

Supporting efficiency or equality in an asymmetrical public goods game: What predicts these fairness principles?

Lennard Prent
Sociology department, Utrecht University
Supervisor: K. Otten
second assessor: Anne-Rigt Poortman

In general, research on social dilemmas has been focused on the behavior in social dilemmas. This paper contributes to a thin but growing set of literature on contribution norms that underlie this behavior. It researches whether field of study, gender, political orientation and nationality are predictors for contribution norms in asymmetrical social dilemmas. The contribution norms are established through the fairness principles which compares equality to efficiency. This paper used a computerized experiment from the experimental laboratory for sociology and Economics (ELSE) at Utrecht University. It had 192 participants divided over 8 sessions with 24 participants each. The analysis showed a significant relation between political orientation and contribution norms, meaning the more a person is on the left political side the more likely they are to support equality over efficiency. There were no other significant relations found. Furthermore, it is found that contribution norms explain behavior for a large part. This paper closes with proposals on how to better research the other hypotheses.

Key words: contribution norms, efficiency, equality, social dilemma, public goods game

Introduction

Social dilemmas are found everywhere in one's everyday life. From having to decide who buys the next round of drinks to deciding who picks up the kids from school. However, what is a social dilemma exactly? It is defined as a situation where two or more people must choose between the act of cooperation or noncooperation (Dawes, 1980). These choices bring payoffs. No matter what the other player in the dilemma chooses you will get the highest payoff when you do not cooperate, but everyone would get a better payoff if all the players cooperate. There are a substantial amount of different social dilemmas in today's world, though for this paper, a public goods dilemma will be used. Prisoners dilemma for example only uses two people in a social dilemma, but This paper researches groups which we find in a public goods game.

In a public goods dilemma, participants get an endowment at the start. These participants must choose whether they will keep this endowment for themselves or to contribute to a group account where all the participants will benefit from. Contributing to this group account or public good benefits all people. However, the benefit for the participant themselves is lower as opposed to keeping the endowment. Based on the course of decision-making, all the players, contributors and non-contributors, receive a certain percentage from this public good. The same rules apply for this dilemma where it would be the best situation if everyone contributes. The interesting part in this dilemma and other social dilemmas is that you get an insight into whether people act through individualistic reasoning or act through reasoning which is most beneficial for the collective (Dawes, 1980). For example, if everyone decides not to contribute to the public good with in mind that they will still receive a payoff from the public good due to the contribution of other people, it would lead to everyone ending up with nothing gained from the public good due to the individualistic reasoning. People can also express reasoning, which is ultimately best for the collective, they will contribute all their endowment and afterwards everyone will be better off due to everyone contributing.

This paper will use an experiment of an asymmetrical public goods game. This means that the participants will not benefit the same amount from the public good. Some will have a higher return from the public good than others, meaning they receive a higher percentage from the group account. It is done asymmetrically to better represent a real-world situation. For example, the taking in of immigrants who flee from war in Africa and the Middle East. Some European countries

will profit more when immigrants are taken into the countries due to the proximity of the wars or their involvement in the wars. The next question is whether the countries that are able to profit more, should take in more immigrants or that every country takes in the same number of immigrants. which brings us to the division of contribution norms. In asymmetrical dilemma's 2 principles of fairness are commonly distinguished (Reuben and Riedl, 2013). The first principle is one of efficiency. Efficiency tells us that everybody should contribute their full endowment. The result of everybody contributing their full endowment is that participants with higher returns end up with higher earnings compared to the participants with lower returns, but the highest total profit is made. The other principle is equality, here participants with higher returns are expected to contribute more than participants with a lower return. This will result in a more equal outcome of earnings. In asymmetrical social dilemma's participants may differ in their principle of fairness norms, either in efficiency or equality. This difference can make it more difficult to coordinate with one another during the game.

It is important to understand where these decisions come from and why people choose to cooperate or not. So that this knowledge may be used in everyday life where social dilemmas constantly arise, such as the immigration problem and be better equipped to achieve cooperation rather than individualistic reasoning. In general, research on social dilemma's has been focused on the actual behavior in social dilemma's (Cappelen, Halvorsen, Sørensen & Tungodden, 2017; Dawes, Johannesson, Lindqvist, Loewen & Ostling, 2012; Fosgaard, Hannsen & Wengström, 2019; Kerschbamer and Muller 2017). This paper will contribute to a thin but growing set of literature on contribution norms (Chen, Wasti & Triandis, 2007; Fehr, Naef & Schmidt, 2006; Fehr & Schurtenberger, 2018). Where behavior is an action that is taken norms are standards of behavior which we can expect from others (Fehr & Schurtenberger, 2018). People can have different norms, but these norms can be understood between each other which may help in achieving more cooperation in negotiations such as the dilemma on immigrants that was previously explained.

This paper looks at what can predict contribution norms. Recent research has suggested that in public good games norms influence behavior to a large extent (Fehr & Schurtenberger, 2018; Reuben & Riedl, 2013). Because contribution norms underlie behavior as Reuben & Riedl (2013) have suggested in their research we want to know where these norms come from. This paper will look at 5 different predictors of contribution norms. These predictors are field of study, gender, political orientation and nationality. These predictors were chosen, because the literature

on predictors for contribution norms is still thin and these are straightforward predictors, which are the same predictors used in other studies when predicting behavior (Carter and Irons, 1991; Anderson and Versterlund, 2015; Cappellen et al., 2017) that will build a good foundation on which other researchers can build. Therefore, the research question of this paper is:

“To what extent are field of study, gender, political orientation and nationality predictors for contribution norms in asymmetrical social dilemma’s?”

This paper uses different theories to make hypotheses on the different predictors used to explain contribution norms. The learning hypotheses (Frank, Gilovich & Regan, 1993) will help to hypothesize why economics students support efficiency over equality. The sociocultural perspective and the evolutionary perspective (Balliet, Li, Macfarlan & Van Vught, 2011) will be used to hypothesize why women support equality more than men. Differences between left-wing and right-wing values (Dawes et al., 2012) will help to hypothesize their tendencies to support either efficiency or equality. Finally, a scale which rates countries on distance in power distribution (Hofstede et al., 2010) will contribute in making a hypothesis on why different nationalities differ in support of efficiency and equality. These will be further explained in the theoretical section. Furthermore, this paper will make use of an experiment in which an asymmetrical public goods game is played in groups of three different participants. In each group, one participant has a higher return than the other two participants. Before the start of the game participants were asked to fill in a questionnaire. In this questionnaire, they were asked what they thought is appropriate behavior regarding contributions to the public good. The participants then had to answer this question for both participants, the ones who have a higher return and lower return. This is used to calculate the contribution norms and the distinction in whether people support efficiency or equality. At the end of the experiment they were also asked to fill in information about their background. This is where the information for the predicting variables is obtained. This will be further explained in the methodology section. Afterwards there will be a section on the results, followed by a conclusion and a discussion section.

Theory

Before the predictors of contribution norms, their theories and hypotheses, a clear definition of what norms are and when a conflict between efficiency and equality arises needs to be established. In order to define social norms accordingly, an explanation of Fehr and Schurtenberger (2018) is used. They define a norm as: “commonly known standards of behavior that are based on widely shared views of how individual group members ought to behave in a given situation” (p. 2). This specific definition encompasses three important aspects of social norms. First of all, social norms provide normative standards of behavior that apply to a specific group and situation. Secondly, social norms exclusively tells members how to behave. They do not define actual behavior, only how group members are expected to behave. Lastly, the norm is widely shared and approved by group members. Due to the definitions for efficiency and equality being established in the introduction, an example of the contributions and earnings following both these principles of fairness will be illustrated. Considering the efficiency rule everyone contributes their full endowment. This leaves the maximum amount possible in the public good. In this case, everyone will get their respective percentage as a return for this public good. The participant with a higher return will end up with more than the participants with a lower return, however it does simultaneously lead to the biggest collective return. This is the most efficient way of solving this social dilemma because the sum of the payoff is the highest. The consequence however is that despite the biggest collective earnings, not everyone earns an equivalent payoff.

This is different with the equality rule. The goal of the equality rule is to end up with equal earnings for both type of participants, with high and low returns. To accomplish this, the participant with a high return must contribute more than the participant with a low return, resulting in equal payoffs. The amount of returns in the experiment will be further explained in the methodology section. A heterogeneous public good was chosen, as it creates a potential conflict between the two normative principles of fairness of efficiency and equality. When there is no difference in returns, i.e. homogeneous returns, full contribution of endowments would satisfy both the principles of efficiency and equality because the collective welfare is maximized and every participant would receive the same payoff. This particularly defeats the purpose of studying which principle of fairness is supported by the participants.

It would also be possible to look at heterogeneous endowments. This means that some participants will have a larger endowment to start with than the other participants. When all of the participants with high and low endowment contribute their entire endowment, it will lead to efficiency and equal payoffs simultaneously. Due to the reason that everyone contributes it leads to the biggest collective return and because the returns are the same for everyone, payoffs will be equal. This means that heterogeneous endowments still do not cause a conflict between efficiency and equality.

With heterogeneous returns, a real difference starts to occur between the principles of fairness. In one situation, efficiency, one participant clearly earns more than the other participants. This does not happen when participants follow the rule of equality. It is in this difference where conflict arises and a certain question can be asked. Will participants support the social norm of efficiency or equality? Previous studies which looked at how the respective predictors influenced participants' behavior or predicted their norms will be presented and hypotheses on why the predictors can predict their social norms will be formed. The predictors will be hypothesized separately, starting with field of study followed by gender, political orientation and nationality. Finally, a small section is dedicated to formulating a hypothesis on whether norms can explain cooperative behavior, which is one of the assumptions made in the introduction section of this paper and whether the predictors mediate this effect.

Field of study

For the field of study predictor, studies are divided in two groups: economics students and non-economics students. The manner in which these studies are divided in the two groups will be explained in the methodology section. Previous studies have also used this distinction and found that economics students have a stronger tendency to maximize profit compared to other students (Carter & Irons, 1991; Rubinstein, 2006). Maximizing profit can be compared to the efficiency rule as it is the goal to get the highest possible earnings from the public good. Fehr and colleagues (2006) specifically found that economics students support the rule of efficiency. There is an underlying explanation that can be found for explaining why economics students support the rule of efficiency more than other students. Frank and colleagues (1993) and Fisman and colleagues (2009) both concluded that the difference in norms can be found in part by the training economics students receive. This training economics students receive is focused on analyzing how markets can be organized in the most efficient way.

These economics students might change their behavior and norms over time to the theories they study, since economics studies teach that efficiency is desirable, it is expected that economics students will support efficiency. This is called the learning hypothesis (Carter & Irons, 1991). Non-economics students do not follow the same curriculum and may therefore be less inclined to support efficiency than economics students do. Therefore, the hypothesis is the following:

H1: “Economics students are more likely to support efficiency over equality than non-economics students.”

Aside from the field of study, the participants were also asked whether they ever followed a course about the game-theory. As Easley and Kleinberg (2010) explained, in this theory the concern is regarding situations in which decision-makers interact with one another. The outcome not only depends on just their own decisions but on the decisions made by everyone. In some ways the game theory is also concerned with what the optimal decision is in a particular setting. Participants who followed a course in game theory will recognize these patterns in the experiment. Game theory teaches how to get the most optimal outcome which would be equal to following the

norms of efficiency, due to the creation of most collective wealth. Which in turn is the most optimal outcome if the game theory is followed. Therefore, the hypothesis is the following:

H2: “Participants who followed a course in game theory are more likely to support efficiency than participants who did not follow a course in game theory.”

Gender

The research on gender and if there are any differences between men and women in cooperative behavior has not been conclusive. Anderson and Versterlund (2015) concluded that when the cost of altruistic behavior was high, women were more cooperative. Furthermore, if the costs were low, men were more cooperative. On the other hand, they also concluded that men could be either totally selfish or totally selfless where women preferred to share evenly. Balliet and colleagues (2011) concluded that women and men were equally cooperative, but that men became more cooperative during repeated social dilemmas. Finally Sell, Griffith and Wilson (2013) concluded no sex differences at all. There is no conclusive answer to whether there is a difference between cooperation of men and women. Instead of looking into the behavior, this paper researched whether men and women differ in support of cooperation norms as was previously mentioned. The sociocultural perspective will help in developing a hypothesis (Balliet et al., 2011).

The sociocultural perspective suggests that there is a different distribution of men and women in specific social roles and a gender hierarchy (Cross & Madson, 1997). For example, men are, on average, stronger than women and women take care of the children after the pregnancy. Because of these differences in men and women historically, they both acquire different sets of skills to fulfill social roles (Eagly & Wood, 1999). This creates expectations that are associated with gender where women are expected to take on a role that focuses on relationships skills. Because of this, women are perceived as more communal (Eagly, 2009) than men. Communal orientation is described with traits such as friendly, unselfish and being considerate to others. Men generally take on roles of high status and power and may be perceived as more independent, assertive and dominant. Considering the above, how does this give us implications on gender differences in social dilemmas? Cooperation in social dilemmas is about the welfare of yourself and others. This is what communal orientation is about (Balliet et al., 2011), but with a specific

orientation in caring for others and being unselfish. There already is evidence that a higher communal orientation leads to more cooperative behavior in social dilemmas (Balliet, Parks & Joireman, 2009). Women are expected to have a higher social orientation and are therefore expected to show more cooperative behavior than men, but it can also be tested if this higher social orientation can also predict the norm of support for equality. Communal orientation refers to the trait of unselfishness. This unselfishness is the same as not needing more than others or wanting equal shares. Therefore, the hypothesis is the following:

H3: “Women are more likely to support equality than men.”

Political orientation

The evidence on political attitudes has not been one-sided. Different researchers find different links between left-wing and right-wing political preferences and the support they show for cooperation. Capellen and colleagues (2017) concluded that people with left-wing political preferences have more tendencies to share evenly, thus they will support equality over efficiency. Dawes and colleagues (2012) find similar results. On the other hand, there is research from Fehr and colleagues (2006) who concluded there is no link between political attitudes and support for equality of efficiency. Some research found a significant difference in cooperation where left-wingers cooperate significantly more than right-wingers (Fosgaard et al., 2019) and lastly Kerschbamer and Muller (2017) concluded that right-wingers make more selfish choices compared to left-wingers.

The differences between right-wingers and left-wingers are rooted in their political orientations. Right-wing political parties generally support policies that promote efficiency. For instance, policies that create a freer market with limited government so that processes may be fast and efficient (Grossmann & Hopkins, 2016). Whereas left-wing political parties generally support policies which promote equality. For example, policies such as universal pre-kindergarten programs for young children (Grossmann & Hopkins, 2016). The people who support these political parties keep seeing policies along the same line which they support and can internalize (Koestner, Losier, Vallerand & Carducci, 1996). This line is given the name the left-right dimension. Where on the left side there is support for even shares and on the right side there is

support for efficiency. What was seen with the economics students can happen here. Followers of left-wing parties will learn more about policies that support equality and even shares, these followers may adjust their behavior and norms over time to these parties and policies, thus the equality principle. This is the learning hypothesis (Carter & Irons, 1991). The same happens with followers of right-wing parties. However, they learn about policies that support efficiency and will come to adjust their behavior and norms over time to these parties and their policies. Also known as the efficiency principle. Therefore, the hypothesis is the following:

H4: “The more left-leaning participants are, the more likely they are to support equality over efficiency.”

Nationality

There are several studies on differences in cooperation between nationalities that have been done in the past. Most of these studies use a differentiation of collectivist cultures. Parks and Vu (1994) concluded that participants from collectivist cultures were more cooperative than participants from cultures in which the emphasis is on individual gain. They used participants from America and Vietnam, where Vietnam has the more collectivist culture. Liebran and van Run (1985) found no differences in cultural motives comparing students from the Netherlands and America. Yamagishi (1988) also did not find collectivist cultures to be more cooperative than individualistic cultures, comparing Japan and America. All these studies compared just two countries to each other. This study will use a dataset with a more diverse group of nationalities and therefore will contribute in a new way to this field of research.

The division of countries into collectivist cultures and individualistic cultures was done with the individualism scale of Hofstede, Hofstede & Minkov (2010). But creating a good distinction between individualistic and collectivist cultures regarding connecting it to efficiency and equality is not sufficient. This is due to the efficiency results in maximum collective wealth. It could be argued that efficiency can also have an importance in collectivist cultures and not only in individualistic cultures for the reason that it creates the most wealth for everyone. Considering this, a different cultural dimension from Hofstede and colleagues (2010) was chosen, the power distance index. This scale measures whether people with less power in a society accept the

hierarchical order in which they live and expect that power is unequally distributed. On the other end of the scale where there is a low power distance, people will strive to equalize the power distribution and society. Not many studies have used this scale to study cooperation and cooperation norms. Matsumoto and Hwang (2011) used the power distance index to study cooperation between participants in a modified version of prisoner's dilemma. They concluded that a higher score on the power distance is related to not cooperating and a lower score on the power distance is related to cooperation. However, they studied the differences in power distance and whether that fostered cooperation or not. This study contributes to the research by looking at whether the power distance index can tell us what contribution norms people support. A high score on the power distance index indicates that people accept the power difference and inequality, but a low score on the power distance index indicates that people from these cultures want an equal distribution of power. Therefore, the hypothesis is the following:

H5: "The lower a participant scores on the power distance index, the more likely they are to support equality over efficiency"

Cooperative behavior

An underlying assumption in this paper which has previously been explained is that contribution norms affect the cooperative behavior of people (Fehr & Schurtenberger, 2018; Reuben & Riedl, 2013). That is: the higher the contribution required by a person's norms; the higher the person's actual contribution will be. Although not the focus of this paper, this paper will also test this hypothesis to examine if this assumption also applies for the current experiment. To add to this assumption, this paper will also test whether the contribution norms that affect the levels of cooperation in people can be partly explained by the previously mentioned predictors of contribution norms. This connects the previous hypotheses to the assumption made on the effect of contribution norms on cooperative behavior.

H6: "cooperative behavior can be partially explained by contribution norms"

H7: "The effect of contribution norms on cooperative behavior can partly be explained by predictors of contribution norms."

Methods

The experiment

In this paper a computerized experiment in the experimental laboratory for Sociology and Economics (ELSE) at Utrecht University was used. This experiment was programmed using z-Tree software (Fischbacher, 2007) and it was done in the months of October and November 2019 (Otten, Buskens, Ellemers & Przepiorka, 2020). The researchers had a total of 192 participants resulting in the forming of 64 groups of 3 participants. These participants were recruited using ORSEE, an internet recruitment system (Greiner, 2015). The 192 participants were divided over 8 sessions with 24 participants. The game that was played is a version of the public goods game with peer punishment with repeated rounds (Fehr & Gächter, 2000). Each session lasted about 75 minutes. Participants would receive a payment depending on how they behaved in the game. The payments ranged from 5 to a maximum of 22 euros, with an average payment of 15 euros. The participants were also given a paper with written instructions about the experiment. Furthermore, they were randomly placed in cubicles. This insured they would not be able to see each other or communicate with each other. Further in this section, the design of the game is explained and what possibilities the participants have. Afterwards, the dependent variable, the independent variables and the control variable are operationalized. The section will conclude with an overview of the analyses.

The design

The game is played in two stages. The first stage consists of receiving the endowment and deciding what amount the participants are willing to contribute to the public good. Afterwards the contributions and payoffs of each player are communicated to all of the participants. Each individual i is assigned to a group consisting of N participants and all receive the same endowment E . Everyone must now decide how much they desire to contribute to the public good, c_i , where c_i can be any round number from 0 to E . The part of the endowment the participants decide not to contribute to the public is kept for the participants themselves. After the contributions are made, the public good will consist of the sum of the contributions made by the participants. Every participant will receive points in return for every point contributed to the public good. This return

is always lower than 1 ($m_i < 1$). The sum of the return factors of each participant together makes up the total multiplication factor of the public good. For an individual it is most profitable to not contribute anything knowing that the individual return is lower than 1. From the perspective of the group it is most profitable if everyone contributes the maximum amount, due to the fact that the group's multiplication factor is greater than 1. These differences between the aspects of the individual and the group form the social dilemma presented in this public good. At the end of the first stage all the payoffs are given to the participants and the associated earnings are communicated to each participant.

The second stage is for giving the participants the opportunity to reflect on the contributions made by the other participants and to assign punishment points if deemed necessary $p_{ij} \in \{0, 1, \dots, \max(p_{ij})\}$ to other participants of the group j . The participant that chooses to punish someone else costs himself one point, but it reduces the payoff for the participant being punished by δ points. This concludes stage two and with that the first round as well. The payoff for one participant after one round is thus given by the following formula:

$$\pi_i = E - c_i + m_i \sum_j c_j - \sum_{j \neq i} p_{ij} - \delta \sum_{j \neq i} p_{ji}$$

To ensure this research is comparable to other papers most of the parameters are set to be the same typical public good games with peer punishment take (Fehr & Gächter, 2000). The participants start out with an endowment of $E=20$, each punishment point received will decrease the payoff by $\delta=3$ and the maximum possible punishment a participant is able to give to another is $p_{ijmax}=10$. The same parameters are used except for the return parameters. This was changed to be able to introduce the possibility of normative views opposing each other. This means heterogeneous returns were assigned to the groups. Specifically one participant was assigned a return of $m_i=0.75$, the other two participants in the group are assigned a return of $m_i=0.50$. This makes the total multiplication $M=1.75$. Research from Reuben and Riedl (2013) suggested that applying these heterogeneous returns would result in disagreements in normative views between the participants. These returns make sure the two principles of fairness previously explained come forth in the experiment. Some participants will support the normative view of efficiency where everybody should contribute equally. The other participants may support the normative view of equality and think that the participant with a high return must contribute more than the participant with a low

return. The following Table 1 will indicate the contributions that have to be made for each of the principles of fairness; efficiency and equality.

Table 1. Contributions and Earnings under efficiency and equality principle

	c_H	c_L	π_H	π_L	c_H/c_L
Efficiency	20	20	45	30	1
Equality	20	10	30	30	2

c_H = contribution of participant with high return, c_L = contribution of participant with low return, π_H = payoff for participant with high return, π_L = payoff for participant with low return.

Prior to the experiment, the participants were asked to make choices for measuring their normative views. These are used for a sorting process of the groups that are based on the normative views measured prior to the experiment. In addition, their support for either efficiency or equality can be measured. The amount someone supports equality or efficiency is measured by dividing the amount the participant gave to the high return participant c_H by the amount of the participant with a low return c_L . This results in a scale ranging predominantly from 1, representing efficiency to 2, representing equality. This scale will be further explained in the operationalization of the scale. Sorting of groups happens twice during the experiment. The first sorting measure is that the group of 3 all have the same normative view and the second sorting measure puts 3 people with different normative views together. The influence of the sorting process on behavior is researched in another paper (Otten et al., 2020). This paper will not look at this aspect of the experiment.

Every group plays 20 rounds of the previously explained public goods game. The first 10 rounds are played with the group that was made at the start of the experiment. After these 10 rounds, every group will have one participant replaced by a new one such that every group has a newcomer. Now the newly formed groups play another 10 round. This paper only uses the first 10 rounds in the analysis, because this paper does not look at the effect of newcomers. In the final stage of the experiment participants are asked to fill in a questionnaire with background questions. This is where the data is collected for the independent variables age, gender, nationality, field of study, political orientation and whether they previously followed a course in game theory. Here the control variable age is also collected.

Operationalization

The total amount of frequencies stands at 189 in the analysis. The data starts with 192. 3 Are lost in the variable gender. The explanation of the loss of data can be found with the respective operationalization of the variable. First the dependent variable is operationalized followed by the independent variables and at last the control variable age is operationalized.

Dependent variable

The normative measurements are measured before the start of the experiment are used for the dependent variable. This is done to obtain their unbiased and unchanged normative views about contribution norms. The experiment may have an unwanted effect on the normative views when participants know their returns. It could then also effect their normative view through self serving bias. That is, participants with high return may prefer efficiency more than equality and low return participants will prefer equality. The normative views are aquired by letting the participants make contribution decisions for a hypothetical group. This group has the same composition of returns the participants will eventually get in the experiment; two participants with $m=0.50$ and one participant with $m=0.75$. Participants can try out different options of contributions and they are able to see the outcomes that it will result in.

The variable for a normative scale uses 2 different variables. The first variable is what the participant though the participant with a high return should contribute c_H . This is divided by what the participant thought the participant with a low return should contribute c_L . This results in the following formula: c_H / c_L . This scale ranges predominantly from 1 to 2. Here a score of 1 means that the participant thought both participants with a high return and low return had to contribute the same amount. Indicating a support for efficiency. A score of 2 indicates that the participant chose to have the participant with a high return contribute twice the amount of what the participant with a low return contributed. Resulting in an equal outcome of payoffs. A score outside of the range 1 to 2 is possible, but this rarely happens. 95.7% of the frequencies range from 1 to 2. The variable contribute is the amount the participant contributes to the public good during the experiment.

Independent variable

The variable for field of study was determined by recoding the studies students listed themselves in into two dummy variables. A study was deemed an economics study when the study was given at the Utrecht school of Economics, rather than at another faculty at Utrecht University. The first dummy is economics students (1) and everything else (0). The second dummy variable is participants who weren't studying at that moment in time (1) and everything else (0). This results in a reference category representing participants who study and do not follow an economics study.

The variable game theory could be answered with a closed question whether they ever followed a course on game theory. For the regression a dummy variable (*gametheory_d*) was made, with not having followed a course on game theory (0) and having followed a course on game theory (1).

The variable gender was made into a dummy (*Male*) for the regression with female (0) and male (1). This excludes 3 participants who answered this question with 'other'. The theoretical predictions are about men and women, therefore the variable 'other' was excluded.

The variable politics was on a scale from 1 to 9 with 1 indicating full support for the left-wing and 9 indicating full support for the right-wing. For the regression the variable is deducted by 1. Therefore, 0 now has a meaningful value, meaning full support of left-wing politics.

The variable Power distance was recoded to represent Hofstede's power distance index. Every participant's was given their respective score on the scale of the power distance index. Participants who answered this question with 2 countries were given the score of the first country listed. A robustness check will see whether there are differences when these answers are excluded from the analysis.

The variable norm for self represents the amount the participant thinks he needs to donate. This variable is made by selecting the view a participant has what a participant with a high return should contribute if the participant is assigned a high return himself. The view a participant has of what a participant with a low return should contribute is selected if the participant is assigned a low return. This results in a variable that represents the amount a participant thinks he/she should contribute for his/her own respective return in the experiment. This means that when the participant scores a 10 on norm for self, he/she is expected to contribute 10 if he/she follows his own norm.

Control variable

Age is used as a control variable throughout the analysis. It ranges from 18 to 68. Therefore, the variable was recoded to have the age of 18 be the lowest possible value (0) by taking the variable age and deducting it by 18.

Descriptive statistics

In Table 2 the descriptive statistics can be found. All variables are measured 189 times. It starts with the efficiency – equality scale, it ranges from 0.00 to 3.00. Furthermore, the efficiency – equality scale has a mean of 1.471 and a standard deviation of 0.450, this shows that the majority of the participants fall between the expected values of 1 and 2. The variable norm for self ranges from 1.50 to 20.00 (mean=13.296; std. deviation=5.140). Political orientation (mean=4.13) ranges from 1 to 9 and the average lies in the middle, this indicates an even distribution on the scale of political orientation. The power distance has a wide range from 13 to 93 (mean=49.122). However, the std. deviation is only 16.004. Finally, The variable age, which will be used as a control variable, has a range from 18 to 68, but a mean of 23.96. (std. dev.=6.228) This shows that the group of participants is a young group. The variable contribute has a range from 0 to 20 with a mean of 12.63 (std. deviation=5.293).

Table 2. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Efficiency – equality scale	189	0.00	3.00	1.463	0.473
Norm for self	189	1.00	20.00	13.296	5.140
Political orientation	189	1	9	4.13	2.073
Power distance	189	13	93	49.122	16.004
Age	189	18	68	23.96	6.228
contribute	189	0	20	12.63	5.293
Gender (male)	189	0	1	.328	
Study (economics)	189	0	1	.164	
No study	189	0	1	.138	
Game theory (yes)	189	0	1	.301	

Note: the reference group for the variables study and No study is no economics

Furthermore, descriptive statistics of the binary variables are shown. Within the gender variable 62 (32.8 %) are male and 127 (67.2%) are female. There are 31 (16.4%) economics students and 158 (83.6%) non-economics students or are not studying at all. The other dummy variable for the hypothesis on Field of study has 26 (13.8%) participants who do not study. This leaves us with 132 (69.8%) students who do not follow an economics study. Finally, there are 57 participants (30.2%) who have previously followed a course on game theory and 132 (69.8%) who have not done this.

Analysis

To test the different hypothesis in this paper a multiple regression analyses will be used. A regression with all the variables and the control variable will run, resulting in 1 model including all independent variables for the respective hypothesis. After this analysis, a robustness check is performed. This regards the variable nationality regarding the participants who answered the question on nationality with 2 countries which was previously explained.

This paper will also test whether the norms actually have an effect on the behavior of participants as suggested by Reuben & Riedl (2013). This can be tested by taking the variable contribute as dependent variable in a regression analysis with the variable norm for self as independent variable. In model 1 the results of the R^2 indicate whether the norm someone has predicts their behavior. Furthermore, the explained variance in a regression of all the predictor variables in model 2 are tested with contribute as dependent variable and in model 3 the predictor variables and the variable norm for self are independent variables in a regression for the dependent variable contribute. A lower increase in explained variance between model 2 and 3 compared to the explained variance in model 1 indicates that the predictors explain part of the effect of norms.

Results

In order to test the different hypotheses, a regression analysis with multiple predictive variables as independent variable and the norm scale as dependent variable was performed. The results of this analysis can be found in Table 3. In this model the effect of economics, game theory, gender, political orientation, power distance and age on the norm are displayed. The constant represents the zero point. This means that the respondent scores 0 on every item and thus scoring 1.771 on the norm scale. This score means that the person is more supportive of the norm for equality. Due to the fact that full support of this norm would result in a score of 2, compared to full support of the norm of efficiency which would result in a score of 1. The person would be someone who has not studied economics, did not follow a course on game theory and is female. Furthermore, the person is an 18 year old and full supporter of left-wing parties on the political spectrum living in a country with a score of zero on the power distance index. The effects of studying economics and previously having followed a course on game theory are both not significant. Thus, the first two hypotheses are rejected. The effect of gender and power distance is also not significant and therefore the third and fifth hypotheses are rejected.

Table 3. effect of predictive variables on norm scale.

Independent variable	Model 1
Economics	-.039 (.103)
No study	-0.055 (.110)
Game theory	-.001 (.077)
Male	-.135 (.076)
Political orientation	-.044 (.017)*
Power distance	-.002 (.002)
Age	.002 (.006)
R ²	.079*
Constant	1.771

*p < 0.05 **p < 0.01. Note: standard error in parenthesis. N=189

The fourth variable, political orientation has a significant effect ($b=-.044$; $t=-2.523$; $p=.012$). The coefficient is negative meaning that the more someone supports right-wing instead of left-wing the lower the score on the norm scale is. This translates in a higher support for the efficiency norm. A right-wing supporter that scores 0 on all the variables and 9 on political orientation would result in a score of $1.771-0.044*9= 1.375$ on the norm scale compared to a left-wing supporter scoring 1.771. This difference can be considered substantial, because the difference, $1.771-1.375=0.396$, is almost half the range of the norm scale which ranges predominantly from 1 to 2. The fourth hypothesis is supported, the more left-leaning people are, the more likely they are to support equality over efficiency.

Robustness check

For the variable power distance, a robustness check is performed. For this analysis, a new variable is made. This variable excludes the participants who answered the question on nationality with 2 countries. When these participants are excluded there is an N of 181. The coefficient resulting from this analysis is the same as the original analysis ($b=-.002$) which can be seen in Appendix in Table 5. In this analysis there again is no significance for power distance. This is with every other variable included. When the regression is performed with only the variable power distance the coefficient is $b=-.003$ and the significance level is $p=.137$, these can be found in Table 5. of the Appendix. The results from the robustness check show no differences and it can be concluded that the analysis is largely robust.

Table 4. Explained variance of norm for self and predictive variables on contributions

	Model 2	Model 3	Model 4
Norm for self	.770 (.050)***		.756 (.051) ***
Economics		-.607 (1.136)	-1.350 (.763)
No study		1.174 (.751)	1.174 (.751)
Game theory		-.886 (.848)	-.261 (.570)
Male		2.297 (.830)**	1.044 (.563)
Political orientation		-.115 (.194)	-.176 (.130)
Power Distance		-.0046 (.024)	-.012 (.016)
R ²	.559***	.081*	.589***
Constant	2.401	14.639	3.500

*p < 0.05 **p < 0.01 ***p < 0.001 Note: standard error in parenthesis.

Note: N=189

Table 4. regards the last hypotheses on whether the norm of a person explains the contribution behavior and whether this is mediated by the predictive variables. In Model 1 the effect is significant ($R^2=.559$; $F=236.626$; $b=.770$; $t=15.383$). This model indicates whether the norm someone has of what he or she should contribute predicts their contribution behavior. The norm a person has about how much it needs to contribute explains for 55.9% the contribution behavior and when the norm of how much needs to be contributed is 1 point higher, their contribution will rise with .770. This confirms the sixth hypotheses that contributions can be partly explained by contribution norms.

In Model 2 the explained variance is .081 ($F=2.674$) and significant. Meaning the predictive variables explain 8.1% of contributions. Finally, Model 3 has an explained variance of .589 ($F=37.052$) which is significant and represents the predictive variables and the norm for oneself. The increase in explained variance from Model 2 to Model 3 when adding the variable norm for

self is .508. This increase in explained variance is lower than the explained variance in Model 1 for the variable norm for self, specifically $.559-.508=.051$. This indicates that the predictive variables (field of study, game theory, gender, political orientation & nationality) explain part of the effect of the norms (5.1%). However, the amount of which it explains is not very high. The seventh hypothesis is accepted, the effect of contribution norms on cooperative behavior can partly be explained by predictors of contribution norms.

Conclusion and Discussion

This research was conducted to get a better understanding of where contribution norms come from. This could in turn help with a better understanding of why people choose to cooperate or not, since these norms have a large influence on cooperative behavior. Furthermore, research on this subject is still growing and this research was able to contribute to that process. An experimental design for this research was preferred over a survey because it gives the opportunity to specifically ask and measure the norms in an anonymous setting and afterwards immediately observe how these norms influence behavior. Surveys only give the opportunity to measure self-reported behavior. The experimental design does however provide less participants than a survey would, and the representation of the sample compared to the society is lower in experimental design compared to a survey. However, due to the experimental design there is a tight control on the variables that make testing of causality reliable and replicability high.

The remainder of this section will be structured as followed. Each hypothesis will be reiterated, and their theoretical implications will be reiterated. Following these findings several caveats will be discussed that were encountered in making this paper. Finally, implications for what next research can focus on are proposed and the conclusions of the hypotheses will be discussed in a broader sense.

The first hypothesis stated that economics students were more likely to support efficiency than non-economics students. The hypothesis was rejected. With the caveat found regarding this variable it can be concluded that more research is needed for this hypothesis. The caveat is further discussed later in this section. The second hypothesis concerned whether participants who followed a course in game theory were more likely to support efficiency than participants who did not follow a course in game theory. This hypothesis was rejected. This tells us that the knowledge

gained in following a course on game theory does not necessarily change a person's support for either principles of fairness. Gender was the next hypothesis which stated that women are more likely to support equality than men. This was rejected, and therefore contrasts with previous research (Cross & Madson, 1997; Eagly & Wood, 1999). This can potentially be explained by the emancipation of our society. Women and men generally do not occupy the same position in society compared to a few decades ago (Hakim, 1994). The hypothesis that followed was the hypothesis on political orientation. It stated that the more left-leaning people are, the more likely they are to support equality over efficiency. This hypothesis was supported. People who are followers of left-leaning parties tend to support the norm of equality over efficiency. This can be seen in the policies proposed by left-leaning parties which were discussed in the theory section. The hypothesis on nationality which was tested by using the power distance index of Hofstede (Hofstede et al., 2010) was not supported. This means that people coming from a country with a lower score on the power distance index are not necessarily more likely to support equality. This can be a difficult hypothesis to test, because of the caveat in the data which is discussed later in this section.

The final two hypotheses were added to this paper to examine whether assumptions made in this paper apply on the data used in this paper. The sixth hypothesis said that cooperative behavior can be partially explained by contribution norms. This hypothesis was supported and the norm a person has about how much it needs to contribute explained the contribution behavior for a large portion. This tells us that contribution norms can be a strong indicator for people on how much they will contribute. The last hypothesis stated that the effect of contribution norms on cooperative behavior can partly be explained by predictors of contribution norms. The results from this hypothesis were significant and predictors of contribution norms explained the effect of the contribution norms on cooperative behavior. However, the amount it explained for was not large. Even though this result is not convincing, it is enough to not reject the hypothesis and encourage future research to do more tests to get a clearer answer on this research question.

Some caveats were found in the variables for the hypotheses on economics students and nationality. First off, the hypothesis on economics students. With many of the students participating being exchange and the possibility of them following a minor other than their bachelor study is apparent. Students who study economics might follow a social sciences minor on their exchange. This could not be tested, but it could have given a skewed distribution of the variables for this hypothesis. Future research should ask for the study in which they obtain their

bachelor's degree when testing this hypothesis. One other caveat in this paper was found in the data of the variable power distance. This was the measurement for the hypothesis on nationality. On this variable there were 13 scores with a frequency of just 1 and one score (38) with a frequency of 86, representing the Netherlands. The variables with just 1 frequency do not give a proper representation of a country and a score with a frequency of 86 is almost half of the total participants which leaves little room for other scores. The lack of frequencies on scores could be a caveat which resulted in a non-significant result. Therefore, new research that will test this hypothesis should ensure a larger sample with higher frequencies on each score. Before continuing research with other predictive variables that predict the contribution norms people have on efficiency and equality, more research should be conducted on the variables used in this paper to create a good baseline from which other researchers can build upon and extend this branch of research on principles of fairness.

The hypothesis regarding political preference does give some implications for the influence of norms and its predictors on behavior in social dilemmas. When we look at the social dilemma of immigrants illustrated in the introduction section for example. By understanding the position countries have in the political climate, their contribution norms can be better understood, and negotiations can make better progress. For this to happen, communication between the participants in the social dilemma is of importance, which was shown in the research by Gangadharan, Nikiforakis and Villeval (2015). Communication has a positive impact on contribution levels. Understanding each other's norms is an important part in communication, in order to help the negotiations progress. For example, a normative conflict occurred during the negotiations in Paris on climate-change negotiations. Developing countries were in favor of relative reduction in emissions and developed countries were in favor of absolute emission reductions (Gangadharan et al., 2015). This normative conflict could potentially have been better understood at the time by focusing on the political inclinations of countries involved in the negotiations.

Literature

- Andreoni, J., & Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *The Quarterly Journal of Economics*, *116*(1), 293-312.
- Balliet, D., Li, N. P., Macfarlan, S. J., & Van Vugt, M. (2011). Sex differences in cooperation: a meta-analytic review of social dilemmas. *Psychological bulletin*, *137*(6), 881.
- Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations*, *12*, 533–547.
doi:10.1177/1368430209105040
- Cappelen, A. W., Halvorsen, T., Sørensen, E. Ø., & Tungodden, B. (2017). Face-saving or fair-minded: What motivates moral behavior?. *Journal of the European Economic Association*, *15*(3), 540-557.
- Carter, J. R., & Irons, M. D. (1991). Are economists different, and if so, why?. *Journal of Economic Perspectives*, *5*(2), 171-177.
- Chen, X. P., Wasti, S. A., & Triandis, H. C. (2007). When does group norm or group identity predict cooperation in a public goods dilemma? The moderating effects of idiocentrism and allocentrism. *International Journal of Intercultural Relations*, *31*(2), 259-276.
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin*, *122*(1), 5–37. <https://doi.org/10.1037/0033-2909.122.1.5>
- Dawes Christopher, T., Johannesson, M., Lindqvist, E., Loewen, P., Östling R., Bonde, M. and Priks, F. (2012). *Generosity and Political Preferences*. IFN Working Paper No. 941, 2012. Stockholm, Sweden: Research Institute of Industrial Economics. Available at:
<http://www.ifn.se/wfiles/wp/wp941.pdf>
- Dawes, R. M. (1980). Social dilemmas. *Annual review of psychology*, *31*(1), 169-193.

- Eagly, A. H. (2009). The his and hers of prosocial behavior: An examination of the social psychology of gender. *American Psychologist*, *64*(8), 644–658.
<https://doi.org/10.1037/0003-066X.64.8.644>
- Easley, D., J. Kleinberg (2010). *Networks, Crowds, and market: Reasoning about a highly connected worlds* (pp. 155–185). Cambridge, United Kingdom: Cambridge University Press.
- Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist*, *54*(6), 408–423.
<https://doi.org/10.1037/0003-066X.54.6.408>
- Fehr, E., & Gächter, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review*, *90*(4), 980–994. <https://doi.org/10.1257/aer.90.4.980>
- Fehr, E., Naef, M., & Schmidt, K. M. (2006). Inequality Aversion , Efficiency , and Maximin Preferences in Simple Distribution Experiments : Comment. *The American Economic Review*, *96*(5), 1912–1917.
- Fehr, E., & Schurtenberger, I. (2018). Normative foundations of human cooperation. *Nature Human Behaviour*, *2*(7), 458–468. <https://doi.org/10.1038/s41562-018-0385-5>
- Fisman, R., Kariv, S., & Markovits, D. (2009). Exposure to ideology and distributional preferences. *Unpublished paper*.
- Fosgaard, T. R., Hansen, L. G., & Wengström, E. (2019). Cooperation, framing, and political attitudes. *Journal of Economic Behavior & Organization*, *158*, 416–427.
- Frank, R. H., Gilovich, T., & Regan, D. T. (1993). Does studying economics inhibit cooperation?. *Journal of economic perspectives*, *7*(2), 159–171.
- Gangadharan, L., Nikiforakis, N. & Villeval, M. C. Normative conflict and the limits of self-governance in heterogeneous populations. *Eur. Econ. Rev.* *100*, 143–156 (2017).

- Grossmann, M., & Hopkins, D. A. (2016). *Asymmetric politics: Ideological Republicans and group interest Democrats*. Oxford, United Kingdom: Oxford University Press.
- Hakim, C. (1994). A century of change in occupational segregation 1891-1991. *Journal of Historical Sociology*, 7(4), 435–454. doi:10.1111/j.1467-6443.1994.tb00074.x
- Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations: software of the mind : intercultural cooperation and its importance for survival*. Rev. and expanded 3rd ed. New York: McGraw-Hill.
- Kerschbamer, R., & Müller, D. (2020). Social preferences and political attitudes: An online experiment on a large heterogeneous sample. *Journal of Public Economics*.
<https://doi.org/10.1016/j.jpubeco.2019.1040766>
- Koestner, R., Losier, G. F., Vallerand, R. J., & Carducci, D. (1996). Identified and introjected forms of political internalization: Extending self-determination theory. *Journal of personality and social psychology*, 70(5), 1025.
- Van Lange, P. A., & Liebrand, W. B. (1991). Social value orientation and intelligence: A test of the goal prescribes rationality principle. *European journal of social psychology*, 21(4), 273-292.
- Liebrand, W. B., & van Run, G. J. (1985). The effects of social motives on behavior in social dilemmas in two cultures. *Journal of experimental social psychology*, 21(1), 86-102.
- Matsumoto, D., & Hwang, H. S. (2011). Cooperation and competition in intercultural interactions. *International Journal of Intercultural Relations*, 35(5), 677–685.
doi:10.1016/j.ijintrel.2011.02.017
- Otten, K., Buskens, V., Ellemers, N., & Przepiorka, W. (2020). *Agree to disagree: Public good provision despite normative disagreement in heterogeneous groups*. Unpublished manuscript.

- Parks, C. D., & Vu, A. D. (1994). Social dilemma behavior of individuals from highly individualist and collectivist cultures. *Journal of Conflict Resolution*, 38(4), 708-718.
- Reuben, E., & Riedl, A. (2013). Enforcement of contribution norms in public good games with heterogeneous populations. *Games and Economic Behavior*, 77(1), 122–137.
<https://doi.org/10.1016/j.geb.2012.10.001>
- Rubinstein, A. (2006). A sceptic's comment on the study of economics. *Economic Journal*, 116(510), 1–9. <https://doi.org/10.1111/j.1468-0297.2006.01071.x>
- Sell, J., Griffith, W. I., & Wilson, R. K. (1993). Are women more cooperative than men in social dilemmas?. *Social Psychology Quarterly*, 211-222.
- Simpson, B. (2003). Sex, fear, and greed: A social dilemma analysis of gender and cooperation. *Social forces*, 82(1), 35-52.
- Yamagishi, T. (1988). The Provision of a Sanctioning System in the United States and Japan. *Social Psychology Quarterly*, 51(3), 265-271.

Appendix A

Table 5. Robustness check of the variable power distance

	Model 5	Model 6
Power distance	-.002 (.002)	-.003 (.002)
Economics	-.062 (.105)	
No study	-.066 (.111)	
Game theory	.007 (.078)	
Male	-.142 (.077)	
Political orientation	-.039 (.018)	
R ²	.075	.012
Constant	1.729	1.616

*p < 0.05 **p < 0.01 ***p < 0.001 Note: standard error in parenthesis.

Note: N=181