

On the Measurement and Validation of Political Ideology

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Abstract

We examine the behavioural validity of survey-measured left-right political ideology by estimating its predictive value in explaining preferences regarding inequality versus efficiency. We link left-right ideology to choices made in an experiment that is designed to capture these preferences. Our findings shows that survey-measured political ideology is a significant predictor for inequality vs. efficiency preferences, and thus, has predictive validity. Additionally, we propose a measure of political ideology that captures multiple dimensions. Using an exploratory factor analysis, we find three dimensions of ideology: Economic Socialism, Contemporary Populism and Social Conservatism. We compare these dimensions to the survey-based measure of left-right ideology and conclude that the latter can be used as a proxy for the dimensions of political ideology.

Key words: political ideology, survey measurement, predictive validity, experiment, factor analysis

1. Introduction

Survey measures, regardless of what they aim to capture, suffer from several, potentially influential, drawbacks, which are inherent to these measures due to the way they are quantified. Examples of these drawbacks include biases caused by self-serving behaviour, strategic motives or inattention (Camerer and Hogarth (1999), Dohmen et al. (2011)). However, economists generally focus on an additional confounding factor influencing survey-based measures, being that surveys are not incentive compatible. Since filling in a survey, truthfully or not, does not involve any financial consequences, respondents are not incentivized to show true preferences or attitudes. Statements made by them are costless and do not necessarily contain any valuable information on what is supposedly measured. Therefore, answers to survey questions might not reflect actual preferences, which means that survey-based measures could lack validity. Or, in other words, they might not measure what they intend to measure (Camerer and Hogarth (1999), Falk et al. (2013)).

In this paper, we assess the validity of such a survey-based measure, being individuals' political ideology. Conventionally, political ideology is quantified using surveys in which people self-report what ideology they identify with on a left-right or liberal-conservative scale.¹ This measure of political ideology is subsequently used in empirical research looking into the effects of ideology on voting behaviour, well-being, redistributive and economic preferences and more (for examples, see Alesina et al. (2011), Di Tella and MacCulloch (2005), Edlund and Pande (2002), Jacoby (2009) or Rockey (2014)). However, since this quantification of ideology is based on un-incentivized surveys, it could suffer from the drawbacks associated with survey measurement. Therefore, to justify the use of this ideology measure, there is a need to examine its validity. Assessing the validity of such a survey-based measure can be achieved in several ways, for example by comparing self-identified ideology with a different, but widely accepted measure that aims to capture the same concept. Additionally, we could test validity by investigating how well this measure of ideology performs in explaining empirically what is theoretically conjectured. However, in this paper we focus on the predictive or behavioural validity of survey-based political ideology, which can be defined as the ability to explain or predict behaviour (Litwin, 1995). In order to examine whether this measure of political ideology passes the test of validity, we compare self-declared ideology to choices made in an incentivized experiment. As such, we can examine the behavioural validity of political ideology, and investigate whether individuals only perceive themselves as having a certain ideology or also behave and choose accordingly.

In this incentivized experiment, we capture preferences for inequality versus efficiency and link these preferences to subjects' self-declared ideology. We focus on these preferences, since one of the core aspects of left-right ideology is how much importance is given to inequality over efficiency considerations (Jost, 2009). We examine whether self-reported left-right ideology has any predictive value in explaining these preferences, and thus, whether we can validate the use of this survey measure of ideology. Even though validating survey-based measures with the use of incentivized experiments is an accepted method (see for example Dohmen et al. (2011) or Glaeser et al. (2000)), there has not been much research into the predictive validity of self-reported political ideology. To the best of our knowledge, the paper of Fehr, Naef and Schmidt (2006) is the only study that concerns itself with comparing choices in an experiment that proxy inequality and efficiency

¹ See for example the American National Election Study (<http://electionstudies.org/index.htm>) and the Eurobarometer (http://ec.europa.eu/public_opinion/index_en.htm).

preferences with left-right ideology. These authors conduct an experiment, in which one subject decides how to allocate income among a group of subjects: equally but inefficiently or unequally and efficiently. The chosen income allocations, which proxy inequality versus efficiency preferences, are linked to self-reported left-right ideology. Since subjects are paid out according to the chosen income allocation, the experiment is incentivized. The authors do not find that self-declared ideology has any predictive value in explaining inequality versus efficiency preferences.

In the experiment we conduct, we ask subjects to vote for one of two income distributions, a unequal but efficient one or an equal but inefficient one. What distribution prevails depends on a strict majority rule, and subjects receive a payoff according to the chosen income distribution, which makes the experiment incentivized. Different from our experiment, the payoff of the decision-maker in the experiment of Fehr, Naef and Schmidt (2006) never depends on the chosen allocation of income. So, even though the decision-maker receives a payoff, no financial consequences are involved with choosing which allocation of income prevails, i.e. he can make a costless decision on how to allocate income. Therefore, it could be argued that there is no real incentive for this decision-maker to make a distinct choice between allocations and show preferences for inequality versus efficiency. To counter this, we vary payoff structure during our experiment; in two out of the three payoff structures that prevail, subjects encounter a small opportunity cost when voting for one of the income distributions. Due to these opportunity costs, subjects are not able to make a costless decision anymore. If a subject chooses the income distribution, in which he encounters these opportunity costs, we know with more accuracy that inequality versus efficiency preferences are revealed. Therefore, the payoff structures that involve these opportunity costs act as an additional check on our findings. We link preferences to self-reported left-right ideology and test whether the former can be explained by the latter. We find that ideology significantly predicts behaviour in the experiment, regardless of payoff structure. Therefore, this measure of political ideology is behaviourally valid; our results indicate that individuals that state having a certain ideology make choices consistent with this ideology.

However, there is additional criticism to measuring ideology with self-identifications, which is specifically aimed at this concept instead of generally applicable to survey-based measures. Firstly, when capturing ideology on a left-right scale, it is assumed that individuals' ideology can be generalized on a linear scale; people are either left, right or somewhere in the middle of these two. In other words, it is assumed that this ideology is of the one-size-fits-all form, which might not be the case, especially when we look at the contemporary political environment.² Secondly, this left-right scale is one-dimensional; however, to date, no consensus has been reached among researchers on the dimensionality of political ideology. In quantitative analyses it is often assumed that ideology can be generalized along a one-dimensional linear scale; however, this is challenged by researchers with conceptual and discursive approaches. Additionally, measuring ideology on a linear scale not only assumes that beliefs are mutually exclusive (Maynard, 2013), but also that individuals' label their ideas and beliefs according to such a scale (Jost, Federico and Napier, 2009).

² Take as an example the Dutch 'Partij voor de Vrijheid' (Party for Freedom). This political party is left in its policies regarding protection for labourers and labour market flexibility; however, its proposed tax reductions and spending cuts on development aid are considered to be right-wing policies. Other examples of parties that do not identify with left or right ideology are the French 'Front National' (National Front) or the Austrian 'Freiheitliche Partei Österreichs' (Freedom Party of Austria). These (anti-immigration) parties are gaining popular support, notably in Europe, indicating demand for them and their ideology; however, a left-right scale is not able to capture this demand.

Therefore, after assessing the predictive validity of left-right political ideology, we address these critiques, specific to the concept of ideology, by measuring it using a different and novel approach. With this approach, we abandon the assumption that ideology can be captured on a left-right one-dimensional scale and we measure multiple dimensions of ideology. Moreover, we do not rely on self-identifications; subjects are, thus, not confronted with concepts that they are not familiar with. Instead, we ask them to what extent they agree with statements on contemporary social, economic and political issues. These statements include a trade-off, for example between privacy and national security, which forces subjects to make a distinct choice showing political preferences. We use the information provided by subjects' opinions on these statements in an exploratory factor analysis and interpret the extracted factors as the dimensions of political ideology. On the basis of the factor analysis, we propose three factors that reflect an Economic Socialism, Contemporary Populism and Social Conservatism dimension of political ideology and we compare these dimensions with self-declared left-right ideology.

The set-up of the paper is consistent with our two main aims. Firstly, we discuss the experiment and the results regarding the predictive validity of self-assessed left-right ideology. Then, we continue with creating our multidimensional measure of ideology and comparing it with the self-identifications. Before doing so; however, we discuss the relevant literature. We end our paper with some concluding remarks and insights for future research.

2. Literature Review

With regards to examining the predictive validity of self-declared political ideology, only very little research has been conducted. Nonetheless, we discuss the outcomes and relevant conclusions of studies that experimentally validate other survey-based concepts. Concerning the potential multidimensional nature of political ideology, more research has been conducted. Many researchers, not only from the field of economics, have argued that the left-right or liberal-conservative scale is outdated and inapt. Below, we give an overview of the arguments given by these researchers.

2.1 Validation of Political Ideology

As argued by researchers investigating the validity of survey measures, this sort of measurement does not entice an individual to show true preferences, whether these are political or of other sorts. This indicates that survey-based measures of political ideology might not predict actual behaviour or attitudes. One of the main arguments is that surveys are not incentivized, so there is no real reason for respondents of surveys to show their true preferences. Furthermore, there are many factors that can influence responses in surveys, such as self-serving biases, strategic motives or inattention (Camerer and Hogarth (1999); Dohmen et al. (2011)). Therefore, there is a need to validate survey measures of ideology.

For measures of other individual characteristics or feelings, such as trust and risk-aversion, there have been validation studies investigating the link between self-identifications or other survey measures and behaviour in an experiment. Dohmen et al. (2011), for example, ask respondents how willing they are to take risks in general, a self-assessment of risk-averseness, and compare responses to choices of the same individuals during an incentivized lottery. They find that self-assessed risk-aversion predicts actual risk taking in the experiment. Therefore, they show that self-identifications of risk-taking have predictive validity. Fehr et al. (2003) conduct a survey and an experiment to

validate trust measures. They find that survey questions are good predictors of actual behaviour. However, a drawback of their study is that the survey and the experiment are conducted at the same time. Due to anticipation effects, the behaviour in the experiment might be biased. Glaeser et al. (2000) also aim to validate survey-based trust measures, but take into account these anticipation effects. There are on average three to four weeks between conducting the survey and the experiment. These authors do not find that the survey responses predict behaviour in the experiment. This is indicative evidence of how influential anticipation effects can be and shows that these should not be taken for granted.³

In order to validate survey-measured left-right political ideology, we conduct an experiment in which respondents have to choose between an equal income distribution or a more efficient, but unequal distribution. An experimental study by Fehr, Naef and Schmidt (2006) comes closest to ours; however, the main focus of these authors is on the difference between economics and non-economics students in preferences for inequality and efficiency. Nevertheless, they also test whether gender, age and political attitudes have an effect on these preferences. Fehr, Naef and Schmidt (2006) conduct an experiment based on a dictator game. In this experiment, one subject is the decision-maker that decides how to allocate payoffs over three subjects, including himself. There are three different allocations: one efficient, but unequal allocation and two inefficient, but more equal allocations. In these income distributions, payoffs are never completely equally allocated over all three subjects. Each subject in their sample is the decision-maker once; therefore, the chosen income allocations by them serve as a proxy for preferences regarding inequality versus efficiency. The effects of gender, age, being an economics student or not, and political left-right ideology on inequality preferences are estimated by an ordered probit model. Fehr, Naef and Schmidt (2006) find that economics students are more likely to prefer higher efficiency in spite of more inequality. Furthermore, they find that women are more likely to favour equality. However and most relevant for our study, they find that left-right political ideology has no effect on preferences for inequality or efficiency measured by this experiment.

There are several elements to the study of Fehr, Naef and Schmidt (2006) that are different from ours. Firstly, whereas income is allocated by one subject in their experiment; the distribution of income that prevails in our experiment depends on a majority of subjects voting for a certain income distribution. Secondly, in our experiment, subjects do not choose between three, but two allocations; a more efficient, but unequal one and a more inefficient, but equal one. Additionally, Fehr, Naef and Schmidt (2006) ask respondents to self-assess their ideology on a left-right scale directly after the experiment. Therefore, their results could be biased due to anticipation effects, which are not likely to affect our study due to the elapsed time between the survey and the experiment. However, we should be aware of sample selection effects, considering that our sample consists of economics students only. Lastly, since the income of the decision-maker in the experiment by Fehr, Naef and Schmidt (2006) does not depend on the chosen income distribution, he can make a costless decision. Therefore, even though the experiment is incentivized, it could be argued that there is no a priori reason that his choice reflects actual preferences regarding inequality and efficiency. In our experiment, we change payoff structures such that in some cases choices of subjects are dependent

³ Another paper that validates survey-based measures of preferences with experiments is Falk et al. (2013). Furthermore, Kraus (1995) conducts a meta-analysis of the empirical evidence regarding the correlation between attitudes measured by a survey and behaviour, either in experiments or self-reported and concludes that attitudes predict actual behaviour.

on opportunity costs. If subjects decide to encounter these costs when choosing for one of the two income distributions, we more accurately measure preferences regarding efficiency and inequality. This enables us to test whether left-right ideology can predict a subject's preferences for inequality and efficiency, also when revealing these preferences is costly.

2.2 Political Ideology: One or Multiple Dimensions?

Other, more specific, critiques regarding the measurement of political ideology focus on the dimensionality of ideology, as well as, on individual's understanding of this concept. Studies on ideology have received the attention of researchers in many different fields, in which different approaches to the measurement of ideology are taken. Maynard (2013) recognizes three broad categories in these approaches: a conceptual, discursive and quantitative approach. The conceptual approach focusses on the ideas and beliefs that form the basis for an ideology. The way we communicate and formulate our political preferences is the main focal point of the discursive approach. The goal of the quantitative approach is to measure ideology by quantifying it, ordinarily on either a left-right or liberal-conservative scale, which is the approach taken when self-identifications are used to capture ideology. Maynard (2013) argues that the among quantitative researchers accepted assumption that ideological beliefs can be placed on one linear scale indicates that it is indirectly assumed that this captures all that is ideology. What these researchers are neglecting is the difficult practice of investigating how the beliefs of individuals interact and hang together. Instead it is assumed that these beliefs can be generalized along one linear dimension and that they are mutually exclusive, even though this conceptualization of ideology has been rejected by researchers that have a conceptual or discursive approach to ideology (Maynard, 2013).

A different source of criticism arises from the method of measuring political ideology, namely asking respondents to self-identify on a one-dimensional left-right or liberal-conservative scale. Underlying this approach is the assumption that people understand what these concepts entail. In a paper by Jacoby (2009), the effects of ideology on votes for Bush or Kerry in the 2004 American presidential elections are examined. He finds that one-third of the respondents in his study is not able to place Bush and Kerry correctly on a liberal-conservative scale. Furthermore, Jacoby (2009) does not find a direct link between ideology and voting behaviour. He argues that there is no relation between the two, because ideology is rare among individual voters; however, Maynard (2013) argues that the unidimensional framework is the one to blame. Ideology cannot be generalized and the concepts liberal, conservative, left and right are not clear, have been subject to debate and are historically used in many different contexts (Freeden, Sargent and Stears, 2013).

An additional objection to the measurement of ideology is given by Jost, Federico and Napier (2009). They argue that when individuals are asked to choose between being left or right, it is assumed that they label their ideas and political attitudes along this scale. In addition to the need of conceptually understanding left and right, individuals also need to organize and structure their beliefs accordingly. In other words, it is necessary that people recognize that one of their preferences or opinions would belong to left-wing ideology, whereas another would fall under right-wing ideology. According to the authors, this might be a lot to ask. Moreover, Jennings (1992) argues that the beliefs of the mass public, the voters, are not well represented by a one-dimensional scale. And even though he does not draw any conclusions on why this is the case, he states that it has become apparent from measuring ideology with surveys that the responses of people are easily influenced by

misunderstandings. According to Jennings (1992), these are created by the fact that the ideology of the respondents is not clearly defined on a left-right or liberal-conservative scale. Conover and Feldman (1984) and Layman and Carsey (2002) examined whether individuals' ideology can be captured with one dimension, and found evidence that it could not. Both argue that ideology on an individual level is multidimensional, even though they do not elaborate on the number of dimensions that would be needed.

Even supposing that a self-identification captures political ideology at least partly, there is the issue of the relation between left and right or liberal and conservative. If these concepts are measured on one scale they should linearly depend on each other. Conover and Feldman (1981) find evidence for separate liberal and conservative dimensions of ideology; hereby contesting the often made assumption that they are bipolar opposites. In addition, consider the possibility that people have different political attitudes towards social and cultural issues than towards economic issues. An example would be someone who is socially liberal but economically more conservative. This person would, conceptually, be labelled as a Libertarian (Freedman, Sargent and Stears, 2013); however, is forced to choose when confronted with a one-dimensional scale. A recent study by de Vries, Hakhverdian and Lancee (2013) shows that nowadays a self-identification based on a left-right scale is interpreted by voters from a cultural dimension, whereas it used to represent a distinction on economic grounds. Due to this dynamic nature of left-right ideology and the potential independence of left and right, the measurement of ideology on a one-dimensional scale might not be appropriate.

Rockey (2014), however, argues that left and right as concepts do have a consistent meaning across countries and time. He examines the correspondence between respondent's ideology and their views regarding income inequality, both measured in a survey, and concludes that they are consistent with each other. Nonetheless, he also finds that this correspondence differs across demographics, such as age and education, which indicates that self-declared ideology is not consistent over individuals. This indicates that people might not correctly understand the concepts of left and right, such that measurement based on confronting people with these concepts might be flawed. Additionally, it shows that self-reports might not reflect actual political views and beliefs.

Considering these final remarks, we believe that to justify the use of a survey-based measure of political ideology, there is a need to show that it has power in predicting choices and political preferences. Furthermore, interesting insights can be drawn from comparing left-right ideology with ideology measured on multiple dimensions, which are not based on the left and right concepts.

3. Validation

3.1 Experimental Design

To enable us to behaviourally validate left-right ideology, we set-up an experiment, in which subjects choose between an equal and unequal distribution of income, where the latter is more efficient.⁴ In the experiment, subjects are asked to vote for one of two outcomes. A socialist outcome, where income is equally divided between all subjects, but aggregate income is low, or a capitalist outcome, where income is divided unequally, but aggregate income is high. A strict majority rule decides which income distribution prevails. We are interested in how subjects vote, since this is a proxy for preferences regarding inequality versus efficiency.

⁴ This experiment is loosely based on Cason and Mui (2003), who aim to test the whether uncertainty causes an efficiency enhancing reform to be rejected by a majority by exposing the subjects to a certain and an uncertain payoff structure.

The level of income a subject receives in the Socialist and Capitalist Income Distributions depends on which role they are assigned. In the Blue role, a subject always receives the highest payoff in the Capitalist Income Distribution. For the Red voters, income is always highest in the Socialist Income Distribution. Payoffs for subjects in the Green role depend on payoff structures, of which there are three; the Baseline, the Socialist-Bias and the Capitalist-Bias payoff structure. See tables 3.1, 3.2 and 3.3 for the payoffs in each structure. In the Baseline payoff structure, Green voters receive the same amount of income, regardless of the chosen distribution. Therefore, these Green voters can cast an incentivized, but costless vote. In the Socialist-Bias payoff structure, the Green voters receive the highest payoff if they vote for the Socialist Income Distribution; the opposite holds for the Capitalist-Bias payoff structure. Therefore, for these Green voters there is a small opportunity cost associated with voting for the capitalist option in the Socialist-Bias payoff structure and with voting for the socialist option in the Capitalist-Bias payoff structure. If subjects vote for the socialist option when the Capitalist-Bias payoff structure prevails, or vice versa, despite the opportunity costs, they convincingly show a preference for inequality or efficiency due to the financial consequences involved. After voting, the majority decides which income distribution is chosen and subjects are paid accordingly.⁵

90 undergraduate and graduate students that study at the faculty of Economics and Business at the University of Groningen participated in the survey and the experiment. We conducted the survey in October 2013 and the validation experiment was held in June 2014. Therefore, a substantial amount of time elapsed between the survey and the experiment, and interdependencies between respondents' political beliefs and their behavioural responses are restricted. The experiment was conducted during 6 sessions. As such, each session consisted of 15 students. In each session 21 rounds are played, and thus, the three payoff structure each prevail for 7 rounds. The order in which they occur differs between sessions. In each round, the colour roles are randomly assigned to the subjects; 11 voters are Green, 2 are Red and 2 are Blue. We assign these roles randomly to avoid subjects behaving strategically.⁶ If it is known to them beforehand how many times they receive a certain role, they can maximize their payoffs by voting strategically and their votes do not show actual preferences anymore. Furthermore, in each round the distributional and efficiency consequences of the two income distributions are made clear to the subjects.⁷

Table 3.1. Baseline Payoff Structure

	Blue	Green	Red	Total
Socialistic Income Distribution	2	2	2	30
Capitalist Income Distribution	6	2	0	34
Number of Voters	2	11	2	15

⁵ 5 experimental euro equal 1 euro paid out. Earnings of subjects were on average 12 euro, and ranged from 9 to 14 euro. This included a show-up fee of 3 euro.

⁶ Since the assignment of the colour roles was random, each subject received the colour roles a different number of times. Count of the number of times subject received which roles can be found in Appendix A, tables 1-9.

⁷ The experiment was conducted in the Groningen Experimental Economics Lab. The sessions never exceeded the hour including all instructions. Subjects signed an informed consent form and it was made clear that their decisions would be fully anonymous. We informed the subjects that all communication between them was banned before the experiment commenced. After the instructions, the subjects were given a test question to ensure that the instructions were clear. During the experiment, subjects remained in their assigned cubicle, specially designed for controlled experiments. The original instructions handed out during the experiment can be found in Appendix B.

Table 3.2. Socialist-Bias Payoff Structure

	Blue	Green	Red	Total
Socialistic Income Distribution	2.5	2.5	2.5	37.5
Capitalist Income Distribution	9.75	2	0	41.5
Number of Voters	2	11	2	15

Table 3.3. Capitalist-Bias Payoff Structure

	Blue	Green	Red	Total
Socialistic Income Distribution	2	2	2	30
Capitalist Income Distribution	3.25	2.5	0	34
Number of Voters	2	11	2	15

Due to the set-up of the experiment and the structure of the payoffs, we do not necessarily expect votes in line with political beliefs for voters in the Blue and Red roles, since these voters have a (large) economic incentive not to do so. For Red voters, it would be irrational to vote for the Capitalist Income Distribution, the opposite holds for the Blue voters. In the Baseline payoff structure, Green voters do not have such an economic incentive and always receive the same payoff regardless of their choice. However, in the Socialist-Bias payoff structure, Green voters encounter a small opportunity cost when voting for the Capitalist Income Distribution. As such there are indirect costs associated to voting in line with ideology. The opposite holds for the Capitalist payoff structure. These payoff structures allow us to test whether subjects vote in line with their ideology, even when the decision to do so is costly, and thus, revealing preferences is costly. A major drawback of the survey-based measure of left-right ideology is that there are no financial consequences to stating what your ideology is. In the biased payoff structures, there are costs associated to showing preferences related to left-right ideology through voting for one of the two income distributions. Therefore, they allow us to test whether subjects refrain from voting in line with their political ideology due to these costs or not. And thus, whether survey-measured ideology remains a predictor for choices made in the experiment, even when there are opportunity costs associated to these choices. If left-right ideology remains to be a predictor for preferences regarding inequality and efficiency, proxied by votes in the experiment, regardless of there being opportunity costs, we have evidence for the predictive validity of this measure.

To sum up, controlling for the different colour roles and payoff structures, we expect that subjects vote in line with their ideology. We expect that a subject that states to be more left-wing votes for the Socialist Income Distribution, whereas a right-wing adherent is expected to vote for the Capitalist Income Distribution.

3.2 Descriptive Statistics

Before we elaborate on the estimation approach and our findings, we discuss some preliminary descriptive statistics. In figure 3.1, you can find histograms of the distribution of average votes over the seven rounds of the Baseline payoff structure per colour group. Similar figures are available in Appendix A, figures 1 and 2, for the Socialist-Bias and Capitalist-Bias payoff structures respectively. It can be seen that only the Red voters are consistent in their votes during all seven rounds. However, two subjects vote for the Capitalist Income Distribution, which is not in line with their economic incentive and is irrational according to the payoffs in this role. Voters that are assigned the Blue role

are not always consistent and nine subjects votes for the Socialist Income Distribution while they were assigned this colour, which is irrational based on the payoff distribution. If these irrational choices can be explained by ideology of voters, our findings would be strengthened. For the voters assigned the Green role, the majority vote for the Socialist Income Distribution. Additionally, many Green voters change their behaviour in the course of the experiment and do not vote consistently.

Figure 3.1. Average Vote by Blue, Green and Red voters in Baseline Payoff Structure

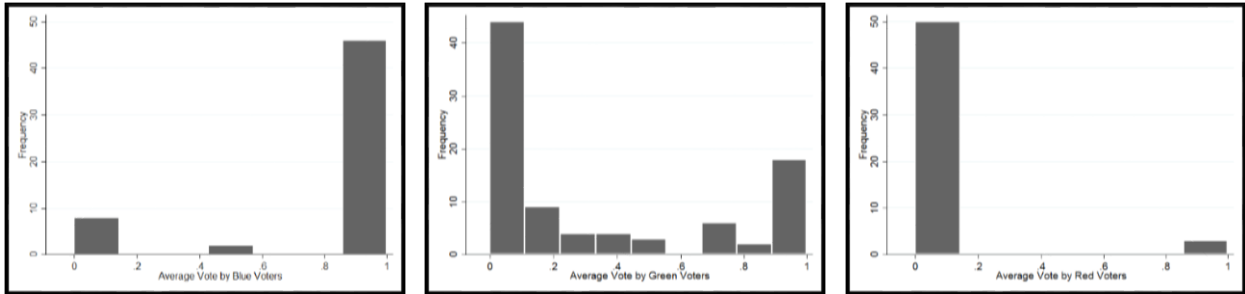
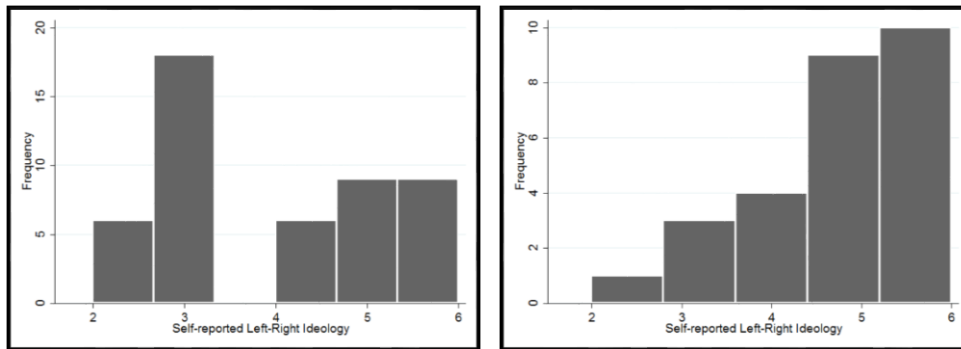


Figure 3.2. Histograms of Left-Right Ideology for Subjects in Green Group split in Socialist (left pane) and Capitalist (right pane) Votes - Sample restricted to Baseline Payoff Structure.



Notes: In the left graph ideology is graphed for subjects that vote socialist; in the right graph for subjects that vote capitalist. The measure of left-right ideology ranges from 1 to 7, where 1 indicates extremely left and 7 extremely right. Votes are the last votes casted by the subject in the Baseline payoff structure.

Figure 3.2 shows histograms of the distribution of left-right ideology of voters in the Green role during the Baseline payoff structure. The left pane shows the ideology of subjects that vote for the Socialist Income Distribution; the right pane that for the subjects that vote for the Capitalist Income Distribution. Left-right ideology is measured on a 7-point Likert-scale, where 1 corresponds to the extreme left, 4 corresponds to the political centre and 7 to the extreme right.⁸ From figure 3.2, it seems that Green-role subjects that vote for the socialist option perceive themselves as being slightly more left-wing; whereas, subjects that vote for the capitalist option clearly indicate to be more right-wing. Since the voters in the Green role do not have an economic incentive to vote for either of the two income distributions, there are no costs associated to their choice in the Baseline payoff structure. However, the relationship for Green voters remains intact in the Socialist- and Capitalist-Bias payoff structure, where there are small opportunity costs associated with a subject's

⁸ The question that asked respondents to self-assess their political ideology included a 'Don't Know'-option; therefore, our left-right ideology variable excludes the subjects that answered this. Close to 17 percent of the respondents indicated that they could not place themselves on the left-right ideology scale. Of the remaining 75 subjects, none would say that their ideology is either extremely right nor extremely left. 31 percent indicated that their ideology is left-wing, whereas 41 percent is right-wing and 11 percent would say they are in the centre of this spectrum.

vote. We also look at the subjects in the Red and Blue group, where there is a (large) incentive to vote for the socialist or capitalist option. In the Baseline payoff structure, the subjects in the Red group that irrationally vote for the Capitalist Income Distribution report to be more right-wing on average; subjects that are in the Blue role and vote irrationally for the socialist option perceive themselves to be more left-wing. Therefore, there seems to be some preliminary evidence that subjects vote for the income distribution that corresponds to the political attitudes of their ideology.⁹ We examine these relations more closely in the subsection 3.4, after discussing our approach.

3.3 Methodology: Probit Model

We want to test whether survey-measured left-right ideology can explain preferences for inequality versus efficiency, which is proxied by votes for a Capitalist or Socialist Income Distribution. Therefore, we are dealing with a dependent variable that is binary and takes on the value of 1 when a subject votes in favour of the capitalist option and 0 when a subject votes for the socialist option. Due to the nature of our dependent variable, we estimate a binary choice model. These models describe the probability that an event occurs or a choice is made conditional on variables that influence this probability and is defined as $P(y_i = 1|\mathbf{x}'_i)$. It is depicted by the binary choice model as follows:

$$P(y_i = 1|\mathbf{x}'_i\boldsymbol{\beta}_0) = F(\mathbf{x}'_i\boldsymbol{\beta}_0),$$

where $F(\cdot)$ is some specified function. In case of a probit model, $F(\cdot)$ is the cumulative distribution function of the standard normal distribution. Turning to our model specifically, we estimate the probability that a subject votes for the capitalist option conditional on left-right ideology and a set of control variables.

Binary choice models, such as the pooled probit model we estimate, are based on underlying latent models. The latent variable in our model is an individual's preference for inequality versus efficiency and our latent model is specified as follows:

$$y_{it}^* = \mathbf{x}'_{it}\boldsymbol{\beta}_0 + \varepsilon_{it} \quad (3.1),$$

where \mathbf{x}_{it} is a vector containing a measure of left-right ideology and control variables and $\boldsymbol{\beta}_0$ a vector of corresponding parameters. Regarding the error term, we assume contemporaneous exogeneity and normality, i.e. $\varepsilon_{it}|\mathbf{x}_{it} \sim N(0,1)$. Since preferences are unobservable, we instead observe the votes that are casted in the experiment. The relation between preferences for inequality and efficiency relate to votes in the experiment according to the following 'observation rule':

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{if } y_{it}^* \leq 0 \end{cases}$$

We observe a choice for the capitalist option if preferences for efficiency exceed some threshold level. Without the loss of generality, this threshold is set to 0. Given this rule, the model in equation

⁹ The relation found in the Red and Blue group does not remain intact. One of the reasons could be that there are only a few subjects that vote 'irrationally'; in the Red group there are even no subjects that vote irrationally. Similar relations are found if we look at votes casted in the first round and average votes over the rounds in each separate payoff structure.

3.1 and the assumptions regarding the error term, we know that for each round in the experiment (t):

$$P(y_{it} = 1|x_{it}) = \Phi(\mathbf{x}'_{it}\boldsymbol{\beta}_0),$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function. Under these assumptions, the parameters in our model, represented by the vector $\boldsymbol{\beta}_0$, can be estimated consistently using maximum likelihood, in which case the following log likelihood is maximized:

$$\sum_{i=1}^N \sum_{t=1}^T \{y_{it} \log \Phi(\mathbf{x}'_{it}\boldsymbol{\beta}_0) + (1 - y_{it}) \log[1 - \Phi(\mathbf{x}'_{it}\boldsymbol{\beta}_0)]\}.$$

The effect of a change in one of the explanatory variables (x_j) on the probability that a vote is casted in favour of the Capitalist Income Distribution ($y_{it} = 1$), i.e. the average partial effect, is defined as:

$$\frac{\partial P(y_{it} = 1|x_{it}; \boldsymbol{\beta}_0)}{\partial x_{jit}} = \beta_{0j} \varphi(\mathbf{x}'_{it}\boldsymbol{\beta}_0) \quad (3.2),$$

where $\varphi(\cdot)$ is the standard normal density function (Verbeek (2012) and Wooldridge (2010)).

In our model, the key variable of interest is the survey measure of left-right ideology. However, to avoid an omitted variable bias we add several control variables that influence the decisions in the experiment. Since it is assumed that the errors are independent of the explanatory variables, omitting a regressor that has explanatory power and is correlated with the other explanatory variables, would invalidate this assumption. Moreover, specific to binary choice models, omitted relevant regressors cause the variance of the error term to deviate from normality, regardless of whether it is correlated with the other regressors (Cramer, 2007).¹⁰ We add as control variables in our model a subject's age, gender, origin and the rank of a subject's total payoff relative to the other subjects during the experiment. Furthermore, we control for colour roles and payoff structures. In addition, we interact the colour roles, the payoff structures and a subject's rank in terms of payoff with our measure of ideology. As such, we allow the effect of ideology on voting to differ for different values of these variables. We include round dummies to control for correlation between a subject's vote over time, i.e. during the course of the experiment. We estimate the model for the total pooled sample and samples restricted to each payoff structure and compute cluster robust standard errors.¹¹ Furthermore, we estimate average partial effects (APE) according to equation 3.2, since these can be directly interpreted.

In table 3.4, you can find our expectations regarding the sign of the APEs of the control variables; for completeness we also include the expected sign for left-right ideology. With regards to age and origin, we do not have specific expectations. We expect the APE for gender to be negative, indicating that women are more inclined to vote for the Socialist Income Distribution than men. This

¹⁰ To see this, consider the following model: $y_i^* = \beta_0^* + \beta_1^* x_{1i} + \beta_2^* x_{2i} + \varepsilon_i^*$, where ε_i^* has zero mean and variance of σ^{*2} . Furthermore, it is uncorrelated with all x_i 's. If we now omit x_{2i} , we obtain the following model: $y_i^* = (\beta_0^* + \beta_2^* \bar{x}_2) + \beta_1^* x_{1i} + (\varepsilon_i^* + \beta_2^* (x_{2i} - \bar{x}_2))$. The variance of the error term has now increase to $\sigma^{*2} + \beta_2^{*2} \text{var}(x_2)$ (Cramer, 2007). Therefore, the assumption of the probit model will be violated and estimates are not consistent anymore.

¹¹ Without more assumptions on the error term than made in text, scores needed in the estimation of the variance matrix suffer from serial correlation. Valid standard errors are only obtained when we use robust estimation (Wooldridge, 2010).

is in line with the results of Alesina et al. (2011) and Fehr, Naef and Schmidt (2006), who find that women are more averse to inequality than men. For the relative rank of a subject in terms of payoff, we expect the APE to be positive. The higher a subject’s relative rank, the more we expect him/her to prefer efficiency over inequality, since there is more to lose in terms of payoff when choosing the less efficient outcome. As to the sign of the Green dummy we have no specific expectations. The subjects assigned this colour have either no economic incentive to vote for one of the two income distributions, have a small incentive to vote for the socialist option, or have a small incentive to vote for the capitalist option. We expect the APE for the Blue dummy to be positive, since the subjects in this group have a (large) economic incentive to vote for the Capitalist Income Distribution, and it would be irrational for them not to do so. The opposite holds for the Red dummy. In the Socialist-Bias payoff structure, there is a bias towards the Socialist Income Distribution in terms of payoffs, which leads us to expect a negative sign. For similar reasons we expect the APE for the Capitalist-Bias dummy to have a positive sign.

Table 3.4. Expected Signs of the Average Partial Effects of the Control Variables

Independent Variable	Expected Sign
Age	+/-
Gender	-
Origin	+/-
Rank of payoff	+
Green dummy	+/-
Blue dummy	+
Red dummy	-
Socialist-Bias dummy	-
Capitalist-Bias dummy	+
Left-right Political Ideology	+

Notes: Depending on the sample, as well as, the variation in votes per group identified by colour role, included colour dummies vary. The dependent variable Vote is a binary variable, where a vote for the Socialist Income Distribution is classified as a 0 and a vote for the Capitalist Income Distribution as a 1.

3.4 Results

In table 3.5, you find the APEs for left-right ideology and the control variables for the total pooled sample.¹² We also create a left-centre-right scale that spreads from 1, which includes the self-identifications ranging from extremely left to centre-left, to 3, which includes those ranging from extremely right to centre-right. A 2 is, therefore, associated with self-assessed centre political ideology. This variable is used to test for robustness. Several outcomes from table 3.5 are worth mentioning. Firstly, the APE of left-right ideology is positive and statistically significant, which is in line with expectations. A self-identification that is more right-wing increases the probability that a subject votes for the Capitalist Income Distribution, even when controlling for the biased payoff structures, in which voting in line with ideology means encountering a small opportunity cost. More specifically, a one-step increase in the survey measure of left-right ideology increases the (conditional) probability of a vote for the capitalist option with 0.06 percentage points on average. For the left-centre-right (LCR) scale this increase in (conditional) probability is 0.09 percentage points. Even though its sign is in line with expectations, the APE for a subject’s rank of in terms of total payoff relative to the other subjects is statistically insignificant. Therefore, there seems to be no

¹² The maximum likelihood estimates of the corresponding pooled probit model can be found in Appendix A, table 10.

‘money effect’ that could cause the influence of ideology on inequality and efficiency preferences to disappear. The colour dummies and payoff structure dummies are statistically significant and their signs are in line with what we expected. There is a difference in how subjects vote between colour roles and payoff structures. However, this does not affect the relationship between our measure of left-right ideology and preferences for inequality or efficiency, which is present even though we control for colour roles and payoff structures. There does not seem to be a difference in the probability of a vote for the Capitalist Income Distribution between subjects of different ages or between Dutch and non-Dutch subjects. However, the (conditional) probability that a woman votes for the Capitalist option is about 0.13 percentage points lower than for a man. This is in line with expectations.

Table 3.5. Average Partial Effects - Total Pooled Sample

Dependent variable: Vote	(1)	(2)
Left-right Ideology	0.061*** (0.012)	
LCR scale		0.088*** (0.016)
Rank of payoff	0.003 (0.003)	0.004 (0.003)
Green dummy	-0.406*** (0.019)	-0.406*** (0.020)
Red dummy	-0.581*** (0.018)	-0.581*** (0.018)
Socialist-Bias dummy	-0.147*** (0.036)	-0.145*** (0.035)
Capitalist-Bias dummy	0.405*** (0.037)	0.407*** (0.037)
Age	0.001 (0.009)	0.003 (0.009)
Gender dummy	-0.131*** (0.036)	-0.134*** (0.036)
Origin dummy	-0.050 (0.040)	-0.052 (0.040)
Observations	1,554	1,554

Notes: Cluster robust standard errors are in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. APE's are calculated from coefficients estimated using a pooled probit specification. The dependent variable Vote is a binary variable, where a vote for the Socialist Income Distribution is classified as a 0 and a vote for the Capitalist Income Distribution as a 1. Left-Right ideology ranges from 1 to 7, where 1 means extremely left and 7 extremely right. LCR is an abbreviation for the Left-Centre-Right scale, which ranges from 1 to 3.

In table 3.6, you can find the estimated APEs for left-right ideology, the LCR scale and the control variables split out in three samples; one for each payoff structure.¹³ In the Socialist-Bias (Capitalist-Bias) payoff structure, all voters in the Red (Blue) role voted for the socialist (capitalist) option. Due to this lack of variation in votes by the subjects identified by these colour dummies, the outcome, being the (conditional) probability of voting capitalist, is perfectly predicted. Therefore, these observations are dropped from the analysis. The conclusions regarding left-right ideology do not change. In the Baseline payoff structure, the (conditional) probability of a vote for the capitalist

¹³ The maximum likelihood estimates of the corresponding probit model can be found in Appendix A, table 11.

option increases with about 0.09 percentage points for the self-report and with 0.13 percentage points for the LCR scale. These increases in probability are around 0.07 percentage points for the sample restricted to the Socialist-Bias payoff structure and on average around 0.06 percentage points for the Capitalist-Bias sample. Since the effect of left-right ideology does not disappear in the Socialist- or Capitalist-Bias payoff structure samples, our results indicate that this measure of ideology remains a significant predictor for inequality versus efficiency preferences even when there are opportunity costs to voting ideologically. For these subsamples, the colour dummies are statistically significant and of the expected sign. Age and origin are statistically insignificant, as in the total pooled sample. The effect of gender is also present in the Baseline and Socialist-Bias payoff structures; as expected, it seems that women are less likely to prefer efficiency over equality. However, this gender effect disappears in the Capitalist-Bias payoff structure.¹⁴

Overall, subjects' choices in the experiment are explained by the survey measure of left-right political ideology. It is, thus, an experimentally validated predictor for preferences regarding inequality versus efficiency. As such, we have showed the behavioural validity of a measure of political left-right ideology based on self-identifications in surveys.

Table 3.6. Average Partial Effects - Samples restricted to the Baseline, Socialist-Bias and Capitalist-Bias payoff structures.

Dependent variable: Vote	(1) Baseline	(2)	(3) Socialist-Bias	(4)	(5) Capitalist-Bias	(6)
Left-right Ideology	0.091*** (0.018)		0.065*** (0.018)		0.049*** (0.017)	
LCR scale		0.129*** (0.026)		0.078*** (0.027)		0.077*** (0.026)
Rank of payoff	0.009* (0.005)	0.010* (0.005)	0.008* (0.004)	0.008* (0.005)	-0.005 (0.004)	-0.004 (0.004)
Red dummy	-0.293*** (0.060)	-0.293*** (0.059)			-0.780*** (0.053)	-0.781*** (0.054)
Blue dummy	0.503*** (0.052)	0.503*** (0.052)	0.757*** (0.040)	0.752*** (0.040)		
Age	-0.0002 (0.016)	0.004 (0.016)	-0.001 (0.013)	0.002 (0.013)	0.011 (0.010)	0.011 (0.010)
Gender dummy	-0.167** (0.065)	-0.169*** (0.064)	-0.185*** (0.048)	-0.182*** (0.048)	-0.073 (0.049)	-0.082 (0.051)
Origin dummy	-0.043 (0.0864)	-0.046 (0.084)	0.014 (0.064)	-0.021 (0.066)	-0.058 (0.056)	-0.043 (0.053)
Observations	518	518	448	448	448	448

Notes: Cluster robust standard errors are in parentheses. Significance is indicated as follows: *** p<0.01, ** p<0.05, * p<0.1. APE's are calculated from coefficients estimated with a pooled probit model. The dependent variables Vote is a binary variable, where a vote for the Socialist Income Distribution is classified as a 0 and a vote for the Capitalist Income Distribution as a 1. Left-Right ideology ranges from 1 to 7, where 1 means extremely left and 7 extremely right. LCR is an abbreviation for the Left-Centre-Right scale, which ranges from 1 to 3. The marginal effects in columns 1-2 correspond to a sample restricted to the Baseline payoff structure, the marginal effects in column 3-4 to a sample restricted to the Socialist-Bias payoff structure, the marginal effects in columns 5-6 to a sample restricted to the Capitalist-Bias payoff structure.

¹⁴ In order to ensure the robustness of our results, we have re-estimated all relations with pooled linear probability models. Results do not change, and thus, are robust to model specification. These findings are available upon request.

To assess the fit of our model, we predict the probability that a subject votes for the capitalist option conditional on survey-based ideology and the other independent variables for each observation. This allows us to examine for how many observations this prediction is correct, and thus, how well our model performs. We assume that whenever the predicted probability estimated by the model is larger than 0.5, the casted vote will be in favour of the capitalist option and vice versa. Results when using as key independent variable left-right ideology for the total pooled sample and the separate payoff structure samples can be found in tables 3.7-3.10; those for including the LCR scale as key explanatory variable are available upon request. As can be seen from table 3.7, 86 percent of the predictions made by the model are correct. In other words, for 86 percent of the observations the model correctly projects that a vote is casted in favour of the socialist or capitalist option. Additionally, table 3.7 shows us that the model incorrectly predicts a vote for the socialist option, when the true vote is capitalist for 14 percent of the votes. These predictions should be classified as false positives. Also for 14 percent of the observations, the model incorrectly predicts a vote for the Capitalist Income Distribution, when the true voted is casted in favour of the socialist one. These predictions are classified as false negatives. For these observations, there is a discrepancy between self-reported left-right ideology and behaviour in the experiment. Subjects that cast false positive votes indicate to be left-wing; however, vote for the right-wing associated capitalist option in the experiment, whereas those that cast false negative votes indicate to be right-wing, but vote for the left-wing associated socialist option. Table 3.7 also shows that in 86 percent of the observations the model predicts true positives and negatives, and casted votes and self-reported left-right ideology coincide. For 23 percent of observations in the sample restricted to the Baseline payoff structure, the model predicts false positives, such that a vote for the capitalist option is predicted; however, the actual vote is casted for the socialist option. Therefore, in 23 percent of the cases, a subject indicates to be right-wing; however, votes in line with left-wing ideology. False negatives are predicted for 16 percent of the predicted socialist votes. For the sample restricted to the Socialist-Bias payoff structure, these numbers are 18 percent and 12 percent, respectively. In the Capitalist-Bias payoff structure sample, 10 percent of predicted probabilities are either false positive or false negatives. However, when taking into account the votes that are correctly predicted by our model in different samples, we conclude that our model fit is quite good.

Table 3.7. Classification of Predicted Probabilities for Model with Left-Right Ideology - Total Pooled Sample

	Vote = Capitalist	Vote = Socialist
Predicted $P(\text{vote} = \text{Capitalist}) \geq 0.5$	86%	14%
Predicted $P(\text{vote} = \text{Capitalist}) < 0.5$	14%	86%
Correctly predicted by model: 86%		

Notes: Predicted probabilities are estimated from a pooled probit model for all observations. A predicted probability larger than or equal to 0.5 means a prediction that the vote is casted in favour of the Capitalist Income Distribution. Those observations for which the predicted probability is larger than or equal to 0.5, but for which the actual vote casted is in favour of the Socialist Income Distribution, are classified as false positives, and vice versa.

Table 3.8. Classification of Predicted Probabilities for Model with Left-Right Ideology - Sample Restricted to Baseline Payoff Structure

	Vote = Capitalist	Vote = Socialist
Predicted $P(\text{vote} = \text{Capitalist}) \geq 0.5$	77%	23%
Predicted $P(\text{vote} = \text{Capitalist}) < 0.5$	16%	84%
Correctly predicted by model: 81%		

Notes: Predicted probabilities are estimated from a pooled probit model for all observations. A predicted probability larger than or equal to 0.5 means a prediction that the vote is casted in favour of the Capitalist Income Distribution. Those observations for which the predicted probability is larger than or equal to 0.5, but for which the actual vote casted is in favour of the Socialist Income Distribution, are classified as false positives, and vice versa.

Table 3.9. Classification of Predicted Probabilities for Model with Left-Right Ideology - Sample Restricted to Socialist-Bias Payoff Structure

	Vote = Capitalist	Vote = Socialist
Predicted $P(\text{vote} = \text{Capitalist}) \geq 0.5$	82%	18%
Predicted $P(\text{vote} = \text{Capitalist}) < 0.5$	12%	88%
Correctly predicted by model: 87%		

Notes: Predicted probabilities are estimated from a pooled probit model for all observations. A predicted probability larger than or equal to 0.5 means a prediction that the vote is casted in favour of the Capitalist Income Distribution. Those observations for which the predicted probability is larger than or equal to 0.5, but for which the actual vote casted is in favour of the Socialist Income Distribution, are classified as false positives, and vice versa.

Table 3.10. Classification of Predicted Probabilities for Model with Left-Right Ideology - Sample Restricted to Capitalist-Bias Payoff Structure

	Vote = Capitalist	Vote = Socialist
Predicted $P(\text{vote} = \text{Capitalist}) \geq 0.5$	90%	10%
Predicted $P(\text{vote} = \text{Capitalist}) < 0.5$	10%	90%
Correctly predicted by model: 90%		

Notes: Predicted probabilities are estimated from a pooled probit model for all observations. A predicted probability larger than or equal to 0.5 means a prediction that the vote is casted in favour of the Capitalist Income Distribution. Those observations for which the predicted probability is larger than or equal to 0.5, but for which the actual vote casted is in favour of the Socialist Income Distribution, are classified as false positives, and vice versa.

4. Multidimensional Political Ideology

Even though we show evidence for the predictive validity of the survey measure of left-right ideology, we propose a different measure of ideology in this section. This measure is able to capture more dimensions, does not confront individuals with concepts they might not understand, and does not assume that beliefs are generalizable and mutually exclusive; some of drawbacks specific to measuring ideology on a left-right dimension. We propose to quantify ideology via statements on contemporary political, economic and social issues by using subjects' opinions on these issues. In our survey, we ask our subjects to what extent they agree or disagree with such statements and use the information provided by them in an exploratory factor analysis. We interpret the extracted factors as dimensions of political ideology and compare these to self-assessed ideology. In order to increase the likelihood that respondents have a strong opinion on the statements and are willing to share this, we ask for opinions on nowadays relevant issues. Furthermore, statements deal with a trade-off, either on economic grounds, for example between income inequality and economic growth, or on social grounds, for example between national security and privacy. Due to these trade-offs, subjects are forced to make a distinct choice in what they believe to be more important.

The survey includes 46 statements, for which we ask respondents to indicated whether they agree or disagree on a 5-point Likert scale. A list of the statements and a table with descriptive statistics can be found in Appendix A, tables 15 and 16. The mean scores on the statements are, in

general, between 2 and 4 with an average standard deviation of 1. However, there are some statements with which subjects agree or disagree more strongly. Subjects do not believe that the government should put national security before privacy, that the death penalty should be reintroduced in the Netherlands and do not think that women should be positively discriminated in the labour market. For these statements, the mean score is lower than 2. There are also statements with which many subjects strongly agree. For example, they strongly agree that women should be able to decide themselves about abortion, that euthanasia should be allowed and that people who do not want to work should not receive unemployment benefits. Scores on these statements are considerably higher than 4. Unfortunately, not all respondents have given their opinion on all statements; 14 subjects refrained from answering one or two of the statement questions. This led to some missing values. In order not to lose information, we impute these values using the Expectation-Maximization algorithm.¹⁵ All subsequent analyses are checked for robustness using the data with the missing values.

Before we discuss the outcome of the factor analysis and interpretation of the dimensions of political ideology, we elaborate on our methodology and the considerations that should be taken into account when deciding on the number of factors to retain.

4.1 Methodology: Factor Analysis

Essentially a factor analysis model is a model of measurement error, since the aim is to measure a latent variable; something that is unobservable. The best we can do is to measure the unobservable variable with a set of indicators with the aim to capture as much common variance between the indicators are possible in measuring the underlying latent variable. This is what factor analysis does.

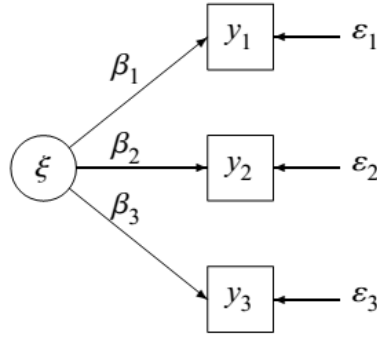
Let us first consider a one factor model. If we assume that we have m indicators to measure one unobservable variable, we have the following factor model:

$$\begin{aligned} \mathbf{y}_n &= \boldsymbol{\beta}\boldsymbol{\xi}_n + \boldsymbol{\varepsilon}_n \\ \boldsymbol{\xi}_n &\sim N(0,1) \\ \boldsymbol{\varepsilon}_n &\sim N_M(0, \boldsymbol{\Omega}) \end{aligned}$$

where \mathbf{y}_n , $\boldsymbol{\beta}$, $\boldsymbol{\xi}_n$ and $\boldsymbol{\varepsilon}_n$ are vectors with m elements. We assume that $\boldsymbol{\xi}_n$ and $\boldsymbol{\varepsilon}_n$ are independent and that $\boldsymbol{\Omega}$ is a matrix of diagonals. These assumptions result in the following distribution for \mathbf{y} : $\mathbf{y}_n \sim N_M(0, \boldsymbol{\Sigma})$ with covariance matrix $\boldsymbol{\Sigma} = \boldsymbol{\beta}\boldsymbol{\beta}' + \boldsymbol{\Omega}$. These equations together form the one factor model, where $\boldsymbol{\beta}$ is a vector of factor loadings, $\boldsymbol{\xi}_n$ is a vector of factor scores and the vector \mathbf{y}_n represents the indicators for $\boldsymbol{\xi}$, the latent variable (Wansbeek and Meijer, 2000). This one-factor model can be graphically represented by a path diagram, where the boxes depict the observed indicators and the circle depicts the latent variable.

¹⁵ This algorithm uses an iterative two step (expectation and maximization) maximum likelihood method to find plausible estimates for the missing values. The final estimated score is reached when the expectation of the missing observation and the estimate from the maximization procedure converge. In order for the EM algorithm to estimate the missing statement scores correctly, it needs to be assumed that they are missing at random (Dempster, Laird and Rubin, 1977). We tested this assumption using Little's MCAR test, which did not reject the null of data missing at random, so the assumption holds.

Figure 4.1. Path diagram of one factor model with 3 indicators ($m = 3$).



Source: Wansbeek and Meijer (2000), p. 31.

In our case, we have 46 indicators, being the statements; however, we do not know how many dimensions of ideology these statements capture. Therefore, we need a factor model that can measure multiple factors. We generalize the one-factor to a multiple factor model as follows:

$$\begin{aligned}
 \mathbf{y}_n &= \mathbf{B}\xi_n + \boldsymbol{\varepsilon}_n \\
 \xi_n &\sim N(0, \boldsymbol{\Phi}) \\
 \boldsymbol{\varepsilon}_n &\sim N_M(0, \boldsymbol{\Omega})
 \end{aligned}$$

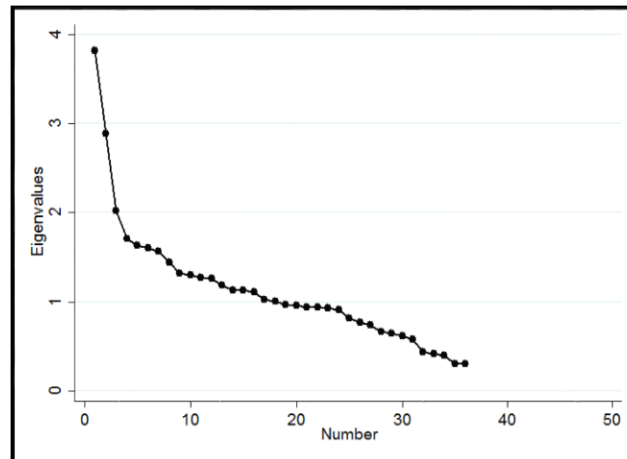
where \mathbf{B} is now a matrix of factor loadings. In this multiple factor model, it is implied that the indicators have the following distribution: $\mathbf{y}_n \sim N_M(0, \boldsymbol{\Sigma})$, with covariance matrix $\boldsymbol{\Sigma} = \mathbf{B}\boldsymbol{\Phi}\mathbf{B}' + \boldsymbol{\Omega}$.

Estimation of this model is done by maximum likelihood and after estimation, the values for the underlying factors can be predicted. We use the Bartlett predictor, since it gives unbiased estimates, which are more likely to generate the actual factor scores compared to other predictors. Interpretation is based on the rotated factor loadings, where indicators that load relatively high on a factor are assigned more weight. We use the Oblimin method for rotation, which allows for correlation between factors (Wansbeek and Meijer, 2000).

Returning to our data, we have 46 indicators and we aim to measure latent political ideology. Since we do not know how many dimensions this latent variable has, we need some decisions rules that tell us how many factors to retain from the analysis. One of these decisions rules is the 'elbow-criterion' and it is based on the scree-plot. This graph plots the number of factors against the eigenvalues of the correlation matrix of indicators. The criterion tell us to keep the number of factors that come before the kink in the plot, since these explain a relatively large part of the variance between indicators compared to those after the kink (Wansbeek and Meijer, 2000). If we consider the scree-plot of a factor analysis on the 46 statements (see figure 4.2), we see that there is a clear kink at factor 4. Therefore, according to this criterion we should retain 3 factors. Secondly, we assess for which number of extracted factors Akaike's information criterion (AIC) and the Bayesian Information Criterion (BIC), both measures of model fit, are lowest. The AIC is lowest for a factor model with 3 factors; the BIC for a model with 2 factors. Therefore, these statistics are inconsistent as to how many factors to extract. However, what is just as important in deciding on the number of factors, is whether the extracted factors can be interpreted as the unobservable latent variables you intend to capture, in our case dimensions of political ideology. Both the 3 factor solution and the 2

factor solution give us interpretable dimensions of political ideology. However, since the ‘elbow-criterion’ and the AIC indicate that a 3 factor solution captures most of the common variance between indicators, we use the 3 factor solution in the analyses and the 2 factor solution as a robustness check on the found relations.¹⁶

Figure 4.2. Screeplot of Eigenvalues against the Number of Extracted Factors



4.2 Interpretation of the Dimensions

In table 4.1 you find an overview of the statements that load relatively high on each factor; factor loadings of the rotated factor analysis for all 46 statements can be found in Appendix A, table 17. We label the first factor Economic Socialism.¹⁷ The statements that load high on this factor deal with redistribution, labour market regulation and the welfare state. This dimension represents political attitudes that stand for the belief that there should be an economic system in which people help each other and the economically weak should be protected and cared for. Furthermore, income redistribution and equality among people is valued highly. There is also a focus on workers’ right and power of trade unions. A negative score on this dimension, thus, represents political attitudes that capture the belief in a more liberal economy, where there is a smaller role for the government and labour unions, as well as the belief in a society where people are responsible for the own fortune. We give this factor the additional label Economic, since the main focus is on the set-up and the role of the government in the economy.

The second factor is labelled Contemporary Populism. A high score on this factor would indicate nationalist beliefs. Statements that load high on this factor deal with a negative attitude towards immigration, stricter punishment for criminals and protectionism. The ideology of this dimension emphasizes that the will of the (native) people should go before that of the elite, which is defined on moral and ethical grounds. Examples of elites are the European Union or immigrants. We name this factor Contemporary due to the fact that this form of populism arose in Europe only since the ‘80s and ‘90s; however, has since gained much popular support (Mudde and Kaltwasser, 2013). A negative score on this dimension would indicate a belief in a multicultural society and support for supranational organizations, such as the European Union.

¹⁶ In addition, we have performed an EFA on the sample with the missing values. The screeplot, which can be found in Appendix A, figure 3, indicates that we should retain either 2 or 4 factors. The AIC is lowest for 3 factors and the BIC for 2 factors. Based on these statistics and the interpretation of the factors, we extract 3 factors, as well as, 2 factors for robustness checks.

¹⁷ Factor Labels are based on theory of ideology in the Handbook of Political Ideologies (Freedman, Sargent and Stears, 2013).

Table 4.1. Overview of High Loading Statements per Factor

Economic Socialism	
+	<i>Income redistribution is more important than economic growth.</i>
-	<i>It should be made easier for employers to lay-off employees.</i>
+	<i>The average income tax rate for high incomes should be increased.</i>
-	<i>Landlords should be free to charge any rent they want to charge.</i>
-	<i>The government should cut spending on unemployment benefits.</i>
+	<i>It should be mandatory for companies to appoint at least one woman on the board of directors.</i>
+	<i>The Prime Minister should be chosen through public elections.</i>
-	<i>Nuclear energy is the best alternative for fossil fuels when these are exhausted.</i>
+	<i>The rights of animals are as important as the rights of humans.</i>
+	<i>In order to protect the rights of workers, labor unions should have more power.</i>
+	<i>When a man and a woman, both equally capable, apply for a job, the woman should always be selected for the job.</i>
+	<i>Income differences should be reduced as much as possible.</i>
+	<i>The production of environmentally harmful goods should be taxed heavily.</i>
+	<i>The government should protect domestic markets, for example by taxing imports.</i>
-	<i>Euthanasia should be allowed.</i>
+	<i>Contributions to health insurance should be income dependent.</i>
Contemporary Populism	
-	<i>Every citizen should be an organ donor.</i>
-	<i>Same sex partners should be allowed to marry.</i>
+	<i>Nuclear energy is the best alternative for fossil fuels when these are exhausted.</i>
+	<i>Borders should be closed for asylum seekers.</i>
+	<i>The death penalty should be reintroduced in the Dutch legal system.</i>
+	<i>When a man and a woman, both equally capable, apply for a job, the woman should always be selected for the job.</i>
-	<i>Fighting poverty abroad is more important than fighting it domestically.</i>
+	<i>Insurance companies should have access to individual medical reports to better set insurance premia.</i>
+	<i>The government should protect domestic markets, for example by taxing imports.</i>
+	<i>Even in times of recession, the government should invest in military defense.</i>
+	<i>Religious schools should have the right to refuse pupils.</i>
Social Conservatism	
-	<i>Same sex partners should be allowed to marry.</i>
+	<i>Increased competition in the market for health care leads to quality improvement in the health care sector.</i>
-	<i>Soft-drugs should be legalized.</i>
-	<i>Women should be able to decide themselves about abortion.</i>
+	<i>Minimum wages should be abolished.</i>
+	<i>Fighting poverty abroad is more important than fighting it domestically.</i>
-	<i>Euthanasia should be allowed.</i>

Note: Statements included in this table have a load of +/- 0.30 or higher on the corresponding factor. The signs indicate whether the statement loads positively or negatively on the factor.

Table 4.2. Correlation between Dimensions of Ideology - 3 Factor Solution

	Economic Socialism	Contemporary Populism	Social Conservatism
Economic Socialism	1		
Contemporary Populism	-0.003	1	
Social Conservatism	-0.026	0.004	1

The statements that load high on the third factor deal with freedom of the individual on social grounds. A high load on this factor is associated with an opposition to social change and a focus on traditional values; therefore we name this factor Social Conservatism. The name Social is specifically given to indicate the emphasis of this factor on social and cultural issues and civil liberties, such as gay marriage, abortion and euthanasia. A negative score on this dimension would

be associated with socially liberal ideas; the belief that individuals are free to choose their own life path and social change is to be encouraged.¹⁸ Table 4.2 shows the correlations between these three dimensions of political ideology. The dimensions correlate only very slightly with each other, which is an indication that each dimension captures separate parts of political ideology.

4.3 Dimensions of Ideology versus Self-reported Left-Right Ideology

To compare this multidimensional measure of political ideology with left-right ideology, we examine the correlation between the two. In our survey, we have also asked respondents whether they consider themselves to be a liberalist or socialist and whether their political beliefs are more progressive or conservative. We link these self-identifications to the dimensions of ideology as well.¹⁹ The correlations, which can be found in table 4.4, show that a high score on the Economic Socialism dimension is associated with left-wing political ideology and social political attitudes. There is no strong relation between this dimension and the progressive-conservative self-identification. Furthermore, the Contemporary Populism dimension and the Social Conservatism dimension are associated with right-wing political ideology and conservative political beliefs. These latter two dimensions also correlate negatively with the liberal-social self-identification, which indicates that they relate to more liberal beliefs. This might, at first sight, seem to contradict the interpretation of the dimensions, especially for Social Conservatism where a high score indicates conservative, not liberal, political ideas. However, when we look more closely at both the correlations in table 4.4 and the statement loadings in table 17 of Appendix A, there might be an explanation for this seemingly contradictory negative relation between social beliefs and the Contemporary Populism and Social Conservatism dimensions.

The reason for this negative relation is that the liberal-social self-identification is interpreted by respondents from an economic perspective, not a social or cultural perspective. This means that the liberal-social self-report is a proxy for beliefs in liberal versus social economic systems, which is confirmed by the high correlation between the Economic Socialism dimension and this self-identification. If we look at the statement loadings in table 17 of Appendix A, we see that statements representing elements of a more liberalized economy, i.e. free markets, load positively on the Contemporary Populism and Social Conservatism dimensions (e.g. statement 4 or 31 and 26 or 39, respectively). This indicates that high scores on these dimensions are also related to liberal views regarding the economy, which explains the negative correlation. However, these 'economic' statements load relatively low on the two social dimensions compared to statements critical to their interpretation and compared to how they load on the Economic Socialism dimension, which explains why they are only included in table 4.2 for the latter dimension.

¹⁸ We also extracted two factors from the data; factor loadings can be found in Appendix A, table 18. Comparing the statement loadings of the 2 factor model with those of the 3 factor model, we see that in the former many of the same statements load on the first factor as in the latter. The correlation between first dimension of the 3 factor solution and the 2 factor solution is 0.98, which confirms that the same political beliefs are captured by these factors; a table of these correlations is found in Appendix A, table 19. We label the first factor of the 2 factor solution Economic Socialism as well and leave the interpretation of this factor unchanged. The second factor capture the combined beliefs of the Contemporary Populism and Social Conservatism dimensions of the 3 factor solution. We label this factor Populist Conservatism. The 3 and 2 factor solutions of the missing values sample can be similarly interpreted, results are available on request.

¹⁹ These survey questions included an 'Neither'-option. 38 out of the 90 respondents said they are neither progressive nor conservative. Of the remaining 52 students, 77 percent indicated that their political attitudes are more progressive than conservative. 31 respondents were not able to indicate whether they are more social than liberal. Of the remainder of the subjects, 63 percent indicated that they are more liberal.

Overall, even though it does so in a slightly differing degree, the survey measure of left-right ideology captures the beliefs of all three dimensions of political ideology in a way consistent with theory. This confirms the labelling of the factors. However, it is also an indication that this overarching ideology measure might be a proxy for beliefs on different ideological grounds, such as socialism, populism and conservatism. Additionally, it seems that the survey-based measure of left-right ideology captures economic as well as social beliefs. Despite the novelty of our proposed multidimensional measure of ideology and the lack of validation of this measure, the relation between the self-assessment measure and the dimensions is additional, although slightly tentative, evidence for the validity of the first.

Table 4.4. Correlation between Factors and Self-assessed Political Ideology - 3 Factor Solution

	Economic Socialism	Contemporary Populism	Social Conservatism
Right (vs Left)	-0.514	0.311	0.423
Conservative (vs Progressive)	-0.033	0.264	0.382
Social (vs Liberal)	0.582	-0.318	-0.357

Notes: The correlation between the dimensions and Right/Conservative/Social ideology is to be interpreted relative to Left/Conservative/Liberal ideology.

5. Conclusions

In this paper, we examine the behavioural validity of a measure of left-right political ideology. Left-right ideology is conventionally measured using self-reports in a survey, and therefore, potentially suffers from problems associated with survey-based measures. These include self-serving biases, strategic motives and respondents giving socially desirable answers. Furthermore, one of the issues surrounding measurement based on surveys, is that there is no financial consequence to giving a response. Therefore, answers are not incentivized and there is, a priori, no reason to believe that they reflect actual preferences or beliefs. Due to these pitfalls associated with survey-based measures, there is a need to validate them. We examine the predictive validity of left-right self-reported ideology by investigating whether this measure can explain preferences for inequality versus efficiency, which are measured in an incentivized experiment. This allows us to examine whether individuals only perceive themselves as having a certain political ideology or belief regarding political issues or also act in accordance with these beliefs.

Our results indicate that the left-right ideology measure is a significant predictor for preferences regarding inequality and efficiency. Based on these results, we conclude that we experimentally validate survey measured left-right ideology. Our results contradict the findings of Fehr, Naef and Schmidt (2006), who do not find that preferences for inequality versus efficiency can be predicted by left-right ideology. These contradicting findings could be the result of anticipation effects, since the experiment and the survey of Fehr, Naef and Schmidt (2006) measuring left-right ideology were conducted at the same time. Furthermore, in their experiment subject's earn the same income regardless of the income allocation they choose, which essentially makes their choice costless. In our experiment, payoff structures vary. In the Baseline structure, subjects receive the same income regardless of their choice like in the experiment of Fehr, Naef and Schmidt (2006). However, in the other two payoff structures, subjects encounter opportunity costs to vote in line with ideology and inequality versus efficiency preferences. We find that, regardless of whether subjects encounter these opportunity costs, choices in the experiment can be explained by survey-based left-right ideology, which indicates that this measure has predictive validity. Furthermore, our

results show that for 10 to 20 percent of our observations, there is a discrepancy between the vote casted in the experiment and self-reported left-right ideology. This discrepancy could be the results of subjects misunderstanding the experiment; however, there could be other reasons for the fact that people state to have a certain ideology, but do not behave accordingly. We leave investigating these reasons for future research. Overall, despite the fact that surveys are not-incentivized, our results imply that survey-based measures of ideology are relevant in terms of explaining actual choices and behaviour. This finding is beneficial for the study of political ideology, as well as, fields of research that rely on political ideology as explanatory variable, since surveys are time-efficient and cost-effective. Additionally, consistency between an individual's perceptions of ideology and behaviour implies that ideology is a meaningful concept used to organize political beliefs.

Criticism on the measurement of political ideology is not solely focused on the general drawbacks of survey measurement, but it is also criticized on issues more specific to political ideology. Firstly, measuring it on a left-right linear scale assumes that ideology is one-dimensional. Furthermore, individuals asked to self-assess their political beliefs on this scale are confronted with concepts that are unclear and have different meaning over time. Additionally, criticism arises regarding the assumptions needed to capture ideology on a linear scale, namely that political beliefs are mutually exclusive and generalizable. We propose a novel measure of ideology that curtails these critiques and is able to measure multiple dimensions of ideology. We ask respondents to what extent they agree with contemporary social, economic and political statements and use an explanatory factor analysis to extract the dimensions of ideology. We find that political ideology has three dimensions: Economic Socialism, Contemporary Populism and Social Conservatism. When comparing these dimensions to our measure of left-right ideology, we see that the latter captures aspects of the former dimensions, at least partly. Therefore, the left-right measure can be seen as a proxy for widespread ideological beliefs, and it is able to proxy for economic as well as social political attitudes. Seeing that the left-right measure captures beliefs of each dimension, we conclude that the criticisms mentioned above are invalid and that survey-measured left-right ideology is of such a size that it does fit all. Consequently, the influence of ideology on not only economic, but also social or other outcomes can be examined with this measure.

As a note to these results, we believe that the choice of which measure to use should be of considerable importance to the researcher. Depending on what is studied, the proposed multidimensional measure can be more appropriate than self-assessed left-right ideology. Compared to the latter, the former measure, for example, allows you to study the relative importance of the different dimensions in voter's decisions. As economic outcomes are affected by ideology through voter's decisions, understanding whether voters make decisions based on their economic, social or populist ideological dimension would be very interesting and could lead to new insights. We leave this as a suggestion for future research.

Our study does come with some caveats that should be taken into consideration by the reader. Firstly, the strong positive relation between self-assessed left-right ideology and the Economic Socialism dimension could potentially be the result of sample selection. De Vries, Hakhverdian and Lancee (2013) show in a representative sample that voters interpret a left-right scale from a cultural perspective, whereas the scale in our survey seems to be interpreted from an economic perspective as well. This might be due to having a sample of economics students only, which political attitudes are skewed to the right and are influenced by the material covered in their

courses (Potrafke, Fisher and Ursprung (2013); Scott and Rothman (1975)). Therefore, if your aim is to measure political ideology with a focus on economic issues, using a left-right one-dimensional scale might come with a potential risk. Furthermore, if respondent's interpretation of the left-right scale also differs across demographics, such as age and gender (Rockey, 2014), and not just the field of education, the risk to using self-identifications might be quite substantial. It implies that these survey-based ideology measures would only lead to correct measurement if a representative sample is used. An additional effect of having a sample of economics students only is that, due to their background, they might be biased towards efficiency (Fehr, Naef and Schmidt, 2006). However, even though this might be influential to some extent, our results show that this is not large enough to render the effect of ideology insignificant. Consequently, if we could re-do our analysis on a representative sample, we might find an even stronger effect of political ideology. This brings us to an additional limitation to our results. Since it is nearly impossible to conduct an experiment using a large representative sample due to time and financial constraints, it is difficult to generalize our results. Unfortunately, this is always a drawback of using an experimental approach.

In future research we would like to re-test our analysis using a more representative sample that not only consists of economics students. This allows us to examine whether the economic side of the left-right measure is solely a result of sample selection or whether we confirm our conclusion that left-right ideology is a good proxy for economic political beliefs and attitudes, as well as, social and cultural ones. Furthermore, it would be interesting to investigate whether the social ideological side of the left-right measure can be behaviourally validated.

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Appendix A - Tables and Figures

Table 1. Count of the Times Subjects Received the Colour Blue - Baseline Payoff Structure

Times that a Subject is BLUE	1	2	3	4	5	6	7	Total
Number of Subjects	32	20	4	0	0	0	0	56

Table 2. Count of the Times Subjects Received the Colour Green - Baseline Payoff Structure

Times that Subject is GREEN	1	2	3	4	5	6	7	Total
Number of Subjects	0	2	10	16	25	20	17	90

Table 3. Count of the Times Subjects Received the Colour Red - Baseline Payoff Structure

Times that Subject is RED	1	2	3	4	5	6	7	Total
Number of Subjects	30	18	3	1	1	0	0	53

Table 4. Count of the Times Subjects Received the Colour Blue - Socialist-Bias Payoff Structure

Times that Subject is BLUE	1	2	3	4	5	6	7	Total
Number of Subjects	33	16	5	1	0	0	0	55

Table 5. Count of the Times Subjects Received the Colour Green - Socialist-Bias Payoff Structure

Times that Subject is GREEN	1	2	3	4	5	6	7	Total
Number of Subjects	0	0	5	18	34	26	7	90

Table 6. Count of the Times Subjects Received the Colour Red - Socialist-Bias Payoff Structure

Times that Subject is RED	1	2	3	4	5	6	7	Total
Number of Subjects	40	16	4	0	0	0	0	60

Table 7. Count of the Times Subjects Received the Colour Blue - Capitalist-Bias Payoff Structure

Times that Subject is BLUE	1	2	3	4	5	6	7	Total
Number of Subjects	32	18	4	1	0	0	0	55

Table 8. Count of the Times Subjects Received the Colour Green - Capitalist-Bias Payoff Structure

Times that Subject is GREEN	1	2	3	4	5	6	7	Total
Number of Subjects	1	0	4	17	30	28	9	89

Table 9. Count of the Times Subjects Received the Colour Red - Capitalist-Bias Payoff Structure

Times that Subject is RED	1	2	3	4	5	6	7	Total
Number of Subjects	37	13	4	1	1	0	0	56

Figure 1. Average Vote by Blue, Green and Red voters in Socialist-Bias Payoff Structure

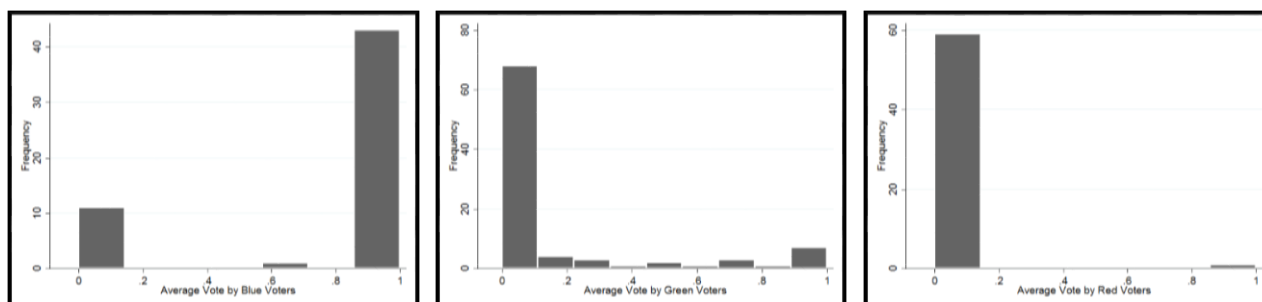


Figure 2. Average Vote by Blue, Green and Red voters in Capitalist-Bias Payoff Structure

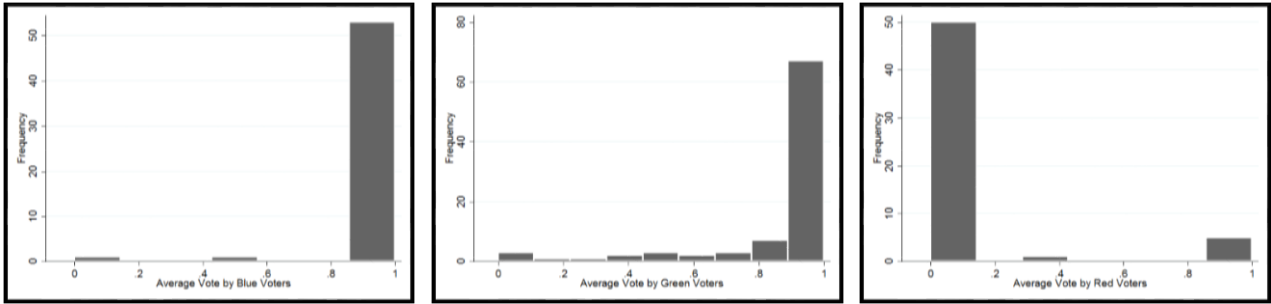


Table 10. Estimation results Pooled Probit Model - Total Pooled Sample

Dependent variable: Vote	(1)	(2)
Left-Right Ideology	0.084 (0.196)	
LCR scale		0.249 (0.287)
Rank of payoff	0.009 (0.048)	0.019 (0.014)
Green dummy	-3.726*** (0.674)	-2.372*** (0.193)
Red dummy	-5.805*** (1.392)	-4.782*** (0.431)
Socialist-Bias dummy	-0.340 (0.588)	-0.659*** (0.171)
Capitalist-Bias dummy	2.590*** (0.589)	1.813*** (0.195)
Green dummy x Left-Right Ideology /LCR scale	0.328** (0.153)	0.367 (0.226)
Red dummy x Left-Right Ideology /LCR scale	0.257 (0.311)	0.284 (0.474)
Socialist-Bias dummy x Left-Right Ideology /LCR scale	-0.083 (0.120)	-0.166 (0.184)
Capitalist-Bias dummy x Left-Right Ideology /LCR scale	-0.191 (0.136)	-0.222 (0.212)
Rank of payoff x Left-Right Ideology /LCR scale	0.002 (0.011)	-0.001 (0.017)
Age	0.006 (0.045)	0.018 (0.047)
Gender dummy	-0.680*** (0.190)	-0.692*** (0.186)
Origin dummy	-0.257 (0.206)	-0.271 (0.205)
Constant	1.607 (1.376)	1.696* (0.994)
Observations	1,554	1,554
Round Dummies	YES	YES
(Pseudo) R-squared	0.508	0.507
Log-likelihood	-529.1	-530.3

Notes: Cluster robust standard errors are in parentheses. Significance is indicated as follows: *** p<0.01, ** p<0.05, * p<0.1. Coefficients are estimated with a pooled probit model. The dependent variables Vote is a binary variable, where a vote for the Socialist Income Distribution is classified as a 0 and a vote for the Capitalist Income Distribution as a 1. Left-Right ideology ranges from 1 to 7, where 1 means extremely left and 7 extremely right. LCR is an abbreviation for the Left-Centre-Right scale, which ranges from 1 to 3.

Table 11. Estimation results - Samples restricted to the Baseline, Socialist-Bias and Capitalist-Bias payoff structures.

Dependent variable: Vote	(1) Baseline	(2)	(3) Socialist-Bias	(4)	(5) Capitalist-Bias	(6)
Left-right Ideology	0.431** (0.180)		0.324 (0.199)		0.337* (0.196)	
LCR scale		0.536* (0.283)		0.480 (0.297)		0.664** (0.316)
Rank of payoff	0.053 (0.078)	0.041* (0.023)	-0.036 (0.108)	0.025 (0.079)	-0.047 (0.099)	-0.009 (0.075)
Red dummy	-0.783 (1.297)	-1.278*** (0.370)			-1.761* (0.994)	-2.676*** (0.878)
Blue dummy	2.650*** (0.814)	2.087*** (0.285)	5.871*** (1.595)	5.040*** (1.210)		
Red dummy x Left-Right Ideology /LCR scale	-0.121 (0.271)	-0.211 (0.391)			-0.282 (0.228)	-0.176 (0.383)
Blue dummy x Left-Right Ideology /LCR scale	-0.143 (0.185)	-0.020 (0.295)	-0.585* (0.322)	-0.828* (0.455)		
Rank of payoff x Left-Right Ideology /LCR scale	-0.004 (0.017)	0.003 (0.027)	0.017 (0.021)	0.008 (0.031)	0.004 (0.022)	-0.013 (0.033)
Age	-0.001 (0.065)	0.016 (0.066)	-0.009 (0.083)	0.014 (0.080)	0.075 (0.069)	0.072 (0.065)
Gender dummy	-0.693** (0.276)	-0.700*** (0.271)	-1.315*** (0.372)	-1.257*** (0.361)	-0.480 (0.320)	-0.543* (0.327)
Origin dummy	-0.178 (0.356)	-0.192 (0.348)	0.087 (0.394)	-0.124 (0.398)	-0.385 (0.365)	-0.293 (0.356)
Constant	-2.283 (1.682)	-0.866 (1.408)	-1.647 (1.871)	-1.688 (1.784)	-1.801 (1.659)	-1.616 (1.557)
Observations	518	518	448	448	448	448
Round Dummies	YES	YES	YES	YES	YES	YES
(Pseudo) R-squared	0.372	0.374	0.519	0.500	0.499	0.506
Log-likelihood	-218.7	-218.1	-128.4	-133.6	-120.9	-119.4

Notes: Cluster robust standard errors are in parentheses. Significance is indicated as follows: *** p<0.01, ** p<0.05, * p<0.1. Coefficients are estimated with a pooled probit model. The dependent variables Vote is a binary variable, where a vote for the Socialist Income Distribution is classified as a 0 and a vote for the Capitalist Income Distribution as a 1. Left-Right ideology ranges from 1 to 7, where 1 means extremely left and 7 extremely right. LCR is an abbreviation for the Left-Centre-Right scale, which ranges from 1 to 3.

Table 12. The political statements.

Statement
1 Every citizen should be an organ donor.
2 Income redistribution is more important than economic growth.
3 Same sex partners should be allowed to marry.
4 It should be made easier for employers to lay-off employees.
5 Increased competition in the market for health care leads to quality improvement in the health care sector.
6 The average income tax rate for high incomes should be increased.
7 Soft-drugs should be legalized.
8 Globalization is only good for the rich, not for the poor.
9 Landlords should be free to charge any rent they want to charge.
10 Downloading illegal music should be a criminal offence.

Table 12. The political statements (continued).

- 11 In order to safeguard national security, the government should have access to all communication data in the country.
 - 12 The government should cut spending on unemployment benefits.
 - 13 Women should be able to decide themselves about abortion.
 - 14 It should be mandatory for companies to appoint at least one woman on the board of directors.
 - 15 Outcomes of all referenda should be binding for the government.
 - 16 Turkey should not be allowed to join the European Union.
 - 17 To decrease the debt burden on future generations, the retirement age should be increased to 70.
 - 18 The constitutional monarchy in the Netherlands should be changed into a ceremonial monarchy.
 - 19 In times of recession, it is the responsibility of the government to stimulate the economy.
 - 20 The Prime Minister should be chosen through public elections.
 - 21 Nuclear energy is the best alternative for fossil fuels when these are exhausted.
 - 22 Members of the Dutch royal family should not receive any income from the government.
 - 23 Borders should be closed for asylum seekers.
 - 24 Good performing students should receive study grants from the government. Bad performing students should pay a higher tuition fee.
 - 25 The rights of animals are as important as the rights of humans.
 - 26 In order to protect the rights of workers, labor unions should have more power.
 - 27 Religiously ritual slaughtering should be made illegal.
 - 28 Protecting the environment should be the responsibility of firms, not the government.
 - 29 A person that refuses to work should not receive a welfare grant.
 - 30 Everyone should be free to say what he wants, even when it discriminates against others.
 - 31 Minimum wages should be abolished.
 - 32 The death penalty should be reintroduced in the Dutch legal system.
 - 33 Child labor should be forbidden, even when this makes clothes considerably more expensive.
 - 34 Europe should become a political union with a European president.
 - 35 When a man and a woman, both equally capable, apply for a job, the woman should always be selected for the job.
 - 36 Income differences should be reduced as much as possible.
 - 37 The free movement of labor in the EMU is harmful for domestic low-skilled workers.
 - 38 Fighting poverty abroad is more important than fighting it domestically.
 - 39 Insurance companies should have access to individual medical reports to better set insurance premia.
 - 40 The production of environmentally harmful goods should be taxed heavily.
 - 41 The government should protect domestic markets, for example by taxing imports.
 - 42 Even in times of recession, the government should invest in military defense.
 - 43 Euthanasia should be allowed.
 - 44 Contributions to health insurance should be income dependent.
 - 45 Religious schools should have the right to refuse pupils.
 - 46 Everyone should be free to express their political views openly, even if they are extreme.
-

Table 13. Descriptive Statistics of Statements

Statement	Mean	SD	Min	Max	Statement	Mean	SD	Min	Max
1	3.32	1.35	1	5	24	2.54	1.17	1	5
2	2.70	1.02	1	5	25	2.68	1.36	1	5
3	4.42	0.94	1	5	26	3.10	0.98	1	5
4	2.89	1.02	1	5	27	3.26	1.21	1	5
5	3.02	1.06	1	5	28	2.62	0.96	1	5
6	2.83	1.32	1	5	29	4.01	1.03	1	5
7	3.20	1.42	1	5	30	2.78	1.18	1	5
8	2.29	1.00	1	5	31	2.19	0.93	1	5
9	2.07	1.13	1	5	32	1.88	1.12	1	5
10	2.10	1.04	1	5	33	4.26	0.91	1	5
11	1.97	1.01	1	5	34	2.60	1.21	1	5
12	2.82	1.00	1	5	35	1.76	0.99	1	5
13	4.43	0.78	1	5	36	2.84	1.22	1	5
14	2.47	1.23	1	5	37	3.18	0.98	1	5
15	3.22	0.93	1	5	38	2.20	0.99	1	5
16	3.10	1.06	1	5	39	2.67	1.15	1	5
17	2.68	1.12	1	5	40	3.90	0.89	2	5
18	2.99	0.92	1	5	41	2.78	1.03	1	5
19	3.79	0.88	1	5	42	2.57	1.11	1	5
20	3.63	1.13	1	5	43	4.05	0.91	1	5
21	2.76	1.41	1	5	44	2.99	1.07	1	5
22	3.03	0.99	1	5	45	2.27	1.02	1	5
23	2.56	1.06	1	5	46	3.68	1.00	1	5

Notes: The mean, standard deviation and the range of answers is given for each statement. (Dis)agreement with the statements is given on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree).

Table 14. Rotated Factor Loadings and Uniqueness - 3 Factor Solution

Statement	Economic Socialism	Contemporary Populism	Social Conservatism	Uniqueness
1	-0.054	-0.347	-0.161	0.844
2	0.656	-0.121	-0.081	0.544
3	-0.100	-0.346	-0.603	0.486
4	-0.559	-0.025	0.235	0.620
5	0.036	0.031	0.410	0.830
6	0.592	-0.165	-0.086	0.612
7	-0.293	-0.195	-0.366	0.742
8	0.188	0.001	-0.167	0.934
9	-0.585	-0.041	0.187	0.610
10	0.014	-0.115	0.217	0.943
11	-0.108	0.060	0.282	0.900
12	-0.510	0.238	0.262	0.599
13	-0.207	-0.121	-0.486	0.709
14	0.625	0.263	0.060	0.533
15	0.111	-0.016	0.059	0.985
16	-0.019	0.018	0.182	0.966
17	-0.275	-0.215	0.242	0.818
18	-0.177	0.215	-0.031	0.924
19	0.290	0.085	0.011	0.908
20	0.368	0.117	0.233	0.801
21	-0.468	0.312	-0.010	0.689
22	-0.149	-0.028	-0.015	0.977
23	-0.234	0.674	0.152	0.458
24	-0.110	0.064	0.254	0.915
25	0.398	0.150	-0.067	0.811
26	0.703	0.255	-0.125	0.415

Table 14. Rotated Factor Loadings and Uniqueness - 3 Factor Solution (continued).

27	0.078	0.086	-0.219	0.939
28	-0.094	-0.232	0.107	0.9270
29	-0.171	-0.073	0.213	0.9182
30	-0.277	0.149	-0.083	0.899
31	-0.300	-0.220	0.489	0.619
32	-0.022	0.531	0.216	0.658
33	0.224	-0.145	-0.031	0.928
34	0.026	-0.174	0.015	0.969
35	0.308	0.336	0.102	0.778
36	0.693	-0.142	0.113	0.499
37	-0.058	0.273	-0.060	0.921
38	0.144	-0.363	0.329	0.760
39	0.091	0.330	0.268	0.802
40	0.495	-0.129	-0.152	0.708
41	0.453	0.615	-0.123	0.396
42	-0.140	0.474	0.101	0.741
43	-0.365	-0.118	-0.583	0.524
44	0.424	-0.029	0.064	0.819
45	0.071	0.301	0.276	0.819
46	-0.082	0.034	-0.028	0.992

Notes: Maximum Likelihood is used to estimate the factor loadings in combination with the Oblimin rotation method. The factor loadings higher than (-)0.3 are bold faced and coloured grey.

Figure 3. Scree-plot of Eigenvalues against the Number of Extracted Factors (Missing Values Sample)

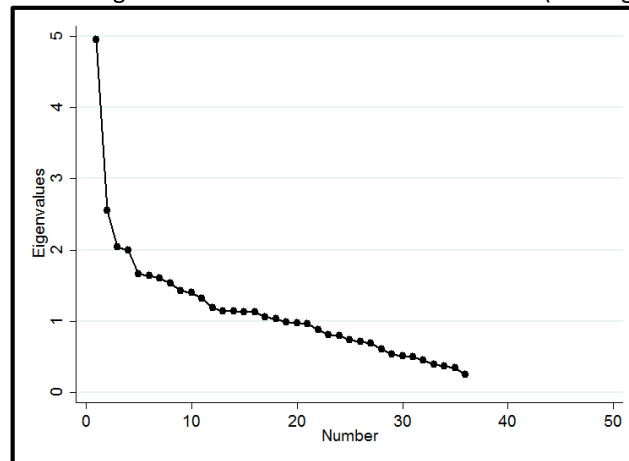


Table 15. Rotated Factor Loadings and Uniqueness - 2 Factor Solution

Statement	Economic Socialism	Populist Conservatism	Uniqueness
1	-0.033	-0.380	0.856
2	0.668	-0.069	0.544
3	0.004	-0.618	0.618
4	-0.598	0.055	0.636
5	-0.041	0.272	0.923
6	0.603	-0.113	0.618
7	-0.229	-0.397	0.799
8	0.220	-0.091	0.942
9	-0.616	0.010	0.620
10	-0.028	0.027	0.998
11	-0.159	0.200	0.932
12	-0.544	0.307	0.594
13	-0.113	-0.385	0.843
14	0.615	0.313	0.544
15	0.101	0.037	0.989
16	-0.055	0.114	0.983
17	-0.324	-0.068	0.893
18	-0.158	0.142	0.953
19	0.285	0.117	0.908
20	0.324	0.285	0.823
21	-0.444	0.213	0.748
22	-0.145	-0.043	0.978
23	-0.228	0.616	0.555
24	-0.155	0.189	0.937
25	0.415	0.131	0.817
26	0.731	0.229	0.430
27	0.131	-0.047	0.980
28	-0.122	-0.166	0.960
29	-0.121	0.057	0.951
30	-0.248	0.054	0.934
31	-0.387	0.047	0.846
32	-0.041	0.593	0.644
33	0.221	-0.121	0.934
34	0.015	-0.134	0.982
35	0.303	0.386	0.772
36	0.653	0.027	0.574
37	-0.033	0.192	0.921
38	0.064	-0.099	0.985
39	0.043	0.462	0.787
40	0.517	-0.130	0.709
41	0.482	0.483	0.558
42	-0.136	0.446	0.777
43	-0.246	-0.437	0.760
44	0.401	0.062	0.838
45	0.024	0.422	0.822
46	-0.074	0.000	0.995

Notes: Maximum Likelihood is used to estimate the factor loadings in combination with the Oblimin rotation method. The factor loadings higher than (-)0.3 are bold faced and coloured grey.

Table 16. Correlation between Dimension of Ideology of the 3 Factor Solution and the 2 Factor Solution

	Economic Socialism (3)	Contemporary Populism	Social Conservatism
Economic Socialism (2)	0.982	-0.013	-0.211
Populist Conservatism	0.055	0.832	0.549

Notes: Economic Socialism (3) refers to the socialistic factor from the 3 factor solution, whereas Economic Socialism (2)

Appendix B - Instructions Experiment

Instructions

General

This is an experiment in political decision-making. Just as in real-life political elections, collective decisions can determine individuals' payoffs. The instructions are simple and you may earn up to 15€, so please follow the instructions carefully when making your decisions. Your attendance already earns you 3€ (i.e., a show-up fee). Your earnings can be collected at the university's financial department after the experiment, by showing a valid proof of identity.

Your commitment to us: No attempt to communicate with each other from now until the experiment ends. It is important that you avoid communication amongst yourselves. If you need clarification or explanation, please ask the experimenter(s).

Our commitment to you: The experiment will be conducted exactly as we describe. This is serious research; we are genuinely interested in the decisions you make. We promise to communicate all information about the experiment accurately.

Description

During the experiment you will interact in a sequence of decision-periods. The computer randomly determines the role of each person. Everyone has an equal chance of having each role. These roles will be randomly reassigned each period. All assignments are random and are not affected by any decision made in the experiment. Your role each period will be expressed as a colour. That is, either you are blue, green or red. These colours have no meaning apart from displaying which payments you can receive after each decision period.

Before the experiment we determine in which cubicle you will be placed. Each cubicle is assigned a random subject number. This number will be displayed on your computer screen. You will never learn the identity of the persons behind other subject numbers. Similarly, others will never learn the identity behind your subject number.

Your choice

You will decide each period if you want to vote for the outcome "Socialist system" or the outcome "Capitalist system". It is not possible to vote blank.

How the outcome is determined by the votes

The outcome, "Socialist system" or "Capitalist system" that receives a strict majority of the 15 votes (i.e. at least 8 votes) will be the winning outcome. You should realise that the chance that your vote affects the final outcome is rather low, as that would require that 7 of the other 14 participants vote in favour of the socialist system and that 7 of them vote in favour of the capitalist system.

Your earnings

Your earnings are determined by your role, what the group chooses as the winning outcome, and the payoff matrix specific to the period. The payoff matrix will change over the course of the experiment. The matrix is displayed on the computer screen. It displays the earnings to persons in each role (colour) conditional on whether the winning outcome is the "Socialist system" or the "Capitalist system". See the example of screen 1 below.

Example of screen 1

Period 1 out of 1 Remaining time (sec) 58

You are subject number 15 in this experiment

Your colour this period is green

Colour	Blue	Green	Red
Individual payoff if the socialist economic system is preferred	2.00 e€	2.00 e€	2.00 e€
Individual payoff if the capitalist economic system is preferred	6.00 e€	2.00 e€	0.00 e€
Number of people with that colour	2	11	2

Aggregate income is 4 points higher in the capitalist system compared to the socialist system. However, in the capitalist system there will be income inequality.

Which economic system do you prefer this period?

The payoffs are expressed in e€ (experimental Euros). The e€ will be converted to real Euros after the experiment at the exchange rate 5 e€ = 1 €.

Consequences of the collective choice

The choice made by the group has implications. If the “socialist system” receives a majority of the votes there will be income equality that period. However, if the “capitalist system” receives a majority of the votes aggregate income will be higher compared to the “socialist system”, however income inequality will be the result. As such, the socialist system can be regarded as a regulated economy, whereas the capitalist system is reflects a market economy.

Example of screen 2

Period 1 out of 1 Remaining time (sec) 12

You are subject number 1 in this experiment

Your colour this period is green

Colour	Blue	Green	Red
Individual payoff if the socialist economic system is preferred	2.00 e€	2.00 e€	2.00 e€
Individual payoff if the capitalist economic system is preferred	6.00 e€	2.00 e€	0.00 e€
Number of people with that colour	2	11	2

The capitalist economic system was preferred by a majority
Your earnings this period are 2.00 points

Ranking of total earnings in the experiment	Accumulated earnings (e€)	Subject number
1	6.00	13
2	6.00	2
3	2.00	12
4	2.00	14
5	2.00	1
6	2.00	8
7	2.00	9
8	2.00	11
9	2.00	6
10	2.00	10
11	2.00	3
12	2.00	7
13	2.00	15

In the examples of screen 1 and screen 2 the aggregate income under the “socialist system” is $(15 \cdot 2 \text{ e€}) = 30\text{e€}$, whereas the aggregate income from the “capitalist system” is $(11 \cdot 2\text{e€} + 2 \cdot 6\text{e€}) = 34\text{€}$. If the socialist system is preferred every individual will earn the same payoff of 2 e€. If the capitalist system is preferred the 2 red individuals earn 0 e€ and the 2 blue individuals earn 6 e€.

Similar characteristics hold in all periods of the experiment. Individual payoffs, income inequality and aggregate income are affected to varying degrees during the course of the experiment. You can view these changing payoffs in the payoff matrix displayed in every period of the experiment. Furthermore, on the bottom of the second screen you can view the accumulated income distribution, this changes after every period depending on the collective choice made.

Procedure

In each period the payoff matrix for that period will be shown. Also, the role you have that specific round, i.e. whether you are blue, green or red will be displayed. Your subject number is also shown. This information is shown on both screen 1 and screen 2 in each period.

On screen 1 you are asked to cast your vote whether you prefer the “socialistic economic system” or the “capitalist economic system”. When all participants have cast their vote you will be informed about the collective choice on the second screen in each period. On screen 2 you can also see the accumulated income distribution. When you have read this information please click the OK button and the experiment can continue to the next period.

Summary for the decisions in the periods

- You will be randomly (re)assigned a colour (role) every period, i.e. whether you are blue, green or red.
- You vote for either the “socialist system” or the “capitalist system”.
- The winning outcome is the outcome that receives a strict majority of votes.
- Your earnings depend on your role, the payoff matrix and the winning outcome.
- There are 2 Blue, 11 Green, and 2 Red participants in every period.
- After 21 decision periods the experiment ends with a short survey (4 question), afterwards you can collect your earnings.
- If you encounter any problems during the experiment please open the door to your cubicle and we will come to you!

Test questions:

1. A majority prefers the “Capitalist system”. If you are red that period, what will your payoff be?
2. If a majority prefers the “Socialist system” will this decision generate income inequality that period?
3. How many people will be voting in your group?
4. Is it likely that your individual vote will have a large impact on the collective decision?

Are there any questions before we begin the experiment?