examples (*you should work through these examples by having all the possibilities laid out in front of people, with Player 1's options from Sh4000 to 0 and a second column showing the effects of the tripling. As you go through each example demonstrate visually what happens to the final outcomes for each player. Be careful to remind people that Player 2 always also has the original Sh4000):

1. *Imagine that Player 1 gives his entire Sh4000 to Player 2.* ***He does not take out insurance (he cannot – he has given everything to Player 2)*** *Sarah triples this amount, so Player 2 gets Sh12000 (3 times Sh4000)* over and above *their initial Sh 4000. At this point Player 1 has nothing and Player 2 has Sh16000. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return Sh 3000 to Player 1. At the end of the game Player 1 will go home with Sh3000 and Player 2 will go home with Sh13000.*

2. *Now let's try another example. Imagine that Player 1 gives Sh3000 to Player 2.* ***He also pays an insurance premium of Sh1000****. Sarah triples the Sh3000 which is handed over, so Player 2 gets Sh9000 (3 times Sh3000 equals Sh9000)* over and above *their original Sh4000. At this point, Player 1 has nothing and Player 2 has Sh13000. Then*

[10] Sarah Khanakwa, the excellent survey coordinator.

Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return nothing to Player 1. ***Player 2 claims on his insurance policy, getting back the Sh3000 he paid over. At the end of the game Player 1 will go home with Sh3000 and Player 2 will go home with Sh13000****.*

(Note: Player 1's gain from being insured is Sh2000*,* compare the corresponding example from the trust game*)*

3. *Now let's try another example. Imagine that Player 1 gives Sh2000 to Player 2.* ***He pays an insurance premium of Sh1000.*** *Sarah triples this amount, So Player 2 gets Sh 6000 (3 times 2000 equals 6000)* over and above *their original Sh 4000. At this point, Player 1 has Sh1000 and Player 2 has Sh 10000. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return Sh3000 to Player 1.* ***This is more than the amount paid over to player 2, so the insurance company does not pay up.*** *At the end of the game Player 1 will go home with Sh5000 and player 2 will go home with Sh7000.*

   (Loss from being insured (gain to insurance company)- Sh 1000)

4. *Now let's try another example. Imagine that Player 1 gives Sh 1000 to player 2.* ***He does not take out insurance****. Sarah triples this amount, so Player 2 gets Sh3000 (3 times Sh1000 equals Sh3000)* over and above *their initial Sh4000. At this point, Player 1 has Sh3000 and Player 2 has Sh7000. Then player 2 has to decide whether they wish to give anything back to Player 1,and if so, how much. Suppose Player 2 decides to return Sh2000 to Player 1. At the end of the game Player 1 will go home with Sh 5000 and Player 2 will go home with Sh5000.*

5. *How let's try another example. Imagine that Player 1 gives nothing to Player 2. There is nothing for Sarah to triple. Player 2 has nothing to give back and the game ends there. Player 2 goes home with Sh4000 and Player 2 goes home with Sh4000.*

*Note that the larger the amount that Player 1 gives to Player 2, the greater the amount that can be taken away by the two players together. However, it is entirely up to Player 2 to decide what he should give back to Player 1. The first player could end up with more than Sh4000 or less than Sh4000 as a result****. In this version of the game, s/he can protect herself against 'exploitation' by taking out an insurance policy. But there are limits to what an insurance policy will protect – if the second player returns nothing, the first player's maximum take-home pay is only Sh3000, against the Sh4000 with which s/he started.***

We will go through more examples with each of you individually when you come to play the game. In the meantime, do not talk to anyone about the game. Even if you are not sure that you understand the game, do not talk to anyone about it. This is important. If you talk to anyone about the game while you are waiting to play, we must disqualify you from playing.

*[*Bring in each Player 1 one by one. Use as many of the examples below as necessary.*]*

6. *Imagine that Player 1 gives his entire Sh4000 to Player 2. Sarah triples this amount, so Player 2 gets Sh12000 (3 times Sh4000)* over and above *their initial Sh 4000. At this point Player 1 has nothing and Player 2 has Sh16000. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return Sh 6000 to Player 1. At the end of the game Player 1 will go home with Sh6000 and Player 2 will go home with Sh10000.*

7. *Now let's try another example. Imagine that Player 1 gives Sh3000 to Player 2.* ***He pays Sh 1000 as an insurance premium****. Sarah triples this amount, so Player 2 gets Sh9000 (3 times Sh3000 equals Sh9000)* over and above *their original Sh4000. At this point, Player 1 has nothing and Player 2 has Sh13000. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return Sh1000 to Player 1.* ***This is less than the Sh3000 he handed over, so the 'insurance policy' pays out the shortfall of Sh2000. At the end of the game, therefore, Player 1 will go home with Sh3000 and Player 2 will go home with Sh12000.***

   Gain from insurance - *1000*

8. *Now let's try another example. Imagine that Player 1 gives Sh2000 to Player 2,* ***and pays Sh 1000 as an insurance premium****. Sarah triples the Sh 2000 paid over, So Player 2 gets Sh 6000 (3 times 2000 equals 6000)* over and above *their original Sh 4000. At this point, Player 1 has Sh1000 and Player 2 has Sh 10000. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return nothing to Player 1.* ***Player 1 claims Sh2000 on his insurance policy. At the end of the game Player 1 will go home with Sh3000 and player 2 will go home with Sh10000.***

   Gain from insurance - 1000

9. *Now let's try another example. Imagine that Player 1 gives Sh 1000 to player 2.* ***He pays Sh 1000 as an insurance premium.*** *Sarah triples the Sh 1000 handed over, so Player 2 gets Sh3000 (3 times Sh1000 equals Sh3000)* over and above *their initial Sh4000. At this point, Player 1 has Sh3000 and Player 2 has Sh7000. Then player 2 has to decide whether they wish to give anything back to Player 1,and if so, how much. Suppose Player 2 decides to return Sh2000 to Player 1.* ***This is more than the amount handed over, so the insurance policy does not pay out. At the end of the game Player 1 will go home with Sh 5000 and Player 2 will go home with Sh5000****.*

   Loss from insurance(gain to insurance company) - 1000

10. *How let's try another example. Imagine that Player 1 gives nothing to Player 2. There is nothing for Sarah to triple. Player 2 has nothing to give back and the game ends there. Player 2 goes home with Sh4000 and Player 2 goes home with Sh4000.*

Now can you work through these examples for me:

11. *Imagine that Player 1 gives Sh3000 to Player 2. So, Player 2 gets Sh 9000 (3 times Sh3000 equals Sh9000)* over and above *their initial Sh4000.* ***Player 1 also takes out an insurance policy, costing him Sh1000****. At this point, Player 1, therefore has nothing and Player 2 has Sh13000. Suppose Player 2 decides to return Sh5000 to Player 1. At the end of the game Player 1 will have how much? [*the initial Sh4000 ,less Sh3000(given to Player 2)=Sh 1000 plus return from player 2 of Sh5000, **less Sh 1000 insurance policy**=Sh5000. If they are finding it difficult, talk through the maths with them, demonstrating with the actual money*]. And Player 2 will have how much? [*Their original Sh 4000 plus Sh 9000 after the tripling less Sh5000 which they return to Player 1= Sh8000.*]* **And how much does the insurance policy pay out? –** ***[*****nothing, because player 2 gets back more than the amount he paid in.*****]***

12. *Now let's try another example. Imagine that Player 1 gives Sh3000 to Player 2.* ***He pays Sh 1000 as an insurance premium****. Sarah triples this amount, so Player 2 gets Sh9000 (3 times Sh3000 equals Sh9000)* over and above *their original Sh4000. At this point, what do the two players have? ([*Player 1 has nothing, because the Sh1000 which remains to him has to be paid out as an insurance premium, and Player 2 has Sh13000*]. Then Player 2 has to decide whether they wish to give anything back to Player 1, and if so how much. Suppose Player 2 decides to return nothing to Player 1. What will the insurance policy pay out? [*It will pay out the original stake of Sh3000*] At the end*

of the game, therefore, Player 1 will go home with Sh3000 and Player 2 will go home with Sh12000.

Gain from insurance – Sh2000

After this 'training' play the game with the first player as follows:

*You are Player 1. Here is your $4. [*At this point Sh 4000 is placed on the table in front of the player.*] While I am turned away, you must hand [the Professor] the amount of money you want to be tripled and passed on to Player 2. You can give Player 2 nothing, Sh1000, Sh2000, Sh3000 or Sh4000.* ***You can also decide, if you wish, to take out an insurance policy. If you decide to do this, you pay a premium of Sh 1000 and you get back any money which you hand over and do not receive in return – less the premium****. Player 2 will receive the amount which you hand over tripled by me plus their own initial Sh4000. Remember that the more you give to Player 2 the greater the amount of money at his or her disposal. While Player 2 is under no obligation to give anything back, we will pass on to you whatever he or she decides to return.[*Now the player hands over whatever he or she wants to have tripled, **and his insurance premium if he decides to take one out,** and the tripled amount is passed to player 2]

*[*Note to researcher: Finish off all Player 1's and send them to a third holding location – they must not return to the group of Player 1's who have not played and they must not join the Player 2's.Once all Player 1's have played you can begin to call Player 2's. Player 2's can be paid off immediately after they play and sent home.*]*

After dealing with *ALL* the first players, deal with the second players as follows:

You are Player 2. First, here is your Sh4000. [Put the Sh4000 in front of Player 2.] Let's put that to one side.[Move the Sh4000 to one side but leave it on the table.] This pile represents Player 1's initial Sh 4000.[Put this Sh 4000 in front of the researcher.] Now I will show you how much Player 1 decided to give to you. Then I will triple it. Then you must hand back the amount that you want returned to Player 1. [Take Player 1's offer out of the pile representing Player 1's stake and put it down in front of Player 2, near but not on top of

Player 2's Sh4000. Then add to Player 1's offer to get the tripled amount. Receive back Player 2's response.] Remember, you can choose to give something back or not. Do what you wish. While I am turned away, you must hand [the professor] the amount of money you want to send back to Player 1. [Now the player hands back his return for Player 1]. You are now free to go home, but do not visit with any of the waiting players.