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SOCIAL CAPITAL AND POLISH STUDENTS' BEHAVIOUR IN EXPERIMENTAL GAMES DESIGNED TO ILLUSTRATE COOPERATION

Urszula Markowska-Przybyła,
Faculty of Economics, Management and Tourism,
Wrocław University of Economics,
Wrocław, Poland,
E-mail: ump@ue.wroc.pl

David M. Ramsey,
Faculty of Computer Science and Management,
Wrocław University of Technology,
Wrocław, Poland,
E-mail: david.ramsey@pwr.edu.pl

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ABSTRACT. Social capital in the form of informal norms and networks of social relationships is an intrinsic element of any society and influences the effectiveness of its economy. For this reason, it is important to understand the relation between individuals' social capital and the behaviour they express in social and economic interactions. Two important elements of social capital are generalised trust and norms of reciprocation. Hence, this article presents results from a study designed to investigate the level of generalised trust and reciprocation among Polish students. In previous studies, a positive answer to the trust question: "Do you believe that the majority of people can be trusted?", has been shown to be associated with cooperative behaviour in the Public Goods Game. Our questionnaire included two novel questions aimed at elucidating students' opinions about what sort of behaviour is most likely to bring success and whether such behaviour is in line with their own outlook. The results of the study presented here indicate that the answer to the first question is a better predictor of behaviour in the two games considered here than the answer to the trust question and one of the possible answers to this question can be interpreted as an expression of generalised trust. Also, when taken together, the answers to these two questions give a more subtle picture of individuals' trust in the general public and institutions.

JEL Classification: C70, C72

Keywords: experimental game theory, generalised trust, social capital, Poland.

Introduction

Social capital in the form of generalised trust and reciprocation is typically seen to be positively correlated with economic growth (Growiec and Growiec, 2014). Poland is often regarded as the most successful of the post-Soviet bloc countries in its transformation from a planned economy to a market economy. However, the level of generalised trust in Poland has been reported to be low, even compared to other post-communist countries (Growiec, 2011).

This article is one in a series based on a project designed to elucidate how individuals' social capital relates to their behaviour in social and economic interactions[1].

This study was carried out at state universities, one in each of the sixteen Polish regions, whose main aim is to study the level of generalised trust and reciprocation among Polish students using experimental game theory alongside a questionnaire.

The first article (Markowska-Przybyła and Ramsey, 2014) presented the games that the students played: the Ultimatum Game (Güth *et al.*, 1982), the Trust Game (Berg *et al.*, 1995) and the Public Goods Game (Isaac and Walker, 1988) and how these games were played in our experimental setting. The second article (Markowska-Przybyła and Ramsey, 2015) presented the results of the questionnaire. This article considers results from the Ultimatum Game and the Public Goods Game.

Although many large scale studies using experimental game theory have been carried out in various countries, this is the first such study to be carried out in Poland (see Gąsiorowska *et al.*, 2012 and Gąsiorowska and Hełka, 2012 for descriptions of smaller scale studies in Poland).

This paper investigates the relation of the behaviour observed in the Ultimatum Game and Public Goods Game with the answers to two questions related to the type of strategy that students regarded as being the most likely to result in success (henceforth referred to as the strategy questions). The article also gives a description (sociological and statistical) of the differences between students according to the answers given to these two questions. These questions look at two dimensions which are elements of any strategy aimed at economic success and how likely a student is to follow the type of strategy which is seen to most often bring success. One of these dimensions is referred to as the social dimension with cooperation at one end of this spectrum and individualism at the other end. The other dimension is the legal dimension with adherence to the law on one end of this spectrum and behaviour on the boundary of the law at the other end. Although the majority of students are proponents of cooperative behaviour, our results indicate that those who are proponents of individualistic behaviour do not feel any discord between their own views and the views of society as a whole. On the other hand, those who see behaviour on the boundary of the law as being the most likely to bring success very often feel discord, regardless of whether they see cooperative or individualistic behaviour as being the most likely to bring success. Those who stated that individualistic behaviour on the edge of the law was most likely to bring success statistically showed the most characteristic behaviour in these two games. They exhibited a low level of cooperative behaviour in both of the games considered. Those who stated individualistic behaviour in adherence with the law showed a low level of cooperation in the Public Goods Game (where there is no possibility of negative reciprocation), whereas they showed a high level of cooperative behaviour in the Ultimatum Game (where negative reciprocation is possible). This indicates that this group of individuals will act individualistically when possible, but in clear social interactions they accept and act upon informal norms. The relation between the answers to these two questions and students' social capital is also addressed.

Section 1 describes the questionnaire and how the experiment was conducted. In Section 2, the Ultimatum Game and the Public Goods Game are described. The methods of statistical analysis are described in Section 3. Section 4 considers the two strategy questions and describes their relationship to the behaviour observed in these two games. Section 5 considers the relation between the answers to these two questions and other factors considered in the questionnaire. Conclusions and possible directions for future research are considered in the Conclusion.

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1. How the Experiment was Conducted

The study was conducted by a team from "EU-CONSULT" Ltd. at state universities[2] in a capital of each of the 16 Polish regions between 16.04.2014 and 12.06.2014, supervised by Dr. Urszula Markowska-Przybyła and Ewa Starczewska from the Faculty of Economics, Management and Tourism of Wrocław University of Economics, based in Jelenia Góra, where both authors observed a pilot study with 32 participants on 11.03.2014. It was intended that 100 students took part at each site. In total, 1540 students participated in the study, with between 88 and 100 students at each site, split into three or four sessions, run one after the other. As the Public Goods Game is a four-player game, the number of participants in a session had to be a multiple of four. The participants obtained a mean payoff of about 45 PLN (€11). All decisions and questionnaires were written on forms coded to identify the player and their "opponents". The participants in a session were assigned into two groups at random (with no knowledge of which group other players were in). Participants first took their decision in the Public Goods Game and the decision of Player 1 in the game appropriate to their group (the Ultimatum Game or the Trust Game). Each participant then obtained the instructions relevant to Player 2 in the game they had not yet played, along with the decision of their randomly chosen "opponent" (Player 1). The aim of this procedure was that students treated the games independently (when making a particular decision, they had no information on the results of other games). Between making each decision, students were given time to read the instructions and ask questions. Finally, the students filled in the questionnaire (required to obtain their payoff), while the payoffs were calculated, which took about 20 minutes. Each session lasted around an hour.

The questionnaire covered the following topics (see Markowska-Przybyła and Ramsey (2015) for a full description of the results from this questionnaire):

a) The subject studied: it has been noted that, in particular, economics students show different behaviour in such experimental settings (see Kopczewski, 2010), as they may have come into contact with the concepts of game theory.
b) Where the student comes from and their feeling of attachment to the region in which they live/study. Lewicka (2013) notes that the way that people bond to the place in which they live is strongly related to their character and outlook on life. The size of a student's home town was categorised according to a four point scale (1: up to 5 thousand inhabitants, 2: from 5 to 20 thousand inhabitants, 3: from 20 to 100 thousand inhabitants, 4: above 100 thousand inhabitants). The following reasons for attachment to a region were listed: i) I was born here, ii) I have lived here for some time, iii) I have lived most of my life here, iv) I do not come from this region, but I plan to spend my future here, v) I do not feel attachment, vi) Other (please state).
c) Generalised trust, membership in social organisations and frequency of social contacts with the three following groups: relatives, friends and acquaintances. Social contact is measured on a seven-point scale, 1: never, 2: less than once a month, 3: once a month, 4: two/three times a month, 5: once a week, 6: several times a week, 7: daily. The expressed level of generalised trust is the answer to the question: "Can the majority of people be trusted?" The possible answers formed a five-point scale, 1: no, 2: rather not, 3: I do not know, 4: rather, 5: yes. Membership in social organisations was assessed based on the following questions with binary (yes/no) answers: "Have you worked as a volunteer in the last year?" and "Are you an active member of an organisation?" Various types of organisation were listed for the participants to indicate (e.g. charity, sporting/recreational, artistic/musical, political, religious), but the type of organisation is not considered here.

[2] These institutes were all "uniwersytety", which in the Polish system are institutes of higher education offering courses in a wide range of subjects, both humanistic and scientific.

Growiec (2011) describes social capital in terms of the strength of links with family (bonding capital) and acquaintances (bridging capital). Putnam (1993) understands generalised trust to be the degree to which one expects unknown people to exhibit positive reciprocation or behaviour that is beneficial to a group as a whole, even at the risk of a personal loss. He argues that membership in an organisation is positively associated with generalised trust and, to a large extent, understands social capital in terms of civic involvement.

d) Interest in current affairs at the following levels: national, regional and local (measured on a scale from one, not at all interested, to five, very interested). For example, Norris (1996) considers the relation between social capital and access to information via the media.
e) General values (relative importance of ethical and legal norms, readiness to reciprocate, attitude to tax evasion). For example, Rotemberg (2008) uses the concept of minimally acceptable altruism to explain negative reciprocation observed in the Ultimatum Game. The relative importance of ethical and legal norms was assessed using the question "In situations of conflict between legal and moral norms, which are the most important to you?" The answers were on a three point scale increasing in the importance of ethical norms, 1: legal norms, 2: ethical norms, as long as the punishment for breaking legal norms is not too harsh, 3: ethical norms. Readiness to exhibit negative reciprocation in public matters is based on the answer to the question "How often do you react when you see someone damaging public property? (e.g. call the police)" on a four-point scale, 1: never, 2: very rarely, 3: sometimes, 4: usually. Readiness to exhibit negative reciprocation in private matters is based on the answer to the question "If somebody acts unfairly to you, how do you react?" on a four-point scale, 1: I do not react, 2: I react if it does not cost me anything, 3: I react if only a small cost is involved, 4: I react, even if it involves a change in my plans and significant costs. A student's attitude to tax evasion was assessed according to the answer to the question "How do you feel about the fact that some people pay less taxes than they should?" on a five-point scale increasing in the level of aversion to tax evasion, 1: strongly in favour, 2: somewhat in favour, 3; indifferent, 4: rather against it, 5: strongly against it.
f) The type of strategy seen to be most likely to bring success and students' willingness to follow such a strategy (the strategy questions). These strategies were expressed in terms of social behaviour (cooperative or individualistic) and civic behaviour (adherence to or on the borders of legality). The answers to these questions result from the interaction between a student's view of the world, in particular the behaviour of others, their own personal views and the level of conflict between these viewpoints. Since this article focuses on the answers to these questions, a full description is given in Section 5. Chai *et al.* (2010) use a questionnaire to measure an individual's position in similar dimensions to those that we call the social and legal dimensions. It should also be noted here that Kaiser *et al.* (2010) state that individuals may express the same attitudes for different reasons and that the same observed behaviour can result from different sources. Hence, attitudes and behaviour should be seen as formally, not causally, related. For example, the observations and interviews carried out by Henrich (2000) regarding behaviour in the Ultimatum Game suggest that some individuals offer an equal split as they instinctively feel that this is fair and some offer such a split after some thought as they are afraid that the other player will reject the proposal.

2. The Games Considered

Here we consider two of the three games played by the study group, namely the Ultimatum Game and the Public Goods Game. The study group also played the Trust Game (see Berg *et al.*, 1995), but this game is not considered in this article.

2.1. The Ultimatum Game

This game was first considered in an experimental setting by Güth *et al.* (1982) in Germany. Two players have to split 20PLN (about €5) between themselves. Player 1 (the proposer) makes an offer, denoted by *x,* to Player 2. This offer must be a multiple of 1PLN, i.e. $x \in \{0,1,2,\ldots,20\}$. The respondent, Player 2, then accepts or rejects this offer. If Player 2 accepts it, then the payoff vector equals (20-*x*, *x*). If Player 2 rejects this offer, the payoff vector is (0, 0).

As the decisions are made sequentially and Player 2 knows the action of Player 1, we can find the Nash equilibria by recursion. Assume that the players are economically rational and Player 1 proposes that the split should be (20-*x*, *x*). When $x > 0$, Player 2 should accept the proposal, thus obtaining a positive payoff instead of nothing. When $x = 0$, Player 2 is indifferent between rejecting or accepting the proposal. Thus there exist two pure equilibria. At one, Player 2 accepts a split if and only if $x \geq 1$ and Player 1 chooses $x = 1$. At the other, Player 2 accepts any split and Player 1 offers 0 PLN. There is also a mixed equilibrium, at which Player 2 accepts any offer of $x \geq 1$, but accepts an offer of 0 with a probability strictly between 0 and 1. In this case, Player 1 randomises, sometimes offering 0 PLN and otherwise offering 1 PLN. Although multiple equilibria exist under the assumption of economic rationality, they are qualitatively similar. Namely, the assumption of economic rationality predicts that Player 1 will demand the vast majority of the pool and Player 2 should accept any positive payoff.

In many countries, there have been experimental studies based on the Ultimatum Game since the original study. Falk and Fischbacher (2006) note that observed behaviour is radically different to that predicted by classical game theory. In nearly all countries, the proposer most often demands between 50 and 60% of the funds available. Such offers are very rarely rejected. Demands of above 80% are rare and commonly rejected.

Güth (1995) argues that players use learned norms. In most studies, roles were assigned to players at random. Hence, we may assume that an even split is considered fair. The interviews described in Henrich (2000) seem to confirm this. Cameron (1999) investigates how the value of money to be split affects the players' actions. The proportion demanded by the proposer does not significantly change as the funds to be split increase. However, the probability of rejecting an offer of less than 20% of the total amount decreases (the cost of inflicting punishment increases). Hence, it seems the proposer might gain a higher expected payoff by demanding a large percentage of a large sum, but avoids doing so, due to risk aversion (see Pratt, 1964).

In order to model such behaviour, utility functions are used that take both an individual's absolute and relative payoff into account. The utility function used in Markowska-Przybyła and Ramsey (2014) takes into account both an individual's monetary payoff and the feeling of discomfort regarding the inequality between the payoffs. In particular, suppose the vector of monetary payoffs is (v_1, v_2), then Player 1's utility, $u_1(v_1, v_2)$, is of the form

$$u_1(v_1, v_2) = \begin{cases} v_1 - \alpha\,(v_1 - v_2), & v_1 \geq v_2 \\ v_1 - \beta(v_2 - v_1), & v_1 < v_2 \end{cases}, \qquad (1)$$

Player 2's utility is defined analogously. The values of the parameters α and β vary according to a player's character. Hence, α and β describe the levels of discomfort resulting from inequality when a player is relatively well-off and relatively poor, respectively. A negative value of a parameter indicates that an individual gains utility from inequality. We assume that $\beta \geq \max\ \{0, \alpha\}$, i.e. no comfort is ever felt from being worse-off and individuals feel at least as much discomfort from a given level of inequality when they are worse-off than when they are better-off. Negative values of α indicate either competitiveness or spite, as an individual gains utility simply by obtaining a greater payoff than the other player. This approach is adopted to derive a Bayesian equilibrium (see Tadelis, 2013, pp. 241-269). At such an equilibrium, Player 2 accepts an offer of x if and only if it exceeds his/her threshold $t(\beta)$, where $t(\beta) = \frac{20\beta}{1+2\beta}$. This threshold is equal to 0 when β equals 0 and increases towards 10 as β becomes very large. Hence, Player 2 should always accept an offer of 10 (or more) and those with a very large value of β only accept even splits. Thus the parameter β may be interpreted as the willingness of Player 2 to punish an unfair action (i.e. exhibit negative reciprocation).

Player 1's proposal depends on his/her attitude to inequality, described by the parameter α, and beliefs about the distribution of the parameter β in the relevant population.

2.2. The Public Goods Game

This game was considered by Isaac and Walker (1988). In general, n players are each given the same amount of money and each simultaneously decides how much to pay into a pool. The pool is then multiplied by a factor k and split equally between the players. Various versions use different parameters (see also Gächter *et al.*, 2004; Fischbacher *et al.*, 2001). We use the version of this game with $n = 4$ and $k = 1.6$ and each player is given 20 PLN, which corresponds exactly to Fischbacher *et al.* (2001) and is similar to values used in other studies.

In order to analyse this game, we first assume that the amount paid into the pool is a continuous variable. Let the amount of money that Player i pays into the pool be x_i. Denote the payments made by the other players into the pool by the vector $\mathbf{x}^{-i}$. The amount to be split is $1.6\sum_{i=1}^{4} x_i$. It follows that the payoff of Player i is given by $v_i(x_i ; \mathbf{x}^{-i})$, where

$$v_i\left(x_i\ ;\ \mathbf{x}^{-i}\right) = (20 - x_i) + \frac{1.6}{4}\sum_{i=1}^{4} x_i = \ (20 - x_i) + 0.4\sum_{i=1}^{i=4} x_i.$$

The first term is the amount a player retains for himself and the second term is the amount that a player obtains from the pool, i.e a quarter of the money in the pool. The factor $\frac{k}{n}$, here 0.4, is called the marginal rate of return (i.e. given the amounts paid into the pool by the other players, for each extra unit one pays into the pool, one obtains 0.4 extra units in return). Isaac and Walker (1988) note that payments are positively correlated with this marginal rate of return.

Assume that players are economically rational (i.e. maximise their own monetary payoff). Note that for $1 \leq i \leq 4$, we have $\frac{\partial v_i}{\partial x_i}$ = -0.6. Hence, given the payments made by others, Player i's payoff is decreasing in the amount he pays into the pool. This remains true when we restrict payments to integer values. Thus $x_i = 0$ is a dominant strategy. Hence, there is a unique Nash equilibrium, where nothing is paid into the pool and all players receive a payoff of 20 PLN.

However, the optimum for the group as a whole occurs when each pays 20 PLN into the pool and then each player obtains 32 PLN. Hence, this game can be interpreted as a generalisation of the Prisoner's Dilemma where players pick one of two actions denoted

"cooperate" and "defect" (see Tadelis, 2013, p. 51). Those who pay a large amount into the pool can be called "cooperators" and those who pay a small amount can be called "defectors".

Considering the constraints inherent within an experimental setting, we assume that the behaviour observed will be intuitive and reflect the participants' level of altruism and generalised trust, i.e. those with high levels of altruism and generalised trust will place more in the pool than those with low levels of altruism and generalised trust.

Gächter *et al*. (2004) used the Public Goods Game and questionnaire in a study carried out in various locations in Russia with participants from the general population. They found that payments into the pool were positively associated with individuals stating that in general people are trustworthy. Students contributed slightly less than non-students, indicating that students are less trusting and/or less altruistic than the population as a whole.

3. Statistical Analysis

First we analyse associations between the decisions of players in these two games and the answers given in the questionnaire. This involved analysing 23 answers, which means that the problem of multiple testing appears (Benjamini and Hochberg, 1995). By testing at a fixed significance level of 5%, on average we would find one or two significant associations, even when behaviour is independent of the answer to any question. Holm 1979 adapts the classical Bonferroni procedure, which controls the false discovery rate (FDR). The FDR is the expected proportion of significant associations found, which are not in fact real associations (if no significant associations are found, then the FDR is defined to be zero). Testing at a significance level of α, the FDR is controlled to be at most αk, where k is the number of tests. Hence, by testing at the 0.1% or 1% level levels, the false discovery rate will be at most 2.3% or 23% respectively. Benjamini and Hochberg s1995 show that this procedure is conservative, i.e. the FDR is actually lower than the given bound. Hence, in our study, if an association is significant at the 0.1% level (the p-value satisfies $p<0.001$), then we can be almost sure that such an association exists, if an association is significant at the 1% level ($p<0.01$), then this is reasonably strong evidence for an association. If an association is significant at the 5% level ($p<0.05$), then this is very weak evidence of an association, which needs to be corroborated by other studies.

To analyse associations between the decisions of the players and binary variables, we used the Student t-test, since the sample sizes were large, without assuming uniformity of variance. When a nominal variable took more than two values, we used analysis of variance (ANOVA). In addition, since the variance may not be uniform, we also applied the corresponding non-parametric test (Kruskal-Wallis test). In these cases, we take the largest p-value from the two tests, i.e. the one which indicates the least evidence for an effect. When ANOVA indicates that there exists some significant difference between the group means, then the least significant difference test is used to compare pairs of groups. To analyse the associations between the decisions of the players and an ordinal variable (i.e. a categorical variable ordered with respect to a scale), we used Spearman's test of correlation.

We also analysed the relation between the answers to the strategy questions and the other answers in the questionnaire. Note that the first answer is a nominal variable and the second is ordinal. In order to analyse the association between two nominal variables, we used Fisher's exact test of independence, or the chi-squared test of independence when the number of categorisations was too large to carry out the appropriate calculations. To analyse the association between two ordinal variables, we used Spearman's test of correlation. To analyse the association between an ordinal variable and a nominal variable, we used the Mann-Whitney test (when the nominal variable was binary) or the Kruskal-Wallis test (in all other cases).

Calculations were carried out in the SPSS package. For greater accuracy in calculating p-values below 0.01, the R package was used. We give the appropriate p-values and Spearman's correlation coefficient, *r*.

4. Observed Behaviour and Answers to the Strategy Questions

The first of two closed questions directed at students' views on the type of strategy regarded as the most likely to bring success was as follows: "Which of the following types of strategy is most likely to bring success? (write "X" in the appropriate box below – **only one strategy type should be indicated**)" – see *Table 1*.

Table 1. Possible answers to the question: "Which of the following types of strategy is most likely to bring success?"

	Primarily indvidual effort, a minimum of cooperation with others	Cooperation with others
Acting in line with the law		
Acting on the boundary of the law or even beyond it		

Source: the authors.

These four strategy types will be referred to as legal-individualist, legal-cooperative, border-individualist and border-cooperative. The two dimensions involved will be called the legal dimension (legal/border) and the social dimension (individualist/cooperative). The second question, the intention question, asked the following: "Do you intend to implement the strategy type indicated?" The possible answers were: yes, probably, do not know, probably not, no. If a student expresses intention to follow the strategy indicated, this suggests that he/she feels no conflict between the way in which he/she wishes to act and the type of strategy assumed to be most likely to bring success.

No valid answer to the first question (i.e. either no cell or more than one cell was indicated) was given by 243 of the 1540 students. These were treated as observations missing completely at random. The 1297 valid answers to these two questions are illustrated in *Table 2*, which shows a clear association between the type of strategy assumed to be optimal and the strength of intention to follow such a strategy ($p < 0.001$, Kruskal-Wallis test). This is due to the association of the level of intention with the legal dimension. Over 90% of the students stating that the strategy most likely to achieve success involved adhering to the law, stated that they would or probably would follow such a strategy, independently of the social dimension. Just under 30% of the students who stated that the strategy most likely to achieve success involved behaviour of the borders of legality stated that they would or probably would follow such a strategy, again independently of the social dimension. Hence, these results indicate that students feel almost no conflict between the level of cooperation or individualism that they personally exhibit and the social behaviour expected to bring success. However, almost 30% of the students see behaviour on the border of legality as being most likely to bring success and just over 70% of this group feel conflict (answer do not know, probably not or no), independently of the position on the social dimension. This conflict might result from various sources e.g. the behaviour assumed to be successful is not in line with a student's ethical norms and/or a student fears the legal consequences of acting on the borders of legality. It should also be noted that in the strategy assumed to be optimal there

exists a tendency for cooperative behaviour to accompany behaviour in line with the law ($p<0.001$, Fisher's exact test).

Table 2. Answers to the strategy questions. The row and column percentages are given in the final column and final row, respectively, in terms of the total number of valid observations. The other percentages give the percentages of those in each row giving a particular answer to the intention question. Due to rounding error the sum of these percentages may not be exactly 100%

	Yes	Probably	Do not know	Probably not	No	Total
Legal-individualist	66 (31.9%)	123 (59.4%)	17 (8.2%)	1 (0.5%)	0 (0.0%)	207 (16.0%)
Legal-cooperative	276 (38.5%)	400 (55.9%)	23 (3.2%)	14 (2.0%)	3 (0.4%)	716 (55.2%)
Border-individualist	6 (5.1%)	26 (22.0%)	30 (25.4%)	31 (26.3%)	25 (21.2%)	118 (9.1%)
Border-cooperative	18 (7.0%)	52 (20.3%)	67 (26.2%)	70 (27.3%)	49 (19.1%)	256 (19.7%)
Total	366 (28.2%)	601 (46.3%)	137 (10.6%)	116 (8.9%)	77 (5.9%)	1297

Source: The authors' survey.

The behaviour observed in the two games is summarised in *Table 3*. It should be noted that large transfers and offers correspond to cooperative behaviour. Transfers in the Public Goods Game and offers in the Ultimatum Game are associated with the type of strategy stated to be optimal (ANOVA, $p<0.001$ and $p<0.01$, respectively). It should be noted that all individuals made a transfer in the public goods game, while only half of the participants played the role of Player 1 (made an offer) in the ultimatum game.

Table 3. Mean transfers made in the Public Goods Game and mean offers in the Ultimatum Game according to the strategy stated to be most likely to bring success

Strategy	Mean transfer in Public Goods Game (st. dev.) [n]	Mean offer in Ultimatum Game (st. dev.) [n]
Legal-individualist	10.82 (4.668) [207]	9.33 (2.235) [97]
Legal-cooperative	12.53 (5.211) [716]	9.24 (2.605) [357]
Border-individualist	11.19 (5.413) [118]	8.14 (3.503) [70]
Border-cooperative	12.25 (5.495) [256]	8.78 (2.968) [121]
Total	12.08 (5.242) [1297]	9.05 (2.754) [645]

Source: The authors' study.

In the Public Goods Game, the association between the transfer made and the strategy stated to be most likely to bring success is based on the social dimension. Those stating that this strategy involves individualistic behaviour transfer less money on average (10.95) than those stating that this strategy involves cooperative behaviour (12.45). The mean transfers made by those in the legal-individualist group (10.82) are significantly lower than those in either of the groups stating that the strategy most likely to bring success involves cooperative behaviour (12.53 and 12.25, $p<0.01$ in both cases, least significant difference test). Those in the border-individual group made lower on average transfers (11.19) than those in the legal-

cooperative group (12.53, $p<0.01$, least significant difference test). There are no significant differences between the two groups stating that individualistic behaviour is a component of the strategy most likely to bring success (10.82 vs. 11.19) or between the two groups stating that cooperative behaviour is a component of the strategy most likely to bring success (12.53 vs. 12.25).

The strategy type thought to be optimal is also clearly associated with the behaviour of the proposer in the ultimatum game ($p<0.01$, ANOVA). However, in this case the most important factor in determining the offer seems to be the position of the proposer in the legal dimension. It should be noted that in the Ultimatum Game the proposer should take into account the reaction of the respondent (i.e. take social norms into account), whereas in the Public Goods Game there is no possibility of negative reciprocation. Based on such an argument, it is unsurprising that the offers made by those expressing the view that a border-individualist type of strategy is most likely to bring success are on average lower than those made by those in the two groups stating that such a strategy involves adhering to the law ($p<0.01$ in both cases, least significant difference test). The mean offer from those expressing the view that a border-cooperative type of strategy is most likely to bring success were the second lowest of the four groups (but not significantly different from the other groups). Those stating that a legal-individualist type of strategy is the most likely to bring success actually made the highest offers on average. It is quite possible that such individuals feel the most internal conflict when deciding what offer to make, since in this game individualistic behaviour is obviously in conflict with the social norms of reciprocation. It would be interesting to compare the time such players take to make an offer compared to those in the other groups. Those in the legal-cooperative group may often instinctively offer an equal split, while those in the legal-individualist group only make such an offer after some reflection (see also Henrich 2000; Kahneman, 2011).

In comparison, the expressed level of generalised trust (given by the answer to the trust question) is not significantly associated with the offer made in the Ultimatum Game ($r = 0.010$, $p = 0.791$, Spearman's test of association) and only very weakly positively associated with transfers in the Public Goods game ($r = 0.063$, $p <0.05$, Spearman's test of association). This is in line with the results obtained by Ahn *et al.* (2003), Gächter *et al.* (2004) and Glaeser *et al.* (2002). The relation between the answer to the trust question and the first strategy question will be considered in the next section.

We now look at how the level of intention to follow the strategy type assumed most likely to bring success is associated with the behaviour observed. The only significant association found was that transfers in the Public Goods Game were positively correlated with the intention to follow such a strategy among those stating that the strategy most likely to bring success is border-cooperative (see *Table 4*, Spearman's test of correlation, $r = 0.146$, $p < 0.05$). This seems logical, since individuals stating that such a strategy is most likely to bring success and wishing to follow such a strategy would be likely to exhibit cooperative behaviour even in the absence of either an authority figure or possibility of reciprocation. In this sense, such students are the most likely to be proponents of a "grassroots civil society", a concept which has gained increasing political and social support in the face of globalisation, centralisation and the recent banking crisis (see Galicki, 2014; Tsakatika and Eleftheriou, 2013). However, due to relatively low level of significance, this results needs to be corrobated by other studies.

Table 4. Transfers in the Public Goods Game by those stating that cooperative behaviour on the borders of legality is most likely to bring success according to intention to follow such a strategy

Do you intend to follow the strategy indicated?	Mean transfer	Standard deviation	N
Yes	13.50	5.894	18
Probably	13.62	6.036	52
Don't know	12.13	5.084	67
Probably not	11.49	5.304	70
No	11.57	5.428	49
Total	12.25	5.495	256

Source: The authors' survey.

5. Relations between the answers to the strategy questions and other explanatory variables

Firstly, we consider which factors are associated with students stating that the type of strategy most likely to bring success involves acting on the borders of legality. Using the Mann-Whitney test, these tend to be students who express a low level of generalised trust ($p<0.001$), are less interested in local and regional matters ($p<0.001$ in both cases), less distaste for tax evasion ($p<0.001$), are less likely to react when public property is being damaged, but react more strongly to private injury ($p<0.001$ in both cases), place a stronger emphasis on ethical norms relative to legal norms ($p<0.001$), come from large towns ($p<0.01$) and have a relatively high level of contact with acquaintances ($p<0.05$). In addition, they are less likely to state attachment to a region due to being born there ($p<0.05$, chi-squared test of association). These results agree with the intuition that such students have a high level of bridging capital relative to bonding capital, as understood by Growiec (2011). Also, males were more likely to state that acting on the borders of legality brings the largest probability of success ($p<0.001$, Fisher's exact test of independence). Those stating that the type of strategy most likely to bring success involves acting of the borders of legality also tended to be at an earlier stage of their studies, i.e. younger ($p<0.01$, Mann-Whitney test). It is unclear whether this indicates that students views evolve as they mature or that views in general are evolving over time, due to e.g. the effects of the banking crisis. Another possibility is that students who continue onto a masters course more often see behaviour adhering to the law as being most likely to bring success.

Those stating that the strategy which gives the greatest probability of success involves individualism are less interested in regional matters ($p<0.001$, Mann-Whitney test), express a lower level of generalised trust ($p<0.001$, Mann-Whitney test), are less likely to have worked as a volunteer in the last year ($p<0.001$, Fisher's exact test) and less likely to be members of an organisation ($p<0.05$, Fisher's exact test). In addition, they are less likely to react when public property is being damaged, but react more strongly to private injury ($p<0.001$ and $p<0.01$, respectively, Mann-Whitney test). It is unsurprising this profile is similar to the profile of an individual stating that the strategy bringing the greatest probability of success involves behaviour on the borders of legality due to the correlation between these two dimensions.

The relationship between the strategy stated to be the most likely to bring success and the expressed level of generalised trust is of interest. Those stating that such a strategy is legal-cooperative express a significantly higher level of trust than those in the other three groups ($p < 0.01$ in each case, least significant different test). Those stating that such a

strategy is legal-individualist or border-cooperative express a very similar level of generalised trust, while those stating that such a strategy is border-individualist express the lowest level of generalised trust (although the difference between this group and the two previously mentioned is insignificant).

Now we consider the level of intention expressed by students to follow the strategy assumed to be the most likely to bring success. As argued above, a low level of intention indicates a high level of conflict between the views of the student regarding what type of strategy is most likely to bring success and how they themselves wish to act.

Those stating that the strategy most likely to bring success is legal-individualist generally show a high level of intention to follow such a strategy (over 90% state that they will or will probably follow such a strategy, see *Table 2*). Those expressing a high level of intention to follow such a strategy have a weak tendency to be more interested in national affairs ($r=0.160$, $p<0.05$, Spearman's test of association) and react when public property is being damaged ($r=0.175$, $p<0.05$, Spearman's test of association).

Those stating that the strategy most likely to bring success is legal-cooperative show a similarly high level of intention to follow such a strategy (see *Table 2*). In addition, the level of intention to follow such a strategy is positively associated with interest in local and national matters ($r=0.120$, $p<0.01$ and $r=0.091$, $p<0.05$, respectively, Spearman's test of association). The level of intention to follow such a strategy is positively associated with expressions of reciprocation when public property is damaged, but negatively associated with expressions of reciprocation in the case of private injury ($r=0.179$, $p<0.001$ and $r= -0.133$, $p<0.001$, respectively, Spearman's test of association). These results two corroborate the conclusions made by Chai *et al.* (2010). A high level of intention to follow such a strategy is positively associated with both having done voluntary work in the past year and being a member of an organisation ($p<0.01$ in both cases, Mann-Whitney test).

Among those stating that a border-individualist strategy is the most likely to bring success, males showed a higher level of intention to follow such a strategy ($p<0.01$, Mann-Whitney test). The level of intention to follow such a strategy is negatively associated with interest in regional matters ($r= -0.196$, $p<0.05$, Spearman's test of association).

Among those stating that a border-cooperative strategy is the most likely to bring success, the level of intention to follow such a strategy is associated with a high level of contact with close friends ($r=0.156$, $p<0.05$, Spearman's test of association), relative acceptance of tax evasion ($r=0.143$, $p<0.05$, Spearman's test of association) and a high level of stress placed on ethical rather than legal norms. In this group, males show a higher level of intention to follow such a strategy ($p<0.01$, Mann-Whitney test). It may be initially somewhat surprising that the intention to follow such a strategy is negatively associated with expressed level of generalised trust ($r= -0.145$, $p<0.05$), since individuals who intend to implement a strategy based on cooperation would be expected to express trust. In addition, as mentioned in the previous section, in this group of students transfers in the Public Goods Game were positively associated with the level of intention to follow a border-cooperative strategy. This could be explained by the fact that the participants in the study (all students) were seen as an "in-group". In this case, students following a border-cooperative strategy chose their transfers in the Public Goods Game based on trust to unknown members of an in-group, rather than on their level of generalised trust. Such an interpretation would agree with the hypothesis that such individuals are natural supporters of the civil society movement, which is based on cooperation within small communities, while showing distrust to public institutions and society as a whole.

Conclusions and Suggestions for Future Research

This article has considered the results of an nationwide study based on experimental game theory and a questionnaire to investigate the level of generalised trust and reciprocation amongst Polish students. Studies carried out in other countries have often used the trust question, which has generally shown to be significantly, but weakly, correlated with the behaviour observed in the Public Goods and Ultimatum games. The questionnaire in our study used two questions, the first regarding the type of strategy individuals assumed to be the most likely to bring success (based on two dimensions: social and legal) and the second regarding whether an individual would implement such a strategy. These questions are aimed at elucidating how individuals feel that success is achieved in the world and whether they feel any conflict between their own views and the way in success is achieved.

In our study, the type of strategy assumed to be optimal (border-cooperative, border-individualist, legal-cooperative or legal-individualist) is more clearly correlated to the behaviour observed in the Public Goods and Ultimatum Games than the answer to the trust question and enables a more subtle understanding of how individuals play such games. In addition, the level of generalised trust expressed is associated with the strategy thought to be most likely to bring success, with those stating that a legal-cooperative strategy is most likely to bring success expressing a high level of generalised trust and those stating that a border-individualist strategy is most likely to bring success expressing a low level of generalised trust. This enables us, to varying degrees, to describe individuals according to the type of strategy they see as being the most likely to bring success as follows (in order of the sizes of the groups):

1. Those who state that the type of strategy most likely to bring success is legal-cooperative. This is by far the largest of the four groups, encompassing 716 of the 1297 students who gave a valid answer to the strategy question (55.2%). Over 90% of these students stated that they would or probably would follow such a strategy, indicating that among these individuals there is little conflict between their view of how success is achieved in the world and how they themselves wish to act. These students tend to express a high level of generalised trust, interest in local and national matters and those who stated that they would follow such a strategy worked more often as volunteers and are more likely to be organisation members. They express a high level of negative reciprocation in the case of damage to public property, but a low level in the case of personal injury. These last results agree with those of Chai *et al.* (2010). Results from the Public Goods and Ultimatum Games (see *Table 3*) show that these students exhibit a relatively high level of cooperative/ egalitarian behaviour both with or without the possibility of negative reciprocation. Hence, we may conclude that such an answer is indicative of generalised trust, an acceptance of social and legal norms and active participation in society as a whole, particularly when an individual affirms that they will follow such a strategy.
2. Those who state that the type of strategy most likely to bring success is border-cooperative. This group comprises 256 students (19.7% of the valid answers). In this group, there is a high level of conflict between their view of how success is achieved and how they themselves wish to act. Only 70 of these individuals (27.3%) stated that they would or would probably follow such a strategy. The results from the games and the questionnaire give a reasonably clear picture of those intending to follow such a strategy. Such individuals tend to be male, have a high level of contact with close friends and a distrust of authority, as indicated by their relative acceptance of tax evasion and strong stress on ethical rather than

legal norms. Although they exhibit a low level of expressed generalised trust, they exhibit very cooperative behaviour in the Public Goods Game. These results indicate that such individuals may show a high level of cooperation and trust when dealing with an in-group, but are mistrustful of society and institutions as a whole. Such behaviour is similar to that expressed by members of the civil society movement (see Tsakatika and Eleftheriou, 2013). On the other hand, it is difficult to characterise individuals in this group who do not intend to follow such a strategy (for example, their level of cooperation in the Public Goods Game is only slightly below the average level).

3. Those who state that the type of strategy most likely to bring success is legal-individualist. This group comprises 207 students (16.0% of valid answers). These students show a low level of conflict between their view of how success is achieved in the world and how they themselves wish to act, since over 90% of these individuals would or would probably follow such a strategy (as in the case of the legal-cooperative group). One very striking characteristic of this group is that such individuals gave on average the lowest transfers in the Public Goods Game, but offered the most equitable shares in the Ultimatum Game (see *Table 3*). Individuals in this group expressed a relatively low level of generalised trust, this is reflected in the transfers made in the Public Goods Game. However, the offers made in the Ultimatum Game suggest that such individuals recognise and respect social norms regarding fairness and take the possibility of negative reciprocation into consideration. One may conclude that such individual show limited trust to members of the general public, but respect formal and informal institutions (see Platje, 2004).
4. Those who state that the type of strategy most likely to bring success is border-individualist. This is the smallest group, comprising 118 students (9.1% of valid answers). There is a high level of conflict between the views of these students on how success is achieved in the world and how they themselves wish to act. Just 32 of these students (27.1%) stated that they would or would probably follow such a strategy. The whole group is characterised by a particularly low expression of generalised trust. It is difficult to give a clearer sociological description of this group, due to its relatively small size and the likely heterogeneity in the types of strategy that members would actually implement. However, it is likely that these individuals feel mistrust to both the general public and formal institutions.

One clear conclusion from the results is that conflict between students' personal views and their views of how success is achieved are only apparent in the legal dimension. Although the majority of students can be assumed to be proponents of cooperative behaviour, the adoption of an individualistic strategy does not in itself raise any conflict. However, there is a high level of conflict in those who see that success is most likely to be achieved by acting on the borders of legality (particularly among females holding this view). Such students form almost 30% of the study group and in general express a low level of trust, both in the questionnaire and through their actions in the games considered here. However, among those stating that they would follow a border-cooperative strategy, the transfers made in the Public Goods Game indicate a high level of trust within an in-group, as within the civil society movement.

These conclusions highlight a problem with the two questions analysed here. They elucidate what type of strategy students believe to be the most likely to bring success and whether this belief is a source of conflict. However, when conflict exists, the questions do not elucidate what the source of conflict is. For example, individuals stating that a border-cooperative strategy is most likely to bring success, but do not intend to follow such a

strategy, might feel that society is ruled by a so called "układ" (informal oligarchy), see Hoff and Stiglitz (2004). Kreidl (2000) notes that in post-communist countries, helpful contacts are seen as a very important factor in achieving wealth. Similarly, those stating that a border-individualist strategy is most likely to bring success, but do not intend to follow such a strategy, might feel that after the initial transformation many young highly educated individuals rapidly made careers (see Řeháková and Vlachová, 1995; Kreidl, 2000), but now the possibility of upward mobility based on qualifications is more limited. However, these groups are likely to be heterogeneous and new research is required to investigate these questions.

Finally, another obvious question is the following: how culturally dependent are the answers to these two strategy questions and their relation to observed behaviour?

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