The impact of a scholarship programme on social capital formation among university students: An economic experiment at the University of Pretoria, South Africa

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Abstract

This study uses an online laboratory experiment and a post-experimental survey to test whether the Mastercard Foundation (MCF) scholarship programme causally influences the creation of cognitive social capital among University of Pretoria recipients. Cognitive social capital, which is based on commonly shared norms among subjects, leads to honest and cooperative behaviour. It is necessary for ease of information flow, a reduction in transaction costs, and allowing communities to deal with social dilemmas like common-pool resource management. The study used incentivised economic experiments on randomly selected subjects drawn from a control group (non-MCF students) and a treated group (MCF students). The experimental results from the two groups were compared to check the differences in terms of levels of trust, reciprocity, altruism, cooperation, in-group favouritism and out-group discrimination. Our results show that the scholarship programme has a significant impact only on levels of in-group favouritism and out-group discrimination. The post-experimental survey showed that MCF and non-MCF subjects were similar in terms of stated pro-social behaviour perceptions and in-group social capital creation.

Key words: cognitive social capital, Mastercard Foundation scholarship, experimental economics, incentivised game determinants, bilateral, trade flow, Ethiopia, gravity model

1. Introduction

In recent years, research has increasingly focused on the impact of social capital on economic activity and growth. Putnam (1994: 6–7) defines social capital as "features of social organization such as norms, networks and social trust that facilitate coordination and cooperation for mutual benefit". It is generally accepted that social capital is an important component in the functioning of societies (Onyx & Leonard 2010). Many studies have documented the positive relationship between social capital, economic development, natural resource management and health (Coleman 1988; Knack & Keefer 1997; Woolcock & Narayan 2000; Hawe & Shiell 2000). Consequently, policymakers have made a significant effort to raise social capital levels on multiple scales and with different stakeholders.

The literature identifies two types of social capital, viz. structural and cognitive (Uphoff & Wijayaratna 2000; Grootaert *et al*. 2003; Chou 2006). Structural social capital is defined as qualities of the social system and the network of relationships (Nahapiet & Ghoshal 1998), including roles, network links, regulations, processes and precedents. It is tangible, as can be seen in the assistance given to those in need, the sharing and exchange of information among people, and social ties with those in positions of authority. Nahapiet and Ghoshal (1998: 244) define cognitive social capital as "those resources providing shared representations, interpretations, and systems of meaning among parties". It requires the usage of a common language and set of codes, as well as shared narratives. It enables people to convey their values, views and attitudes. As distinguished from tangible structural social capital, cognitive social capital is intangible, as it involves perceptions of a common world. Trust, reciprocity, respect, obligations, expectations, rules of acceptable behaviour and sanctions are all examples of cognitive social capital (Claridge 2018).

Social capital may have an important impact on the management of natural resources by agricultural communities. Smallholder farmers are often trapped in using unsustainable agricultural practices (Vosti & Reardon 2007). Over the past decades, public and research investments have attempted to stimulate farmers' adaptation with regard to scarcer resources and increasing variability of climate. To that end, agriculture-oriented projects co-develop sustainable practices with farmers, and use participatory tools to foster cooperation between farmers and researchers (Röling 2009; Berthet *et al*. 2018; Gamache *et al*. 2020; Compagnucci *et al*. 2021). In this respect, social capital may be an important ingredient in the success of these collaborative projects (Van Rijn *et al*. 2012; King *et al*. 2019; Charatsari *et al*. 2020). On one hand, social capital may facilitate the co-development of innovations, e.g. trust and frequent relations among members of the community facilitate co-investment and the sharing of information, and ultimately foster the success of the project. On the other hand, the project may increase social capital by pushing farmers to cooperate for the design of innovations and to work with new partners.

To properly study the level of social capital in communities that benefit from development projects, an analysis in two stages (ex-ante and ex-post development project) was determined to be suitable. The purpose of this exploratory study was to assess ex-post how a development project affects beneficiaries' levels of cognitive social capital. This preliminary work is intended to help by contributing to defining an experimental protocol that will allow for the implementation of a full analysis in two stages.

The literature suggests that development projects targeted at improving the livelihoods of poor people also support the development of community values, norms, trust and coordination. This was the

experience, for example, with the community-led total sanitation initiative in Mozambique (Mosler *et al*. 2018) and in a conditional cash transfer and collaboration project in South Africa (Attanasio *et al*. 2015).

Pro-social behaviours, such as trust, reciprocity norms, cooperativeness and altruism, are among the fundamental preconditions for cognitive social capital development (Uphoff & Wijayaratna 2000; Avdeenko & Gilligan 2015). Pro-social behaviours can be measured using lab-in-the-field experiments (Ostrom 2010; Viceisza 2012). In particular, observing people's behaviour in incentivised experiments, as in the investment games of Berg *et al*. (1995) and Güth *et al*. (1997) provide an empirical measure of trust and trustfulness. These two games are widely used to measure trust in different socio-cultural contexts (Johnson & Mislin 2011).

This study uses an online lab experiment to assess the effect of the Mastercard Foundation (MCF) scholarship programme, which has been operational since 2013, on cognitive social capital formation among University of Pretoria students. This programme is designed to empower academically talented but poor young African students with the capacity to improve the African continent, and the globe at large, through their leadership qualities, attitudes and values (University of Pretoria 2020). The programme encourages recipients to have a positive impact in their communities by emphasising the value of 'Give Back', which is a vital concept that all recipients must observe (University of Pretoria 2020). This concept is implemented once students return to their home countries, where they are urged to share what they have learned and gained during the programme with their communities. Recipients are also encouraged to participate in voluntary activities, like organising outings and braais (barbeques), web design, editorial work, video recording, photography, and off-campus outreach activities like visiting orphanages and feeding the poor. The recipients also help the programme's academic team as tutors and mentors, and to deal with any other issues that may arise amongst them during their studies. Consequently, this study assessed the programme's impact by comparing recipients (experimental group) to non-recipients (control group) against the following outcome variables: levels of trust, reciprocity, altruism, cooperation, in-group favouritism and out-group discrimination.

We assumed that the MCF programme, like any other developmental intervention, has a positive influence on recipients' cognitive social capital through its activities. To the best of our knowledge, no study has assessed how a development project like a scholarship programme in a university student setting affects cognitive social capital formation. We focused on university students because, beyond imparting knowledge and skills, higher education also imparts values and social norms. In other words, university education should enhance students' social capital, thereby strengthening their ability to deal with social problems (Putnam 1994). We applied two complementary methods in this study. The first was an online lab experiment in which students played four games, which allowed us to observe pro-social attributes and risk attitudes.[1] Second, students filled out a follow-up questionnaire, which allowed us to identify the size of their social networks, as well as their specific trust and trustworthiness preferences, which we used to cross-check the game results. Our investigations were guided by two hypotheses:

Hypothesis 1 (H1): *Pro-social behaviour is more widespread in the MCF group than in the non-MCF group*.

The rationale for H1 is that there appears to be an association between programmes like the MCF and better monitoring of existing public services among recipients, which results in improved collective

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[1] Attitude towards risk was analysed in this study, as it is cardinal for monitoring the degree of self-assurance and pro-action towards challenging initiatives among the subjects taking part in the MCF programme.

action among community members (for example, see Björkman and Svensson 2009; Banerjee *et al*. 2010). Such programmes endeavour to rebuild communities, restore trust at the local level, and rebuild social relationships.

Hypothesis 2 (H2): *The positive effects of the MCF programme on pro-social behaviour apply not only to the relationships among MCF subjects, but also to their behaviour towards non-MCF subjects.*

We hypothesised that the positive effects of the MCF programme on cognitive social capital will prevail, even if MCF subjects related with non-MCF subjects. H2 contradicts identity theory (Tajfel & Turner 1979, 1986), which predicts in-group favouritism (love) and out-group discrimination (hate). These effects of social identity have been documented extensively, based on incentivised economic experiments (see, e.g., Eckel & Grossman 2005; Bernhard *et al*. 2006a, 2006b; Goette *et al*. 2006). In-group favouritism and out-group discrimination seem to be well established in many communities (Falk & Zehnder 2007; Grimm *et al*. 2017; Abbink & Harris 2019). Underlying H2 is the idea that the pro-sociality effect of MCF subjects is stronger than their in-group favouritism, so that, overall, they also exhibit pro-sociality towards the out-groups, but to a lesser extent than towards their in-groups. This is the result of the coaching they receive, and the experiences they have, on the importance of civic participation.

Our study follows previous studies that ran different experiments to identify pro-social attributes among subjects (Labonne & Chase 2011; Baldassarri & Grossman 2013; Falk *et al*. 2013; Attanasio *et al*. 2015). Due to the Covid-19 pandemic, which imposed constraints that prevented us from having physical sessions with the subjects, we designed and performed the surveys online. The data collection tool was designed such that it could be run on any device that has a web browser.
The rest of the paper is organised as follows: The methods and procedures are presented in Section 2, the results and discussion are presented in Section 3, and we conclude in Section 4.

2. Methods and procedures

This section summarises the recruitment procedure, the experimental setup, the games used and the data analysis. Details about the methods used can be found in Appendix A.

We used e-mails to recruit study subjects from the faculties of Natural and Agricultural Sciences (NAS) and Economic and Management Sciences (EMS) at the University of Pretoria and invited them to participate in an online lab experiment. These faculties were purposely chosen because they had a higher number of MCF students and we had obtained ethics approval from them. The study sample included undergraduate, honours and postgraduate students. We also sent the invitation to WhatsApp groups with target subjects, such as the MCF students' WhatsApp group and the NAS faculty departmental WhatsApp groups.

This was done to easily compare MCF and non-MCF students with similar characteristics.

We conducted 17 sessions using oTree, an open-source framework for laboratory, web and field experiments (Chen *et al*. 2016). Twelve subjects participated in each session: six MCF and six non-MCF students. Subjects were required to complete five tasks in the survey: the dictator game (Forsythe *et al*. 1994), the investment game (Berg *et al*. 1995), the public good (PG) game (Ledyard *et al*. 1995), the bomb risk elicitation task (BRET) (Crosetto & Filippin 2013), and a short exit survey.

Data was collected from the 17 sessions and for 204 subjects[2] at the University of Pretoria in 2020. All data analyses were done using STATA software. We measured the treatment effects of the MCF programme using the games' outcome variables: the amounts sent and returned in the investment game, the amount sent in the dictator game, the amount contributed to the group account in the PG game, and the number of cells collected in the BRET.

3. Results and discussion

3.1 Descriptive statistics of the sample

The summary statistics of the individual subjects are shown in Table 1 below. We treated age and parental size as categorical variables, as all the other variables in the table. Age ranged from 19 to 37 years, and parental household size from one to 20 members per family. We therefore ran a chi[2] test to check for significant differences between samples. Table 1 suggests that there were no statistically significant differences between the observations of the MCF subjects (treated) and non-MCF subjects (control) for the following covariates: age, gender, ethnicity, society, marital status, participation in elections, political view, and religion. There were differences between the treated and control groups in terms of education and parental household size (distribution of frequencies, chi[2] p-value < 0.05). Except for these two latter variables, a good balance was achieved in the samples representing the control and the treated group. The observed differences in terms of educational level[3] and parental household size are discussed further on to explain the effects of the experiments.

Table 1: Summary of descriptive statistics of the sample

Variables	MCF (N = 58)	Non-MCF (N = 62)	Total (N = 120)	Chi[2] p-value
Age (years)	24.24 (0.527)	22.90 (0.320)	23.55 (0.309)	0.148
Parental household size (number)	5.93 (0.397)	5.73 (0.404)	5.83 (0.283)	0.033
Gender (%)				0.562
Female	48.28	51.61	49.17	
Male	51.72	46.77	50	
Other	-	1.67	0.83	
Ethnicity (%)				0.181
Black	100	91.94	95.83	
Coloured	-	1.61	0.83	
White	-	3.23	1.67	
Indian/Asian	-	-	-	
Other	-	3.23	1.67	
Society (%)				0.46
Rural	27.59	24.19	25.83	
Semi-urban	41.38	33.87	37.5	
Urban	31.03	41.94	36.67	
Education (%)				0.001
Undergraduate	50	82.26	66.67	
Honours	10.34	6.45	8.33	
Master's	39.66	11.29	25	
Marital status (%)				0.275
Single	98.83	83.87	89.17	
Married	3.45	4.84	4.17	
Separate/entanglement	-	3.23	1.67	

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[2] After discovering certain flaws in the way questions were presented to 84 of the subjects, this number was decreased to 120, which then represented the final sample for our experiment. The final sample had 58 (MCF) and 62 (non-MCF) subjects. This was the data that was used to run the Mann Whitney and chi-square tests.

[3] The MCF group had more master's and honour's students than the non-MCF group. The non-MCF group had more undergraduates than the MCF group. The differences are attributed to the self-selection of subjects from the two faculties.

Cohabiting	-	3.23	1.67	
Prefer not to say	1.72	4.84	3.33	
Elections (%)				0.698
Yes	74.14	70.97	72.5	
No	25.86	29.03	27.5	
Political view (%)				0.161
Very conservative	13.79	17.74	15.83	
Slightly conservative	24.14	12.9	18.33	
Slightly liberal	24.14	17.74	20.83	
Very liberal	15.52	32.26	24.17	
Prefer not to say	22.41	19.35	20.83	
Religion (%)				0.175
Christianity	94.83	87.1	90.83	
Buddhism	-	1.67	0.83	
Judaism	-	-	-	
Islam	3.45	-	1.67	
Hinduism	-	-	-	
Other	-	1.61	0.83	
None	1.72	6.45	4.17	
Prefer not to say	-	3.23	1.67	

Note: Standard errors in parenthesis

3.2 Treatment effects: MCF vs. non-MCF subjects

To check for treatment effects, a non-parametric statistical test (Mann Whitney (MW) at p-value = 5%) was used. Table 2 presents the means (and corresponding median) and MW p-values of the variables used to represent the subjects' choices in the four games included in our experiment. The table shows the results for the MCF and non-MCF groups. The MCF subjects sent more money in the dictator and investment games, reciprocated more in the investment game, and contributed more to the public good, even though the p-values of the MW tests were not all significant.[4] Being a member of the MCF scholar community had no impact on the BRET game.

Table 2: Amounts chosen by players in all games (median (mean))

Outcome variable	MCF (N = 58)	Non-MCF (N = 62)	Total (N = 120)	MW p-value
Dictator amount sent (ZAR)	25.0 (25.2)	23.5 (24.6)	25.0 (24.9)	0.8963
Investment amount sent (ZAR)	30.0 (31.2)	27.5 (28.7)	30.0 (29.9)	0.3504
Investment: amount returned (% of received amount)	46.8 (44.6)	33.9 (39.9)	42.1 (42.1)	0.1688
PG contribution (ZAR)	37.5 (35.1)	30.0 (30.5)	30.0 (32.7)	0.6503
BRET (cells collected)	50.0 (45.1)	50.0 (44.5)	50.0 (44.8)	0.8664

Note: ZAR is South African rand.
Source: Experimental data collected by authors

Our findings support previous research that revealed no effect of the programmes on the subjects' pro-social behaviour (Mansuri & Rao 2012; Wong 2012; Avdeenko & Gilligan 2015). From Table 2 it is clear that the MCF subjects contributed about 50% of their endowment, while the non-MCF subjects contributed 47%.[5] In the investment game, MCF subjects sent approximately 60% of their

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[4] This behaviour is associated with the level of education of the two groups. The MCF group comprised subjects with a higher education (honours and master's) than subjects in the non-MCF group. Donating to charitable causes is associated with higher levels of education (Brown 2005; Bekkers 2006)

[5] This is in line with what Avdeenko and Gilligan (2015) reported in their study, namely that subjects gave more than 50% of their endowment. Our results are higher compared with what was reported in the meta-analysis done by Engel (2010), in which it was found that the subjects gave about 28% of their endowment on average.

endowment, while non-MCF subjects sent approximately 55%.[6] We found that approximately 90% of the subjects in both the MCF and non-MCF groups returned tokens they received from the sender, while 10% did not return these to the sender. Table 2 shows that, on average, MCF subjects returned about 46% of the rand received, while 33% of the rand received was returned by the non-MCF subjects.[7] Our findings show that 93% of the subjects in both the MCF and non-MCF groups contributed some positive amount towards a public project. This figure is greater than that reported by Avdeenko and Gilligan (2015), who found that 76% of both the treated and control groups contributed to a PG.

Table 2 shows that, in the BRET game, subjects from both the MCF and non-MCF group opened approximately 50 cells on average. Our results are in line with those of Crosetto and Filippin (2013), who reported that subjects opened 46 cells on average. Their number falls in the risk-aversion zone (K < 50), while our sample is at the neutral point (k = 50). We discovered, using the cumulative distribution of choices, that 46.22% of the subjects were in the risk-aversion zone (K < 49), 20.17% were risk neutral (k = 50), and 33.61% were in the risk-loving zone (k > 51).[8] Most of the subject from our sample were risk averse, followed by the risk loving, with the smallest group being those who were risk neutral.[9]

3.3 In-group favouritism and out-group differentiation

As social capital is often a question of interrelations among subjects, we observed whether the behaviour of subjects depended on whether they were interacting with members of the same group, i.e. in-groups (MCF with MCF or non-MCF with non-MCF), or with out-groups (MCF with non-MCF or non-MCF with MCF). We checked for possible in-group favouritism and out-group discrimination, as predicted by Tajfel's theory (Tajfel & Turner 1979, 1986). Such behaviours are reported in the literature. Abbink and Harris (2019) found both in-group favouritism and out-group discrimination in a multiplayer dictator game in a naturally occurring group environment. They conclude that out-group discrimination only occurs when two groups are in conflict, as in the case of two rival political parties. In their meta-analysis of in-group favouritism in cooperation, Balliet *et al.* (2014) found that in-group favouritism is greater when there is a mutual understanding of group membership and during simultaneous exchanges. Grimm *et al.* (2017) found that senders sent more points to in-group members than to other groups in their analysis of in-group favouritism and discrimination among multiple out-groups of students from the same university, but different departments.

Partially confirming the findings of Abbink and Harris (2019) and Grimm *et al.* (2017), we found that the only subjects showing significantly different behaviour throughout the games were the non-MCF when they were relating with subjects of the MCF group. This relating was in the sense of discriminatory behaviour, viz. reduced cooperation (PG), reduced altruistic behaviour (dictator game), and reduced trust (both sending and reciprocating). Conversely, MCF subjects did not seem

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[6] This is slightly higher than the findings of Avdeenko and Gilligan (2015), who found that, in the trust game, subjects from both the treatment and control groups sent roughly 47% of their endowment in their assessments of international interventions relating to creating social capital in Sudan.

[7] This result is higher than what Avdeenko and Gilligan (2015) reported in their study. They found that about one-third of what was received was returned by the subjects to the sender in both the treatment and control groups.

[8] Our results mirror the general findings reported by Crosetto and Filippin (2013) when they presented the BRET. They found risk-averse subjects to be about 52.1%, risk-neutral subjects at 14.7%, and risk-loving subjects at 33.2%.

[9] Risk-averse subjects are those who commit to situations that are more predictable but have a lower payoff (n < 50), while risk-loving subjects are those who commit to situations that are extremely unpredictable, but that have a higher payoff (n > 50). Finally, risk-neutral subjects are those who choose neither risk-loving nor risk-aversion options and exist between the two extremes (n = 50).

to display a significant difference in the way they treated subjects of their group and subjects outside their group, except in the public goods game, where they contributed less to the public good. The behaviour of the MCF subjects is a product of their mutual understanding of group membership and the simultaneous interactions that occur among the MCF subjects. Finally, non-MCF subjects seemed to have the same level of cooperation and trust in their relations with other non-MCF subjects, as did MCF subjects with other MCF subjects (i.e. within the same group). Table 3 shows the means and medians of the amounts that the subjects from the non-MCF and MCF groups allocated to members of the same group and to members of a different group.

Table 3: Amounts chosen by players in games where interactions are possible (in-group/out-group values: median (mean))

Interaction	Trust	Reciprocity	Dictator	PG	Observations
mcf to mcf	30 (31.0)	0.43 (0.44)	25 (27.3)	40 (35.4)	38
mcf to non-mcf	30 (31.5)	0.50 (0.45)	25 (21.3)	30 (34.5)	20
non-mcf to mcf	15 (21.5)	0.30 (0.33)	20 (21.3)	22.5 (19.7)	20
non-mcf to non-mcf	30 (32.1)	0.37 (0.43)	25 (26.2)	40 (35.6)	42
Total					120

Source: Experimental data collected by authors

An MW test was done to check differences between the groups' choices. The boxplots in Figure 1 show the distributions of the choices in the four subgroups presented in Table 3 in the games where differences between groups are significant ($p < 0.05$ for trust/send and PG; $p < 0.1$ for trust/send back). The tables alongside the plots report the corresponding MW p-values.
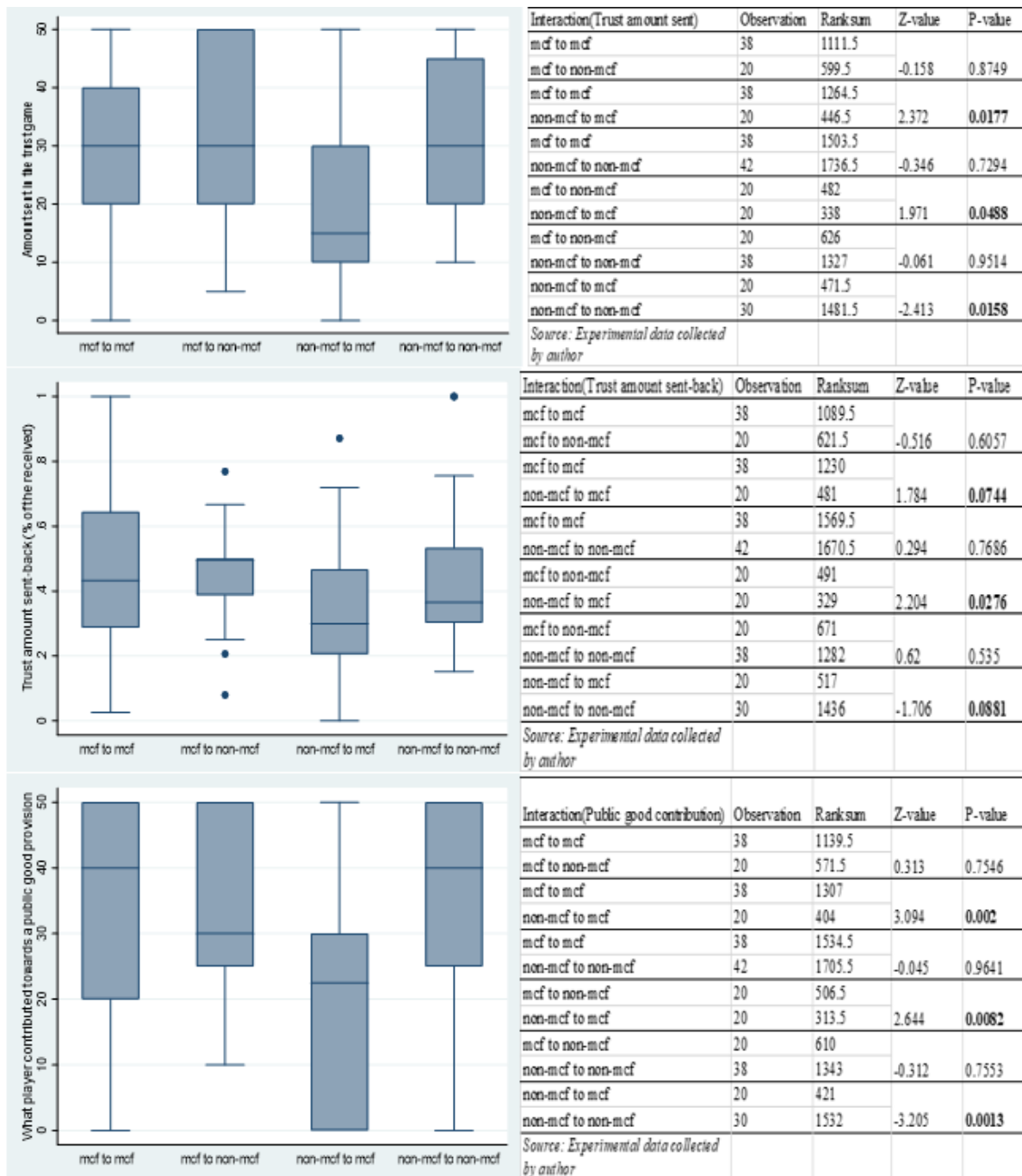
Interaction(Trust amount sent)	Observation	Rank sum	Z-value	P-value
mcf to mcf	38	1111.5		
mcf to non-mcf	20	599.5	-0.158	0.8749
mcf to mcf	38	1264.5		
non-mcf to mcf	20	446.5	2.372	**0.0177**
mcf to mcf	38	1503.5		
non-mcf to non-mcf	42	1736.5	-0.346	0.7294
mcf to non-mcf	20	482		
non-mcf to mcf	20	338	1.971	**0.0488**
mcf to non-mcf	20	626		
non-mcf to non-mcf	38	1327	-0.061	0.9514
non-mcf to mcf	20	471.5		
non-mcf to non-mcf	30	1481.5	-2.413	**0.0158**
Source: Experimental data collected by author				

Interaction(Trust amount sent-back)	Observation	Rank sum	Z-value	P-value
mcf to mcf	38	1089.5		
mcf to non-mcf	20	621.5	-0.516	0.6057
mcf to mcf	38	1230		
non-mcf to mcf	20	481	1.784	**0.0744**
mcf to mcf	38	1569.5		
non-mcf to non-mcf	42	1670.5	0.294	0.7686
mcf to non-mcf	20	491		
non-mcf to mcf	20	329	2.204	**0.0276**
mcf to non-mcf	20	671		
non-mcf to non-mcf	38	1282	0.62	0.535
non-mcf to mcf	20	517		
non-mcf to non-mcf	30	1436	-1.706	**0.0881**
Source: Experimental data collected by author				

Interaction(Public good contribution)	Observation	Rank sum	Z-value	P-value
mcf to mcf	38	1139.5		
mcf to non-mcf	20	571.5	0.313	0.7546
mcf to mcf	38	1307		
non-mcf to mcf	20	404	3.094	**0.002**
mcf to mcf	38	1534.5		
non-mcf to non-mcf	42	1705.5	-0.045	0.9641
mcf to non-mcf	20	506.5		
non-mcf to mcf	20	313.5	2.644	**0.0082**
mcf to non-mcf	20	610		
non-mcf to non-mcf	38	1343	-0.312	0.7553
non-mcf to mcf	20	421		
non-mcf to non-mcf	30	1552	-3.205	**0.0013**
Source: Experimental data collected by author				

Figure 1: Interactions between MCF and non-MCF subjects: Amounts sent and sent back in the investment game and contributions in the PG game
Source: Authors' analysis

3.4 Stated preferences from the survey after the experiment

The sets of questions in the survey were meant to establish the level of stated preferences in relation to a pro-social attitude and to the creation of social capital in the group to which the subjects belong. The results of the survey show a general similarity between MCF and non-MCF subjects in terms of their stated perception of their pro-social behaviour and the creation of social capital within their group. This is in line with the non-significant differences found in the experiments conducted.

Table 4 below refers only to those questions to which the replies indicated a significant difference between the MCF and non-MCF subjects measured through a chi-squared test ($p < 0.05$) of the frequency of replies to the options provided to the respondents. MCF members seemed to trust more than other members of the same group, as indicated by the reaction to the sentence, "In this group, one must be alert, or someone is likely to take advantage of you". MCF members showed significantly higher disagreement with this sentence, while non-MCF members showed higher agreement, and even strong agreement. MCF members also were less prone to reciprocate negative behaviour than non-MCF members, as indicated by their reactions to the sentence, "If somebody puts me in a difficult position, I will do the same to him/her".

Such stated preferences towards social behaviour might explain the differences observed in the experiments in which MCF and non-MCF subjects were placed in relation to subjects of the same group or subjects of the other group. The greater percentage of non-MCF members prone to reciprocate a negative behaviour, as well as the greater share of non-MCF members showing mistrust of other members of the same group, could lie at the origin of the out-group discrimination observed in the investment game and in the PG game. In other words, non-MCF subjects stated a higher level of mistrust in members of the same group and were more likely to reciprocate negative behaviours. While this was not sufficient to change their behaviour when put in relation to members of the same group, it might have produced discriminatory behaviour when the non-MCF subjects were put in relation to MCF subjects. In contrast, the stated social preferences of MCF subjects would explain the lower discriminatory behaviour toward non-MCF subjects, as they showed a smaller chance of reciprocating negative behaviour and a lower mistrust of others.

Table 4: Subjects' perceptions of trust and reciprocity in the group to which they belong

Variables	MCF (N = 58)	Non-MCF (N = 62)	Total (N = 120)	Chi² p-value
In this group, one must be alert or someone is likely to take advantage of you (%)				0.036
Disagree strongly	15.83	10	25.83	
Disagree somewhat	14.17	7.5	21.67	
Neither agree nor disagree	6.67	9.17	15.83	
Agree somewhat	7.5	15	22.5	
Agree strongly	4.17	10	14.17	
If somebody puts me in a difficult position, I will do the same to him/her (%)				0.033
Disagree strongly	25.83	16.67	42.5	
Disagree somewhat	14.17	19.17	33.33	
Neither agree nor disagree	6.67	5.83	12.5	
Agree somewhat	0.83	6.67	7.5	
Agree strongly	0.83	3.33	4.17	

Source: Experimental data collected by authors

3.5 Determinants of subjects' game behaviour

We used OLS regression analysis, as shown in Tables 5 and 6, to determine the effect of demographic and treatment covariates on the outcomes of the four games used in the experiments. Through these models, it was also possible to relate some of the attitudes emerging from the post-experiment survey to the outcomes of the experiments.

In terms of treatment effects, the variable MCF1[10] implies that being a member of the MCF programme has a significant and positive ($p = 0.07$) effect only on the PG game, while the variable

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[10] This variable is a dummy that takes a value of 0 for non-MCF members and 1 for MCF members.

MCF01[11] implies that the negative discrimination is significant for non-MCF subjects when reciprocating in the investment game. In both the dictator and investment (send) games, age has a significant and positive impact. This means that, as people get older, they are more likely to be trusting and compassionate toward others in their community. Female subjects sent less in the dictator game and reciprocated less in the investment game, in contrast to what is generally found in these type of studies in the literature, where female subjects are found to demonstrate a high level of trustworthiness in their societies. The description, other gender, refers to subjects who identify as neither male nor female. These sent significantly more money in both the investment and the dictator games. This suggests that people who do not identify as male or female are more sympathetic and trusting in their interactions with others. In the investment game, married subjects sent smaller amounts, in contrast to the findings of Putnam (1994), who found that people who are single, divorced and separated, along with never-married men and women, are much less trusting than married people. Our results would imply that most people who were married could be in disintegrating marriages and hence these families had low membership of community groups. Being a graduate or an undergraduate student had no effect on the observed variables, except for subjects at the honours level, who sent more in the investment game. This result suggests that the duration of participating in the MCF programme does not affect the results.

Some variables resulting from the answers to the survey were significantly correlated with the results of the experiments: subjects who stated that others were very likely to cooperate and subjects stating that others were unlikely to cooperate contributed more to the PG game. This is an interesting result, as the latter subjects might have contributed more as a signal to 'redress' the behaviour of others. Subjects indicating that they looked for new friends in the group they belonged to sent significantly more in the investment game. This was also true for subjects who stated that they had more trust in general in the investment game. People who are open to making new friends are socially skilled, hail from societies that are not isolated, and live in an environment in which they can meet new people. The amount sent back (reciprocity) and the amount sent in the trust game have a strong and positive correlation. In the trust game, subjects who regarded others as trustworthy sent more. This result shows that trust is a proxy for trustworthiness. Subjects willing to take risks in financial matters both contributed more in the PG game and were more prone to take risks in the BRET. In the latter game, subjects who contributed more to the PG game risked more (open more cells). This is interesting, as it shows that subjects contributing to the PG game had an objective of profit maximisation and were ready to take a risk in the common enterprise of the group.

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[11] The MCF01 variable is also a dummy that takes a value of 0 for non-MCF and 1 for MCF subjects, and signifies a match when non-MCF subjects are matched with MCF subjects.

Table 5: Primary determinants arising from the investment game

Variables	Amount sent	Amount returned[#]
MCF1	1.453	
	(2.695)	
Age	0.864*	-0.120
	(0.499)	(0.914)
Female	-1.606	-10.59*
	(2.511)	(6.217)
Other gender	22.75*	-45.39
	(13.61)	(33.84)
Married	-13.05*	
	(6.754)	
Separate/entanglement	-12.78	
	(9.803)	
Cohabiting	-0.222	
	(10.21)	
Prefer not to say	-16.69**	
	(6.855)	
Yes (new friends)	12.93**	
	(5.167)	
Honours	11.75**	
	(4.829)	
Master's	-3.596	
	(3.896)	
Investment: amount returned (ZAR)	0.109**	
	(0.0418)	
Trust general (ranking)	1.140**	
	(0.466)	
MCF01		-14.08*
Trust (alert)		(8.183)
Disagree somewhat		0.698
		(8.918)
Neither agree nor disagree		12.25
		(9.728)
Agree somewhat		-5.091
		(8.817)
Agree strongly		-20.13*
		(10.37)
Constant	-10.84	77.79***
	(13.28)	(23.13)
Observations	120	120
R-squared	0.303	0.127

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
[#] The amount returned corresponds there to the response to the highest amount received in the strategy method, viz. R150

Table 6: Primary determinants arising from the dictator, PG and BRET games

Variables	Dictator amount sent	PG contribution	BRET collected
MCF1	-0.335	5.535*	
	(2.419)	(2.966)	
Age	0.948**	-0.654	-1.037
	(0.364)	(0.456)	(0.767)
Female	-5.099**	-0.211	
	(2.381)	(3.102)	
Other gender	25.60*	3.587	
	(13.11)	(16.21)	
Somewhat unlikely to cooperate		22.16*	
		(11.55)	
Neither likely nor unlikely to cooperate		9.096	
		(8.501)	
Somewhat likely to cooperate		11.42	
		(7.431)	
Very likely to cooperate		14.63*	
		(7.572)	
Risk in financial matters		1.238**	1.636*
		(0.611)	(0.971)
Contribute time	6.048		
	(5.209)		
Contribute money	-0.0915		
	(5.282)		
MCF01			8.084
			(7.080)
Married			0.416
			(12.77)
Separate/entanglement			-18.59
			(18.70)
Cohabiting			-6.282
			(18.63)
Prefer not to say			5.590
			(13.36)
PG contribution			0.348**
			(0.162)
Constant	-0.508	25.69**	46.62**
	(9.756)	(12.72)	(19.07)
Observations	120	120	119
R-squared	0.133	0.115	0.098

Notes: Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4. Conclusion

An important question about development projects and initiatives resides in their capacity to stimulate social capital in recipient societies. This fact is of particular importance, as social capital is a crucial constituent of communities' resilience towards various types of risks and dynamics, such as climate change, and political, economic and social changes. Communities' enhanced resilience, particularly in rural and agricultural areas, where natural resources are at the core of the local levels of livelihood and contribute significantly to food security, is closely connected with their capacity to use and manage natural resources in a more sustainable way. Sustainable development, and an improved and durable use of natural resources, are then extremely intertwined with the creation and maintenance of the social capital of the communities that deal with these resources. A better understanding of the relationships at play is important for at least two reasons. In the presence of self-selection bias (Heckman 1990), not recognising that a development project worked with communities with higher

social capital before the start of the project would unduly increase the measurement of the impact of the project. In the same way, not recognising the increase in social capital due to the project would unduly undermine an important long-term impact of the project. Farmers may not benefit directly from the project, but they would have learned to work together or with new partners.

To properly study the level of social capital in communities that benefit from development projects, an analysis in two stages (ex-ante and ex-post the development project) would be suitable.

The aim of this study was to verify ex-post, through an incentivised experiment, whether the Mastercard Foundation (MCF) scholarship programme at the University of Pretoria (UP) influenced the level of cognitive social capital among its members. This preliminary work is intended to contribute to the definition of an experimental protocol that will allow the later implementation of a complete analysis in two stages.

We designed an online experiment composed of four well-known games (investment game, dictator game, PG game and BRET), and then collected preferences through a survey that followed the games. The MCF and non-MCF students who were recruited came from the same population, and the data generation process that produced the student types was the same.

We tested two hypotheses on the capacity of the studied project to improve the recipients' cognitive social capital. The first hypothesis was: *Pro-social behaviour is more evident in the MCF group than in the non-MCF group*. The second hypothesis was: *The positive effects of the MCF programme on pro-social behaviour are visible also when MCF subjects relate with non-MCF subjects*.

Our findings did not corroborate hypothesis 1, as there is no significant treatment effect in our experiments, even if the results went in the expected direction in all games. On the other hand, unlike the non-MCF subjects, the MCF subjects had similar behaviour when relating with both MCF subjects and non-MCF subjects. Therefore, even if we do not observe significant differences within the groups in the experiments conducted, these differences appear when the subjects of a group are related with subjects of the other group, and particularly when non-MCF subjects are related with MCF subjects. In this case, negative discriminatory behaviour appears. The MCF programme then has a positive effect on the pro-social behaviour of MCF members in the sense that it reduces both mistrust of other members and reciprocation of negative behaviours. This fact pushes MCF subjects to act with non-MCF subjects in the same way as with MCF subjects, thereby partially confirming hypothesis 2. The positive effect of the MCF programme therefore resides in the reduction of out-group discrimination and in-group favouritism among the MCF group members.

We found a consistent pattern between the observed behaviour in the games and the self-reported measures in the survey. Following the formulated hypotheses, this behaviour could be attributed to the effects of the MCF scholarship programme. Our findings will need further research to establish the factors that led to the subjects exhibiting a reduction in mistrust and a reciprocation of negative behaviour. The MCF and non-MCF students all met the same minimal admission requirements for UP graduate programmes. As a result, we do not believe that being an international student, poor and academically talented influences pro-social behaviour.

Some factors linked to the present conjuncture can further explain the results of the experiments. The MCF programme engages students to participate in different activities, such as outings, special holidays like Heritage Day, and braais (barbecues). However, due to the Covid-19 pandemic, interactions were banned throughout the year. Due to the countrywide lockdown and restrictions imposed to control the pandemic, there was no way in which these interactions could have been

fostered. Finally, another factor that could possibly explain the lack of significant results confirming H1 is that our MCF sample consisted of a group of students who had been part of the programme for different periods of time. The same experiment conducted on MCF students who had been part of the programme since their undergraduate years would possibly produce different figures.

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Appendix A

Recruitment procedure

Students who were willing to participate were asked to reply via e-mail and share their WhatsApp number. A total of 204 students participated in the survey: 102 MCF and 102 non-MCF students. Due to funding constraints and the availability of MCF students in these faculties, the sample size was thus limited to 204. Since participation was voluntary, not all MCF students participated in the study. We recruited the subjects after receiving approval from the respective deans and ethics approval from the faculty according to University of Pretoria policy.

Subjects were added to a dedicated WhatsApp group, where further instructions were given. Three appointment times were provided for a given day, and those who were available at the said times were asked to communicate privately via WhatsApp to provide their details. A list of subjects was compiled as each private message was received, with the allocation of equal numbers to each group (treatment and control). Subjects were asked privately to be online at a specific time and day. A reminder was sent 45 minutes before the allocated time to check on the availability of the subjects. A link was then shared 15 minutes before the session to those who confirmed availability.

Experimental setup

The subjects played in isolation for the dictator game and the bomb risk elicitation task (BRET), while they interacted with others in the Investment[12] and PG games, i.e., their rewards depended both on their own and others' decisions. They did not know who they were paired with until the end of each session, and they did not get any input on the other students' choices. Finally, in the exit survey, the subjects answered questions about themselves and their relationships with other students. Anonymity prevailed in all tasks.

At the end of the session, one of the four incentivised tasks was selected at random and paid out in real money. Subjects were paid in rand according to their own and others' decisions in the selected task. In addition, each subject was given R50 show-up fee, which was added to their payoff for the selected task.

Experimental games

Each session was composed of four incentivised tasks: the dictator game, the investment game, the public goods (PG) game, and the bomb risk elicitation task (BRET). Each of the corresponding games was played once only. The online software was created in such a way that each game could be played only after the previous one had been finished.

Dictator game
The dictator game is usually interpreted as a tool to measure subjects' level of altruism, a key dimension of pro-sociality. However, this interpretation is questionable (see List 2007). Before playing, the subjects were notified whether they were playing an MCF or a non-MCF student. In this game, four types of matches were established: MCF to MCF, MCF to non-MCF, non-MCF to MCF, and non-MCF to non-MCF. Each subject was assigned to an in-group (MCF to MCF or non-MCF to non-MCF) and an out-group (MCF to non-MCF or non-MCF to MCF). They were two roles for

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[12] Formally, the dictator game also involves an interaction because there are two roles. In our study, we made the receiver inactive in the experiment and the sender played alone.

consideration in this game: sender and receiver. The senders' behaviour was our focal point, and thus the receiver did not respond to the senders' action in this game. To analyse the indication of altruism in the dictator game, all players were assigned the role of sender at the start. In the dictator game, subjects had an endowment of R50[13] and had to choose a value between R0 and R50 to send. No decision was made by the receiver. The sender's gain was equivalent to the number of rand they kept. The receiver's gain was equal to the amount of rand they received from the sender. Details of each aspect of this game, its calibration and conversion rate to rand, are described further in the following section (Details of the games).

Investment game

There were two variables in the investment game: trust, which is calculated by the amount sent by the sender to the recipient, and trustworthiness, which is measured by the percentage of the received amount returned to the sender. In this game, we assessed subjects' pro-social behaviours of trust and reciprocity. Subjects were notified before play whether they were playing with an MCF or non-MCF student. Four types of matches were devised, as in the dictator game: MCF to MCF, MCF to non-MCF, non-MCF to MCF, and non-MCF to non-MCF. Each subject was divided into one of two groups: an in-group (MCF to MCF or non-MCF to non-MCF) and an out-group (MCF to non-MCF or non-MCF to MCF). In this game, as in the dictator game, there were two roles to consider: sender and receiver, but here the subjects took on both roles. They were requested to send a sum ranging from R0 to R50 to the receiver. The sum sent was multiplied by three before getting to the receiver. The receiver was required to return a sum ranging from zero to three times the amount received from the sender. The receiver had to make a conditional decision. He/she was given five possibilities of amounts to be received from the sender (R30, R60, R90, R120 and R150), and had to select how much to return in each case. The sender's payoff was equal to the amount kept plus the amount the receiver returned to him or her. The receiver's payoff was equal to the initial sum (R50), plus the amount received from the sender (multiplied by three) minus the amount returned to the sender. In the next section, more details are provided for this game, its calibration and the conversion rate to rand.

Public goods (PG) game

The observed variable in the public goods (PG) game is the individual contribution to the group account, which is a measure of revealed cooperativeness. Before playing the PG game, subjects were notified whether they were playing with an MCF or non-MCF student. There were three types of groups with four subjects in the PG game: all MCF subjects, half MCF and half non-MCF subjects, and all non-MCF subjects. Subjects were required to secretly contribute between R0 and R50 to a public good. The rands contributed were multiplied by a factor (two in our game) to become the "public good". The total amount contributed by all group members was then evenly divided among the players, regardless of the amount contributed. Each subject also kept the rands they did not contribute, and they received the same payoff from the project. The game is further explained in the following section (Details of the games).

Bomb risk elicitation task (BRET)

In the BRET, the observed variable is the number of cells opened by a subject, where opening more cells indicates being more risk tolerant (or if fewer are opened, the subject is more risk averse). The

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[13] At the exchange rate at the time of this study, of 15.6 rand to the US dollar, each subject was given approximately 3.2 dollars as an initial endowment.

BRET assesses the subjects' willingness to take risks, or their attitudes toward danger. On the subjects' screens in the BRET game, a 10 x 10 matrix with 100 cells was displayed. Subjects played alone and had to choose the number of cells they wanted to open. To do this, they directly entered the number of cells they wanted to collect, or they could use the arrows (up and down) to increase/ decrease the number of cells they wanted to open. Once opened, the cell was marked with a tick symbol. A bomb hidden behind one of the cells would destroy everything that was opened. If the bomb did not explode, the remaining 99 cells were valued R1 each. The bomb was positioned randomly by the computer. Players only knew that the bomb might be anywhere and that it had an equal chance of being discovered. Subjects had to press the 'Stop' button when they were satisfied with the number of cells they wanted to open. The contents of the cells were revealed when they hit the 'Solve' button. A dollar sign appeared on each of their opened cells if the bomb was not discovered. A fire symbol appeared in the opposite case. Subjects received R1 for each cell they collected if they opened cells that did not contain the bomb, and R0 otherwise. More details of this game are described further in the following section (Details of the games).

Post-experimental questionnaire

After completing the games, the subjects were asked to complete a questionnaire that included demographic questions, as well as questions about the subjects' perceptions of and preferences for the social norms elicited through the games, and about their relationships (see questionnaire in Appendix B). The questionnaire included questions that enabled us to determine the extent of the subjects' social networks, as well as their preferences for trust and trustworthiness, altruism and cooperation, and their attitudes towards risk and group solidarity.

Details of the games

Investment game

To elicit trust behaviour, we used the investment games developed by Berg *et al*. (1995). In this game, each student was paired up with another student online – at random and anonymously. There are two positions in each pair: sender and receiver. The subjects played both roles in this game. Subjects began as senders, just as they did in the dictator game. After playing the sender role, a screen appeared on which everyone was categorised as a receiver, and they all took on the role of the receiver. Since all subjects were considered senders and receivers, we were able to obtain more data. The experimenter gave both players the same initial endowment (R50). This was done to control for other motivations for the trustor to pass money to the trustee; thus, the initial endowments were equalised. If the trustor's endowment was biased in his favour, he would feel compelled to transfer funds to equalise payoffs and alleviate his guilt. The subjects were told whether the other player had a Mastercard scholarship. They had to determine how much to give to the receiver, after being informed that the receiver would receive three times the sum they sent, and that the receiver would potentially be able to send back some of the money to the sender. The senders had to select an amount from R0 to R50 to send.

Subjects in the receiver position were told whether or not the sender had a Mastercard scholarship. They needed to determine how much money to return to the sender. The subjects were given scenarios in which they received money from the sender. They had to specify the sums to return if the sender had sent R30, R60, R90, R120 or R150, respectively. The trustee maximises his pay-out by returning nothing to the trustor under traditional behavioural assumptions, i.e. self-interested players. The trustor does not give anything to the trustee because he does not expect a return. This is the game's ideal subgame equilibrium: zero reciprocity and zero trust. The social optimum, on the other hand,

would necessarily require complete trust. The sender receives a payment equal to the amount they did not send, plus the amount returned to them by the receiver. The payoff for the receiver is equal to the original total (R50), plus the amount received from the sender and minus the amount returned to the sender.

This is an example of a social dilemma: the subject's interest is to mistrust, while the group's interest is to trust completely. Taking this into account, the trustor's transfer of funds can be seen as a representation of his trust in the trustee, whereas the trustee's return of funds can be seen as a reflection of the trustee's trustworthiness or reciprocity. Trust is valuable in the investment game; however, it is risky because the trustee could be untrustworthy.

Dictator game

The dictator game of Forsythe *et al*. (1994) is also a two-player game, but one of the players is a spectator. In this task, subjects were matched with another person online to form a pair. In each pair, there were two roles: sender and receiver. The sender was given R50 and the receiver had nothing. The sender was told whether the receiver had a Mastercard Foundation scholarship or not. The sender decided how much money to send to the receiver. He or she could choose any amount between R0 and R50. The gain of the sender was equal to the number of rand that they kept. The gain of the receiver was equal to the number of rand that they received from the sender. As noted previously, the amount sent is widely viewed as indicative of the sender's altruism. Practically, the game was organised in such a way that all the players had the initial role of sender, as this allowed us to evaluate an indicator of altruism (Carpenter *et al*. 2008). Other interpretations of the motivations behind the dictator's giving behaviour are 'warm glow' (Andreoni 1989) and 'guilt aversion' (Battigalli & Dufwenberg 2007). However, to comply with the instructions given to the players and to prevent deception, subjects were in reality paired with another random student in the session when calculating the final payoff, and each was assigned a specific role of sender or receiver. The decisions taken in the dictator game are often used to demonstrate how likely people are to donate to non-profit projects such as student solidarity funds, to make community donations for rehabilitating a community school, and to make charitable contributions.

Public good

In the public goods game of Ledyard (1995), subjects are allocated to teams in which they could make voluntary contributions to create a social good. The voluntary contribution mechanism (VCM) and voluntary contribution game (VCG) are other names for this game (Polania-Reyes 2015). The VCM expresses the willingness among members of the group to cooperate by contributing money to a group account from which each subject will benefit, thus improving his or her well-being. For this game, subjects were members of a group of four players, and there were a total of three groups. The first group had only MCF students, the second group had all non-MCF students, and the third was a mixture of two MCF students and two non-MCF students.

Subjects were asked to contribute towards a public good, depending on the group to which they had been assigned. Each subject was given R50. Each group member determined how much he or she wanted to contribute to a group project. The subject could contribute any amount between R0 and R50. What they did not contribute to the project was kept by the subjects. After all members of the group had chosen their contributions, the total amount contributed was doubled and divided equally between the four subjects of the group by the software, so that each subject received the same payoff from the project. The amount in a player's private account benefitted only him/her. At the individual level, the return from the private account is greater than the return from the group account in this

game, which is like an investment game. Since the group account corresponds to a pure public good, the return from the group account is higher for the group payoff at the collective level (non-rivalry, non-excludability). This is because the group account rewards all equally.[14] Since investing zero in the group account has a higher payoff regardless of what other players contribute, it is the dominant strategy for each player. There will be no public good provided if each player follows this strategy. This strategy is not socially optimal, because it disadvantages other subjects. Indeed, the social optimum is for each member to contribute his or her entire endowment to the group account.

Now, let **w** represent a subject's endowment and **n** represent the number of members in a group. For the group account, the marginal return is α < 1, and for the private account it is 1. At the social optimum, the individual payoff is **α*n*w**, while at the Nash equilibrium (dominant strategies), it is **w**. There is a social dilemma if **α > 1/n.** Some of the factors that can lead to cooperation in such a game include recurrence, communication, punishments or rewards for action taken, and unequal payments. This game is important because it allows for the measurement of people's willingness to pay for the provision of a public good, as well as the inclusion of instruments that aid in the coordination of cooperation and the regulation of free-rider issues that occur among community members.

The bomb risk elicitation game (BRET)

Crosetto and Filippin (2013) introduced the bomb risk elicitation game. We used their (Crosetto & Filippin 2013, 2016) dynamic visual version, which has a ten-by-ten square, with each square representing a cell. The bomb risk elicitation game is an incentivised risk-elicitation task (Crosetto & Filippin 2013). The game therefore displays a 10 x 10 matrix containing 100 cells on the subjects' computer screens. Subjects have to choose how many of the cells they want to open. To do this, they type the number of cells they want to collect, or they can use the arrows (up and down) to increase/decrease the number of cells they want to open. Once opened, the cell is marked with a tick symbol.

Behind one of the cells there is a hidden 'bomb' that would 'destroy' everything that had been opened. The remaining 99 cells are worth R1 each, provided that the bomb does not explode. The bomb is planted randomly by the computer and subjects do not know where the bomb is located. They only know that the bomb could be anywhere, with an equal chance of being found. Subjects have to press the 'Stop' button when they are satisfied with the number of cells they want to open. When they press the 'Solve' button, the contents of the cells are revealed. Each of the opened cells displays a dollar sign or a fire symbol (for the bomb). If they have selected the bomb, all their earnings in the task are destroyed and their payoff is R0. If the cells they opened did not contain the bomb, they received R1 for each of the cells they collected.

This game provides a very clear explanation of the probabilities that are involved in the game. It is simple and intuitive, as it allows subjects to understand it even when used with people with less of an educational background. The probability of confusing the respondents is thus reduced. It is an important game, as it allows the measuring of risk attitudes when making decisions in uncertain instances. The game allows an estimation of the level of risk aversion and risk loving. This game helps to determine to what extent people are willing to take risks when a new technology or activity with proposed benefits is introduced into a community.

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[14] Technically, the marginal per capital return (MPCR) must strictly be greater than 1/n, where n is the number of group members, and strictly less than 1, since 1 is the marginal return from the private account.

Details of data analysis

We compared the outcome variables of the MCF subjects with those of the non-MCF subjects, using Mann Whitney tests to check for significant differences because our data was not normally distributed. We then ran chi-squared tests on the responses of the subjects' stated preferences in the post-experimental survey. We used the chi-squared test because we wanted to find out whether the distribution of the categorical variables of the MCF group differed from those of the non-MCF group. In-group favouritism is the difference between the amounts sent to the in-group (MCF or non-MCF) and the out-group (non-MCF or MCF). The discrepancy between the amounts sent to the in-group (MCF or non-MCF) and the out-group (non-MCF or MCF) is known as in-group favouritism. Ordinary least squares (OLS) regressions were used to observe the effect of demographic and treatment covariates on the outcomes of the four games. On the definition of variables, see Table 7 below.

Table 7: Definitions of variables for the regressions in Table 5 and Table 6

Variable	Definition of variable
MCF01	Dummy variable taking a value of 0 for non-MCF members and 1 for MCF members. Variable representing a match between non-MCF and MCF subjects
MCF1	Dummy variable taking a value of 0 for non-MCF members and 1 for MCF members
Age	Age of subject in years
Gender	Gender of subject, with options of male, female, other, prefer not to say
Marital status	Marital status of subject, with options of single, married, separate/entanglement, cohabiting, prefer not to say
New friends	Subject's ability to make new friends, with options of Yes and No
Education	Subject's level of education, with options of undergraduate, honours, master's, PhD or higher
Investment amount returned	Amount sender returned in the investment game
Trust general	Ranking for question on general trust within the subject's group, with a scale varying from 1 (disagree strongly) to 5 (agree strongly)
Trust alert	Trust alert question of trust in subject's group, with options on a scale of 1 to 5 (where 1 is disagree strongly and 5 is agree strongly)
Group cooperation	Willingness of members of subject's group to cooperate, with options on a scale from 1 (very unlikely to cooperate) to 5 (very likely to cooperate)
Risk in financial matters	Subject's willingness to take risks in financial matters on a scale of 0 to 10
Contribute time	Subjects' willingness to contribute time when a campus project does not benefit them, with 1 indicating that they will not contribute time, while 2 indicates that they will contribute time
Contribute money	Subjects' willingness to contribute money when a campus project does not benefit them; a value of 1 indicates that they will not contribute time, while 2 indicates they will contribute time
PG contribution	Subjects' contribution towards a public good in rand

Appendix B

Part 1: Experiments

Experiment 1

MCF to MCF

You were matched online randomly and anonymously with another person to form a pair. Like you, this person is a member of the group of students who received a Mastercard Foundation scholarship. In each pair, there are two roles: sender and receiver. Before the game starts, each player will learn whether he/she is the sender or the receiver. The sender initially receives R50 and the receiver initially receives nothing. The sender must decide how many rand to send to the receiver. He/she can choose any amount from R0 to R50. The gain of the sender is equal to the number of rand that he/she keeps. The gain of the receiver is equal to the number of rand that he/she receives from the sender.

You are the sender in your pair. Please select how much of the R50 you would like to send to the receiver.

MCF to non-MCF

You were matched online randomly and anonymously with another person to form a pair. Unlike you, this person is not a member of the group of students who received a Mastercard Foundation scholarship. In each pair, there are two roles: sender and receiver. Before the game starts, each player will learn whether he/she is the sender or the receiver. The sender initially receives R50 and the receiver initially receives nothing. The sender must decide how many rand to send to the receiver. He/she can choose any amount from R0 to R50. The gain of the sender is equal to the number of rand that he/she keeps. The gain of the receiver is equal to the number of rand that he/she receives from the sender.

You are the sender in your pair. Please select how much of the R50 you would like to send to the receiver.

Non-MCF to MCF

You were matched online randomly and anonymously with another person to form a pair. Unlike you, this person is a member of the group of students who received a Mastercard Foundation scholarship. In each pair, there are two roles: sender and receiver. Before the game starts, each player will learn whether he/she is the sender or the receiver. The sender initially receives R50 and the receiver initially receives nothing. The sender must decide how many rand to send to the receiver. He/she can choose any amount from R0 to R50. The gain of the sender is equal to the number of rand that he/she keeps. The gain of the receiver is equal to the number of rand that he/she receives from the sender.

You are the sender in your pair. Please select how much of the R50 you would like to send to the receiver.

Non-MCF to non-MCF

You were matched online randomly and anonymously with another person to form a pair. Like you, this person is not a member of the group of students who received a Mastercard Foundation

scholarship. In each pair, there are two roles: sender and receiver. Before the game starts, each player will learn whether he/she is the sender or the receiver. The sender initially receives R50 and the receiver initially receives nothing. The sender must decide how many rand to send to the receiver. He/she can choose any amount from R0 to R50. The gain of the sender is equal to the number of rand that he/she keeps. The gain of the receiver is equal to the number of rand that he/she receives from the sender.

You are the sender in your pair. Please select how much of the R50 you would like to send to the receiver.

Experiment 2

For this experiment, you are matched randomly and anonymously with another subject on this online platform to form a pair. One of you will be selected at random to be the sender; the other will be the receiver. You will learn whether you are the sender or receiver prior to making any decision. To start, both the sender and the receiver receive **R50**. This game has two steps:

Step 1: The sender must decide how many rand to send to the receiver. He/she can choose to send any amount between **R0** and **R50**. The amount sent by the sender will be multiplied by **three** so that the receiver will receive triple the amount.

Example 1: The sender sends **R0**, so the receiver receives **R0**.

Example 2: The sender sends **R5**, so the receiver receives **R15**.

Example 3: The sender sends **R50**, so the receiver receives **R150**, and so on.

Step 2: If the receiver receives rands from the sender, the receiver must decide how many rand to return to the sender. He can choose any amount between zero and the amount that he/she received from the sender after been multiplied by **three**.

Example 1: The sender sent R5 and the receiver received **R15**. How much does the receiver return from the **R15** received?

Example 2: The sender sent R15 and the receiver received **R45**. How much does the receiver return from the **R45** received?

Example 3: The sender sent R45 and the receiver received **R135**. How much does the receiver return from the **R135** received, and so on.

Once paired with another subject, you will play both roles. You will first be asked how much you want to send to the receiver. You will then know how much the other subject had sent to you and will need to choose how much you want to send back. The computer will then select which of the scenarios will be used for the payment if this experiment is used for the final payment. You will then be asked to fill in a table with hypothetical scenarios of people sending you money, and you will be asked to state how much you want to send back for each of the scenarios.

MCF to MCF

Sender's decision

In this task you have been selected as the sender. You have R50. Like you, the receiver is a member of the group of students who received a Mastercard Foundation scholarship. How much will you send to the receiver, knowing that he will receive three times the amount you sent and will eventually send back some money to you? Please select the amount (between R0 and R50) that you would like to send.

MCF to non-MCF

Sender's decision

In this task you have been selected as the sender. You have R50. Unlike you, the receiver is not a member of the group of students who received a Mastercard Foundation scholarship. How much will you send to the receiver, knowing that he will receive three times the amount you sent and will eventually sent back some money to you? Please select the amount (between R0 and R50) that you would like to send.

Non-MCF to MCF

Sender's decision

In this task you have been selected as the sender. You have R50. Unlike you, the receiver is a member of the group of students who received a Mastercard Foundation scholarship. How much will you send to the receiver, knowing that he will receive three times the amount you sent and will eventually send back some money to you? Please select the amount (between R0 and R50) that you would like to send.

Non-MCF to non-MCF

Sender's decision

In this task you have been selected as the sender. You have R50. Like you, the receiver is not a member of the group of students who received a Mastercard Foundation scholarship. How much will you send to the receiver, knowing that he will receive three times the amount you sent and will eventually send back some money to you? Please select the amount (between R0 and R50) that you would like to send.

Task 3

MCF to MCF

Receiver's decision

In this task you are the receiver, and you will be given scenarios in which senders send you money. Like you, the sender is a member of the group of students who received a Mastercard Foundation scholarship. In each case, state the amount you want to send back to the sender.

MCF to non-MCF

Receiver's decision

In this task you are the receiver, and you will be given scenarios in which senders send you money. Unlike you, the sender is not a member of the group of students who received a Mastercard Foundation scholarship. In each case, state the amount you want to send back to the sender.

Non-MCF to MCF

Receiver's decision

In this task you are the receiver, and you will be given scenarios in which senders send you money. Unlike you, the sender is a member of the group of students who received a Mastercard Foundation scholarship. In each case, state the amount you want to send back to the sender.

Non-MCF to non-MCF

Receiver's decision

In this task you are the receiver, and you will be given scenarios in which senders sent you money. Like you, the sender is not a member of the group of students who received a Mastercard Foundation scholarship. In each case, state the amount you want to send back to the sender.

Sender sent	10	20	30	40	50
You received	30	60	90	120	150
You decide to send back					

Experiment 3

Instruction

All MCF students

For this task, you are a member of a group of four players. Each member has R50. All players in this group received an MCF scholarship. Each member of the group must decide how much to contribute to a group project. You can decide to contribute any amount between R0 and R50. What you do not contribute to the project is yours to keep. After all members of your group have contributed, we will double the total amount that the group contributed and divide the amount equally between the four members of the group, so that each member gets the same payoff from the project, regardless of how much they contributed.

Mixed group

For this task, you are a member of a group of four players. Each member has R50. In this group, some players received an MCF scholarship, and some did not. Each member of the group must decide how much to contribute to a group project. You can decide to contribute any amount between R0 and R50. What you do not contribute to the project is yours to keep. After all members of your group have contributed, we will double the total amount that the group contributed and divide the amount equally

between the four members of the group, so that each member gets the same payoff from the project, regardless of how much they contributed.

All non-MCF students

For this task, you are a member of a group of four players. Each member has R50. All players in this group did not receive an MCF scholarship. Each member of the group must decide how much to contribute to a group project. You can decide to contribute any amount between R0 and R50. What you do not contribute to the project is yours to keep. After all members of your group have contributed, we will double the total amount that the group contributed and divide the amount equally between the four members of the group, so that each member gets the same payoff from the project, regardless of how much they contributed.

Example 1: Nobody contributes to the project. There is nothing to be doubled. Each member of the group gets zero from the project and keeps his R50.
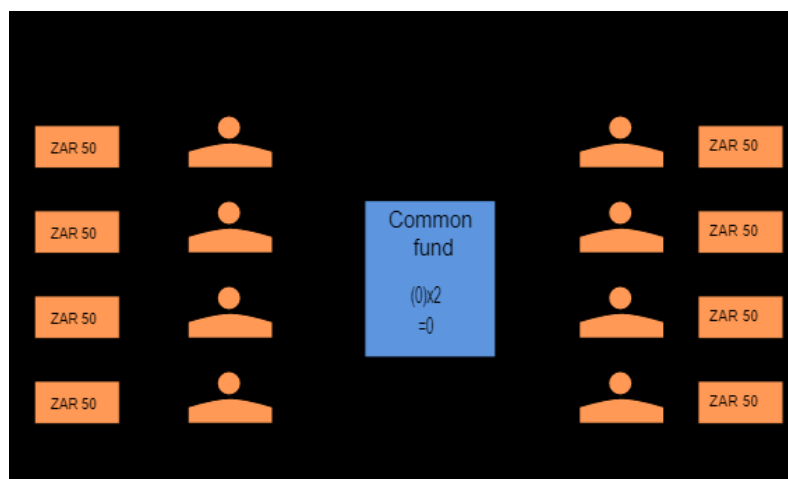

Example 2: Everybody contributes their entire R50 to the project. Therefore, the total amount in the project is R200. We multiply this amount by two so that R400 is available for the group. After sharing this amount equally, everybody in the group ends up with a payoff of R100.
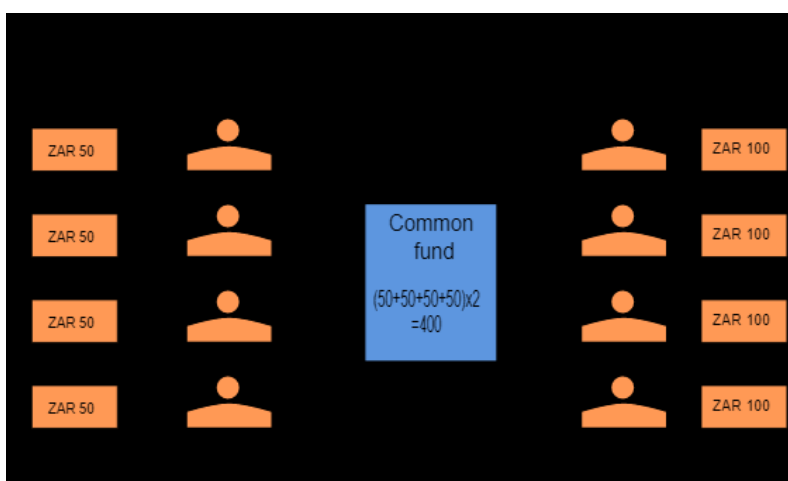

Example 3: Everybody contributes R10 to the project. Therefore, the total amount in the project is R40. We multiply this amount by two so that R80 is available for the group. After sharing this amount

equally, everybody in the group gets R20 from the project. In addition to that, you have the R40 that you did not contribute to the project. Your total payoff from the game therefore is R60.
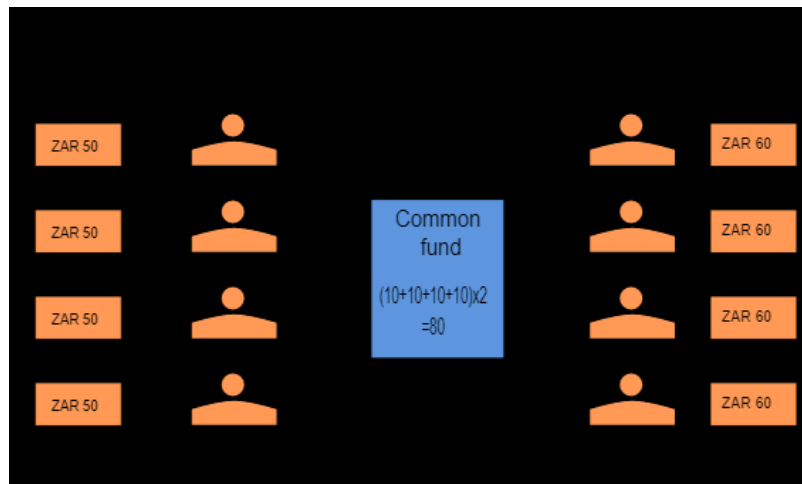
Example 4: Two people contribute R10 and two people contribute R30. The total amount for the project is R80, which is doubled to give R160. This is shared equally among the people in the group, such that each gets R40. The total payoff therefore is R80 (the R40 not contributed + the R40 from the project) for those who contributed R10, and R60 (the R20 not contributed + the R40 from the project) for those who contributed R30.
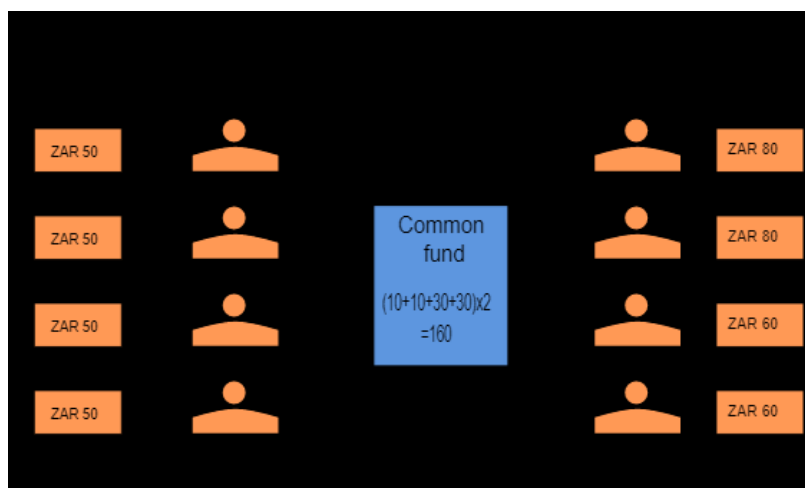
All MCF students

You are a member of a group of four players. Each member has **R50**. All members of this group received an MCF scholarship. When all members have made their contribution, the total amount contributed will be doubled. The doubled amount will be divided equally between the group members, regardless of how much each contributed. How much do you want to contribute?

Mixed group

You are a member of a group of four players. Each member has **R50**. In this group, some players received an MCF scholarship and some did not. When all members have made their contribution, the total amount contributed will be doubled. The doubled amount will be divided equally between the group members, regardless of how much each contributed. How much do you want to contribute?

All non-MCF students

You are a member of a group of four players. Each member has **R50**. All members of this group did not receive an MCF scholarship. When all members have made their contribution, the total amount contributed will be doubled. The doubled amount will be divided equally between the group members, regardless of how much each contributed. How much do you want to contribute?

Experiment 4

In the following, you will see a 10 x 10 matrix containing 100 cells on your screen. You can choose the number of cells you want to open. To do this, you can directly type the number of cells you want to open, or use the arrows (up and down) to increase/decrease the number of cells you want to open. Once opened, the cell is marked by a tick symbol. For each cell you have collected, you earn R1.

Behind one of the cells hides a bomb that destroys everything that has been opened. The remaining 99 cells are worth R1 each. The bomb has been planted randomly by the computer and you do not know where the bomb is located. You only know that the bomb can be in any place with equal probability. Your task is to choose the number of cells you want to open. When you are satisfied with your choice, you hit the 'Stop' button. The content of the cells will be revealed when you hit the 'Solve' button. A dollar sign or a fire symbol (for the bomb) will be shown on each of your opened cells.

- If you opened the cell in which the bomb is located, the bomb will explode. All your earnings in this task will be destroyed and your payoff will be R0.
- If your opened cells did not contain the bomb, you will receive R1 for each of the cells you opened.

Example 1: You choose to open 30 cells. The bomb is not in any of the 30 cells when opened by the computer. You will win R30.

Example 2: You choose to open 10 cells. If the bomb is among the 10 cells opened by the computer, you will win R0.

How many cells do you want to open?

Part 2: Questions on you and your relationships

1.   (For MCF students only) Before joining MCF, were you a member of another scholarship programme or group that engaged its members in different activities?
☐   Yes
☐   No

2.   a. On campus, do you belong to any formal or informal group? A group can be academic and educational, political and cultural, recreation and sports, religious, student government, community service, etc.
☐   Yes
☐   No

        b. Please choose the type of group you associate with the most:
☐   Academic and educational
☐   Political
☐   Recreation and sports
☐   Student government
☐   Community service
☐   Cultural
☐   Ethnic or linguistic
☐   Religious
☐   Other (specify)

3.   Thinking about the group you identify with most:
        Does your group work with or interact with other groups on the campus?
☐   No
☐   Yes, occasionally
☐   Yes, frequently

4.   Thinking about the group you identify with most:
        Can you easily make new friends in your group?
☐   Yes
☐   No

5.   Thinking about the group you identify with most:
        About how many close friends do you have in your group? These are people you feel at ease with, can talk to about private matters, or call on for help.
☐   0
☐   1
☐   2
☐   3
☐   4
☐   5
☐   More than 5

6.   Thinking about the group you identify with most:
        If you suddenly needed to borrow a small amount of money, are there people in your group
        to whom you could turn and who would be willing and able to provide this money?
☐   Yes
☐   No

7.   There are often differences in characteristics between students on campus in different groups.
        Examples are differences in wealth, income, social status, ethnic or linguistic
        background/race/caste/ tribe. There can also be differences in religious or political beliefs, or
        there can be differences due to age or sex. To what extent do such differences characterise
        your group? Answer using the five-point scale below:
1.   Very few such differences exist in my group
2.   Few such differences exist in my group
3.   Neither many nor few differences exist in my group
4.   Many such differences exist in my group
5.   Very many such differences exist in my group

8.   Do any of these differences' hinder interactions with one another in your group?
☐   Yes
☐   No

9.   Which differences hinder interactions within your group? (may give two answers)
1.   Differences in the level of education
2.   Differences in wealth/material possessions
3.   Differences in social status
4.   Differences between genders
5.   Differences between younger and older students
6.   Differences in political party affiliations
7.   Differences in religious beliefs
8.   Differences in ethnic or linguistic background/race/caste/tribe

10.   Thinking about the group you identify with most:
        How often have you communicated with people in your group in the past month via online
        platforms, e.g. Zoom, Google Meet, WhatsApp call/video call and other related media?
1.   0 times
2.   Once
3.   Twice
4.   3-5 times
5.   More than 5 times

11.   How do you see yourself? Are you generally a person who is fully willing to take risks, or do
        you try to avoid taking risks? Please tick a number on the scale below, where 0 means 'risk
        averse/try to avoid taking risks' and 10 means 'fully prepared to take risks':
        0 1 2 3 4 5 6 7 8 9 10

12.   People can behave differently in different situations. How would you rate your willingness to
        take risks in the following areas? Rate on a scale from 0 to 10:
a.   While driving
b.   In financial matters
c.   During leisure and sport

d.   In your occupation
e.   With other people
f.   Your faith in other people

13.   As a general rule, would you say that most people can be trusted, or that you can never be too careful in your dealings with people? Could you provide a ranking on a scale from 0 to 10, where 0 means 'You can't be too careful' and 10 means 'Most people can be trusted'.
        0 1 2 3 4 5 6 7 8 9 10

14.   Could you rank yourself on a scale from 0 to 10, where 0 means 'am very careful in my relationships with other people' and 10 means 'am very confident in my relationships with others'.
a.   In general
b.   With family
c.   With other students

15.   Thinking about the group you identify with most, please rate the following statements using the following rankings: 1 (disagree strongly); 2 (disagree somewhat); 3 (neither agree nor disagree); 4 (agree somewhat); and 5 (agree strongly)
a.   'Most people who are in this group can generally be trusted'
b.   'In this group one must be alert or someone is likely to take advantage of you'
c.   'Most people in this group are willing to provide help if you need it'
d.   'In this group, people generally do not trust each other in matters of lending and borrowing money'

16.   How much do you trust the people in your group?
1.   I do not trust them
2.   I have minimal trust in them
3.   I have moderate trust in them
4.   I have high trust in them
5.   I have very high trust in them

17.   Thinking about yourself, please rate the following statements using the following rankings: 1 (disagree strongly); 2 (disagree somewhat); 3 (neither agree nor disagree); 4 (agree somewhat); and 5 (agree strongly)
a.   'If someone does me a favour, I am prepared to return it'
b.   'If somebody puts me in a difficult position, I will do the same to him/her'
c.   'I go out of my way to help somebody who has been kind to me before'
d.   'I am ready to undergo personal costs to help somebody who has helped me before'

18.   How well do people in your group help each other out during these days, under the conditions of the Covid-19 pandemic?
1.   People are never helping
2.   People rarely help
3.   People help sometimes
4.   People help most of time
5.   People are always helping

19.   In the past five months, did you voluntarily participate in any activity within or outside your
        group in which you assisted with something for the benefit of others? E.g. mentoring, tutoring,
        counselling, or donations.
☐   0 times
☐   Once
☐   Twice
☐   3-5 times
☐   More than 5 times

20.   Thinking about the group you identify with most:
        Are people in your group willing to cooperate and come together to work for a common
        purpose? For example, working voluntarily for a community orphanage or working together
        when there is a problem in your group.
1.   People are very unlikely to cooperate
2.   People are somewhat unlikely to cooperate
3.   People are neither likely nor unlikely to cooperate
4.   People are somewhat likely to cooperate
5.   People are very likely to cooperate

21.   If a campus project does not directly benefit you but has benefits for many others on campus,
        would you contribute time to the project?
1.   Will not contribute time
2.   Will contribute time

22.   If a campus project does not directly benefit you but has benefits for many others on campus,
        would you contribute money/material things to the project?
1.   Will not contribute money/material things
2.   Will contribute money/material things

Part 3: Socio-demographics

23.   What is your age?

24.   What gender do you identify as?
☐   Male
☐   Female
☐   Other
☐   Prefer not to answer

25.   Please specify your ethnicity.
☐   Black
☐   Coloured
☐   White
☐   Indian/Asian
☐   Other
☐   Prefer not to say

26.   What is your country of origin?

☐☐☐☐☐☐☐☐☐☐☐ (empty box)

27.   Please specify the type of society you come from in your country of origin.
☐   Rural
☐   Semi-urban
☐   Urban

28.   What is the size of your parental family?

(empty box)

29.   What is your level of study?
☐   Undergraduate
☐   Honours
☐   Master's
☐   PhD or higher

30.   What is your marital status?
☐   Single
☐   Married
☐   Divorced
☐   Widowed/widower
☐   Separate/entanglement
☐   Cohabiting
☐   Prefer not to say

31.   Do you participate in the national elections of your country? E.g. taking part in voting for new
       leaders.
☐   Yes
☐   No

32.   How would you describe your political view?
☐   Very conservative
☐   Slightly conservative
☐   Slightly liberal
☐   Very liberal
☐   Prefer not to say

33.   If applicable, please specify your religion.
☐   Christianity
☐   Judaism
☐   Islam
☐   Buddhism
☐   Hinduism
☐   Other
☐   None
☐   Prefer not to say

Thank you for taking the time to participate. We will now proceed to the selection of the game that will be used to calculate your reward.