

Cross-racial envy and underinvestment in South African partnerships

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5 Trust games are employed to investigate the effect of heterogeneity in income and race on cooperation in South Africa. The amount of socio-economic information available to the subjects about their counterparts is varied. No significant behavioural differences are observed when no such information is provided. However, when the information is available, it significantly affects individual trust behaviour. The low income subjects from both racial groups invest significantly less in partnerships with the high income subjects of the other racial group than in any other partnership. We attribute this behaviour to cross-racial envy, which on aggregate may lead to substantial efficiency losses.

Key words: Trust game, Ethnic diversity, Income inequality, Cooperation
JEL classifications: C91, J15

15 1. Introduction

A recent hypothesis in the literature is that economic performance will be furthered by the absence of economic and ethnic divisions (see, e.g., Alesina *et al.*, 1999; Easterly and Levine, 1997). Knack and Keefer (1997), for example, note that, for countries like Norway, Finland, Sweden, Denmark and Canada, a high degree of homogeneity both in terms of income and ethnicity goes along with a high degree of economic performance.¹ The explanation behind this linkage is that people with a greater set of similar characteristics are more likely to form partnerships and start to cooperate.²

25 In this paper, we examine the effect of economic and ethnic division in the case of South African society. This society is extreme in its heterogeneity, with segmentation along both racial and income divides. In particular, before the breakdown of apartheid in 1994, the

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¹ Incidentally, based on the World Social Survey measurement, these five countries also have the highest level of trust. The close correlation between trust, social homogeneity and economic performance can also be derived from the experimental results by Glaeser *et al.* (2000) who find that when individuals are closer socially, trust and trustworthiness tend to be higher.

² However, as shown by Collier (2001), democracy may considerably soften the detrimental effects of ethnic diversity on economic growth.

black population¹. received less than 50% of the national income, but this share had risen to 75% in 1995². (Stewart, 2000). However, at the same time intra-racial income inequality had increased. Amongst black households the Gini index increased from 0.49 in 1970 to 0.59 in 2000, while among the whites it moved from 0.43 to 0.49 (Whiteford and van Seventer, 2000).

Widening income gaps within ethnic groups can imply low intra-group trust levels, next to the low trust between groups. To study both aspects of the trust problem, we conducted trust game experiments in South Africa, in which the subjects were given information about their opponents' race and income characteristics. The trust game, originally developed by Berg, Dickhaut and McCabe (1995), is a two-player game in which the first player, the sender, sends part of his initial endowment to the second player, the receiver. The experimenter triples the sent amount, and the receiver can then decide which part of his total endowment (the tripled transferred amount plus the initial endowment) to return to the sender. The game is called a trust game as the amount the sender transfers to the receiver gives an indication of the sender's trust in the willingness of the receiver to reciprocate. Starting with the original inventors of the game, Berg *et al.* (1995), the trust game has also widely been dubbed 'the investment game', as the sender, by sending part of the endowment to the receiver, 'invests' his money, which will generate some positive 'return' if the latter returns a sufficiently large amount. Hence, the amount sent is frequently called the 'investment'. The trust game has emerged as one of the leading experimental instrument for the measurement of the level of cooperativeness in societies (see Camerer, 2003; Glaeser *et al.*, 2000)

We employ the trust game to assess the degree to which racial and income disparity may be degrading trust in South Africa. More specifically, the questions that we raise include the following. Is the level of trust and cooperative attitude in South African society generally (disregarding specific race and income disparities) different from what has been reported in the literature on other societies? In what ways does information on the race and the income characteristics of a trading partner determine the level of trust and reciprocity in the multiply segmented South African society? The answer to the question whether racial and income divides prevent subjects from investing in personal relationships is obviously vital to economic and social development, because trust and cooperation across racial and income boundaries will be necessary in order to reduce transaction costs and, thus, to enhance economic exchange and efficiency.

A number of theories have been proposed to explain why inequality and ethnic heterogeneity may affect the individual level of trust. Since perceived satisfaction (or happiness) is often positively correlated to the perceived relative income position in a reference group (Clark and Oswald, 1996; McBride, 2001; Solnick and Hemenway, 1998), income inequality can affect individuals' well-being (Festinger, 1954; Frank, 1985; Pollak, 1976). Hence, high degrees of inequality can lead to envy and dissatisfaction thus reducing trust and cooperativeness in economic relationships (Alesina and La Ferrara, 2002; Leigh, 2006). Inequality can also imply an urge to invest resources to verify the trustworthiness of the individuals with whom they interact. Zak and Knack (2001), in particular, argue that with increasing inequality the transaction costs attached to interaction with individuals of different income levels can become excessively high.

¹ According to the 1996 census 77% of the 40,583,573 people in the country were black and 11% were white, while Indians (3%) and coloured (9%) people made up smaller percentages.

² South Africa had a Gini index of 0.58 in 1997, which made it the country with the highest inequality after Brazil with a Gini index of 0.63 (World Bank, 1997).

70 Ethnic heterogeneity has also been shown to have a negative effect on economic activity (Alesina and La Ferrara, 2002; Bandiera *et al.*, 2005; Leigh, 2006). A number of different causalities for this effect have been mentioned in the literature (cf. Bandiera *et al.*, 2005). Amongst the most prominent hypotheses are that collective action is more difficult in heterogeneous communities due to increased differences in tastes, in preferences for
75 working together in ethnically mixed teams, and in the configuration of the sharing rules. Furthermore, ethnic heterogeneity may also lead to competitive and growth-reducing rent-seeking activities (Alesina and La Ferrara, 2005). These effects have been studied on a local or country level by regressing aggregate measures of inequality and heterogeneity on ‘measures of cooperation’ such as participation in social groups, or on economic growth
80 rates (cf. La Ferrara, 2002).

While empirical studies help to reveal the correlations between trust and the socio-economic parameters, experimental studies, such as ours, scrutinise the underlying behaviour at the individual level. In fact, several experimental studies have examined the effect of ethnicity on trust and trustworthiness. However, no study so far has attempted to
85 disentangle the ethnicity effects from the income inequality effects. Fershtman and Gneezy (2001) studied Israeli partnerships in which the individuals were informed of their partner’s last name. Since last names in Israel are generally indicative of their pre-immigration ethnicity, the names may be used to discriminate between partners from different ethnical origins. In fact the study showed a systematic mistrust of ‘eastern’ males,
90 resulting in a lower efficiency of the partnerships they were involved in. On first sight, this outcome seems to imply a clear case for ethnic discrimination. But a closer look at the income distribution across the ethnic divide reveals that there may have been an effect of income inequality that confounded the results. Since individuals of ‘eastern’ origin are much more likely to be in the lower income groups (Fershtman and Gneezy, 2001), and
95 since the actual income level of the subjects was not controlled for, it remains unclear whether the discrimination (i.e. the distrust) was towards the ‘eastern’ males or towards ‘poor’ males.

In a study with US subjects, Eckel and Wilson (2003) found that allowing individuals to observe their partner’s picture increases trust and trustworthiness. However, they also
100 found that the pictures could lead to ethnic discrimination, because minority groups (in particular African-Americans) were less likely to be trusted than the majority groups (Caucasian). Again, there was no control for the income distribution effects, which happen to point in the same direction as in the Fershtman and Gneezy (2001) study: the ethnic group that is mistrusted happens to be the ethnic group with the lower average income.

105 In a study with South African subjects, Burns (2003) conducted dictator and trust games with high school students in the greater Cape Town area.¹ To check the effect of race on the propensity to trust, subjects were shown pictures of their partners. In the dictator games, blacks are favoured by non-whites, but not by whites, who show no bias towards any race. In trust games, however, black students are trusted less by all groups,
110 including their own group. Once again, this seems to be clear evidence for the prevalence of

¹ Experimental studies on trust in (South) Africa using experiments are rare. Barr (2003) conducted experiments in Zimbabwe in order to detect which factors contribute to the feeling of shared social *identities* within communities. Carter and Casteillo (2003) examine the level of trust for South African communities in the province of KwaZulu-Natal, investigating the difference between rural or urban communities in the degree of intra-racial trust. In a closely connected study, Haddad and Maluccio (2003) conduct household-level research in KwaZulu-Natal. Their results suggest that both local trust (in neighbours and extended family) and income level are important for financial group participation, which is shown to be correlated with economic prosperity.

racial discrimination, but there is no control for possible confounding effects of income inequality. As in the other two studies, the group that is being mistrusted most also represents the poorest ethnic group, leaving the question open as to whether racial or income discrimination has been detected.

115 Our experimental design allows us to disentangle the two main division lines that exist in heterogeneous societies (i.e. the racial or ethnic and the income divides) by giving subjects information both on the income level and the race of their partner. Surprisingly, we find neither a purely racial nor a purely income-based discrimination effect. Instead, we discover a strong and significant *cross-racial envy* effect that—to our knowledge—has not
120 been reported by any study so far. Envy is known to play an important role in social and economic life (Mui, 1995; Schoeck, 1966). An envious person suffers from the knowledge that another person has a greater share of the economic resources. Envious individuals, therefore, may be willing to take actions to decrease other individuals' resources, even if such actions come at a strictly positive cost.

125 In the context of our trust game, if low income subjects have feelings of envy towards high income subjects, they will invest or return little when matched with a high income partner. We find no sign of envy between individuals of the same race. What we find is that low income individuals of both races display envy only in partnerships with a high income partner from the other race. This effect can be considered a robust discrimination effect,
130 because behaviour in the baseline treatment without information, which we conducted with a randomised sub-sample of our subjects, neither exhibits significant differences within the subject pool, nor significant differences when compared to the behaviour observed in earlier experiments without information.

Next to envy, our experimental design also allows us to discover charity, the behavioural
135 counterpart to envy. While an envious person has incentives to decrease the payoffs of those who are better-off, a charitable person has incentives to increase the payoffs of others, and the more so the lower their income.¹ Hence, charity, in our experiment, entails investing more than one expects to receive back or returning more than the investment. The only charitable behaviour we observe pertains to high income white individuals who
140 are matched to low income black individuals.

The observed effects are likely to be a remnant of the history of apartheid and anti-apartheid in South Africa. The violent inter-racial tensions seem to have focused the envy across the race barrier, leaving the poor black especially envious of the rich white and the poor white especially envious of the rich black. Surprisingly, we find no pure racial
145 discrimination effect, which hints at a sense of solidarity and acceptance across races amongst individuals of the same economic segments. Furthermore, we even find some charitable behaviour across races, with charity mainly going from the rich white to the less privileged black.

We proceed in the following fashion. Section 2 describes the experimental protocol.
150 Section 3 contains the results on the effects of information. In particular it discusses whether discrimination, if it exists, is based on income or on race. Section 4 works out the correlates between survey questions and experimental decisions and thereby analyses the impact of social distance on the propensity to trust. The last section concludes.

¹ Our design also allows us to discover other forms of altruism, such as warm-glow altruism, in which giving is independent of the distribution of payoffs. However, we do not find any signs of such behaviour.

2. Experimental procedures

155 The subjects played the one-shot trust game. We applied the strategy method where each subject decided how much to transfer both in the role of sender and the role of receiver.¹ Subjects knew at the start of the experiment that they had to play both roles. The role that determined the actual payoff was drawn randomly. Both sender and receiver were endowed with 20 Rand. (At the time of the experiment the exchange rate was €1 = 7.8 Rand.) As senders, subjects were asked to decide how much of their
160 endowment they would like to transfer to a receiver. To decrease decision complexity and paperwork, the sender transfer was restricted to being zero or any even integer smaller or equal to 20. As receivers, subjects were asked to decide how much they would like to transfer back for each of the 11 possible amounts (0, 2, . . . , 20) that they may
165 have received from a sender. Additionally, each subject was asked to report both the amount expected as a return on their own transfer as a sender and the amount expected as an investment as a receiver.²

Our treatment variable is the information that subjects received on the characteristics of their counterparts. Upon recruitment, subjects were asked to report their race³ and
170 to assess whether they perceive their family income to be above or below the average family income in South Africa. We chose to use a perception instrument instead of an exact measurement, because it is more likely that behaviour is linked to the perception of the relative income position than to an exact measure of income differences, which is not readily accessible to most people. Based upon this self-assessment information, we
175 categorised our subjects according to their race (B = black; W = white) and their income level (L = low income, i.e. below average; H = high income, i.e. above average). In the ‘information’ treatment, the information on the race and the income level of the counterpart was given to each subject before any decision was made. The information was given in the same brief and matter-of-fact manner in all information
180 sessions. No specific emphasis was put on any part of the information (see the instructions in Appendix A). In the ‘no information’ treatment, no such information was given to subjects. The experimental conditions, including the number of observations for all the distinguished subject types and treatments, are summarised in Table 1.

185 A total of 172 subjects participated in the experiment: 94 black and 78 white. Family income was considered to be below average by 112 subjects and above average by 60.⁴ Obviously, the population distribution at the universities is not equivalent to the distribution of race and income in the general population of South Africa. But, note that this does not disturb the internal validity of our experimental investigation, because the
190 socio-economic matching that we used in each partnership was predefined and known to the subjects. Hence, the population distribution played absolutely no role in the decision-making and the evaluation of the results.

¹ We applied the strategy method, as we had to recruit a large part of our subjects on the spot and did not know in advance whether a counterpart for each recruited subject could be found.

² The instructions to the subjects are contained in the Appendix.

³ In South Africa students are normally asked to indicate their race upon registering for a university or a school. Hence, asking for this information does not have to generate suspicion with the subjects regarding the experimenters’ intentions. No single subject objected to providing the information on their race.

⁴ We used an open advertisement recruiting procedure at the two universities visited. Even though the student population can be considered as biased towards the high income groups, the frequency of high income blacks in the population is so low, that we were not able to recruit as many BH subjects as we had initially planned.

Table 1. *Experimental conditions and number of observations in South Africa trust game*

		No information ^a	Information ^a				Total
			BL	BH	WL	WH	
Subjects' characteristics	BL	15	15	15	15	20	80
	BH	1	6	1	0	6	14
	WL	4	4	7	7	10	32
	WH	8	9	8	10	11	46
	Total	28	34	30	32	47	172

^aIn the 'information' treatment, subjects were given both race and income level information on their counterpart before the transfer decisions were made. No such information was given at any time in the 'no information' treatment.

BL, black on low (below average) income; BH, black on high (above average) income; WL, white on low income; WH, white on high income. Note that income categories are based on subject's own self-assessment.

The experimental sessions were conducted in October 2003, at the Potchefstroom University¹. (predominantly white) and at the Mafeking University (predominantly black).
 195 We conducted the experiment using pen and paper. A post-experimental questionnaire, containing some general questions and some standardised items on equity preferences, was solicited from each subject after the experiment. In particular, subjects had to react to the well-known trust question from the General Social Survey (GSS), used by Knack and Keefer (1997) in their demonstration that trust is conducive to economic growth. In
 200 Section 4 we will consider whether the extracted information in the questionnaire contribute to explaining the experimental results. After all sessions were completed, each subject's decision form was linked to that of another subject, respecting the predetermined matching that was recorded on the subject's decision form.² Next, the role of the subject in the partnership was determined randomly and with equal probabilities. Finally, the
 205 subject's payoff was calculated using the linked decision forms and the subjects were paid in cash.

Note that our subjects have an incentive to act according to their self-interest and not according to the perceived interest of the experimenter, because their payoffs are incentive compatible and not flat (as in many surveys and in some psychological experiments).
 210 Furthermore, our subjects are not confronted with survey-like questions and receive neither explicit nor subtle hints as to what the experimenter expects to observe. In fact, in the given situation, it is rather difficult to pinpoint the 'socially desirable' behaviour, since the game begins with a fair division (every player receives the same endowment) and trusting the other is not obviously fairness enhancing. Finally, we can verify that our
 215 procedures did not create a distorting experimenter demand effect, because the responses generated in our control treatment (without information on the race or the income level of the counterpart) show no significant differences when compared with the responses observed in the original double-blind experiment by Berg *et al.* (1995). Their double-blind

¹ Conducting the experiments was made possible by the hospitality of the Economics Department of Potchefstroom University; in particular, the support given by Professor Wim Naudé was indispensable.

² Note that the strategy method guarantees that each decision form can be considered as an independent observation, because no interaction has taken place, when subjects make their decisions. Furthermore the strategy method guarantees that we can match unbalanced groups without letting any subject play more than once and without deceiving subjects.

procedure safeguards against experimenter demand effects, because it ensures that
 220 subjects are fully aware of the fact that the experimenter cannot link observed behaviour
 to their identities.

Another methodological issue concerns the effect the size of the stakes may have on
 behaviour. The empirical evidence on this issue generally is that high stakes may slightly
 affect behaviour, but frequently the effects are not even strong enough to be significant [c.f.
 225 the overview given by Camerer (2003)]. In particular, quite a number of experiments have
 been conducted in which the average payoff was close to a monthly or even annual salary of
 the participants (e.g. Slonim and Roth, 1998). Typically, even in these experiments
 subjects exhibit very similar patterns of behaviour as in analogue ‘normal stakes’
 experiments with average payoffs close to the opportunity cost of participation, i.e. close
 230 to the average expected hourly wage of the group.

3. Results

3.1 Outcomes without race or income information

In the original trust game of Berg *et al.* (1995) subjects were not provided with any socio-
 economic information on their counterparts. Nevertheless, it is clear that the subjects had
 235 some general notion of the cultural environment in which their partnerships lay. All
 subjects in that study were university students in the USA. Our subject pool is similar,
 because all our subjects are university students in South Africa. Clearly, a basic assessment
 of the general level of trust and trustworthiness exhibited by our subjects is necessary to
 ensure comparability of our results concerning the main treatment effects (i.e. the effect of
 240 socio-economic information on behaviour). Hence, we conducted the ‘no information’
 treatment, which provides us with such a general benchmark, because it elicits behaviour
 with the same amount of socio-economic information as was given in the original study. In
 other words, by comparing the results of our ‘no information’ treatment to the results of
 Berg *et al.* (1995), we can examine in which way trust and trustworthiness in South African
 245 student communities differs from the US students behaviour, when behaviour in both
 cases is elicited in the absence of socio-economic discrimination effects.

Table 2 presents summary statistics on the original study by Berg *et al.* (1995) and our
 two treatments. The table displays the number of independent observations, the initial
 endowment size, the observed proportion of senders transferring zero, the average
 250 investment ratio (i.e. the ratio of the sent amount to the endowment), and the average
 return ratio (i.e. the ratio of the amount returned to the initial endowment plus received
 transfer). It is striking how close the values of the three observational variables are when we
 compare our ‘no information’ data to the original data. In fact, statistical tests confirm that
 there is no difference between the behaviour of US and South African subjects in the trust
 255 game.¹

Interestingly, this result also stands if we compare the behaviour of the subjects in each of
 the socio-economic groups of the ‘no information’ treatment separately. Table 3 reports
 the investment ratio (both actual and anticipated) as well as the return ratio (both actual
 and anticipated) for the sub-samples in the ‘no information’ treatment.² Trusting and

¹ We use the Mann–Whitney U-test to check for location differences between the Berg *et al.* (1995) data and our ‘no information’ data. We find significant differences (not even on a 20%, one-tailed level) neither in the portion of senders sending zero, nor in the investment ratio, nor in the return ratio.

² The BH sub-sample is left out of this analysis, due to the very small number of observations we have.

Table 2. Comparison of behaviour of subjects between data from Berg *et al.* (1995) and South Africa

	Berg <i>et al.</i> (1995)	South Africa ^a	
		No information	With information
Independent observations	32	28	144
Initial endowment size	US\$10.00	ZAF\$20.00	ZAF\$20.00
Proportion of first players who sent zero	0.06	0.04	0.09
Investment ratio (ratio of investment to endowment)	0.52	0.55	0.45
Return ratio (ratio of return to amount available)	0.28	0.28	0.29

^aIn Berg *et al.* (1995), second players make responses only when senders invest more than zero while in South African experiment subjects continue to play as we used the strategy method.

260 reciprocating behaviour in none of the sub-sample groups of the ‘no information’
treatment is statistically different from the behaviour of the Berg *et al.* (1995) subjects.
Furthermore, none of the across sub-sample comparisons (e.g. BL versus WL, BL versus
265 WH etc.) reveals a significant difference in behaviour. Thus, despite the fact that South
African society is rather heterogeneous, it seems that the general level of trust and
trustworthiness (as measured by the trust game) is similar to the level found in more
homogenous societies (Camerer, 2003) when discrimination based on race or income
information is not possible.

3.2 Aggregate outcomes with race and income information

The last column of Table 2 displays the average aggregate outcomes in the ‘information’
270 treatment, in which subjects were given socio-economic information on their counterparts.
Despite the fact that there are a few more investors sending 0, and that the average aggregate
investment is slightly lower in the ‘information’ than in the ‘no information’ treatment, we
do not observe either strong or significant differences when comparing our treatments to
one another, nor when comparing them to the results of Berg *et al.* (1995). Even a closer
275 look at the relationship between the invested amount and the return ratio does not reveal
any behavioural differences on the aggregate level. As displayed by Figure 1, the way the

Table 3. Average percentages of available amounts in the ‘no information’ treatment

Socio-economic group	BL	WL	WH
Investment ratio	0.56	0.60	0.56
Anticipated investment ratio	0.62	0.70	0.61
Return ratio	0.30	0.26	0.30
Anticipated return ratio	0.31	0.33	0.33

BL, black on low (below average) income; WL, white on low income; WH, white on high income. Note that income categories are based on subject’s own self-assessment. The BH sub-sample is left out of this analysis, due to the very small number of observations we have

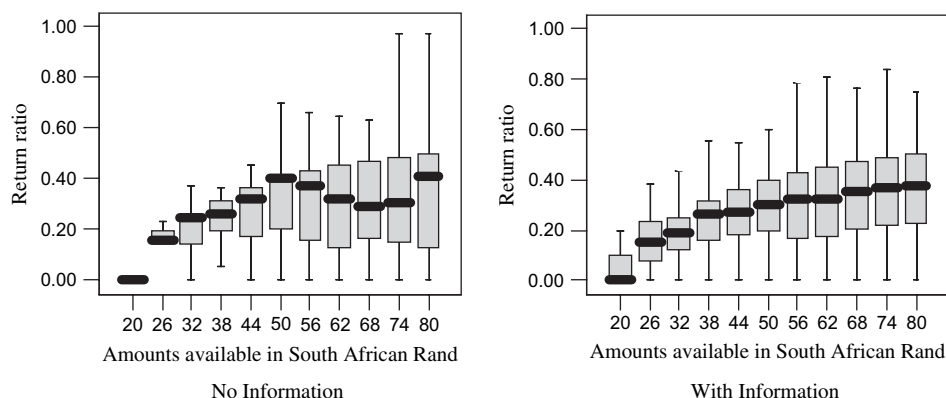


Fig. 1. Aggregate return ratio at different investment levels.

average return ratio increases with the investment level seems to be very similar both with and without socio-economic information.

3.3 Group specific investment decisions with race and income information

280 While the effect of race and income information seems rather small in the aggregate, we can use our detailed data to analyse whether differences exist between the socio-economic groups. Figure 2 shows the average investment ratio exhibited by the subjects in each of the four socio-economic sub-samples (BL, BH, WL and WH) of the ‘information’ treatment when facing a receiver from their own or from each of the other groups.¹ To facilitate the
 285 comparisons, the average investment ratios are shown as deviations from the average investment ratio in the ‘no information’ treatment (i.e. 0.55). We use the behaviour in the ‘no information’ treatment as a benchmark, because it cannot be biased by any deliberate discrimination that specifically targets the socio-economic group of the counterpart. Furthermore, since we have established that the behaviour in our ‘no information’
 290 treatment is indistinguishable from the trust game behaviour observed in completely different cultural settings, the ‘no information’ benchmark seems to exhibit a certain degree of universality.

The leftmost section of Figure 2 displays the average investment ratios chosen by BL subjects in each of their four possible partnerships. Although all four averages lie below the
 295 benchmark of the ‘no information’ treatment, only investment ratios in partnerships with WH subject are, on average, significantly below the benchmark.² The third section of Figure 2 shows that WL subjects also tend to invest less when they have socio-economic information on their counterpart than when they do not. Exactly as in the case of the BL subjects, a cross-racial relationship specifies the only partnership in which the investments
 300 of the WL subjects are significantly lower than in the ‘no information’ benchmark. The average investment ratio of the WL subjects in informed partnerships with BH subjects is just above 17%, which is not only dramatically and significantly less than the average 60%

¹ Due to a lack of observations we are not able to present any meaningful mutual relationship between BH subjects and WL and BH subjects, respectively.

² We compare the group’s decisions with the overall averages (benchmark case). It would not change our results if comparison were made with group averages. Moreover, we do not find any statistically significant differences in the behaviour of the BL subjects when comparing locations, i.e. Potchefstroom with Mafikeng.

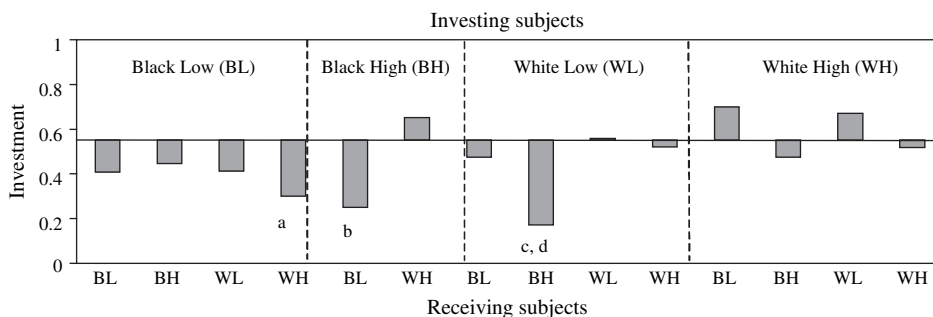


Fig. 2. Average investment ratio. The bars represent the average investment ratio that was exhibited by investors in each socio-economic group (sub-title on top) in partnerships with receivers of each socio-economic group (indicated on the x-axis). (a) Significantly lower investment ratio in partnerships with WH than in the no information benchmark (at 5%, one-tailed). (b) Significantly lower investment ratio in partnerships with BL than with WH (at 1%, one-tailed). (c) Significantly lower investment ratio in partnerships with BH than in the no information benchmark (at 1%, one-tailed). (d) Significantly lower investment ratio in partnerships with BH than with WL, BL, and WH (at 1%, 1% and 5%, one-tailed, correspondingly).

investment ratio of WL subjects in the ‘no information’ treatment, but also significantly
 305 groups (47.5%, 55.7%, and 52% for BL, WL and WH, respectively).

The second and fourth sections of Figure 2 show that, while WH subjects, on average,
 do not differentiate their investments by socio-economic categories (i.e. there are no
 significant effects of socio-economic information on investment behaviour), the BH
 subjects do. The average investment of BH subjects in partnerships with BL subjects is
 310 significantly lower than their average investment in partnerships with WH subjects. The
 average investment ratio of BH in BL partnerships (25%) is also substantially below the
 BH average investment ratio in the ‘no information’ benchmark (55%). The lack of
 statistical significance in this comparison is most probably due to the relatively small
 number of observations with BH subjects.

315 The fact that subjects differentiate their investments according to the socio-economic
 characteristics of their counterpart can be based either on a preference for discrimination
 or on distrust. Distrust towards a certain other group may not be justified, i.e. that group
 may actually be trustworthy on average, but thought to be the contrary, perhaps due to
 widespread prejudices in the investor group. But, if the distrust is actually justified, because
 320 the average return by partners from the specific socio-economic group is below the return
 by others, then the low investment may be solely driven by economic incentives and
 completely free of any preference for discrimination.

Figure 3 shows the average return ratio that subjects expected from each of the groups of
 counterparts. Note that the BL subjects expected almost equal levels of return from all
 325 groups. This is important, because it shows that investing very little in partnerships with
 WH subjects is not due to a low-return expectation, but due to a conscious act of
 discrimination that is probably based on envy. Note, furthermore, that the observed envy
 seems to be purely cross-racial, because the BL subjects’ expectations concerning, and
 behaviour towards, the rich in their own ethnic group is statistically indistinguishable from
 330 the ‘no information’ benchmark.

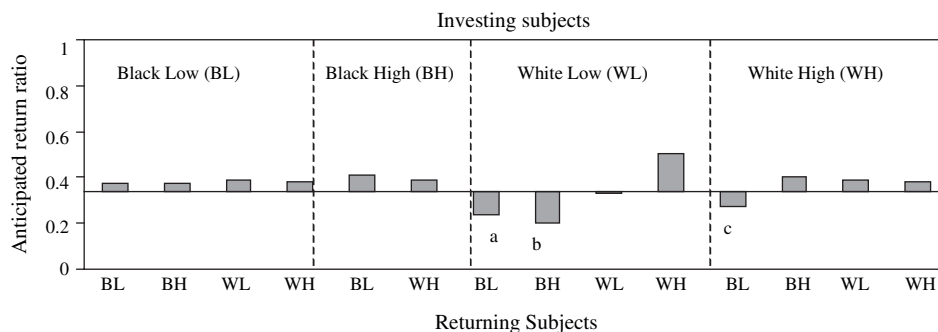


Fig. 3. Average anticipated return ratio. The bars represent the average return ratio that was expected by investors of each socio-economic group (sub-tiles on top) in partnerships with receivers of each socio-economic group (indicated on the x-axis). (a) Significantly lower return ratio expected in partnerships with BL than with WH (at 5%, one-tailed). (b) Significantly lower return ratio expected in partnerships with BH than with WH (at 1%, one-tailed). (c) Significantly lower return ratio expected in partnerships with BL than with BH (at 5%, one-tailed).

For the WL subjects things are slightly different. Just as for the BL subjects, WL subjects show cross-racial envy by investing significantly less only in partnerships with BH subjects. The slight difference is that the WL subjects also expect significantly smaller return ratios from the BH subjects than from the WH subjects. Note, however, that this difference is mainly due to the overly optimistic view of the WL subjects on the behaviour of the rich in their own ethnic group. Compared to the benchmark of no information, their return expectations are not significantly different.

Summarising, we find discrimination based on cross-racial envy, since both low income type investors (BL and WL) discriminate towards the high income type receivers of the other ethnic group (WH and BH, respectively). In addition to the cross-racial envy effect, we observe that BH subjects discriminate against the poor in their own ethnic group, by investing very little in those partnerships, even though they expect returns from BL subjects to be no different than from any other group. Finally, we also observe mildly charitable behaviour of the WH subjects, who invest substantial amounts in partnerships with BL subjects, even though they expect less to be returned to them by the BL subjects than by any other group.

3.4 Group specific return decisions with race and income information

Figure 4 indicates the average return ratio chosen by the subjects of each socio-economic group in their partnerships with subjects of different socio-economic groups. None of the average return ratios is significantly different from the average return ratio observed in the ‘no information’ treatment. Furthermore, there is only a single case in which the subjects of one group significantly differentiate their return responses on the basis of the socio-economic characteristics. BL subjects exhibit lower return ratios in partnerships with WH subjects than with WL subjects. This seems to correspond to the cross-racial envy effect that we also observe concerning the investment ratio of the BL subjects. It seems that WH subjects are generally treated somewhat worse by the BL subjects. Note first that this behaviour must be driven by some non-monetary motivation, because the BL subjects

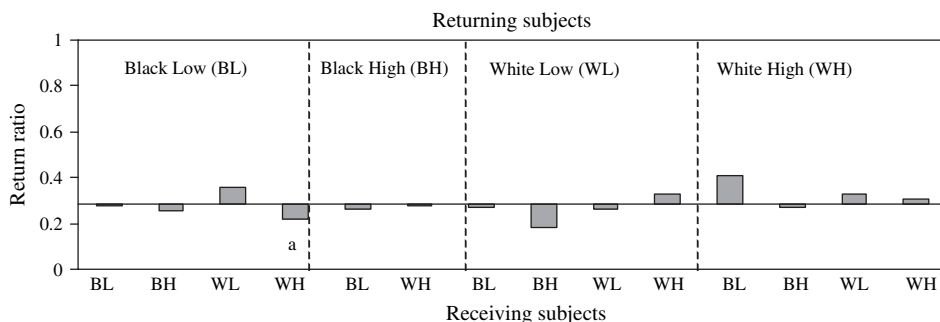


Fig. 4. Average return ratio. The bars represent the average return ratio that was exhibited by receivers in each socio-economic group (sub-title on top) in partnerships with investors of each socio-economic group (indicated on the x-axis). (a) Significantly lower return ratio in partnerships with WH than with WL (at 5%, one-tailed).

invest less in partnerships with WH subjects even though they do not expect lower returns. Note also that the adverse treatment of WH subjects by BL subjects cannot be a purely racial differentiation effect, since we observe a (insignificantly) higher average return ratio of the BL subjects in partnerships with WL subjects than in any partnership with black subjects.

Comparing the expressed beliefs of investors and the observed return behaviour, we generally find no significant differences. Hence, expectations and behaviour are pretty well-aligned, perhaps with the notable exception of the white subjects' expectations of the black, low-income subjects' return behaviour. Although the differences are neither extreme nor significant, it seems that the white subjects, particularly the WH subjects, underestimate the trustworthiness of the BL subjects.

Finally, note that the slightly charitable behaviour of WH subjects as investors is echoed in the fact that they, on average, return more to BL subjects than to subjects from any other group. Although the differences in return ratios are not statistically significant, they seem to underline a generally charitable attitude in the group of white, high-income subjects.

Figure 5 displays the average investment ratios that were expected in each type of partnership by the receiving subjects in each of the socio-economic groups. As in the previous figures, the average investment ratio expected in the 'no information' treatment is used as a benchmark. In general, the expressed expectations are not significantly distinguishable from the benchmark. Nevertheless, two interesting observations can be made. First, in many cases where an above benchmark investment ratio was expected, the actual investment ratio was below zero and vice versa. In other words, the expectations are not always well aligned with the actual behaviour. Second, the only significant effects observed relate to the expectations of white subjects concerning the investment ratios of BH and WL subjects. All white subjects expect too low investment ratios by BH subjects and too high investment ratios by the WL subjects, when compared with the actual investment behaviour.

3.5 Payoff consequences

In the analysis so far, we focused on detecting differential behaviour and expectations. When subjects' choices were in conflict with their expectations of monetary income, we

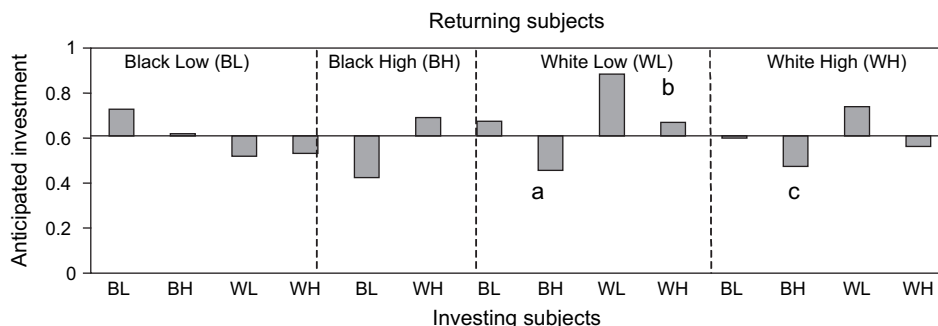


Fig. 5. Average anticipated investment ratio. The bars represent the average investment ratio that was expected by receivers in each socio-economic group (sub-title on top) in partnerships with investors of each socio-economic group (indicated on the x-axis). (a) Significantly lower investment ratio expected in partnerships with BH than with WL (at 1%, one-tailed). (b) Significantly lower investment ratio expected in partnerships with WH than with WL (at 5%, one-tailed). (c) Significantly lower investment ratio expected in partnerships with BH than with WL (at 1%, one-tailed).

could localise a preference for differential treatment for which a payoff disadvantage was taken into account. In this section we pursue the question how the observed behaviour translates into payoffs for the different subject types. Since we have elicited strategies from our subjects, we can create a more complete picture of the distribution of payoffs by calculating the average payoff each subject would have had if we had matched him/her to every possible counterpart from the corresponding socio-economic group. The top two panels in Figure 6 show the averages of these population payoffs for the investors and the receivers, correspondingly. The lowest panel displays the average income of both roles in each of the socio-economic groups. The ‘no information’ benchmark is once again provided to allow a visual assessment of the effect of socio-economic information on the payoffs achieved in the game.

The general picture that emerges from Figure 6 is that socio-economic information has an adverse effect on the behaviour in partnerships, leading to negative payoff consequences. This holds in particular for BL subjects who are on the losing side in all but one of the possible partnerships. Only BL subjects in partnership with WH subjects earn substantially more than in the ‘no information’ benchmark. This is mainly due to the fact that WH subjects invest significantly more in partnerships with a BL receiver than in the ‘no information’ benchmark, although they receive significantly less from the BL subjects. While WH subjects are acting more generously than they would without information, the BL subjects are behaving less generously than they would without information. It is not surprising that the strongest payoff effects of the socio-economic information are present in this specific relationship, in which subjects exhibit preferences for differential treatment that are not based on monetary incentives.

4. Determinants of experimental decisions

In this section, we report a series of regression analyses that help to quantify the observed effects of the socio-economic information given to the subjects. Additionally, the

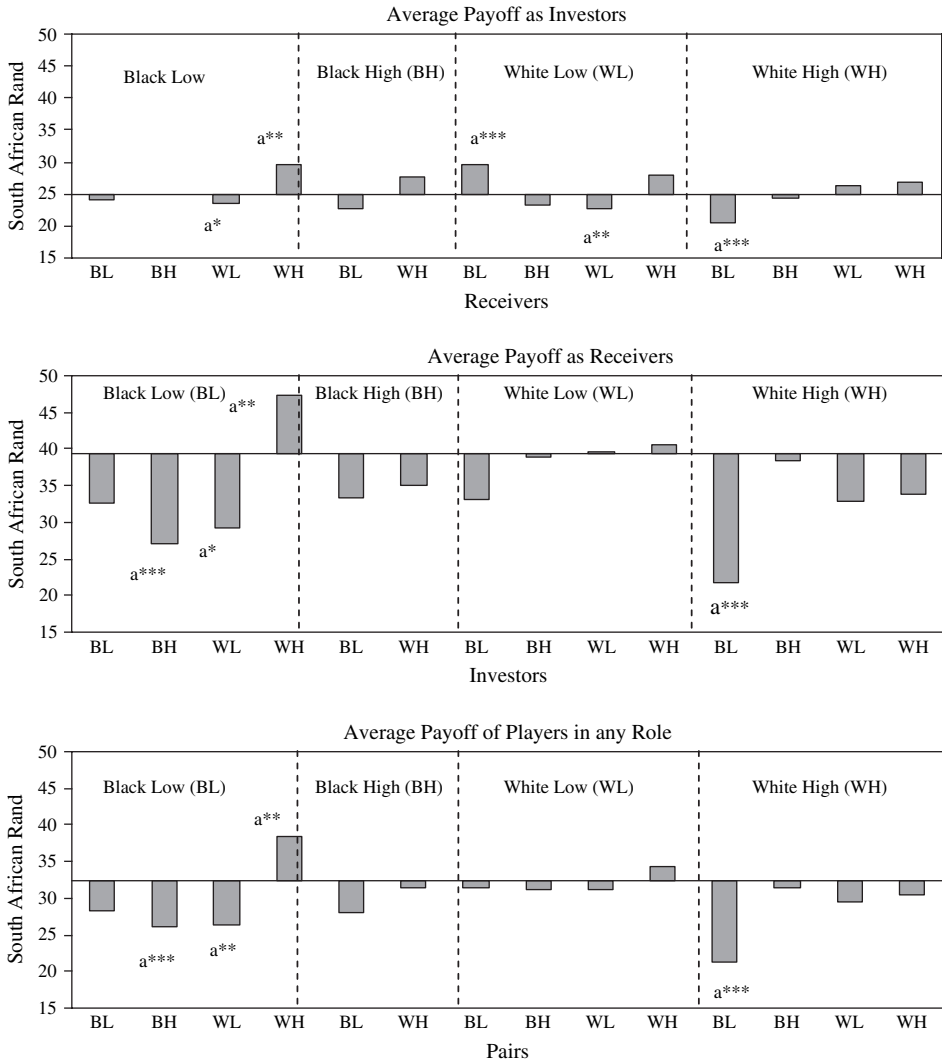


Fig. 6. Average payoffs. The bars represent the average payoff of the corresponding players in each socio-economic group (sub-title on top) in partnerships with counterparts of each socio-economic group (indicated on the x-axis). For the WL subjects linked to BH subjects we have no observations on the latter. In this case, therefore, we determined the WL payoffs by drawing from observations from a pilot. Significant at *10% level, one-tailed, **5% level, one-tailed and ***1% level, one-tailed, respectively.

regressions are used to check for correlations of the observed behaviour to the questionnaire answers provided by the subjects. We can confirm that low-income subjects send significantly less than other subjects if they are linked to high-income subjects of the other race. Moreover, we show that the questionnaire responses do not provide reliable forecasts on subjects' behaviour. First, the regressions explaining the investment ratio are reported and then the regressions explaining the return ratio.

Table 4. Double-censored Tobit estimates on the investment ratio

	1	2	3	4
Constant	0.525 (0.111)***	0.493 (0.109)***	0.604 (0.181)***	0.198 (0.176)
Male	-0.059 (0.071)	-0.069 (0.069)	-0.063 (0.074)	-0.049 (0.063)
Low income	-0.144 (0.082)**	-0.062 (0.086)	-0.050 (0.091)	-0.124 (0.078)
White	0.127 (0.078)	0.096 (0.077)	0.082 (0.084)	0.046 (0.070)
Income-hetro	0.056 (0.098)	0.057 (0.096)	0.081 (0.097)	0.141 (0.084)
Race-hetro	0.034 (0.104)	0.034 (0.101)	0.035 (0.102)	0.137 (0.088)
Social distance	-0.161 (0.143)	0.179 (0.194)	0.171 (0.195)	0.055 (0.169)
Income*Soc		-0.462 (0.184)***	-0.487 (0.189)***	-0.372 (0.161)***
Perceptions			-0.047 (0.041)	-0.050 (0.036)
Opportunity			0.023 (0.074)	-0.010 (0.062)
Education			0.054 (0.084)	0.046 (0.071)
Trust index			-0.034 (0.051)	-0.034 (0.044)
Expected return ratio				-0.054 (0.161)
Expected investment ratio				0.716 (0.106)***
Σ	0.409 (0.031)	0.398 (0.030)	0.397 (0.030)	0.331 (0.025)
Log likelihood	-98.988	-95.863	-94.656	-69.322
Wald Test (χ^2)	13.1	19.35	21.6	68.1
Observations	144	144	143	141

Numbers in parentheses are the estimated standard errors.

Significant at 5% level; *significant at 1% level.

4.1 Investment ratio

We used a double-censored Tobit regression with the investment ratio as the dependent variable. The results are summarised in Table 4. The variable names are self-explanatory. (See Appendix Table A.1 for the definitions of variables that are reported.)

Column 1 contains the coefficient estimates for the regression in which only the basic characteristics of the sender and the receiver are included. None of the coefficients are significant. In particular, not even the dummy variable ‘social distance’, which is equal to one when both the race and the income levels of the matched individuals are different, has significant explanatory power for the observed variations in the chosen investment ratios. This may seem surprising on first sight, but is intuitively clear when we take into consideration that the observed behaviour towards subjects from another race and income group is asymmetric, since the low income subjects hold back investments in partnerships with high income subjects from the other race, but the opposite is not true. In column 2, we introduce a dummy variable called ‘income*soc’, which is equal to one when the sender has a low income and is matched with a subject of both a different race and a different income level. As expected, the coefficient of this variable is highly significant, confirming our experimental results.

In column 3, questionnaire items measuring subjects’ perceptions of equity and fairness are included. None of the coefficients are significant. Including trust, measured by means of the GSS trust question as an explanatory variable, does not contribute to explaining the investment ratio.¹ Finally, in column 4, subjects’ expectation of the amount invested and

¹ Incidentally, this confirms results by Glaeser *et al.* (2000), and subsequently others, who show that trust as measured by the trust game does not correspond to the GSS trust measure.

returned by their partner is included in the regression. The coefficient on the expected investment ratio is positive and significant, suggesting that, in general, subjects' own investment behaviour is driven by what they expect their counterparts to invest, but not on what they return.

4.2 Return ratio

The estimated coefficients of the return ratio regressions are summarised in Table 5. Single-censored regression is used as every single subject always retained a substantial part of their partner's investment for themselves. Since we used the strategy method, we have more than one observation for each respondent. In particular, each respondent had to state how much to return for each of the 11 possible amounts that could be received from the sender. To take the panel character of this dataset into account, we employed the random effects Tobit model.

The return ratio is positively correlated to the amount available to the subject, θ . However, since the return ratio increases as a decreasing rate, there is a negative effect of the square of the amount available. The baseline regression also includes the characteristics of both the investor and responder, as reported in column 1 of Table 5. It seems that males return more, while low income participants return less. Neither income nor race heterogeneity, however, seems to play a role in responder's decision on the return. And again, as in the case of the investments, the symmetric cross-effect of income and race ('social distance') is not significant, while the asymmetric cross-effect ('income*soc') has a significantly negative effect on the return ratio, thus conforming the negative effect of cross-cultural envy.

Adding the questionnaire responses to the regression (column 3), provides significantly negative, but very small effects for the 'perceptions' and 'trust index' variables, which indicate whether the subject perceives inequality as having been generated fairly and, correspondingly, whether the subject generally trusts others. However, since both coefficients switch to positive as soon as we add the expectation on investment and return (in column 4), it seems that the actual effect of these variables cannot be measured very precisely. However, there is a significantly positive effect between the expected return from the partner and one's own return ratio.

5. Concluding remarks

We report the results of a series of experimental trust games conducted in South Africa focusing on the effects of racial and income inequality on cooperation in partnerships. We vary the amount of socio-economic information available to the subjects about their counterparts in order to assess the effect of inequality between the partners. In the control treatment, in which no such information is provided, we observe no significant differences in the behaviour across races and income groups. In fact, despite the extreme heterogeneity of South African society, we find that the general level of trust and trustworthiness observed in the control treatment is very similar to that which is observed in more homogenous societies.

When socio-economic information on their counterparts is provided to the subjects, individual trust behaviour is affected significantly. While we neither observe simple racial nor simple income-based discrimination, we do observe that the low income subjects from both racial groups invest significantly less in partnerships with the high income subjects of

Table 5. *Single censored Tobit estimates of the return ratio*

	1	2	3	4
Constant	-0.181 (0.032)**	-0.189 (0.032)***	-0.034 (0.039)	-0.198 (0.041)***
Θ	0.014 (0.001)***	0.014 (0.001)***	0.015 (0.001)***	0.015 (0.001)***
Θ^2	-0.0001 (0.00001)***	-0.0001 (0.00001)***	-0.0001 (0.00001)***	-0.0001 (0.00001)***
Male	0.073 (0.015)**	0.039 (0.012)***	0.011 (0.013)	0.004 (0.012)
Low income	-0.051 (0.017)***	-0.034 (0.014)**	-0.003 (0.014)	-0.066 (0.014)
White	-0.004 (0.015)	0.027 (0.014)**	-0.038 (0.012)***	-0.020 (0.013)
Income-hetro	0.005 (0.017)	0.003 (0.015)	-0.025 (0.013)	-0.035 (0.014)***
Race-hetro	-0.017 (0.019)	0.08 (0.017)***	0.043 (0.021)**	0.046 (0.016)***
Social distance	-0.011 (0.029)	0.047 (0.026)	0.144 (0.031)***	0.102 (0.026)***
Income*Soc		-0.12 (0.039)***	-0.201 (0.024)***	-0.178 (0.025)***
Perceptions			-0.030 (0.006)***	0.010 (0.005)**
Opportunity			-0.048 (0.01)***	-0.021 (0.013)
Education			0.004 (0.015)	-0.008 (0.012)
Trust index			-0.023 (0.007)***	0.020 (0.008)***
Expected return ratio				0.212 (0.023)***
Expected investment ratio				0.019 (0.008)
Σe	0.17 (0.005)	0.169 (0.005)	0.182 (0.005)	0.174 (0.004)
Σu	0.137 (0.003)	0.136 (0.003)	0.013 (0.003)	0.014 (0.003)
Rho	0.607 (0.016)	0.607 (0.017)	0.646 (0.014)	0.624 (0.015)
Log likelihood	447.833	456.152	465.68	462.46
Wald test (χ^2)	511.51	595.96	718.63	760.77
Observations	1573	1573	1562	1550

Numbers in parentheses are the estimated standard errors.

Significant at 5% level; *significant at 1% level.

the other racial group than in any other partnership. Interestingly, the exceptionally low investment ratios that are observed in these ‘maximal distance’ partnerships cannot be attributed to particularly low return expectations. Hence, it seems clear that the motivation for such behaviour is genuinely non-monetary and perhaps best described as ‘cross-racial envy’.

In addition to the fundamental observation of the cross-racial envy effect, we came across an interesting, but perhaps specifically South African, phenomenon concerning the racially differentiated behaviour of the rich. While the black high-income subjects tend to discriminate against the poor in their own ethnic group, the white high-income subjects tend to behave charitably. This outcome is especially surprising, not only because of the history of ‘white supremacy’ in South Africa, but also because the relative cost of discrimination is lower for the high-income groups than for the low-income groups (i.e. the efficiency loss in a mixed partnership hurts the rich less than it hurts the poor). It remains an open issue, whether the political changes of the last decades have created a social consensus of non-discrimination amongst the high-income white South Africans¹. or whether the norm of non-discrimination had evolved earlier and was then at the root of the political process leading to the breakdown of apartheid. In either case, our finding indicates a fundamental support of the anti-apartheid norms by the high-income white subjects, even when they have to ‘put their money where their mouth is’, i.e. bear the financial risk and cost of their non-discriminatory actions.

An explanation for the discriminatory behaviour of the high-income black towards the low-income black might be that there is a desire of newly rich individuals to break away from their previous peer group in an attempt to increase self-esteem. This can lead to an isolation of the rich, who eventually form a new homogeneous group of their own. Such a phenomenon has been observed by La Ferrara (2002) in rural Tanzanian communities. The low investments by high-income black subjects in partnerships with the poor in their ethnic group is perhaps a token of the desire to create a new class of their own.

South African society is heterogeneous in many dimensions, of which we considered the two most evident ones, i.e. the racial and the income dimensions. Given this heterogeneity, it is difficult to define the (ethnic, racial or socio-economic) groups to which individuals (think they) belong. As a result, the existence of so-called parochialism, i.e. a preference for favouring one’s own group, which has been established to exist in other more homogeneous societies (Bernhard *et al.*, 2006), will be hard to establish. Indeed, our experiments do not generate clear evidence for higher investments in relationships with subjects who, in our design, we have defined to be of the same type. We find some indirect evidence for parochialism, though, as subjects, who are evidently *outside* one’s own group are treated worse, in some cases, due to cross-racial envy.

Although the results of this study, like those of most other micro-economic studies, must only be cautiously generalised to the macro-economic level, we do believe to have found some evidence with macro-economic implications. On the one hand, it seems that substantial socio-economic gaps in an economy, i.e. great cultural diversity and considerable inequality, may interact to create inefficiencies due to distrust and discrimination. Hence, we find some support for the growing body of literature that indicates that a policy

¹ In particular, for this group the introduction of democratic institutions after the breakdown of apartheid may have generated the confidence that mutually beneficial policy outcomes would be adopted by the black majority, in line with Collier’s (2001) findings that democracy can mitigate detrimental effects of ethnic diversity.

of decreasing income inequality (including possibly a more equitable land distribution) may actually increase economic efficiency, in spite of the economic distortions that redistributive measures are usually supposed to imply. On the other hand, as our experimental results indicate that the effect of inequality is not simply 'linear' but is intrinsically related to racial relations, our results also seem to indicate that the genesis of inequality affects the attitudes and the behaviour of the economic agents. Thus, we must conclude that socio-economic differences may affect behaviour in different ways, depending on the history of social interaction. The history of social interaction in South Africa, for example, may explain why high-income black subjects may have less scruples to discriminate against others than high-income white subjects.

Finally, since the provision of socio-economic information may exacerbate the inefficiency caused by distrust and discrimination, states with high degrees of social diversity and economic inequality may be well-advised to create institutions that mask all personal attributes of investors. This may be achieved by installing (trusted) government financing or (controlled) impersonal investment and venture capital corporations.

Appendix: Instructions

Welcome to our experiment, which is part of a research project of Tilburg University in cooperation with the North West University. In this experiment you can earn real money, which will be paid to you privately, in cash, at the end of the experiment. Because participants take part in the experiment at different times and places, the experiment may not end today. After the session, we will inform you when and where you can pick up your payoff. How much money you will receive in the end depends on your decisions and the decisions of other participants of the experiment.

We will read these instructions together. After this you will have ample opportunity to ask questions. If you have a question by then, please raise your hand and we will help you.

Description

In this experiment, you will be randomly matched to another participant. Both of you start with an endowment of 20 Rand. Each of you will decide what amount of money to transfer to the other. You will decide one after the other. The first to decide is called player A, the second to decide is called player B. For now you do not know whether you are player A or B. You will be informed later.

If you are player A, you will decide how much of your initial endowment (20 Rand) you want to transfer to player B. The amount that you transfer to player B must be an even number that means a number from the set $\{0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$. Your transfer to B will be tripled by the experimenter. For example, if you are player A and transfer 4 Rand to player B, the amount that B will actually receive is $3 \times 4 = 12$ Rand. Note that you can decide not to transfer money to player B. If you do not, then nothing is tripled and each of you will have the original 20 Rand to take home.

If you are player B, you will receive the tripled amount of money that was transferred to you by player A. This tripled amount is added to your initial endowment of 20 Rand. For example, if you are player B and player A has transferred 4 Rand to you, then you will have total amount of $20 + 12 = 32$ Rand. Now, you can decide to transfer some part of your total earnings to A. Your transfer to A is not tripled. The remaining part of your total

575 earnings (the amount that you did not transfer to A) is your payoff of the experiment. Note that you can decide not to transfer money to player A. If you do not, then you will have your total earnings to take home, while A will have the original endowment minus the transfer made to you.

580 **Decision Form (with information on partner; in the no information treatment, no information on race and income is provided to the subjects)**

This is the decision form that you must fill out. You will make decisions both for the role as player A and as player B. A random draw will later determine whether you are actually player A or player B.

585 Upon registration, the participant to whom you are matched has provided the following information:

Race black white other
 Family Income below average above average

The corresponding information that you have provided is also given to the participant you are matched with.

Suppose you are player A

Please, fill in your decisions as player A on the blanks in the lines 1) and 2).

1) Your transfer to player B is _____ Rand

590 Remember that you may only choose an even number.
 So, you may choose from: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18 or 20.

2) You expect B to transfer to you _____ Rand

Suppose you are player B

595 The table below lists all possible amounts that player A may send to you. If you are randomly determined to be player B, only one of these amounts will actually count, namely the one that was chosen by the player A who is matched to you. But, since for now you do not know which amount will actually be chosen by player A, you must make a transfer decision for every possible amount.

A transfers	0	2	4	6	8	10	12	14	16	18	20
A retains	20	18	16	14	12	10	8	6	4	2	0
B receives	0	6	12	18	24	30	36	42	48	54	60
B has	20	26	32	38	44	50	56	62	68	74	80
B transfers											
	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑

Please, fill in a transfer to A in each of these empty cells.
 Make sure that the transfer you fill in is not greater than the amount in the cell immediately above it.

You expect A to transfer to you _____ Rand
 Remember that A may only choose an even number.
 So, A may choose from: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18 or 20.

600

Table A.1. *Summary statistics of variables used in regressions*

Variables	Mean	SD	Definition of variables used
Male	0.473	0.45	Dummy 1 if male
Low income	0.646	0.479	Dummy 1 if family income is below average
White	0.459	0.498	Dummy 1 if white
Education	0.465	0.500	Dummy 1 if parents have college degree
Perception	2.850	0.869	Index of economic position based on ability, based on questionnaire responses from 1 (disagree strongly) to 4 (agree strongly)
Opportunity	0.479	0.500	Dummy 1 if subjects perceive equality in opportunity
Trust index	0.706	0.707	Index of GSS fair, trust and help
Income-hetro	0.534	0.500	Dummy 1 if match is different in income
Race-hetro	0.479	0.500	Dummy 1 if match is different in race
Social distance	0.250	0.433	Interactive term for ‘income-hetro’*‘race-hetro’
Income*Soc	0.187	0.390	Interactive term for ‘income’ and ‘social distance’
Amount sent	0.451	0.321	Amount sent out of available stake
Return ratio	0.285	0.224	Amount returned out of available amount
Expected return ratio	0.367	0.207	Expected return out of available amount
Expected investment ratio	0.606	0.311	Expected amount sent out of available amount

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