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journal homepage: [www.elsevier.com/locate/eer](http://www.elsevier.com/locate/eer)Inequality aversion and voting on redistribution<sup>☆</sup>Wolfgang Höchtel<sup>a</sup>, Rupert Sausgruber<sup>a,\*</sup>, Jean-Robert Tyran<sup>b,c</sup><sup>a</sup> Department of Economics and Statistics, University of Innsbruck, Universitätsstr. 15, A-6020 Innsbruck, Austria<sup>b</sup> Department of Economics, University of Vienna, Hohenstaufengasse 9, 1010 Vienna, Austria<sup>c</sup> Department of Economics, University of Copenhagen, Øster Farimagsgade 5, DK-1353 Copenhagen, Denmark

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## ABSTRACT

Some people have a concern for a fair distribution of incomes while others do not. Does such a concern matter for majority voting on redistribution? Fairness preferences are relevant for redistribution outcomes only if fair-minded voters are pivotal. Pivotality, in turn, depends on the structure of income classes. We experimentally study voting on redistribution between two income classes and show that the effect of inequality aversion is asymmetric. Inequality aversion is more likely to matter if the “rich” are in majority. With a “poor” majority, we find that redistribution outcomes look as if all voters were exclusively motivated by self-interest.

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## 1. Introduction

Mounting evidence suggests that people have heterogeneous preferences for fair distribution (e.g. Bellemare et al., 2008, see Camerer, 2003 for a survey). For example, Alesina and Giuliano (2010:93) note that “individuals have views regarding redistribution that go beyond the current and future states of their pocketbooks. These views reflect different ideas about what an appropriate shape of the income distribution is: in practice, views about acceptable levels of inequality”.<sup>1</sup> While much research has investigated the effects of social preferences on bargaining, labor markets and contracting (e.g. Cabrales et al., 2010; Charness and Kuhn, 2011; Fehr et al., 2009), economists have devoted surprisingly little attention to the question of how such fairness preferences may affect democratic redistribution (see e.g. Dhami and Al-Nowaihi (2010) and Galasso (2003) for theoretical work). This lack of attention may be driven by the apparently plausible intuition that the extent to which fairness concerns induce redistribution simply depends on how pronounced “views about acceptable levels of inequality” are in a given population. In this paper, we show that this intuition is misleading and that structural factors are relevant too.

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<sup>1</sup> This fact has been recognized by many scholars in the field. For example, Downs (1957:27) noted: “In reality, men are not always selfish, even in politics. They frequently do what appears to be individually irrational because they believe it is socially rational i.e., it benefits others even though it harms them personally.”

This paper shows experimentally that the effect of a given share of fair-minded voters on redistribution outcomes depends on the structure of income classes, in particular which class is in majority and the relative size of the classes. By virtue of random allocation of subjects to treatments, we control that the distribution of voters with a concern for fairness is the same in all of our treatments. By virtue of experimental control over material payoffs, we control the “pocketbook interest” of voters, i.e. the redistribution level that maximizes a voter’s income. We then vary structural parameters (i.e. which class is in majority) to identify the causal effect of class structure on redistribution outcomes. We show that the discrepancy between observed and predicted, according to pocketbook interests, redistribution is asymmetric in majority voting. The discrepancy tends to be pronounced if few fair-minded voters suffice to tip the balance, but essentially no discrepancy occurs when many are needed.

We demonstrate this asymmetric effect of preferences for a fair distribution on redistribution outcomes in a laboratory experiment with two homogeneous income classes, which we call the “rich” and the “poor” for convenience. Participants decide on a one-dimensional redistribution parameter (which can be thought of as a compound of a tax and per capita redistribution of tax revenues) in a majority vote. Parameters are such that the pocketbook interests of the “rich” are for low, and those of the “poor” for intermediate redistribution. The poor prefer intermediate rather than extreme redistribution because higher redistribution levels reduce efficiency (as in e.g. [Meltzer and Richard, 1981](#)). Thus, the median-voter model with strictly self-interested voters predicts low redistribution if the rich are in majority but intermediate redistribution if the poor are in majority.

Now suppose that some voters have a preference for a fair distribution, i.e. suppose that some voters are “inequality averse” ([Fehr and Schmidt, 1999](#); [Bolton and Ockenfels, 2000](#)). Such fair-minded voters demand more redistribution than otherwise identical, purely self-interested voters. To illustrate the asymmetry effect, assume that the rich and the poor are equally concerned with fairness and that all voters vote sincerely. If the rich are a narrow majority, i.e. they are the median class, few fair-minded rich suffice to tip the balance and a fair-minded rich voter is likely to be pivotal. If the poor are in majority, (moderately) fair-minded rich cannot move the median position, and many fair-minded poor voters are required to move the median position beyond the pocketbook interest of the poor. Thus, fair-minded voters are unlikely to be pivotal in this case. In summary, the probability that a fair-minded voter is pivotal depends on the class structure in majority voting. The probability is high when the median class demands relatively low levels of redistribution and when it is a small majority (we show in the online supporting materials that the asymmetry result extends to a continuum of voters and any finite number of income classes).

Our experimental design tests how the asymmetric effect of inequality aversion depends on the class structure in two ways. First, we test if the asymmetry is present when we expect it to be present. We compare redistribution outcomes in majority voting when the rich are in majority vs. when the poor are in majority, holding everything else constant. In line with the asymmetry hypothesis, we observe redistribution beyond the pocketbook interest of the rich when they are in majority but we do not observe redistribution beyond the pocketbook interest of the poor when the poor are in majority. Second, we test if the asymmetry is absent when we expect it to be absent. We implement control treatments with the same class structure as in the main treatments, but in which the probability to be pivotal does not depend on the class structure by design. In these “random dictator” treatments the probability to be pivotal is exogenous and same for all voters, independent of whether they are rich or poor. In line with the asymmetry hypothesis, we observe that the deviation from pocketbook outcomes is not different for a rich or a poor majority.

Perhaps the most remarkable aspect of our paper is that we identify structural conditions under which (by virtue of randomization) given preferences for fair distribution matter much and, perhaps more surprisingly, when they matter little. This is, to the best of our knowledge, a novel demonstration of the well-known phenomenon that the aggregate outcome may look as if all individuals were rational and self-interested when, in fact, deviations from this reference case are common at the individual level (see [Fehr and Tyran \(2005\)](#) for a general discussion). For example, we find that when the poor outnumber the rich in majority voting, only about 30% of the rich vote in line with their pocketbook interest. However, these rich voters are unlikely to be pivotal because about 80% of poor voters vote in line with their pocketbook. In other words, the pocketbook prediction is robust to the rather pronounced deviation from pocketbook voting by rich voters because they are not pivotal in this case.

While the asymmetry effect is in some sense a purely “mechanical” effect mapping individual preferences into majority voting outcomes, it is perhaps surprising that it is observed at the aggregate level because of a possible countervailing effect resulting from insincere voting. If voters anticipate the asymmetry effect, they expect to be pivotal with high probability in some cases but expect to be largely irrelevant for the outcome in other cases. Deviations from pocketbook voting are less costly when a voter is unlikely to be pivotal, and it seems plausible that such deviations are more likely in this case. We indeed find some evidence of insincere voting. For example, when the rich are in majority (RMV), we find that the rich vote much more in line with their pocketbook interest (about 60% vs. 30% when they are minority). Despite the fact that in RMV many (60%) rich voters do vote their pocketbook, we observe frequent deviations from pocketbook predictions in redistribution outcomes because inequality-averse rich voters are likely to be pivotal in this case.

Our paper adds to a relatively slim experimental literature on the role of social preferences in voting on redistribution. [Ackert et al. \(2007\)](#) show that inequality aversion induces approval for redistributive taxes among voters who do not benefit from redistribution when taxes are not distorting but find that voting is mainly in line with self-interested voting in the presence of a trade-off between fairness and equality, a result in agreement with [Engelmann and Strobel \(2004\)](#). However, [Bolton and Ockenfels \(2003\)](#) study the trade-off between fairness and efficiency in voting and find that voters

are about twice as likely to vote against their pocketbook interest in favor of a more fair compared to a more efficient allocation. Durante and Putterman (2009) investigate how self-interest vs. social preferences shape voting on redistributive taxes both when voters are and are not affected by the outcome (i.e. are an impartial spectator) and show that voters are willing to redistribute, in particular when the cost of doing so is low (see also Beckman et al., 2002). Grosser and Reuben (2010) study voting on redistribution of incomes earned in a competitive market and observe support for income-equalizing redistribution, in line with equilibrium predictions assuming pocketbook voting.<sup>2</sup>

Several experimental papers have investigated how variation in pivot probabilities may induce voters to cast votes that deviate from their material self-interest. A prominent idea is that voters may use their votes to express moral views rather than to instrumentally affect the redistribution outcome if they believe that their vote is unlikely to matter for the redistribution outcome (e.g. Tyran, 2004; Shayo and Harel, 2012; Feddersen et al., 2009).

The literature on experimental committee decision making is also related to our paper, and some of that literature discusses the role of fairness concerns (e.g. Eavey and Miller, 1984). However, that literature often uses complex designs which do not have sharp predictions or that cannot clearly discriminate between alternative motivational accounts. A paper in this tradition that is relatively closely related to ours is Sauermann and Kaiser (2010).

A close match to our paper is Tyran and Sausgruber (TS) (2006) who have first noted the asymmetry property (their result 1). Our experimental design differs in several ways from TS. TS study voting on one exogenously proposed redistribution proposal while we allow the redistribution level to be endogenously determined. TS study zero-sum (i.e. costless) redistribution while our design implements a trade-off between efficiency and equality. While TS have mainly focused on the case where “a little fairness may induce a lot of redistribution”, we study both aspects of the asymmetry, including the case where the redistribution outcomes are unlikely to be affected despite a considerable concern for fair distribution in the electorate. While TS were unable to directly test for the asymmetry effect (they only had one treatment), we test for the asymmetry to arise in two treatments with majority voting, and provide structurally identical control treatments with random dictator voting designed to eliminate it.

## 2. Experimental design

In all treatments,  $N=5$  voters are allocated to two income classes with  $R$  “rich” and  $P$  “poor” voters ( $N=R+P$ ). Voters are homogenous within a class. The pocketbook interests of the rich are for low redistribution, the pocketbook interests of the poor are, because of a built-in trade-off between equality and efficiency explained below, for moderate redistribution. In each period, each voter simultaneously chooses a redistribution level  $r_i$ . Voting is compulsory.<sup>3</sup> Our experimental design has 4 treatments. In the 2 main treatments, the redistribution outcome is determined by majority voting, i.e. by the decision of the median voter. In 2 otherwise identical control treatments, the outcome is determined by the random dictator procedure, i.e. by a randomly chosen voter. The level chosen by the decisive voter is implemented for all voters. At the end of each period, all voters are informed about the choice of the decisive voter and the resulting income distribution but not about the distribution votes, and a new period begins. We use a partner design, i.e. group composition is constant for all  $T=15$  periods.

In the two main treatments the redistribution outcome is determined by majority voting, and the treatments exclusively differ by which income class is in majority. In treatment RMV, the rich are in majority ( $R=3, P=2$ ), while the poor are in majority ( $R=2, P=3$ ) in treatment PMV. The two treatments with random dictator procedure are identical to the respective treatments with majority voting in all respects (e.g. payoffs, class structure) except for how redistribution outcomes are determined from individual votes. While in RMV and PMV the median voter determines the outcome, redistribution levels are determined by a random draw from individual choices in treatments RMRD and PMRD.

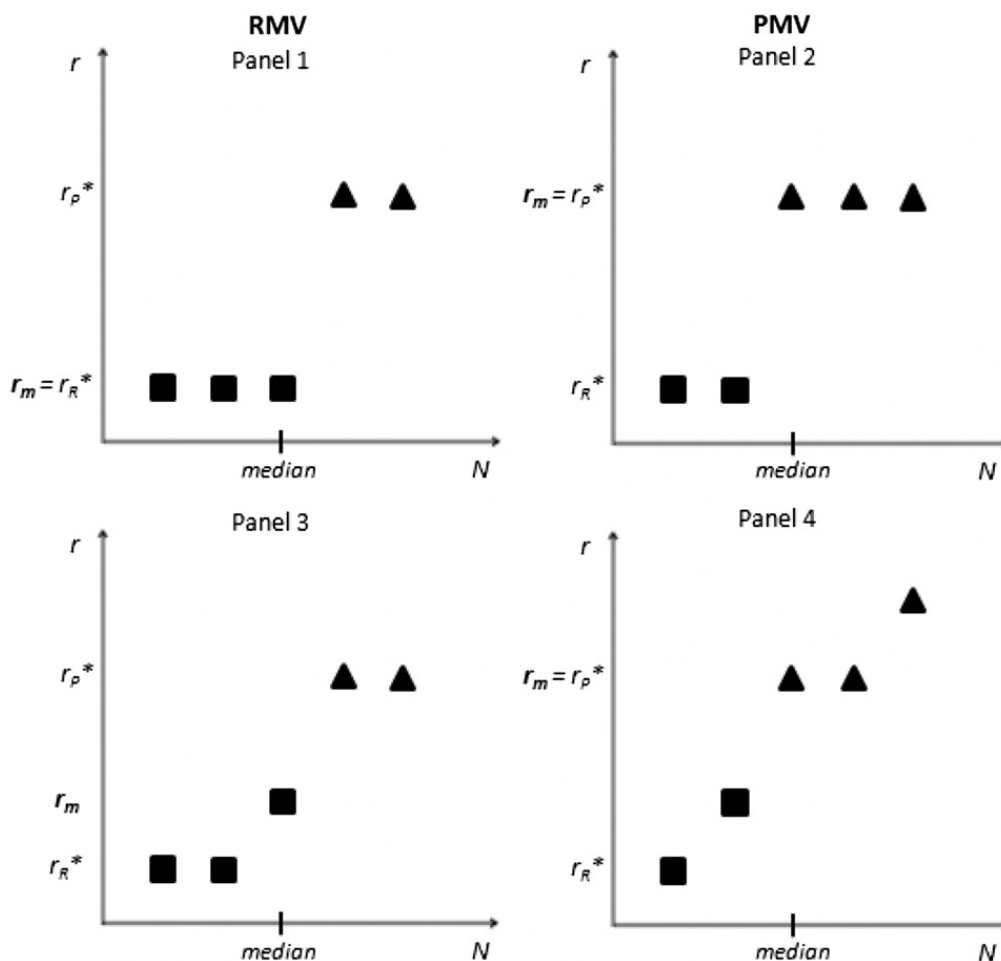
Whether a voter is pivotal in majority voting is endogenous, i.e. depends on how others vote, and is not known to voters ex ante. According to the asymmetry hypothesis, inequality aversion has asymmetric effects on redistribution outcomes in majority voting across treatments because inequality-averse rich voters are more likely to induce redistribution outcomes beyond the pocketbook prediction when the rich are in majority (in RMV) than when the poor are in majority (in PMV). In the treatments with the random dictator procedure, we control the probability to be pivotal. In these treatments, the probability of being pivotal is  $1/N$  for each voter and the effect of inequality aversion on redistribution outcomes is predicted to be symmetric, i.e. independent of the treatment.

### 2.1. Properties of the asymmetry effect

Fig. 1 illustrates the basic intuition of the asymmetry effect in majority voting on redistribution for 5 voters in 2 income classes (see online supporting materials for the case of a continuum of voters in  $k$  classes). The vertical axis shows the

<sup>2</sup> The expression “pocketbook voting” is often used in field studies to mean retrospective voting in which voters punish the incumbent if personal or household financial conditions have deteriorated (e.g. Duch and Stevenson, 2008). In contrast, we use the term “pocketbook voting” in the sense of voting in line with material self-interest. This is possible in our study by virtue of experimental control. In our experiment, the properties and consequences of alternative redistribution outcomes are known with certainty to voters.

<sup>3</sup> Battaglini et al. (2010) show experimentally that participation in referenda is systematically affected by pivotality considerations in a framework with differently informed voters.



**Fig. 1.** Redistribution outcomes in majority voting for a rich majority (left panels) and poor majority (right panels), without (top) and with (bottom) inequality aversion.

redistribution level  $r$  and the horizontal axis ranks the voters by income class. The squares represent the ideal positions of rich voters, the triangles the ideal positions of poor voters. For example, panel 1 shows a case with 3 identical rich (self-interested) voters who have ideal points at  $r_R^*$  and 2 (self-interested) poor voters with ideal points at  $r_P^*$ . The panels on the left illustrate outcomes for rich majorities (RMV), the panels on the right for poor majorities (PMV). The upper panels show cases with self-interested voters, the lower panels cases where some voters are inequality averse.<sup>4</sup>

Pocketbook voting by all voters (see upper panels) predicts dramatically different redistribution outcomes in RMV and PMV. If all voters cast their votes according to the pocketbook, the median voter is rich in RMV and low redistribution at  $r_m = r_R^*$  is the predicted outcome (see panel 1). In contrast, the median voter is poor in PMV, and an intermediate level of redistribution at  $r_m = r_P^*$  is the predicted outcome (see panel 2).

The lower panels in Fig. 1 illustrate outcomes when some voters are inequality averse and vote sincerely according to their preference. Panel 3 illustrates the outcome in RMV where one rich voter is inequality averse and casts a vote  $r_i > r_R^*$  while all others vote according to the pocketbook. In this case, inequality aversion does affect the redistribution outcome ( $r_m > r_R^*$ ). Panel 4 illustrates the case with a poor majority (PMV) where two voters are inequality-averse but the redistribution outcome is not affected by inequality aversion and the same outcome prevails in PMV when no voter is inequality averse ( $r_m = r_P^*$ ).

The asymmetry in redistribution outcomes prevails in the example above because with a narrow rich majority, the most inequality-averse rich voter drives the outcome (panel 3) but with a narrow poor majority, the least inequality-averse poor voter drives the outcome (panel 4). Thus, a little inequality aversion goes a long way in RMV (this is the intuition discussed in Tyran and Sausgruber (2006)), but is irrelevant in PMV.

Table 1 illustrates how the asymmetry effect depends on the size of the electorate and the relative size of the two income classes in a simple simulation exercise. We assume that all  $N$  voters have single-peaked preferences and that their

<sup>4</sup> The asymmetry effect assumes the existence of a systematic deviation from self-interest. In particular, voters are assumed to be either inequality-averse or self-interested. For example, rich voters are assumed not to have status preferences, i.e. to vote for redistribution to increase inequality. Such voters would tend to cancel out the votes of inequality-averse voters. The analogous case prevails if poor voters are assumed to be efficiency-loving, i.e. to vote against their self-interest to increase inequality.

**Table 1**  
Probability of obtaining redistribution outcomes in line with “pocketbook” prediction with inequality-averse voters ( $\rho=0.2$ ).

	No. rich voters ( $R$ )	No. poor voters ( $P$ )							
		1	2	3	4	5	6	7	8
1		–	0.96		0.97		0.98		0.99
2		0.64	–	0.99		0.99		1.00	
3			0.51	–	1.00		1.00		1.00
4		0.82		0.41	–	1.00		1.00	
5			0.66		0.33	–	1.00		1.00
6		0.90		0.66		0.26	–	1.00	
7			0.97		0.85		0.21	–	1.00
8		0.94		0.80		0.50		0.17	–

ideal points can be ordered as follows: self-interested rich ( $r_R^*$ ) < inequality-averse rich < self-interested poor ( $r_P^*$ ) < inequality-averse poor. That is, we assume that inequality aversion induces ideal points to shift in the direction of more redistribution, but only moderately so. To keep the argument simple, we assume that rich and poor voters are equally likely to be inequality averse (the argument can easily be extended to different probabilities across classes). In particular, we assume that voters are sampled from a population with a share of  $\rho$  percent inequality-averse voters. All voters are sincere and  $N$  is an odd number. If  $R > P$  (RMV), redistribution beyond the pocketbook is obtained if at least  $x_{RMV} = 1/2 (R - P + 1)$  inequality-averse rich voters are sampled into the electorate. If  $P > R$  (PMV), this is the case if at least  $x_{PMV} = 1/2 (R + P + 1)$  inequality-averse poor voters are sampled into the electorate. The main point to note here is that for any  $(R, P)$  and  $(R', P')$ , with  $R = P'$  and  $P = R'$ ,  $x_{PMV} > x_{RMV}$ . Thus, obtaining redistribution in excess of the pocketbook prediction is more likely in RMV than in PMV.<sup>5</sup>

The probability of observing the pocketbook redistribution outcome, Prob(pocketbook), can be calculated using a binomial distribution (in Table 1, we assume a share  $\rho = 0.2$  of voters are inequality-averse). For example, in an electorate with  $R = 3$  and  $P = 2$ , Prob(pocketbook) =  $(1 - \rho)^3 = 0.51$ . In contrast, with  $R = 2$  and  $P = 3$ , the probability is  $1 - \rho^3 = 0.99$ , i.e. the probability to observe the pocketbook outcome is about twice as large in the case of the poor majority. The numbers in Table 1 below the main diagonal are for the case  $R > P$ . Importantly, these numbers are smaller than those above the diagonal for  $P > R$  which illustrates the asymmetry effect. That is, pocketbook redistribution outcomes are generally more likely with a poor majority than with a rich majority.

The asymmetry effect is particularly pronounced for “narrow” majorities. For example, holding the size of the electorate constant at  $N = 9$ , the probabilities to obtain the pocketbook outcome are essentially the same for  $R:P = 8:1$  as for  $R:P = 1:8$  (0.94 vs. 0.99) but the probabilities are much different for  $R:P = 5:4$  and  $R:P = 4:5$  (0.33 vs. 1.0). For a narrow rich majority, inequality aversion matters a lot while for the mirrored case with a poor majority it does not (the numbers above the diagonal are close to 1.0).

The asymmetry effect is particularly pronounced when inequality aversion looms large ( $\rho$  is large) and when the size of the electorate  $N$  increases. For example, if  $\rho = 0.3$ , Prob(pocketbook) is 0.34 for RMV ( $R = 3, P = 2$ ) but still 0.97 for PMV. Thus, the asymmetry grows from about 2:1 (0.99 vs. 0.51, see Table 1) with  $\rho = 0.2$  to about 3:1 with  $\rho = 0.3$ . The asymmetry is also more pronounced in larger electorates as long as majorities are narrow. For example, holding the ratio  $R:P$  constant at 3:2, the probability to obtain a pocketbook outcome is 0.51 with  $N = 5$  but only 0.43 with  $N = 15$  (not shown in the table).

## 2.2. Payoffs

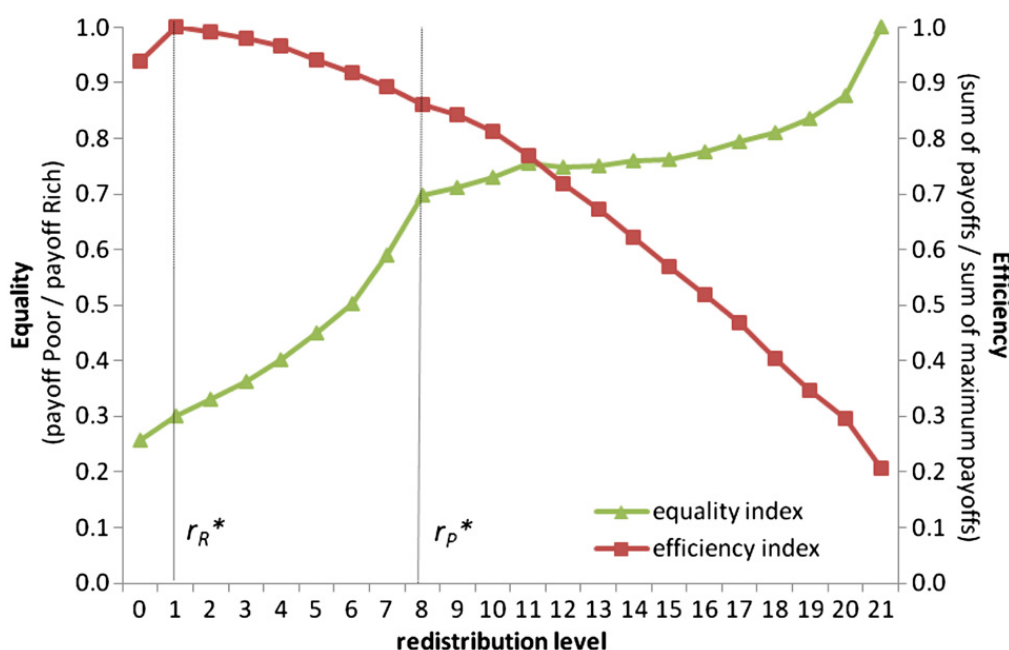
Table 2 shows the payoffs used in all 4 treatments by income class and redistribution level.<sup>6</sup> The rich have higher maximum payoffs than the poor (200 vs. 92) and have higher payoffs at all redistribution levels except for the maximum redistribution level which equalizes incomes (payoff of 27 each). Note that payoffs are common information and there is no uncertainty over one's (future) income position such that voting does not take place behind a “veil of ignorance” (see Cabrales et al. (2012) for an experimental study of social insurance).

<sup>5</sup> Note that this statement pertains only to the probability of observing redistribution beyond the pocketbook. Additional assumptions on the intensity of inequality aversion would be needed to make precise statements about the extent of the deviation from pocketbook voting. For example, Fehr and Schmidt (1999) assume that spite is stronger than generosity which implies that the “poor” deviate more from their ideal points than the rich, if they deviate at all.

<sup>6</sup> Instructions use neutral labeling. The “redistribution level” is called “allocation”, and the “rich” and the “poor” are called “X-type” and “Y-type”, respectively. As noted by a referee, the expression “redistribution” used throughout the paper should be interpreted with care because distribution choices are not made starting from an earned or endowed primary distribution or clear status quo. In fact, redistribution choices with entitlements may differ from (re)distribution choices without clear entitlements.

**Table 2**  
Payoffs.

Redistribution level	Payoff rich	Payoff poor	Redistribution level	Payoff rich	Payoff poor
0	194	50	11	114	86
1	200	60	12	107	80
2	194	64	13	100	75
3	187	68	14	92	70
4	179	72	15	84	64
5	169	76	16	76	59
6	159	80	17	68	54
7	146	86	18	58	47
8	132	92	19	49	41
9	128	91	20	41	36
10	122	89	21	27	27



**Fig. 2.** Trade-off between efficiency and equality (vertical lines show redistribution outcomes according to pocketbook voting in RMV and PMV).

Payoffs were chosen to reflect a trade-off between efficiency and equity. Fig. 2 shows that redistribution decreases efficiency (the sum of the payoffs normalized to the sum of maximum payoffs) but increases equality (measured by the payoff of the poor relative to the rich). Rich voters maximize their income at low redistribution ( $r_R^*=1$ ), and poor voters at intermediate redistribution ( $r_P^*=8$ ).<sup>7</sup> Assuming pocketbook voting, a poor voter earns only about a third of a rich voter ( $=60/200$ ) in equilibrium in RMV. The equilibrium ratio of payoffs with PMV is more equal. At  $r_P^*=8$ , the poor earn about 70 percent ( $=92/132$ ) of what the rich earn.

Inequality aversion may cause redistribution outcomes to deviate from  $r_R^*$  and  $r_P^*$ . For example, the poor may be spiteful and willing to sacrifice own payoff to reduce the payoff of the rich. However, doing so does not do much damage as can be seen in Fig. 2. For example, inequality is not reduced much by moving from  $r=8$  to 15 but comes at a hefty cost (about 1/3) in terms of efficiency. Thus, poor voters need to be strongly averse to inequality<sup>8</sup> to find spiteful choices worthwhile. For the rich, generously giving up own payoff to increase payoffs of the poor (choices in  $\{2, \dots, 8\}$ ) is consistent with high values of  $\beta$  in the model of FS. However, redistribution beyond  $r=10$  implies  $\beta > 1$ , which is ruled out by assumption in the model of FS. In short, we do not expect redistribution outcomes above 8 given the inequality aversion typically assumed in the fairness model of FS.

<sup>7</sup> Table 2 was part of the written instructions (see Appendix C). The payoffs were calculated from a standard model of Meltzer and Richards (1981).

<sup>8</sup> For example, choosing  $r=11$  requires  $\alpha=1$  in the model of Fehr and Schmidt (1999).

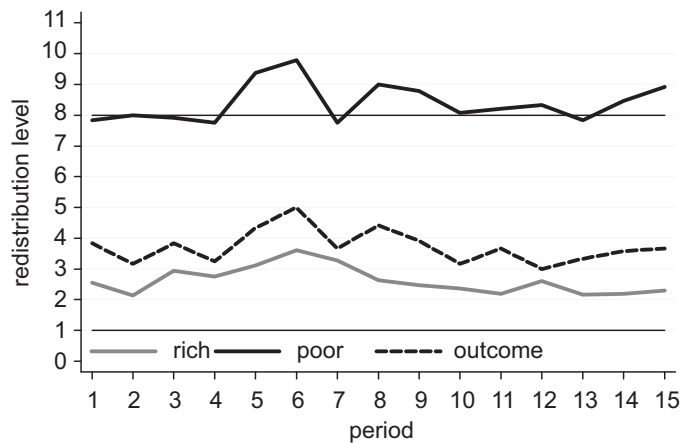


Fig. 3. Average votes and redistribution outcomes in RMV ( $n=60$ ).

In total, 180 undergraduate students<sup>9</sup> participated in the experiment as follows: 60 in RMV, 40 in PMV, 40 in RMRD and 40 in PMRD. Points earned during the experiment were exchanged at a rate of 200 points for 1 Euro. A show-up fee of 4 Euro was paid to all participants at the end of the experiment in addition to earnings during the experiment. The experiment was programmed in zTree (Fischbacher, 2007).

### 3. Results

Section 3.1 shows that redistribution in RMV exceeds the level predicted by pocketbook voting, but that redistribution is almost perfectly in line with pocketbook voting in PMV. Thus, we find pronounced asymmetry in how inequality aversion affects majority voting on redistribution. Section 3.2 shows that asymmetry is absent in the control treatments with a random dictator voting mechanism. Section 3.3 discusses that the asymmetry effect may induce insincere voting. We find that insincere voting increases with low pivotality according to the asymmetry hypothesis but is not pronounced enough to swamp the asymmetry effect.

#### 3.1. The pocketbook rules with PMV but not with RMV

Fig. 3 shows the main results for majority voting with a rich majority (RMV). We observe redistribution outcomes averaged across groups ( $r_m$ , see dashed line) beyond the pocketbook prediction ( $r_R^*=1$ , solid thin line) already in period 1 ( $p=0.003$ , one-sample Wilcoxon signed-rank test, WSR), and  $r_m$  remains at levels close to 4 throughout (average  $r_m$  is 3.72 over all periods). The “excessive” redistribution is mainly due to the voting of the rich with an average vote of  $v_R=2.62$  ( $p=0.012$ , WSR). In contrast, voting of the poor is quite close to  $r_P^*=8$  (the average is  $v_P=8.40$  over all periods;  $p=0.209$ , WSR).<sup>10</sup> The fact that  $r_m$  is closer to  $v_R$  than  $v_P$  reflects the fact that the rich tend to be pivotal in RMV.<sup>11</sup> The fact that  $r_m > v_R$  reflects that the inequality-averse rich tend to be pivotal, i.e. they drive the redistribution outcome in RMV.<sup>12</sup> In summary, the remarkable finding from RMV is that while the poor vote quite in line with material self-interest, and the rich on average only deviate somewhat on the generous side, the average redistribution outcome is considerably more equal than predicted by pocketbook voting (index of inequality is 0.39 rather than 0.3 as predicted).

Voting is rather heterogeneous across the 12 electorates or groups in RMV. Overall, less than half (82/180) of the group-level outcomes are in line with pocketbook voting. While 5 groups have redistribution outcomes broadly in line with the pocketbook voting (i.e. deviate by 2 or fewer increments from  $r_R^*=1.0$ ), 7 groups are clearly not in line with such predictions. Four of these groups implement intermediate levels of redistribution between 3 and 5 on average, while 3 groups have redistribution levels that are close to redistribution level 8.<sup>13</sup> In one of these groups this is due to all three rich subjects consistently voting for  $r=8$ , in the other two groups there are two and respectively one subject doing so. In these cases, the median voter gives up a payoff of 68 points (=200–132, see Table 1) to increase the income of the poor voters by 32 (=92–60) points each. The choice reduced efficiency only by about 6 percent but considerably increased equality (the ratio of incomes of rich to poor falls from 3.3 to 1.4). While voting reduces inequality considerably, the resulting secondary

<sup>9</sup> Participants were students recruited at the University of Innsbruck, using ORSEE (Greiner, 2004). 46.1% of the participants were female, 60% were from the Faculty of Management and Economics.

<sup>10</sup> To give a measure of noisiness behind these figures, Appendix B contains graphs showing error bars for  $v_R$  and  $v_P$  in all treatments.

<sup>11</sup> Averaged over all periods, the distance to median in redistribution levels is 1.10 for the rich and 4.68 for the poor voters ( $p=0.005$ , Wilcoxon matched pairs test, WMP).

<sup>12</sup> 2.62 vs. 3.72,  $p=0.002$ , WMP.

<sup>13</sup> Observing a rich voter to opt for redistribution level 8 is consistent with maximin preferences.

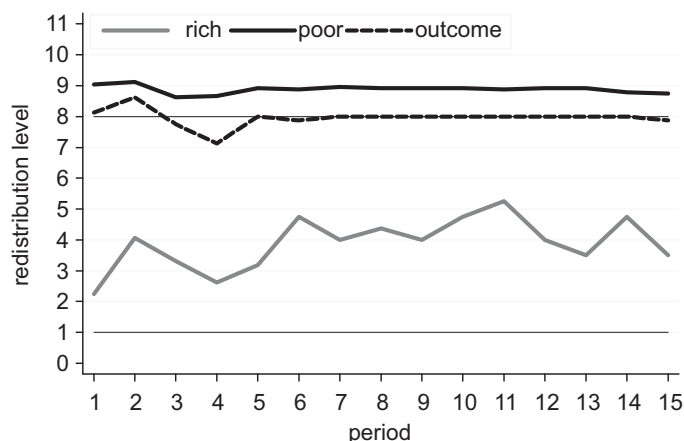


Fig. 4. Average votes and redistribution outcomes in PMV ( $n=40$ ).

income distribution is still rather unequal overall. The average payoff in the RMV treatment is (excluding the show-up fee) 13.2 Euro (rich) and 5.4 Euro (poor) ( $p=0.000$ , two-sided Mann–Whitney test, MW).

Fig. 4 shows that redistribution outcomes are almost perfectly in line with pocketbook voting when the poor are in majority (PMV). Average redistribution is  $r_m=7.96$  (see dashed line) which is very close to  $r_p^*=8$ , and the prediction  $r_p^*=8$  is implemented exactly in 95 percent of the cases (=114 out of 120 group-level observations). As a result, average total payoffs (excluding the show-up fee) are relatively equal in PMV (6.9 Euro for the poor and 9.9 Euro for the rich<sup>14</sup>). The redistribution outcome  $r_m$  is close to but systematically below the graph representing the average vote  $v_p$  of the poor (see solid black line) in PMV.<sup>15</sup> The fact that  $r_m$  is closer to  $v_p$  than  $v_R$  reflects that the poor tend to be the pivotal voters in PMV.<sup>16</sup> The fact that  $r_m < v_p$  reflects that the inequality-averse poor are unlikely to be pivotal, i.e. tend not to drive the redistribution outcome.

The predictive success of “pocketbook voting” for aggregate outcomes in PMV is striking because its predictions are rather imprecise if not plainly wrong for individual votes (see Appendix A for distributions of individual votes). The average vote of the rich is clearly biased away from their pocketbook optimum ( $r_R^*=1$ ) throughout all 15 periods ( $v_R=3.89$ ,  $p=0.012$  WSR, see bold gray line in Fig. 4). In addition, a considerable share of the poor consistently vote above  $r_p^*=8$  and the average vote over all periods is  $v_p=8.88$  ( $p=0.019$  WSR, see bold black line in Fig. 4). While only 53 percent of all voters (18 poor and 3 rich) vote their pocketbook interest in at least 2/3 of the periods, the redistribution outcome is almost always (in 95 percent of group-level outcomes) consistent with pocketbook voting. Thus, in line with the asymmetry hypothesis, we find that – despite many voters supporting redistribution beyond the pocketbook – inequality aversion does not matter for aggregate outcomes when the poor are in majority.<sup>17</sup>

### 3.2. Results from random dictator treatments

We now show that there is in fact no asymmetry in the deviation from pocketbook outcomes across class structures when there should be none according to the asymmetry hypothesis. To test, we run treatments with an exogenous and constant probability to be decisive. Importantly, the probability is the same ( $1/N=0.2$ ) for all voters in both treatments, i.e. does not depend on which class is in majority. We implement two treatments with random dictator decision making. Treatment RMRD has a rich majority, and treatment PMRD has a poor majority. Note that these treatments are identical to RMV and PMV in all respects except for the voting rule. Our main finding is that the deviation from pocketbook outcomes is not different across treatments, i.e. is independent of which class is in majority.

Figs. 5 and 6 show the average redistribution choice by income class for random dictator voting in RMRD and PMRD. Both the poor and the rich make random dictator choices slightly above predictions in PMRD ( $d_p=8.56$  vs.  $r_p^*=8$ ,  $p=0.030$ ;  $d_R=1.50$  vs.  $r_R^*=1$ ,  $p=0.030$ , WSR). In RMRD average choices are not significantly different from predictions (poor: 8.40 vs. 8,  $p=0.356$ ; rich: 1.28 vs. 1,  $p=0.110$ , WSR).

The heavily dashed lines in Figs. 5 and 6 show the implemented redistribution in the two treatments. Implemented redistribution is noisy because one choice is picked at random to determine the outcome in these treatments, and the choice may come from a rich or a poor voter. Importantly, we find that the deviation of predicted and implemented redistribution is not different across treatments. The pocketbook prediction  $r_d^*$  is 5.20 in PMRD and 3.80 in RMRD (see

<sup>14</sup> The difference is nevertheless significant:  $p=0.001$ , MW.

<sup>15</sup> 7.96 vs. 8.88,  $p=0.019$ , WMP.

<sup>16</sup> The average (absolute) distances are  $r_m - v_R=4.07$  and  $v_p - r_m=0.92$  ( $p=0.050$ , WMP).

<sup>17</sup> Additional analysis (available from the authors on request) suggests that voters are able to learn whether they are pivotal, that rich voters are more likely to be pivotal when in majority and more so when voting for redistribution beyond than below their pocketbook interests. Similar results hold for poor voters.



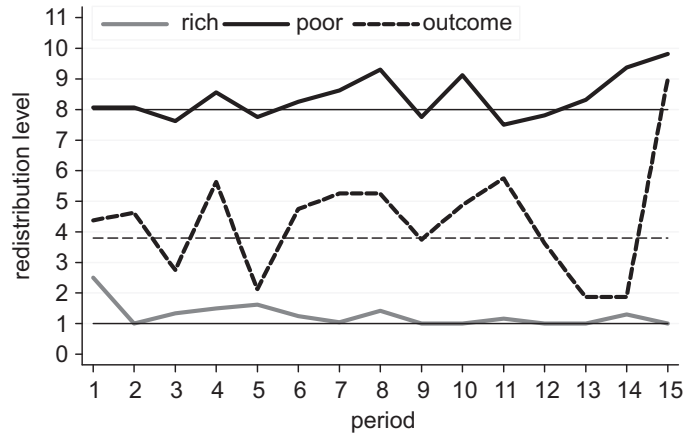


Fig. 5. Average votes and redistribution outcomes in RMRD (n=40).

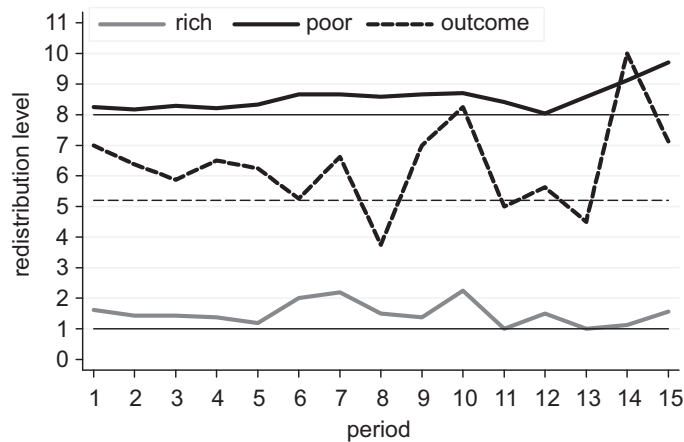


Fig. 6. Average votes and redistribution outcomes in PMRD (n=40).

dashed horizontal lines). These predictions differ from those in RMV and PMV because of a simple composition effect [note that  $r_d^* = (Rr_R^* + Pr_P^*)/N$ ]. Overall (weighted) dictator choices are  $r_d = (Rd_R + Pd_P)/N$ . The absolute deviation  $r_d - r_d^*$  is 1.14 in PMRD (6.34 vs. 5.20), and 0.57 in RMRD (4.37 vs. 3.80), and these deviations are not significantly different ( $p=0.371$ , MW). In contrast, the deviations from predicted outcomes are significant with majority voting i.e. across RMV and PMV. The deviation  $r_m - r_R^*$  is 2.72 in RMV (3.72 vs. 1) and  $r_p^* - r_m = -0.04$  in PMV (7.96 vs. 8), which is significantly different ( $p=0.001$ , MW). In summary, the deviations between predicted and observed redistribution outcomes are small (about 0.6) and do not differ across treatments in the random dictator procedure, but deviations are large (about 2.8) and significant in the majority voting treatments.

Our finding that the deviation of implemented redistribution from the pocketbook prediction does not differ across treatments when pivotality is independent of class structure also holds for individual choices. This is true for both rich and poor voters, and for both the level and the variance of choices. A comparison of PMRD vs. RMRD reveals that neither rich voters (1.50 vs. 1.28,  $p=0.419$ , MW) nor poor voters (8.56 vs. 8.40,  $p=0.522$ , MW) choose differently across these treatments on average. The average within-group standard deviation for rich voters is 0.74 in PMRD and 0.55 in RMRD ( $p=0.957$ , MW). For the poor voters the respective numbers are 0.77 vs. 1.31 ( $p=0.394$ , MW).

### 3.3. Discussion of results: insincere voting

The asymmetry hypothesis claims that *sincere* voting for redistribution beyond the pocketbook by a given share of inequality-averse voters is more or less likely to translate into redistribution outcomes beyond pocketbook interests depending on how likely inequality-averse voters are to be pivotal; pivotality, in turn, depends on the relative strength of income classes. The discussion above has shown that we find support for the asymmetry hypothesis in majority voting in the sense that aggregate redistribution outcomes are much less in line with pocketbook voting in RMV than in PMV. This holds both with respect to overall average redistribution levels and with respect to group-level outcomes. For example, 46 vs. 95 percent of group-level outcomes are in line with pocketbook voting in RMV and PMV, respectively.

These results are surprising because voters may anticipate and strategically respond to the differential pivot probabilities by voting insincerely. For example, rich voters may anticipate that they are more likely to be pivotal when

they are in majority (in RMV) than when they are not (in PMV). Not to vote for the income-maximizing choice is thus less costly in PMV than in RMV. Voters may react to these differences in expected cost by voting carelessly (thus increasing the noise) or by expressing support for what may be seen as a morally worthy cause (thus increasing the bias towards redistribution beyond the pocketbook prediction). Note that incentives for insincere voting are completely absent in the treatments with random dictator choice.

A comparison of voting patterns across RMV and PMV reveals that deviations from pocketbook voting are indeed more common for rich voters when they are less likely to be pivotal but the evidence is weak for poor voters. For example, among the rich, we find that 57 percent ( $=309/540$ ) of individual votes are in line with the pocketbook interests ( $r_m^* = 1$ ) in RMV but only 32 percent ( $=76/240$ ) are in PMV. The difference is significant ( $p=0.000$ ,  $\chi^2$  test). Yet, deviations by the rich mainly increase noise rather than the average vote.<sup>18</sup> Similar results hold for poor voters.<sup>19</sup>

Insincere voting may also explain some of the apparent differences in individual choices across voting rules. However, the comparison is less sharp in this case. The reason is that while we control the pivot probability in the random dictator treatments (it is 0.2), the absolute level of that probability is not known in the voting treatments. We do know from the asymmetry hypothesis that this probability is higher for rich voters in RMV than PMV.<sup>20</sup> Alternatively, differences in individual voting across voting rules may also be explained by rich voters deviating less from  $r_R^*$  in RMRD than in PMV because they anticipate relatively fair redistribution outcomes when a poor voter happens to be the dictator.

### 3.4. Discussion of results: more than two income classes

We have tested the asymmetry effect in a simple laboratory environment with two income classes. The experimental results provide support for the effect since we find that the asymmetry effect prevails when we expect it to be present (in majority voting) and does not prevail when we do not expect it to be present (in the random dictator treatments). In the specific context of two income classes, the interpretation of the asymmetry effect is clear and simple: inequality aversion matters more for redistribution outcomes in majority voting with a rich majority than with a poor majority. Given the fact that there are few if any societies in which the rich are in majority, the result seems to indicate that inequality aversion should not matter much in the field. Below, we use examples with more than two (three, to keep it simple) income classes to explain that this interpretation is mistaken.

The simple examples below serve to illustrate that the asymmetry effect does not hinge on the condition that the rich are in majority. Instead, the general condition (see the discussion in the online supporting materials for the general case) for the asymmetry effect to prevail is that the median voter is fair-minded. How likely that is depends on the structure of income classes. More specifically, it depends on whether the share of fair-minded voters in the class containing the median voter and the classes above (i.e. those richer than the median class) is sufficient to induce the aggregate voting outcome to tip.

Consider a society with  $N$  voters in 3 homogeneous income classes. Suppose 20% of voters are rich, 50% are middle class, and 30% are poor. Suppose that 70% of voters are self-interested and cast votes according to their ideal points ( $r_R^* = 1$  for the rich,  $r_M^* = 3$ , and  $r_P^* = 8$  for the middle-class and poor voters, respectively), while 30% of voters in all income classes are slightly averse to inequality in the sense that they prefer redistribution at one increment above the respective ideal points of self-interested voters. We assume all voters cast votes sincerely.

In this society, the median voter is a member of the middle class and is unlikely to be inequality averse. The share of middle-class voters willing to vote for  $r > r_M^*$  is only 15% of the electorate (i.e. 30% of middle-class voters who comprise half of the electorate). Inequality aversion among the rich does not matter since they are assumed to be only mildly inequality averse, if at all, and therefore none of the rich voters opts for  $r > r_M^*$ . Thus, the rich (20% of the electorate) plus the self-interested middle-class voters (35% of the electorate) constitute a majority and the median voter therefore is a self-interested middle-class voter (note that inequality aversion among the poor is irrelevant for the redistribution outcome in this example). In conclusion, the fact that 30% of all voters are fair-minded does not matter for the redistribution outcome and looks as if all voters were strictly self interested ( $r_M^*$  prevails).

Now consider an electorate with a different structure of income classes while holding the concern for inequality constant at the level of the previous example (i.e. 30% of voters in all classes have a mild concern for equality). Specifically, assume that some middle-class voters slip into poverty, such that the distribution across income classes is now 20% rich,

<sup>18</sup> In RMV, the average within-group standard deviation of votes among the rich is less than half that of PMV (1.06 vs. 2.29,  $p=0.021$ , MW, based on a comparison of 12 and 8 independent group observations in RMV and PMV, respectively). But the average vote of the rich is not significantly different between RMV and in PMV (2.62 vs. 3.89,  $p=0.123$ , MW).

<sup>19</sup> As for the rich, poor voters are more likely to deviate from  $r_P^*$  when they are in minority: 51% ( $=183/360$ ) and 78% ( $=281/360$ ) of poor voters vote in line with pocketbook in RMV and PMV, respectively.  $p=0.000$ ,  $\chi^2$  test. While the average within-group standard deviation of votes is higher in RMV than PMV (2.12 vs. 0.22,  $p=0.002$ , MW), average votes do not differ across the treatments (8.40 vs. 8.88,  $p=0.396$ , MW).

<sup>20</sup> Additional analysis (not reported here) suggests that rich voters were able to learn that their pivot probability was high (above 0.2) in RMV but low in PMV, and conversely for poor voters. For completeness, we note that for the rich both the average (3.89 vs. 1.50,  $p=0.007$ , MW) and the standard deviation (2.29 vs. 0.74,  $p=0.027$  MW) are different across PMV than PMRD. Neither is the case for the poor voters (8.88 vs. 8.56,  $p=0.958$ , MW; 0.77 vs. 0.22,  $p=0.388$ , MW). There are no differences in levels or standard deviations for either rich or poor voters when comparing RMV with RMRD.

40% middle class, 40% poor.<sup>21</sup> If all voters cast votes sincerely, the median voter is a member of the middle class (as before) but is now likely to be an inequality-averse voter. To reason is that the share of middle-class voters willing to vote for  $r > r_M^*$  is now 12% of the electorate (i.e. 30% of middle-class voters who comprise 40% of the electorate). Thus, the rich (20% of the electorate) plus the self-interested middle-class voters (28% of the electorate) now constitute a minority and the median voter therefore is a fair-minded middle-class voter (note that inequality aversion among the rich and the poor is still irrelevant for the redistribution outcome in the example). As a consequence, the redistribution outcome is  $r > r_M^*$  and fairness concerns do matter for the redistribution outcome.

The upshot of the discussion above is that whether a given amount of fairness concerns matter for the redistribution outcome is driven by the structure of income classes. Given information about the structure of income classes and the prevalence of fairness concerns, the asymmetry effect can be used to predict when fairness concerns do not matter (as in the first case above) or do matter (as in the second case above).

#### 4. Concluding remarks

A burgeoning literature has convincingly shown that concerns for a fair distribution are common but little attention has been devoted to how it may affect voting on redistribution. Whether fairness concerns matter for redistribution outcomes in majority voting depends on whether inequality-averse voters are pivotal. Pivotality, in turn, depends on the income class structure of the electorate and we show that its effect is asymmetric. Our results support the idea that a given amount of fairness concerns matter when few fair-minded voters are sufficient to tip the balance in majority voting, but do not matter much when many are needed.

While the asymmetry effect extends to redistribution in electorates with more than two income classes in theory, we would like to caution the reader to extrapolate the willingness to redistribute beyond the pocketbook observed in our study because the concern for fairness manifested in our experiment may not be typical for other samples. For example, [Alesina and Giuliano \(2010\)](#) note that different cultures emphasize the relative merits of equality versus individualism in different ways, and different historical experiences shape social norms about what is acceptable in terms of inequality (for a study of cultural effects on cooperation see [Hermann et al. \(2008\)](#)).

An interesting alley for further experimental investigation is how fair-minded voting is shaped by the conditions that can be controlled in an experiment. For example, voting for inequality-reducing redistribution may be less common when incomes are earned and voters therefore feel entitled to their incomes (see [Fong \(2001\)](#) for survey evidence; [Cappelen et al. \(2010\)](#) for dictator games with production; [Esarey et al. \(2012\)](#) for voting on redistribution). The absence of such entitlements in our design may have induced voters to think of choosing a distribution rather than actually redistributing incomes with firm entitlements. On the other hand, voting for inequality-reducing redistribution may be more common when the trade-off between efficiency and equality is less pronounced than in our design because preferences for efficient outcomes seem to be common (e.g. [Charness and Rabin, 2002](#)). Indeed, [Durante and Putterman \(2009\)](#) provide evidence showing that the support for redistribution decreases with its private and social cost.

In a broader perspective, our paper adds to an emerging literature discussing the conditions when fairness concerns in a heterogeneous population matter for aggregate outcomes (e.g. [Dufwenberg et al., 2011](#); [Sobel, 2009](#); [Schmidt, 2011](#)). One way to read our results is as a kind of “robustness test” of the conventional median voter theory which assumes that the median voter is strictly self-interested. Our results suggest that fairness preferences may matter much or be essentially irrelevant since the outcomes of majority voting on redistribution may look as if all voters were strictly self-interested. Which effect prevails depends, according to our analysis, on the structure of income classes which can be reasonably well measured in the field. Thus, we believe our experimental finding can provide interesting directions for field research. Our results suggest that relating (easily observable) redistribution outcomes to particular (easily observable) aspects of the structure of income classes may provide a promising new perspective to investigating the role of (only indirectly observable) fairness preferences in democratic redistribution.

#### Appendix A. Distribution of individual redistribution choices by treatment and class

The following figures show the distribution of redistribution choices by treatment and class over all periods. The distributions are split by whether a chosen  $r$  is different (black bars) or equal (gray bars) from the outcome  $r'$  at various levels of  $r$ . Thus, the black bars indicate instances in which voters experience that their choice was not pivotal.

See [Figs. A.1–A.4](#).

#### Appendix B. Average redistribution choices by treatment and class

The following figures show average redistribution choices by rich and poor voters (see dots) plus the 2-sided confidence intervals (calculated from standard deviation of means between groups) over time for all treatments.

See [Figs. B.1–B.4](#).

<sup>21</sup> To keep the argument simple, we assume that the change in the structure of income classes does not affect voters' ideal points (voters would generally demand less redistribution in a model of Meltzer Richards but fair-minded voters would demand more redistribution in model of Fehr and Schmidt).

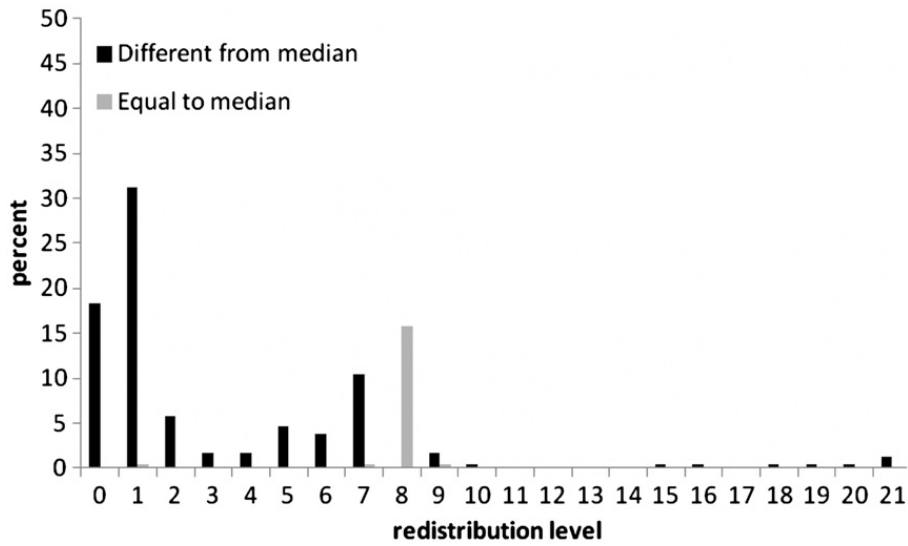


Fig. A.1. PMV distribution of redistribution levels chosen by rich voters (n=540).

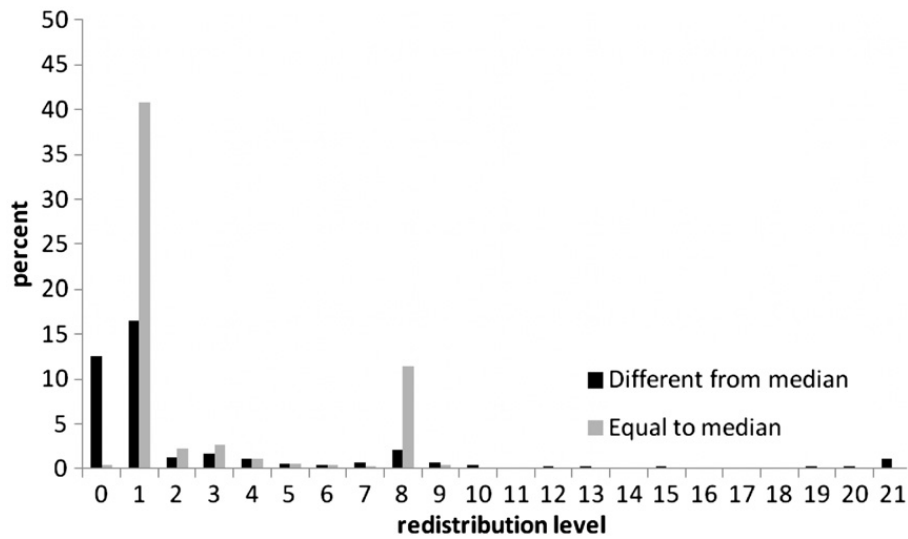


Fig. A.2. RMV distribution of redistribution levels chosen by rich voters (n=360).

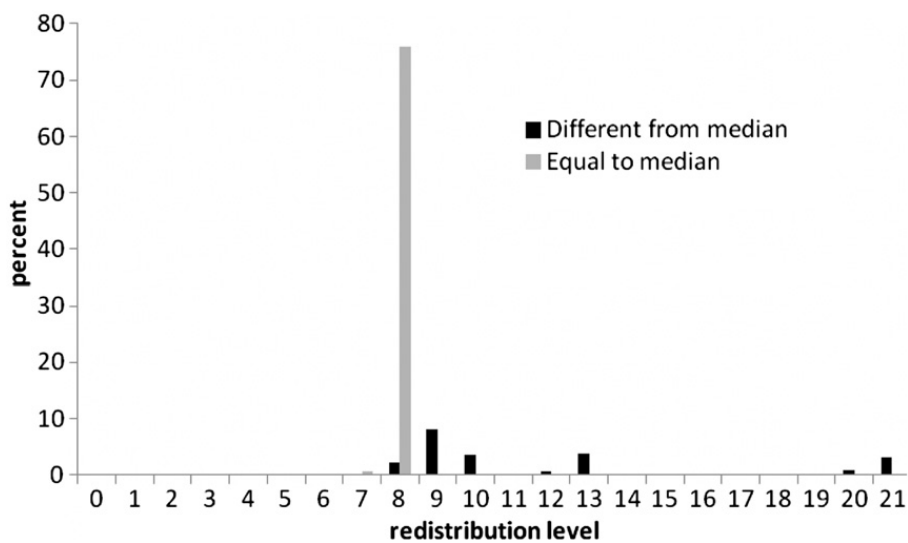


Fig. A.3. PMV distribution of redistribution levels chosen by poor voters (n=360).

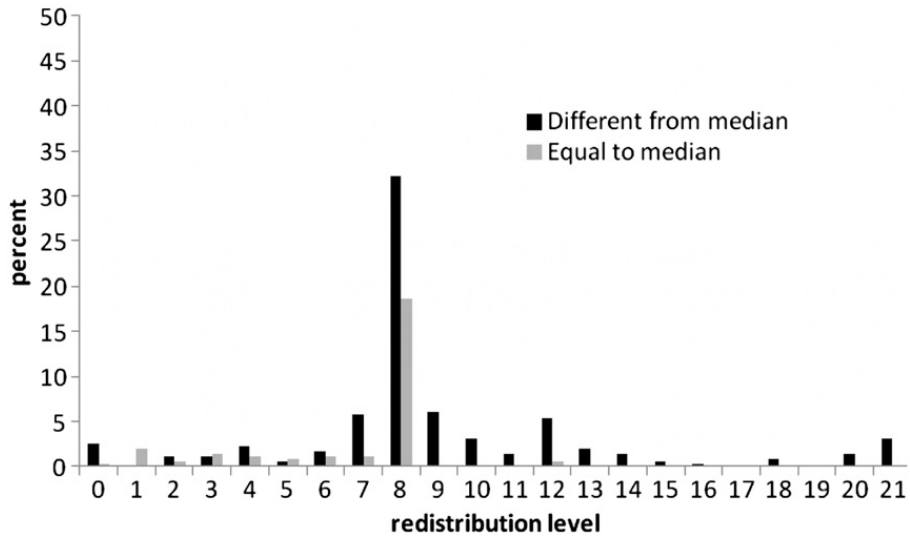


Fig. A.4. RMV distribution of redistribution levels chosen by poor voters ( $n=240$ ).

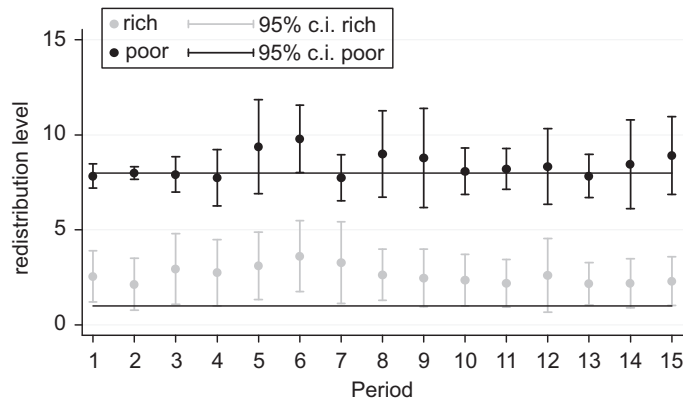


Fig. B.1. Choices in RMV ( $n=60$ ).

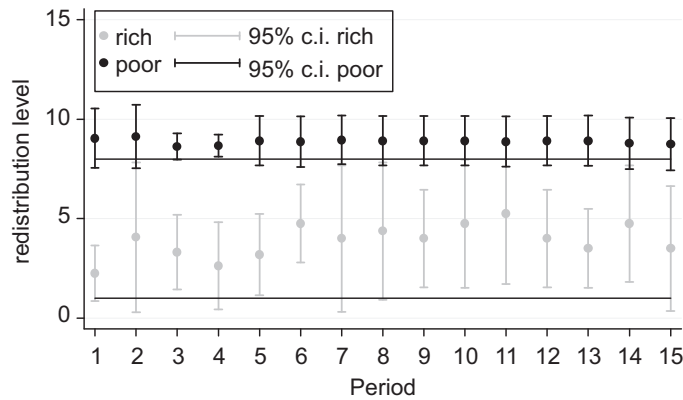


Fig. B.2. Choices in PMV ( $n=40$ ).

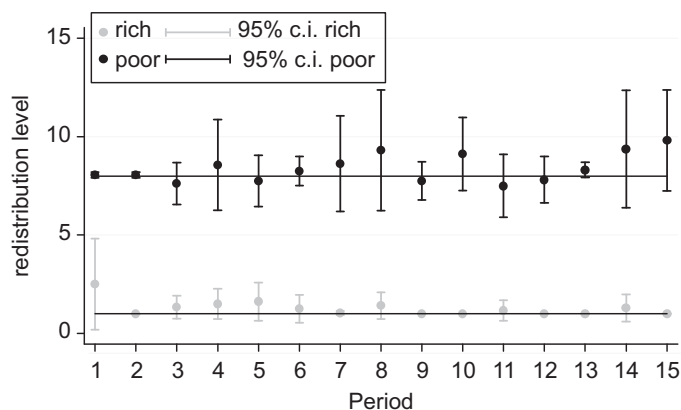


Fig. B.3. Choices in RMRD (n=40).

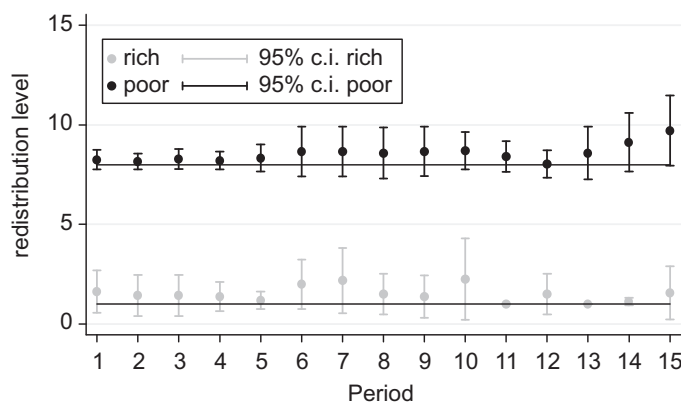


Fig. B.4. Choices in PMRD (n=40).

**Appendix C. Sample instructions (translated from German)**

Welcome to the experiment. If you read these instructions carefully and follow the rules you can earn money in this experiment. The money will be paid out in cash right after the experiment. During the experiment, we denote earnings in points which are converted to Euro as follows: 200 points=1 Euro.

You are not allowed to communicate with other participants during the entire experiment. If you have a question, please raise your hand and we will answer your question individually. It is important that you follow this rule because otherwise the results are worthless to us.

In this experiment, participants are randomly sorted into groups of 5. This means that you are in a group with 4 other participants. The same 5 participants stay in a group throughout the entire experiment.

In your group, there are 2 members of **type Y** and 3 members of **type X**. The computer randomly determines who is of which type.

**What are the consequences of being type X or typeY?** Players of type X have better opportunities to earn money in the experiment.

In this experiment, your task is to decide about the distribution of incomes within your group.

*C.1. Specific instructions for the experiment*

**You are of type Y.** In this experiment, every participant earns an individual income. You **vote** about whether and to what extent you would like to redistribute these incomes by choosing an “allocation.”

The experiment has 15 periods in total. In each period, you have to vote about the redistribution of the incomes in your group. The outcome of the vote in each period determines your and the other 4 group members’ payoff.

*C.2. Redistribution decision*

Table C1 shows the incomes for each allocation. There are 22 possible allocations in total. You and the other participants in your group decide about the allocation for your group and thus about the distribution of incomes in your group.

**Table C1**  
Incomes for different allocations.

Allocation	Income of X types	Income of Y types
0	194	50
1	200	60
2	194	64
3	187	68
4	179	72
5	169	76
6	159	80
7	146	86
8	132	92
9	128	91
10	122	89
11	114	86
12	107	80
13	100	75
14	92	70
15	84	64
16	76	59
17	68	54
18	58	47
19	49	41
20	41	36
21	27	27

#### C.2.1. For treatments RMV and PMV

The redistribution decision is made according to the following rules: you and the other group members each choose an allocation by typing an allocation number into the decision screen that will pop up. The allocation numbers chosen by all group members are sorted from low to high. The number in the middle, i.e. the third number, in this list is the **median** allocation. The median allocation determines the incomes of all group members in this period (see Table C1).

**Example:** Suppose you have chosen allocation 12. The other four group members have chosen allocations: 11, 2, 17, 5. Sorted from low to high we have

1:	2
2:	5
3:	11 (=median allocation)
4:	12
5:	17

The median allocation and, thus, the group's redistribution decision, in this example is 11 which means that X types earn 114 points and Y types earn 86 points.

Suppose you had chosen 8 instead of 12 in the situation above while the others choose as before (11, 2, 17, 5). In this case, your allocation choice is the third in the sequence. Therefore, the median allocation would be 8 and the group's redistribution decision is therefore 8, which means that X types earn 132 points and Y types 92 points.

#### C.2.2. For treatments RMRD and PMRD

The redistribution decision is made according to the following rules: you and the other group members each choose an allocation by typing an allocation number into the decision screen that will pop up. The computer then **randomly draws one of these allocations with equal probability (20%)**. The random draw from the choices determines the incomes of the group members in this period (see Table C1).

**Example:** Suppose you choose allocation 12. The other members of your group choose the allocations: 11, 2, 17, 5. The computer draws one of these 5 allocation randomly and all allocations are equally likely to be implemented. For example, if allocation 11 is drawn, all group members obtain the income shown for allocation 11 in Table C1 (114 points for X types and 86 points for Y types).

#### C.2.3. All treatments

See Table C1.

#### C.2.4. How you make your decision

In each period, you choose an allocation by typing a number from 0 to 21 into the **decision screen**. When all group members have made their decisions, the group choice is determined and displayed. At the end of the period you will see

the following information on the **outcome screen**: [You are type ..., The group's allocation decision is ..., Your income is ..., Group members of type X earned ..., group members of type Y earned ...].

The experiment is about to start. If you have a **question** please raise your hand.

#### Appendix D. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.eurocorev.2012.07.004>.

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