DFG Research Group 2104
Need-Based Justice and Distribution Procedures

Leaky bucket in the lab. The effect of system inefficiency on voting on redistribution

Markus Tepe, Maximilian Lutz, Fabian Paetzel and Jan Lorenz

Working Paper Nr. 2017-08

http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-08.pdf

Date: 2017-08-29

DFG Research Group 2104 at Helmut Schmidt University Hamburg
http://needs-based-justice.hsu-hh.de

Leaky bucket in the lab. The effect of system inefficiency on voting on redistribution

Markus Tepe*

Maximilian Lutz†

Fabian Paetzel‡

Jan Lorenz§

August 29, 2017

Abstract

Introducting system inefficiency into a simplified Meltzer and Richard (1981) model is predicted to have a twofold effect; it alters subjects' rational vote and triggers their efficiency preferences. In a series of laboratory experiments, we find that system inefficiency biases subjects' preferences tax rate downwards by minus 8% in the individual vote and minus 17% in the group decision. Although these effects are in substantive terms not as strong as the rational egoistic prediction, the robustness analysis confirms that system inefficiency exerts a unique negative effect on subjects' vote choice and the final group decision.

Keywords: redistribution, inefficiency, voting, laboratory experiment, leaky bucket, political attitudes, taxation

JEL classification: C91, C92, D72

*University of Oldenburg, markus.tepe@uni-oldenburg.de.
†University of Oldenburg, maximilian.lutz@uni-oldenburg.de.
‡Helmut Schmidt University Hamburg, fpaetzel@hsu-hh.de.
§Jacobs University Bremen, post@janlo.de.

1 Introduction

Inefficiency in the redistribution system can play an important role to understand why growing inequality does not necessarily lead to more redistributive taxation (Scheve and Stasavage, 2016). The importance of ascribed system efficiency can be illustrated with some stylized facts drawing on the 2008 European Social Survey's module on welfare attitudes (Survey, 2008), in which respondents were asked how efficient they think their national tax authorities are[1]. Figure 1 plots the weighted country specific response to this item against social spending (OECD, 2017), welfare generosity (Scruggs and Kuitto, 2014) and income inequality (OECD, 2016) for 14 OECD countries in 2007.[2] While there is only a moderate positive association between the perceived efficiency of tax authorities and welfare spending (pairwise correlation 0.19; p-value 0.52), the positive association is rather strong with welfare generosity (pairwise correlation 0.41; p-value 0.14), and strongly negative with respect to income inequality (pairwise correlation -0.64; p-value 0.02). Taken together, these stylized associations are consistent with the narrative that societies in which tax authorities are perceived to be inefficient are also less willing to reduce income inequality. The implied causality of this statement, however, cannot be inferred from the cross-country data as inefficient tax authorities can either be the cause or a consequence of income inequality. In order to identify the causal effect of the inefficiency of the redistribution system on voters' preferences for redistribution, we need to manipulate the actual degree of system inefficiency. Since such manipulations are neither possible nor legitimate in any real-world setting, this study utilizes an experimental research design.

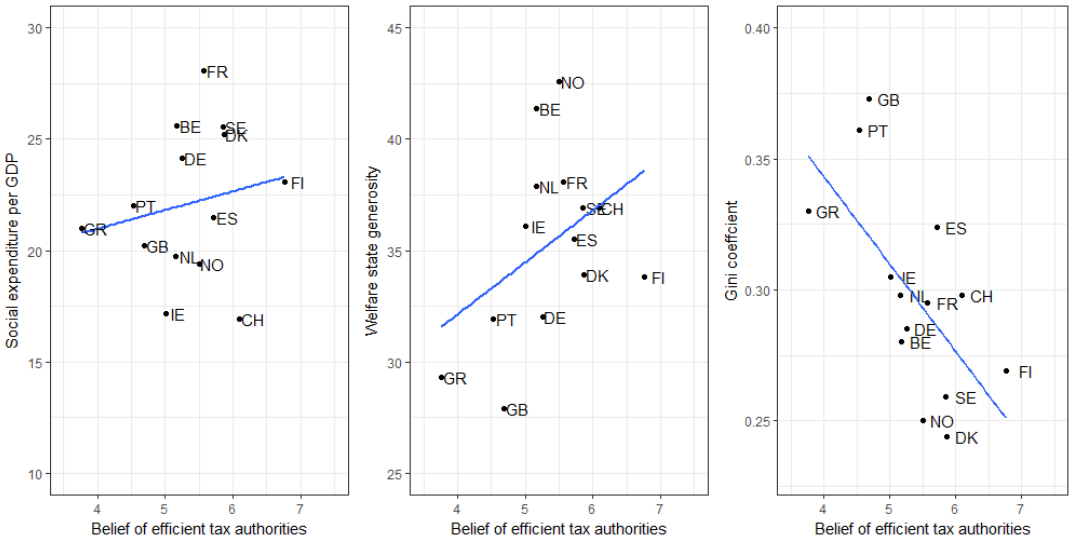

Figure 1: Perceived efficiency of tax authorities and the welfare state.

This study builds on Okun (1975) "leaky-bucket" argument and Meltzer and Richard (1981)

[1]Literal Question: "And how efficient do you think the tax authorities are at things like handling queries on time, avoiding mistakes and preventing fraud? Please use this card where 0 means they are extremely inefficient in doing their job and 10 means they are extremely efficient."

[2]The country sample is restricted by the availability of the generosity indicator (not available for East European countries) and the ESS sample.

(henceforth MR) model to test the effect of system inefficiency on redistributive taxation. According to Okun (1975) society faces an inevitable trade-off between equality and efficiency. This argument is based on the presumption of an unsolved technological problem in redistribution programs, namely, that the money must be carried from the rich to the poor in a "leaky-bucket". The leakage represents a system inefficiency. It implies that the poor are getting less than that which has been taken away from the rich as some money disappears in transit. Okun (1975) does not offer a positive answer on how to repair the leakage or a normative answer on how much inefficiency is acceptable. He simply concludes that each society must decide how much leakage it is willing to accept without rejecting the redistributive system as a whole.

Various studies explored the relationship between inefficiency and acceptance of redistribution by the use of survey data. They find that inefficiency lowers both, subjects' tax moral (Barone and Mocetti, 2011) and support for redistribution (Amiel et al., 1999; Pirttila and Uusitalo, 2010). These studies focus on how individuals decide the trade-off between equality and efficiency, but ignore the political process of voting on redistribution, which is at the center of the Meltzer and Richard (1981) model (MR model). Experimental studies have used the MR model (Agranov and Palfrey, 2015) and simplifications of it (Esarey et al., 2012a,b; Barber and Wibbels, 2013), to test its ultimate prediction that the tax rate is determined by the relative income position of the median voter. While macro-comparative research on the MR model provides mixed results (Alesina and La Ferrara, 2005; Perotti, 1996), evidence from experimental studies is more consistent with the median voter prediction (e.g. Agranov and Palfrey, 2015), but also shows that self-interest appears to be a rather weak predictor of voting behavior. When deciding upon redistributive taxation, subjects' vote choice tends to depend on multiple, often conflicting, motives including fairness considerations (e.g. Kittel et al., 2015), group loyalty (Klor and Shayo, 2010) and risk aversion (e.g. Durante and van der Weele, 2014) and inequality aversion (e.g. Tyran and Sausgruber, 2006).

What has yet not been addressed is the effect of system inefficiency on subjects' vote choice.[3] This study, therefore, introduces fiscal leakage into a simplified version of the MR model and tests its effect on subjects' voting behavior in a series of laboratory experiments. In theoretical terms, we hypothesize that system inefficiency activates subjects' efficiency concerns, which causes them to favor lower taxation. In methodological terms, we collect subjects' preferred tax rate before a phase of numerical communication, and their decisions on it afterward. Each group votes on a proportional tax rate under a majority rule. The treatment variable is the degree of inefficiency represented with 0%, 5%, 20% or 60% of the tax revenues getting lost. The experimental design enables us to test the effect of system inefficiency on both the individually preferred and the collectively agreed tax rate.

The main findings of this study can be summarized in three points: (1) A "leaky bucket" significantly reduces the willingness to redistribute. The individually preferred and collectively

[3]See (Scott and Bornstein, 2001, p.751) for efficiency understood as a normative allocation principle

agreed tax rate is 8% (individual vote) resp. 17% (group decision) lower in the treatments having a "leaky bucket". (2) The degree of inefficiency has no linear negative effect on the individually preferred tax rate, which means higher degrees of inefficiency are not associated with a proportional decline in the individually preferred tax rate. (3) The leaky bucket effect is robust towards the inclusion of the median voter prediction, subjects partisan orientation and outlives the process of political group communication.

2 Literature review

As a normative allocation principle, efficiency can be used to justify inequality (Scott and Bornstein, 2001, p.751). Thus, inequality can be legitimate if its based on efficiency Nozick (1976); Hayek (1976). The tension between efficiency and equality is at the center of Okun's (1975) work. He introduced the concept of redistribution through a "leaky bucket" to demonstrate that societies face an inescapable trade-off between equality and efficiency (Okun, 1975, p. 99). If a program that transfers money from the rich to the poor suffers from an unsolvable technical leakage, the question arises of how much inefficiency is tolerated before the program is rejected as a whole. Instead of providing an answer to this normative puzzle, Okun (1975) invests into justifying the leakage presumption in order to strengthen his conclusion that the trade-off between equality and efficiency is inescapable. According to Okun (1975) there are four reasons why redistribution leads to lower aggregate net income; administrative cost of redistributive systems, changes in the individual work effort induced by the redistributive system, changes in savings and investment behavior induced by the redistributive system, and finally, changes in voters attitudes towards redistribution as a result of redistributive programs (also see Gouyette and Pestieau (1999)).

For Okun (1975, p. 99), it is among the core questions of any society to agree on how much leakage in redistribution is acceptable. Despite theoretical analyses of the linkage between the size of fiscal leakage and acceptance rates of inequality (see Atkinson, 1970; Seidl, 2001; Blank, 2002), empirical work on the "leaky bucket" and voting is still scant. Theoretical work on redistribution in economics almost always assumes that there is a technical leakage when taxes are paid and redistribution is organized. Prominent examples are Persson and Tabellini (1994) and Alesina and Giuliano (2011). While Okun's assumption is generally established in the literature, little is known about the drawbacks on the preference for redistribution stemming from different degrees of inefficiency.

Amiel et al. (1999) utilized the "leaky bucket" experiment formulated by Okun (1975, p. 99) in a survey conducted on groups of Australian and Israeli students in order to gain measures of inequality aversion. They find that measures of inequality can be obtained through the principle of transfer inefficiency and that such measures are also lower than values typically used by those that measure inequality and examine optimal tax structures. Using representative survey data related

to real-world economic problems, Pirttila and Uusitalo (2010) confirm that transfer inefficiency matters for the estimation of inequality measures. Relying on a laboratory experiment conducted in the US and China, Beckman et al. (2003) measure individual redistribution choices both from behind and in front of the Rawlsian veil of ignorance. In the experiment, groups of five individuals had to decide between two lists of pay-offs through a secret ballot. In each case, the two lists were oriented towards efficiency (no leak, higher differences in income) or equality (loss through leak but higher equality in distribution of incomes). The list gathering majority support was used to distribute payments among subjects. Some of these rounds were conducted with a "leaky bucket", with different shares from 50 to 100 percent of the transfer lost in the process. Beckman et al. (2003) find that the veil of ignorance has a strong effect on accepted efficiency losses. When subjects do not know their income position, leakages of 50% are rejected in three out of four cases. When the individual income is known, however, the acceptance of higher leakage strongly rises. Transfers entailing 67% leakage now pass in all cases. Using data from the 2004 Survey of Households Income and Wealth (SHIW), Barone and Mocetti (2011) examine the effect of the "leaky bucket" regarding tax morale – defined as attitude towards paying taxes. They find that public spending inefficiency negatively affects citizens' tax morale. Barone and Mocetti (2011, p. 6) points out that redistribution through a "leaky bucket" represents a *"waste of resources and implies a less favorable ratio between the supply of public goods and the taxes used to finance them"*. In a quasi-contractual relationship between the state and tax payers, the tax payers punish the state via tax evasion if it fails to redistribute resources effectively.

This study contributes to the literature in three ways: First, instead of asking how subjects decide a trade-off between equality and efficiency individually, it focuses on the process of political preference aggregation on redistributive taxation. The experimental design enables us to make both components of the redistributive regime transparent, the voting mechanism (majority rule) and the redistribution mechanism (via proportional taxation) and let subjects communicate on the appropriate level of taxation before they take a final vote. Second, existing survey-based studies use hypothetical settings asking respondents how much inefficiency they tolerate. Apart from the general limitations that come with stated preferences, relying on stated preferences is likely to be particularly vulnerable to the social desirability bias in the context of redistribution. Using a laboratory experiment with monetary rewards enables us to observe subjects' voting behavior and to have full control over the degree of system inefficiency. Third, instead of seeking to find an empirical answer to the normative question of how much inefficiency is accepted for exchange of equality, this study asks whether a well-known system inefficiency causes subjects to vote for less redistribution. We test this 'leaky bucket" effect against the rational solution derived from a simplified MR model.

3 Theoretical Framework

3.1 Median voter

Before we continue theorizing the effect of system inefficiency on subjects' preferences for redistribution, we present the simplified version of the Meltzer and Richard (1981) model and explain how inefficiency is implemented into this model. In the Meltzer and Richard (1981) model, the redistribution mechanism consists of a proportional tax rate that is imposed on all incomes. The tax revenues are distributed in equal shares among all group members. Depending on the size of the tax rate, this mechanism redistributes income from those with net incomes above the mean toward those with net incomes below the mean. The single-dimensional conflict over the size of the proportional rate is decided through majority rule. Thus, under the premise of fully rational and egoistic agents, the group member with the median net income is pivotal. The redistribution mechanism for N individuals with *net incomes* $x_1, \ldots, x_N$ can be defined as:

$$y_i = (1 - \tau)\, x_i + \tau\, \bar{x}, \tag{1}$$

where y_i is the *gross income* of individual i under redistributive *tax rate* τ. The average net income is denoted $\bar{x} = \frac{1}{N}\sum_{j=1}^{n} x_i$. Individuals with net income below the average ($x_i < \bar{x}$) maximize their income through full redistribution ($\tau = 100\%$), which is their rational choice under egoistic preferences. Analogously, endowments above average ($x_i > \bar{x}$) lead to a preference for no redistribution ($\tau = 0\%$). Individuals with endowments being exactly $\bar{x}$ are indifferent in the standard model because their net and gross income remains the same regardless of the collectively agreed tax rate. The distributional conflict in the group is thus polarized except for indifferent individuals.

The "leaky bucket" is implemented by adding an inefficiency factor $\lambda = \{0, .., 1\}$ to the simplified Meltzer and Richard (1981) model.

$$y_i = (1 - \tau)x_i + (1 - \lambda)\tau\bar{x}, \tag{2}$$

The inefficiency factor determines the fraction of the tax revenue which disappears in transit. Individuals with gross income above mean net income after redistribution through the leaky bucket ($x_i > (1 - \lambda)\bar{x}$) will still aim for no redistribution ($\tau = 0\%$), because these subjects lose more by paying taxes than they gain through the net transfer income. In contrast, only individuals with income below $(1 - \lambda)\bar{x}$ maximize their income through full redistribution ($\tau = 100\%$). Introducing inefficiency changes the rational choice under egoistic preferences for those subjects with a gross income that lies between $\bar{x}$ and $(1 - \lambda)\bar{x}$. Without inefficiency ($\lambda = 0\%$), individuals with a gross income equal to the average income $\bar{x}$ are indifferent with regards to the level of redistribution. However, with inefficiency ($\lambda > 0$), individuals with an income of $(1-\lambda)\bar{x}$ are indifferent concerning

the level of redistribution. The higher the inefficiency parameter λ, the more individuals have egoistic preference for no redistribution. That is because by redistribution through a "leaky bucket" a fraction of $\tau\lambda$ of the total income is lost in transit. Thus, the median voter prediction states:

H$_1$ *Subjects with a gross income above* $(1-\lambda)\bar{x}$ *vote for* $\tau = 0\%$ *and subjects with subjects with a gross income below* $(1-\lambda)\bar{x}$ *vote for* $\tau = 100\%$

3.2 System inefficiency

An individual's behavior is rarely exclusively guided by rational self-interest. Social preferences also matter and combinations with strategic consideration and constraints shape behavior. Existing laboratory research on the Meltzer and Richard (1981) model (Agranov and Palfrey, 2015) and simplifications of it (Esarey et al., 2012a,b; Barber and Wibbels, 2013), indicate that both, egoistic and pro-social preferences, matter for subjects' vote choice. Subjects eschew extreme net income distributions, as $\tau = 0\%$ and $\tau = 100\%$ hardly occur. Instead, subjects with gross income above $\bar{x}$ tend to support modest levels of redistribution, compared to subjects with gross income below $\bar{x}$. The latter are in support of higher levels of redistribution but do rarely opt for equal distribution of net incomes. These overall empirical results indicate that when it comes to voting on redistribution, subjects balance what is in their self-interest against their pro-social preferences. For example, Tyran and Sausgruber (2006) highlight that already a small fraction of inequality-averse rich players is enough to increase redistribution.

Introducing system inefficiency (λ) alters the rational choice under egoistic preferences but beyond that, it could also activate subjects' efficiency preferences. As shown in survey (e.g. Pirttila and Uusitalo, 2010; Barone and Mocetti, 2011) and experimental research (e.g. Engelmann and Strobel, 2004; Beckman et al., 2003), a substantive share of subjects hold efficiency preferences (also see Scott and Bornstein, 2001, p.751). These preferences are irrelevant for subjects' vote choice if $\lambda = 0\%$. But, if $\lambda > 0\%$, efficiency preferences start to matter and accompany subjects' egoistic and pro-social consideration. Efficiency-minded subjects prefer less redistribution if the redistribution mechanism suffers from inefficiency.

A socio-psychological basis for the expectation that system inefficiency leads subjects to vote for less redistribution, is given by research on loss aversion in a risk-free choices Kahneman (1982); Tversky and Kahneman (1991). These studies indicate that many subjects have limited capability to understand trade-offs properly. Subjects systematically fail to choose the option that has a greater benefit than another when it is associated with only a small loss. Even in risk-free choices, losses and disadvantages have a stronger impact on preferences than gains and advantages (Tversky and Kahneman, 1991). System inefficiency represents such a small loss. Therefore, in the case of redistributive taxation, system inefficiency induces subjects to prefer a lower tax rate, regardless of their gross income position.

H$_2$ *Redistribution through a "leaky bucket" has a negative effect on the preferred tax rate.*

A second psychological mechanism through which system inefficiency might reduce preferences for redistribution refers to subjects' inner conflict between following egoistic or pro-social preferences. Again, starting from the presumption that subjects vote choice on redistributive taxation is guided by multiple, often conflicting, motives. Dating back to the theory of cognitive dissonance Festinger (1957), it is well known that people strive to maintain a positive self-image. This includes the desire to meet their own moral standards and pro-social preferences (see Elster, 1989, p. 101). If subjects behave in a way that violates their moral goals, it creates discomfort and unpleasant feelings of guilt and in response, subjects try to reduce this discomfort. Subjects with a gross income above the mean may still support a certain degree of redistribution for pro-social reasons, but system inefficiency lower their psychological cost of violating their pro-social preferences. Inefficiency offers them a justification for voting selfishly without feeling guilty or having a bad conscience for not meeting their own moral standards. Thus, in the subjects inner conflict between egoistic and pro-social preferences, inefficiency pushes the odds towards following egoistic preferences. This effect should become particularly visible in the voting behavior of subjects with a gross income equal or above $\bar{x}$, which leads us to our second hypothesis:

H$_3$ *The negative effect of redistribution through a "leaky bucket" on the preferred tax rate is stronger for subjects with a gross income equal or above* $(1-\lambda)\bar{x}$.

A matter of particular relevance for the assessment of the merits of democracy refers the question of whether the theorized effect of system inefficiency on subjects vote choice disappears in the political decision process or whether it persists and thereby also effects the collectively agreed tax rate. Similar to economists who believe that interactions in markets will correct individual irrationality, political scientists tend to show an implicit hope that the irrationality of some voters will be suspended in the process of political deliberation. In the context of market and market-like interactions, Fehr and Tyran (2005, p. 44) argue that type of interdependence of decisions is important for whether the aggregate outcome will be closer to the rational solution or further away from it. They distinguish between strategic substitutability, where the action of one agent generates an incentive to another agent to decrease his action, and strategic complementarity with mutually reinforcing actions (Fehr and Tyran, 2005, p. 44). Under strategic complementarity, even a small amount of individual irrationality can lead to large deviations from the aggregate predictions of rational models; while under strategic substitutability, a minority of rational agents can be sufficient to generate aggregate outcomes consistent with the predictions of rational models (Fehr and Tyran, 2005, p. 44). Although this logic certainly applies to market and market-like interactions, it remains questionable whether these dynamic decision interdependencies also occur in group-vote-choice situations. To this end, it remains an open empirical question whether the effect of system inefficiency on subjects vote choice disappears in the collective decision process.

Another aspect of this study that does not come with a well-defined theoretical prediction

concerns the effect of the size of the fiscal leakage on the individual and aggregate vote choice. Previous survey based studies utilizing Okun's leaky bucket experiment as a measurement device (e.g. Baron et al., 2012) find that respondents support for redistributive transfer diminishes when the share of leakage goes up, even though high levels of leakage are accepted when respondents know their position in the gross income distribution Beckman et al. (2003). On these grounds, we question whether only large amounts of system inefficiency matter for subjects' vote choice. In order to answer this question, we introduce three different sizes of leakage into the simplified MR model. The size of the leakage will be set to 5%, 20% and 60% to compare a rather small system inefficiency with a moderate and a large system inefficiency. On the one hand, subjects might take into account the actual size of the fiscal leakage and scale down their preferred tax rate accordingly. On the other hand, however, there is no need to presume a strict proportional relationship between the size of fiscal leakage and a consequent reduction in preferred taxation (e.g. see Tyran and Sausgruber, 2006, for the effect of inequality aversion). Therefore, the question of how the different shares of fiscal leakage affect subjects' vote choice remains an empirical one.

3.3 Mediating role of partisanship

Partisan orientation is a well-known determinant of subjects' preferences for redistribution (e.g. Jaeger, 2008). It is usually conceptualized on an ideological right-left dimension, whereas left corresponds with preferences for greater equality and reduction of poverty and right-wing views are associated with promoting individual responsibility and economic freedom Mair (2007). Individuals' partisan orientation is associated with certain welfare state preferences Feldman and Zaller (1992); Jacoby (1994); Scheepers (2005); Stegmueller et al. (2012); Jaeger (2008). A leftist partisan orientation is connotated with a preference for redistribution and a positive evaluation of the efficiency of the welfare system Jaeger (2008, p. 363). A rightist partisan orientation, on the other hand, is linked with skepticism towards the efficiency of the state as a supplier of goods and services in general, and less support for redistribution specifically.

Despite the extensive use of subjective partisan orientation measures in survey research, little is known about the behavioral implications of subjects' self-reported partisan orientation. Previous research by Scheepers (2005, p. 459-461) shows that left-wing subjects donate more money to alleviate poverty than people that see themselves as right-wing. The question is whether self-reported attitudes on partisan orientation help to explain subjects' voting behavior in the simplified MR Model. Existing laboratory evidence by Esarey et al. (2012a) shows that votes for a redistributive tax are almost entirely in accordance with self-interest, while subjects' preferences for fairness and their self-reported economic ideology are not directly related to their voting behavior. Barber et al. (2013) also rely on a simplified version of the MR model also find that subjects self-reported partisan ideology does not help to predict their voting behavior. Despite these negative findings,

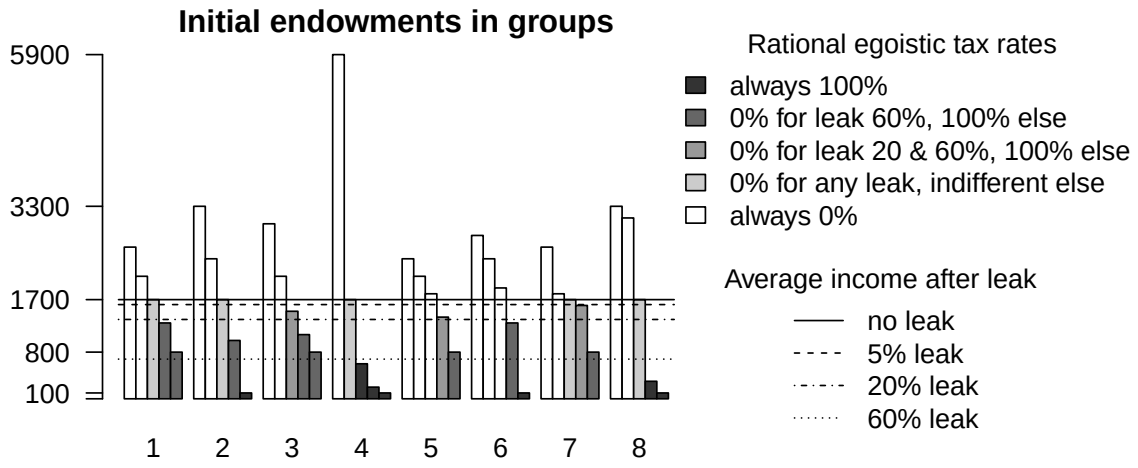

Figure 2: Distributions of endowments. The horizontal lines show the average income after redistribution with a "leaky bucket".

the baseline assumption would still be that subjects reporting a leftist partisan orientation should vote for more redistribution. More importantly, a strong partisan orientation should come with a pre-evaluation of the vote choice. A strong leftist partisan orientation may immunize subjects against the "leaky bucket" effect as these subjects will always vote for high levels of redistribution, regardless of the system inefficiency. This conditional relationship between system inefficiency and subjects' partisan orientation is summarized in our last hypothesis:

H$_4$ *The decreasing effect of a "leaky bucket" for redistribution on the tax rate is smaller for subjects with strong leftist attitudes.*

4 Experimental design and procedures

Building on existing experimental work Kittel et al. (2015), Esarey et al. (2012a) and Lorenz et al. (2015), we use the redistribution mechanism of Equation 2 to test the impact of a "leaky bucket" with different degrees of inefficiency in a laboratory democracy. We use leakage size of $\lambda = 0\%, 5\%, 20\%$ and 60% (cf. Beckman et al., 2003).

4.1 Experimental Vehicle

In each of the eight rounds, subjects were randomly assigned to groups of five. In each round, subjects received endowments from the pre-specified distributions as displayed in Figure 2 via a random assignment. Each distribution has an average endowment of $\bar{x} = 1700$. Figure 2 also show the rational egoistic preferences for tax rates for the subjects for each endowment with and without the different "leaky buckets". Table 1 reports the mean rational egoistic preferences for all distribution (D1-D8) and leakages.

The laboratory experiment was conducted with z-tree Fischbacher (2007) and consisted of the following stages:

Table 1: Mean rational egoistic preferences

Leakage	D1	D2	D3	D4	D5	D6	D7	D8	mean
$\lambda = 0$	0.5	0.5	0.6	0.7	0.4	0.4	0.5	0.5	0.51
$\lambda = 0.05$	0.4	0.4	0.6	0.6	0.4	0.4	0.4	0.4	0.45
$\lambda = 0.20$	0.4	0.4	0.4	0.6	0.2	0.4	0.2	0.4	0.38
$\lambda = 0.60$	0.0	0.2	0.0	0.6	0.0	0.2	0.0	0.4	0.17

1. **Information about endowments and individually preferred decision.** Subjects were informed about their own endowment and the endowment of all other group members. In this stage, subjects were privately asked to enter their ideally preferred tax rate.
2. **Numerical communication stage.** Each subject had to make ten proposals, which appeared in a five-column table visible to all group members. The first proposals appeared in the table after the last group member confirmed his or her proposal. All other proposals appeared immediately after confirmation. The endowments were displayed throughout the whole communication stage. Subjects could only communicate with numbers to coordinate their final decisions.
3. **Collective decision stage.** After the tenth proposal, a decision box appeared where subjects had to enter their final decision privately. A group decision was achieved when at least three subjects decided on the same number (majority rule). The net income was then computed using the redistributive mechanism explained in Section 2. If the group failed to reach a collective decision, the income was 50% of the endowment or 850 (50% of the average endowment) whichever was lower.
4. **Information payoff.** Subjects were informed on the result of the collective decision and about their net income in the eight periods at the end of the eighth period. The payoff in Euro was defined by a subject's average earnings over eight periods. The exchange rate was: 1 experimental token = €0.005.

Subjects played eight different gross income distributions (rounds). After the eighth round, subjects completed a questionnaire consisting of questions about their political attitudes, socio-demographic background (age, gender) and field of study. Subjects partisan orientation is measured on a 1 to 10 scale, where 1 represents extreme right-wing orientation and 10 represents an extreme left-wing orientation.

Subjects were recruited from the University of (anonymized) and the University of (anonymized) using the software ORSEE (Greiner, 2015) and hroot (Bock et al., 2014). Using a between-subjects design, 100 subjects played the no leakage condition, 75 subjects played the 5% leakage condition, 75 subjects the 20% leakage condition, and another 75 subjects played the 60% leakage condition. With 325 subjects in total and 8 rounds per subject, the dataset contains 2600 individual observations. Full documentation of the written instructions and the treatment can be found in

Lorenz et al. (2015). Table 2 provides an overview of treatments and sessions.

Table 2: Overview Treatments

Treatment	Subjects	Rounds	Observations
$\lambda = 0$	100	8	800
$\lambda = 0.05$	75	8	600
$\lambda = 0.20$	75	8	600
$\lambda = 0.60$	75	8	600
Overall	325		2600

5 Results

5.1 Descriptive Results

Figure 3 compares the median voter prediction (see Table 1) and subjects actual behavior in the laboratory experiment for the four treatment conditions ($\lambda = 0\%, 5\%, 20\%$ and 60%). In particular it is shown that over all distributions we would expect 51% as the average tax rate for no leak, 45% for a leak of 5%, 38% for a leak of 20%, and just 17% for a leak of 60% when subject would vote rationally egoistic.

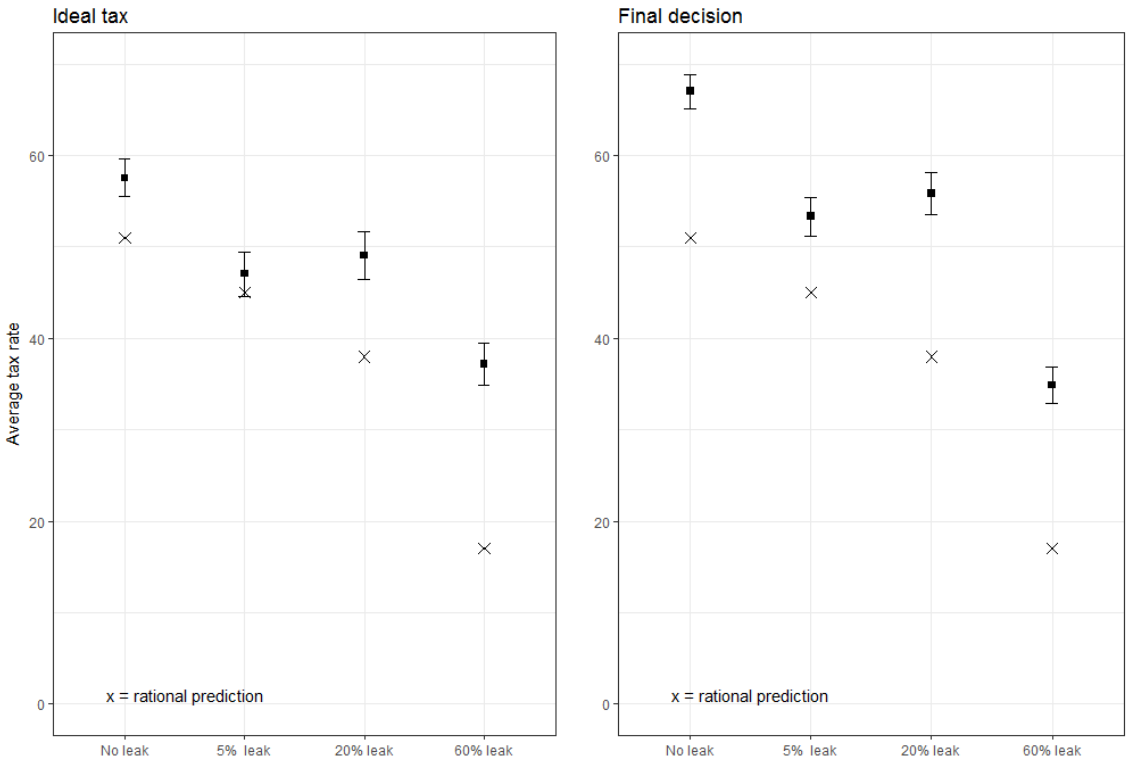

Figure 3: Average tax rate by treatment conditions

Findings from Figure 3 can be summarized in three points: First, in each treatment condition we see that the empirical levels of redistribution are above the median voter prediction. Second, the existence of a fiscal leakage is associated with a strong reduction in both, the ideally preferred and finally chosen tax rate. The reduction is the strongest in the 60% leakage condition. A 5% leakage and 20% leakage trigger a substantial reduction of the average ideally preferred tax rate, and the tax rate after numerical communication compared to the situation without leakage. Surprisingly, the reduction is slightly stronger for the 5% leakage, however, the difference to the lower reduction under the 20% leakage is not significant, since the 95% error bars are largely overlapping. This implies that subjects respond towards fiscal leakage by voting for a lower tax rate but a 5% leakage and 20% leakage have the same effect. Only with a comparatively large leakage of 60% leakage does the reduction in the ideally preferred tax rate and the tax rate after numerical communication significantly increase. Third, we find no evidence that the process of numerical communication washes out the fiscal leakage effect. On the contrary, regardless of the treatment condition, the average tax rate after numerical communication is higher than the average ideal tax rate before numerical communication.

5.2 Regression analysis

Random effect regression with robust standard errors is used to estimate the effect of fiscal leakage on subjects' ideally preferred tax rate and their final vote choice. In order to account for subjects' rational prediction under the presumption of fully egoistic preferences, the regression models include two dummy variables accounting for whether subjects should vote for $\tau = 100\%$ or $\tau = 0\%$ (H1). The rational prediction indifference serves as the reference category. The model specification controls for age, gender, subjects' field of study and subjects self-reported left right ideology. In addition each model includes a dummy variable accounting for subject pool effects, since the experiments were conducted at two different laboratories.[4]

For each of the two dependent variables, subjects' ideally preferred tax rate (Table 3) and subjects' final vote on tax rate (Table 4), we specify five regression models. Models 1 uses a simple dummy measure for treatments including a fiscal leakage in order to test H2. Model 2 includes a set of dummies specifying the size of the leakage (5%, 20% or 60%). The no leakage treatment serves as the references category. Model 3-4 serve to test H3 on whether the leakage effect is conditional on subjects' egotistic preferences. Therefore, Model 3 is estimated on the sample of subjects which are predicted to vote for $\tau = 0\%$ and Model 4 is estimated on the sample of subjects predicted to vote for $\tau = 100\%$. The last model includes a multiplicative interaction term between self-reported right-left ideology and the leakage dummy, in order to test H4 on whether the fiscal leakage effect is conditioned by subjects partisan orientation (Model 5).

The median voter prediction is qualitatively supported by our data (H1). Subjects whose

[4]The inclusion of period fixed effects does not alter any of the substantive findings.

Table 3: Ideally preferred tax rate

	Model 1 Ideal	Model 2 Ideal	Model 3 Ideal	Model 4 Ideal	Model 5 Ideal
Median voter					
$\tau = 0\%$ (Dummy)	-0.244***	-0.243***			-0.244***
	[0.04]	[0.04]			[0.04]
$\tau = 100\%$ (Dummy)	0.113***	0.113***			0.113***
	[0.04]	[0.04]			[0.04]
System inefficiency					
Leak Dummy	-0.0894***				-0.0836
	[0.03]				[0.10]
Leak 5%		-0.103***	-0.0688*	-0.155***	
		[0.03]	[0.04]	[0.04]	
Leak 20%		-0.0543*	-0.0498	-0.0641*	
		[0.03]	[0.04]	[0.04]	
Leak 60%		-0.112***	-0.0804**	-0.160***	
		[0.03]	[0.04]	[0.05]	
Partisan orientation					
Right Left (RL)	0.214***	0.220***	0.259***	0.101	0.221*
	[0.08]	[0.08]	[0.09]	[0.10]	[0.12]
RL x Leak Dummy					-0.00920
					[0.16]
Controls					
Female	0.00743	0.00952	0.0488*	-0.0559*	0.00755
	[0.02]	[0.02]	[0.03]	[0.03]	[0.02]
Age	-0.000195	-0.000739	0.00480	-0.00719**	-0.000201
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Natural sciences	0.0583	0.0585	0.0138	0.0978	0.0582
	[0.05]	[0.05]	[0.05]	[0.08]	[0.05]
Social sciences	0.0237	0.0270	0.0302	0.0531	0.0235
	[0.04]	[0.04]	[0.05]	[0.07]	[0.04]
Business sciences	0.0230	0.0288	0.00974	0.0882	0.0229
	[0.04]	[0.04]	[0.05]	[0.07]	[0.04]
Other	0.0167	0.0137	0.0279	0.0194	0.0165
	[0.04]	[0.04]	[0.05]	[0.07]	[0.04]
Subject pool	-0.0245	-0.0239	-0.0183	-0.0424	-0.0246
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]
Constant	0.508***	0.515***	0.0715	0.911***	0.504***
	[0.11]	[0.11]	[0.11]	[0.12]	[0.11]
Observations	2600	2600	1544	960	2600
Sample	All	All	$\tau = 0\%$	$\tau = 100\%$	All
R2 within	0.265	0.265	0.001	0.001	0.265
R2 overall	0.249	0.252	0.0424	0.0825	0.249
R2 between	0.224	0.231	0.0633	0.0904	0.224

Notes. Random effects regression with robust standard errors. Dependent variable: Individually preferred tax rate from (0-1). Robust standard errors in brackets. $^{*}p \leq 0 > .1$, $^{**}p \leq 0.05$,$^{***}p \leq 0.01$.

egoistic preferences is to vote for $\tau = 0$ prefer an ideal tax rate that is 24.3 percentage points lower than the ideally preferred tax rate of subjects that are predicted to be indifferent, and 21.3 percentage points lower in the final vote (Model 1 in Table Table 3 and Table 4). Subjects whose egoistic preferences is to vote for $\tau = 100$ have a 11.4 percentage points higher ideally preferred tax rate than subjects who are predicted to be indifferent. Having an egoistic preference to vote

Table 4: Finally preferred tax rate

	Model 1 Final	Model 2 Final	Model 3 Final	Model 4 Final	Model 5 Final
Median voter					
$\tau = 0\%$ (Dummy)	-0.213***	-0.208***			-0.214***
	[0.03]	[0.03]			[0.03]
$\tau = 100\%$ (Dummy)	-0.00241	-0.00523			-0.00330
	[0.03]	[0.03]			[0.03]
System inefficiency					
Leak Dummy	-0.179***				-0.067
	[0.02]				[0.08]
Leak 5%		-0.149***	-0.103***	-0.204***	
		[0.03]	[0.03]	[0.03]	
Leak 20%		-0.109***	-0.0816**	-0.143***	
		[0.03]	[0.04]	[0.04]	
Leak 60%		-0.283***	-0.254***	-0.306***	
		[0.03]	[0.03]	[0.04]	
Partisan orientation					
Right Left (RL)	0.116*	0.147**	0.194***	0.0461	0.244**
	[0.07]	[0.06]	[0.08]	[0.08]	[0.10]
RL x Leak Dummy					-0.179
					[0.13]
Controls					
Female	0.010	0.017	0.034	-0.021	0.012
	[0.02]	[0.02]	[0.02]	[0.03]	[0.02]
Age	0.0004	-0.001	0.0003	-0.003	0.0003
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Natural sciences	0.0401	0.0402	0.00278	0.0585	0.0393
	[0.04]	[0.04]	[0.05]	[0.06]	[0.04]
Social sciences	-0.00819	0.00657	-0.0137	0.0347	-0.0118
	[0.04]	[0.04]	[0.04]	[0.05]	[0.04]
Business sciences	-0.00883	0.0140	-0.0404	0.0872	-0.0115
	[0.04]	[0.04]	[0.04]	[0.06]	[0.04]
Other	0.0280	0.0263	0.0128	0.0430	0.0247
	[0.04]	[0.04]	[0.04]	[0.05]	[0.04]
Subject pool	-0.0281	-0.0251	-0.0233	-0.0594**	-0.0298
	[0.02]	[0.02]	[0.03]	[0.03]	[0.02]
Constant	0.714***	0.721***	0.436***	0.854***	0.641***
	[0.10]	[0.09]	[0.10]	[0.11]	[0.10]
Observations	2600	2600	1544	960	2600
Sample	All	All	$\tau = 0\%$	$\tau = 100\%$	All
R2 within	0.106	0.106	0.001	0.001	0.106
R2 overall	0.180	0.208	0.102	0.121	0.181
R2 between	0.312	0.391	0.187	0.196	0.316

Notes. Random effects regression with robust standard errors . Dependent variable: Finally tax rate voted for (0-1). Robust standard errors in brackets. $^{*}p \leq 0 > .1$, $^{**}p \leq 0.05$,$^{***}p \leq 0.01$.

for $\tau = 100$, however, has no effect on the final vote choice, indicating that vote preferences have changed after numerical communication phase. The median voter prediction is an important determinant of subjects vote choice. Estimating the effect of the two median voter prediction dummies in the ideally preferred tax rate and the finally choosen tax rate without any controls yield an overall R2 of 22,8 (ideal) and 12,5 (final). However, the estimation results also show that a very substantive share of voting behavior deviates from the median voter prediction (also see

Appendix Figure 5.

In line with H2, fiscal leakage is associated with an 8.9 percentage point lower ideally preferred tax rate and a 17.9 percentage point lower tax rate in subjects' final vote choice (Model 1 in Table 3 and Table 4). Looking more specifically at the effect of leakages of different sizes largely confirms findings from the descriptive analysis. A 60% leakage is associated with the strongest reduction in the ideally preferred (-11.2 percentage points) and final vote choice (-28.3 percentage points). A 5% leakage is associated with a 10.3 percentage point lower ideally preferred tax rate and a 14.9 percentage point lower tax rate in subjects' final vote choice (Model 2 in Table 3 and Table 4). In both instances, the effect size of the 5% leakage is smaller than the 20% leakage and statistically significant at a lower level. Again, this pattern supports the notion that a small and medium leakage unfold to have an almost similar impact on subjects' final vote choice.

There is no evidence in favor of H3. Regardless of whether subjects' egoistic preference is to vote for $\tau = 0$ or $\tau = 100$ (Model 3 and 4 in Table 3 and Table 4), fiscal leakage is associated with a lower tax rate. Again, the 60% leakage is associated with the strongest reduction in the ideally preferred and finally chosen tax rate. Thus, subjects whose egoistic preference is to vote for $\tau = 0$ do not respond systematically different towards fiscal leakage than subjects whose egoistic preference is to vote for $\tau = 100$. In terms of effect size, coefficients for the 5% and 60% leakage double in size on the $\tau = 100$ sample compared to the $\tau = 0$ sample. Therefore, if anything, fiscal leakage does not foster "rich" subjects to vote against redistribution as it rather prevents the "poor" from voting for higher redistribution.

The effect of subjects' self-reported right-left orientation is twofold. First, subjects' self-reported partisan orientation helps to explain subjects' voting behavior, as there is robust evidence that subjects who consider themselves left-leaning vote for higher redistributive taxation: plus 16.7 percentage points in the case of the ideally preferred tax rate and plus 11.3 percentage points on subjects' final vote choice (Model 2 in Table Table 3 and Table 4). The overall pattern suggests that the effects of subjects' partisan orientation on the preferred tax rate gets slightly smaller after the stage of numerical communication. But still, subjects' self-reported ideological orientation exerts a persistent effect on subjects' vote choice. Only in the split sample Model 4 (in Table 3 and Table 4), which considers only those subjects that are predicted to vote for $\tau = 100$, subjects' self-reported partisan orientation has no effect. Second, contrary to H4, the effect of the leakage dummy is not conditioned by subjects' self-reported orientation (Model 5). This means that even a strong leftist partisan orientation does not immunize subjects against the fiscal leakage effect.

5.3 Robustness

In order to test the robustness of the effect of system inefficiency on the individually preferred and collectively agreed tax rate, we run a series of auxiliary regressions in which the three leakage

Table 5: Testing leakages of different size against no leakage treatment

	Model 1 Ideal	Model 2 Ideal	Model 3 Ideal	Model 4 Final	Model 5 Final	Model 6 Final
Median voter						
$\tau = 0\%$	-0.244***	-0.256***	-0.250***	-0.211***	-0.221***	-0.228***
	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.04]
$\tau = 100\%$	0.115***	0.125***	0.116***	-0.000426	0.00359	0.0102
	[0.04]	[0.04]	[0.04]	[0.03]	[0.03]	[0.03]
System inefficiency						
Leak 5%	-0.113***			-0.153***		
	[0.03]			[0.03]		
Leak 20%		-0.0374			-0.0917***	
		[0.03]			[0.03]	
Leak 60%			-0.108***			-0.271***
			[0.03]			[0.03]
Partisan orientation						
Right Left (RL)	0.238***	0.202*	0.249**	0.143**	0.201**	0.211***
	[0.09]	[0.11]	[0.10]	[0.07]	[0.09]	[0.07]
Observations	1400	1400	1400	1400	1400	1400
R2 within	0.277	0.291	0.249	0.119	0.126	0.136
R2 overall	0.264	0.251	0.286	0.163	0.144	0.321
R2 between	0.240	0.171	0.344	0.274	0.185	0.576

Notes. Random effects regression with robust standard errors. Dependent variable: Ideal tax rate (Model 1-3), Finally tax rate voted for (Model 4-6) [0,1]. Full set of control variables included but not reported. Robust standard errors in brackets. $^{*}p \leq 0 > .1$, $^{**}p \leq 0.05$,$^{***}p \leq 0.01$.

treatments are tested against the no leakage treatment separately (Table 5). In addition, these auxiliary regressions test the robustness of the median voter prediction and the role of self-reported partisan orientation. The robustness analysis presented in Table 5 confirms previous findings on the leaky bucket effect (H2). Models 1 and 3 show that a leakages of 5% and 60% are associated with a 11 percentage points decrease in the ideally preferred tax rate. The 20% leakage fails to exert a statistically significant effect on the ideally preferred tax rate. With respect to the finally chosen tax rate, all three leakage dummies exert a significant negative effect (Model 4-6).

Moreover, Table 5 also confirms previous findings on the median voter prediction (H1) and the role of self-reported partisan orientation. Subjects whose egoistic preference is to vote for $\tau = 0$ prefer an ideal tax rate that is about 25 percentage points lower than the ideally preferred tax rate of subjects that are predicted to be indifferent (Model 1-3) and 22 percentage points lower in the final vote (Model 4-6). Subjects whose egoistic preference is to vote for $\tau = 100$ have a 11 percentage points higher ideally preferred tax rate than subjects who are predicted to be indifferent (Model 1-3), while the rational prediction $\tau = 100$ has no effect on the finally chosen tax rate (Model 4-6). If subjects self-reported partisan orientation increases from its minimum (right) to its maximum (left), the ideally preferred tax rates increases by about 20 to 25 percentage points (Model 1-3), and the finally chosen tax rate by 14 to 21 percentage points (Model 4-6).

Table 6: Testing leakages on the probability to vote rational (yes/no)

	Model 1 Rat.Ideal	Model 2 Rat.Ideal	Model 3 Rat.Ideal	Model 4 Rat.Ideal	Model 5 Rat.Final	Model 6 Rat.Final	Model 7 Rat.Final	Model 8 Rat.Final
Median voter								
$\tau = 0\%$	2.020***	2.020***			2.115***	2.102***		
	[0.13]	[0.13]			[0.13]	[0.13]		
System inefficiency								
Leak Dummy	-0.690***				-0.937***			
	[0.24]				[0.15]			
Leak 5%		-0.906***	-0.0615	-1.635***		-1.072***	-0.642*	-1.357***
		[0.30]	[0.49]	[0.38]		[0.18]	[0.39]	[0.24]
Leak 20%		-0.383	-0.100	-0.467		-0.671***	-0.575	-0.790***
		[0.30]	[0.50]	[0.38]		[0.18]	[0.38]	[0.24]
Leak 60%		-0.785**	-0.244	-1.303***		-1.095***	-0.479	-1.790***
		[0.31]	[0.49]	[0.44]		[0.21]	[0.37]	[0.32]
Partisan orientation								
Right Left (RL)	-0.021	-0.000	-1.019	1.044	-0.561	-0.533	-2.483***	0.426
	[0.67]	[0.67]	[1.09]	[0.87]	[0.42]	[0.42]	[0.85]	[0.56]
Observations	2504	2504	1544	960	2504	2504	1544	960
Sample	All	All	$\tau = 0\%$	$\tau = 100\%$	All	All	$\tau = 0\%$	$\tau = 100\%$
Log likelihood	-1224.6	-1223.2	-610.6	-565.1	-1080.1	-1077.5	-441.6	-607.0

Notes. Random effects logit model with robust standard errors. Dependent variable: Ideally preferred tax = rational prediction (Model 1-4), Finally chosen tax rate = rational prediction (Model 5-8). Full set of control variables included but not reported. Robust standard errors in brackets. $^{*}p \leq 0 > .1$, $^{**}p \leq 0.05$,$^{***}p \leq 0.01$.

Another angle to explore the effect of system inefficiency on subjects' voting behavior in the simplified MR Model is to focus on whether subjects meet their median voter prediction. In other words, the question is whether inducing system inefficiency make subjects more likely to fail in choosing their rationally predicted tax rate. To this end, we have constructed two new binary dependent variables which take the value 1 if subjects' predicted tax rate is identical with its ideally preferred tax rate, resp. its finally chosen tax rate, and 0 otherwise. Since there is no point prediction for subjects whose rational prediction is to be indifferent, we exclude these subjects from the sample.[5]

For each of the two binary dependent variables, we specify four regression models (see Table 6). Models 1 and 5 use a simple dummy measure for treatments including a fiscal leakage. Models 2 and 6 include a set of dummies specifying the size of the leakage (5%, 20% or 60%). Models 3 and 7 are estimated on the sample of subjects who are predicted to vote for $\tau = 0\%$ and Models 4 and 8 are estimated on the sample of subjects predicted to vote for $\tau = 100\%$. First, the positive coefficients for the $\tau = 100\%$ dummy simply shows that subjects who are predicted to vote for $\tau = 100\%$ are more likely to meet this prediction than subjects who are predicted to vote for $\tau = 0\%$. Second, system inefficiency decreases the likelihood that subjects prefer (Model 1) and choose the tax rate they should prefer and choose under the presumption of rational egoistic preferences (Model 5). This effect is confirmed if the leakage effect is decomposed by its size (see Model 2 and 6). Finally, comparing the effect of the leakage dummies on the two samples indicates that, if anything, its subjects who are predicted to vote $\tau = 0\%$ that are most likely to deviate from the rational prediction when system inefficiency occurs. This implies that these subjects vote against their egoistic preference and accept lower tax rates due to system inefficiency. Subjects partisan orientation is relevant for the preferred and finally chosen tax rate (see Table 3 and Table 4),but it does not help to explain why the subjects preferred and finally chosen tax rate is identical with their rational expectation.

6 Conclusions

There is a substantial gap between rational median voter predictions of redistribution and empirical level of redistribution in macro-comparative research (e.g. Alesina and Giuliano, 2011) as well as experimental explorations of the MR model. When deciding upon redistributive taxation, subjects' vote choice tends to depend on multiple, often conflicting, motives including fairness considerations (e.g. Kittel et al., 2015), group loyalty Klor and Shayo (2010) risk preferences (e.g. Durante and van der Weele, 2014) and inequality aversion (e.g. Tyran and Sausgruber, 2006). This study has shown that system inefficiency provides another component to explain why empirical levels of redistribution may fall below the rationally predicted level.

[5] Alternatively, instead of excluding rationally indifferent voters one could set their predicted tax rate to $\tau = 50\%$. Doing so does not alter any of the substantive findings presented in Table 6.

The introduction of inefficiency biases individual preferences for redistribution downward. This distortion outlives the process of numerical communication, and is therefore also reflected in the collectively agreed tax rate. The effect of system inefficiency on redistribution is significant but not as strong as the rational egoistic prediction states. Concerning the effect of the size of the leakage on lowering individual and collective preferences for redistribution, the experimental results suggest that even a little bit of inefficiency can cause major declines in preferred tax rates. The size of the leak, however, cannot be shown as a direct function on the tax rate with used rates of 5%, 20% and 60% of loss to the system, since an inefficiency factor of 20% is followed by very unstable tax preferences.

The robustness analysis shows that system inefficiency exerts a unique negative effect on redistributive preferences. First, the negative effect remains after controlling rational egoistic preferences as well as ideological preferences. We find no evidence that the leakage effect of preferences for redistribution is moderated by partisan ideology. Second, there is some tentative evidence that it is moderated by subjects rational predictions, meaning that those who should rationally vote for $\tau = 100\%$ accept lower tax rates in the face of system inefficiency. Third, the leakage effect is not reduced through communication. On the contrary, the leakage effects tends to be stronger in the final vote choice.

These findings can have important policy implications. Moving beyond the MR model, the degree of efficiency with which welfare states transfer income from the rich to the poor is usually hard to measure. As we have seen, however, voters strongly respond to such measures. Skillful politicians might take advantage of this fussiness and exaggerate system inefficiency in order to stir voters fear of system inefficiency as a means to make voters that should be rationally in favor of redistribution, vote against it. Thus, from the policy-making perspective, presenting and reproducing a participial negative image of the welfare state and its capacity to fulfill its task can be an effective measure to make voters irrationally vote against redistribution.

7 Acknowledgments

This work was supported by German Research Foundation (DFG, LO-2024/2-1) “Opinion Dynamics and Collective Decision” and German Research Foundation (DFG, FOR 2104, TE1022/2-1) study group on “Need-Based Justice and Distributive Procedures”. The DFG is not responsible for any of the findings reported here.

References

Agranov, Marina and Thomas R. Palfrey (2015), "Equilibrium tax rates and income redistribution: A laboratory study." *Journal of Public Economics*, 130, 45–58.

Alesina, Alberto and Paola Giuliano (2011), "Preferences for redistribution." In *Handbook of Social Economics* (Jess Benhabib, Alberto Bisin, and Matthew Jackson, eds.), 93–132, North Holland, Amsterdam.

Alesina, Alberto and Eliana La Ferrara (2005), "Preferences for redistribution in the land of opportunities." *Journal of Public Economics*, 89, 897–931.

Amiel, Yoram, John Creedy, and Stan Hurn (1999), "Measuring attitudes towards inequality." *Scandinavian Journal of Economics*, 101, 83–96.

Atkinson, Anthony B. (1970), "On the measurement of inequality." *Journal of Economic Theory*, 2, 244–263.

Barber, B., P. Beramendi, and E. Wibbels (2013), "The behavioral foundations of social politics: Evidence from surveys and a laboratory democracy." *Comparative Political Studies*, 46, 1155–1189.

Barber, Pablo Beramendi, Benjamin R. and Erik Wibbels (2013), "The behavioral foundations of social politics: Evidence from surveys and a laboratory democracy." *Comparative Political Studies*, 46, 1155–1189.

Baron, Jonathan, Burcu Gürçay, Adam B. Moore, and Katrin Starcke (2012), "Use of a rasch model to predict response times to utilitarian moral dilemmas." *Synthese*, 189, 107–117.

Barone, Guglielmo and Sauro Mocetti (2011), "Tax morale and public spending inefficiency." *International Tax and Public Finance*, 18, 724–749.

Beckman, Steven R., John P. Formby, and W. James Smith (2003), "Efficiency, equity and democracy: experimental evidence on okun's leaky bucket."

Blank, Rebecca M. (2002), "Can equity and efficiency complement each other?" *Labour Economics*, 9, 451–468.

Bock, Olaf, Ingmar Baetge, and Andreas Nicklisch (2014), "hroot – hamburg registration and organization online tool." *European Economic Review*, 71, 117–12.

Durante, Putterman L., R. and J. van der Weele (2014), "Preferences for redistribution and perception of fairness: an experimental study." *Journal of the European Economic Association*, 12, 1059–1086.

Elster, Jon (1989), "Social norms and economic theory." *Journal of Economic Perspectives*, 3, 99–117.

Engelmann, Dirk and Martin Strobel (2004), "Inequality aversion, efficiency, and maximin preferences in simple distribution experiments." *American Economic Review*, 94, 857–869.

Esarey, J., T. Salmon, and C. Barrileaux (2012a), "What motivates political preferences? self-

interest, ideology, and fairness in laboratory democracy." *Economic Inquiry*, 50, 604–624.

Esarey, J., T. Salmon, and C. Barrilleaux (2012b), "Social insurance and income redistribution in a laboratory experiment." *Political Research Quarterly*, 65, 685–698.

Fehr, Ernst and Jean-Robert Tyran (2005), "Individual irrationality and aggregate outcomes." *The Journal of Economic Perspectives*, 19, 43–66.

Feldman, Stanley and John Zaller (1992), "The political culture of ambivalence: Ideological responses to the welfare state." *American Journal of Political Science*, 36, 268.

Festinger, Leo (1957), *A Theory of cognitive dissonance*. Stanford University Press, Stanford.

Fischbacher, Urs (2007), "z-tree: Zurich toolbox for ready-made economic experiments." *Experimental Economics*, 10, 171–178.

Gouyette, Claudine and Pierre Pestieau (1999), "Efficiency of the welfare state." *Kyklos*, 52, 537–553.

Greiner, Ben (2015), "Subject pool recruitment procedures: organizing experiments with orsee." *Journal of the Economic Science Association*, 1, 114–125, URL `http://dx.doi.org/10.1007/s40881-015-0004-4`.

Hayek, Friedrich (1976), *Law, Legislation, and Liberty. Vol. II: The Mirage of Social Justice*. Routledge, London.

Jacoby, William G. (1994), "Public attitudes toward government spending." *American Journal of Political Science*, 38, 336.

Jaeger, M. M. (2008), "Does left-right orientation have a causal effect on support for redistribution? causal analysis with cross-sectional data using instrumental variables." *International Journal of Public Opinion Research*, 20, 363–374.

Kahneman, D. Slovic (1982), "P. & tversky, a." In *Judgment Under Uncertainty: Heuristics and Biases* (Daniel Kahneman, Paul Slovic, and Amos Tversky, eds.), Cambridge University Press.

Kittel, Bernhard, Fabian Paetzel, and Stefan Traub (2015), "Competition, income distribution, and the middle class: An experimental study." *Journal of Applied Mathematics*, 2015, 1–15.

Klor, Esteban F. and Moses Shayo (2010), "Social identity and preferences over redistribution." *Journal of Public Economics*, 94, 269–278.

Lorenz, Jan, Fabian Paetzel, and Markus Tepe (2015), "Just don't call it tax! framing in an experiment on voting and redistribution."

Mair, Peter (2007), "Left-right orientations." In *The Oxford Handbook of Political Behavior* (Russel J. Dalton and Hans-Dieter Klingemann, eds.), 206–222, Oxford University Press, Oxford.

Meltzer, Allan H. and Scott F. Richard (1981), "A rational theory of the size of government." *The University Chicago Press*, 89, 914–927.

Nozick, Robert (1976), *Anarchy, State, and Utopia.* Basic Books, New York.

OECD (2016), *OECD Income Inequality and Poverty*. OECD.Stat, Paris.

OECD (2017), *OECD Social expenditure database*. OECD.Stat, Paris.

Okun, Arthur M. (1975), *Equality and efficiency: The big tradeoff*. The Godkin lectures on the essentials of free government and the duties of the citizen, Brookings Inst, Washington, DC.

Perotti, Roberto (1996), "Income distribution, democracy, and growth: What the data say." *Journal of Economic Growth*, 1, 149–187.

Persson, Torsten and Guido Tabellini (1994), "Is inequality harmful to growth?" *American Economic Review*, 84, 601–621.

Pirttila, Jukka and Rope Uusitalo (2010), "A leaky bucket ind the real world: Estimating inequality aversion using survey data." *Economica*, 77, 60–76.

Scheepers, P. (2005), "Who cares for the poor in europe? micro and macro determinants for alleviating poverty in 15 european countries." *European Sociological Review*, 21, 453–465.

Scheve, Kenneth and David Stasavage (2016), *Taxing the rich. A History of Fiscal Fairness in the United States and Europe*. Princeton University Press, Princeton.

Scott, R. E. Michelbach P. A., J. T. Matland and B. H. Bornstein (2001), "Just deserts: An experimental study of distributive justice norms." *merican Journal of Political Science*, 45, 749–767.

Scruggs, Detlef Jahn, Lyle and Kati Kuitto (2014), *Comparative Welfare Entitlements Dataset 2. Version 2014-03*. University of Connecticut and University of Greifswald, Connecticut.

Seidl, Christian (2001), "Inequality measurement and the leaky-bucket paradox." *Economics Bulletin*, 4, 1–7.

Stegmueller, D., P. Scheepers, S. Rossteutscher, and E. de Jong (2012), "Support for redistribution in western europe: Assessing the role of religion." *European Sociological Review*, 28, 482–497.

Survey, European Social (2008), *European Social Survey Round 4 Data. Data file edition 4.4*. Norwegian Centre for Research Data, Norway.

Tversky, Amos and Daniel Kahneman (1991), "Loss aversion in riskless choice: a reference-dependent model." *Quarterly Journal of economics*, 106, 1039–1061.

Tyran, Jean-Robert and Rupert Sausgruber (2006), "A little fairness may induce a lot of redistribution in democracy." *European Economic Review*, 50, 469–485.

8 Appendix

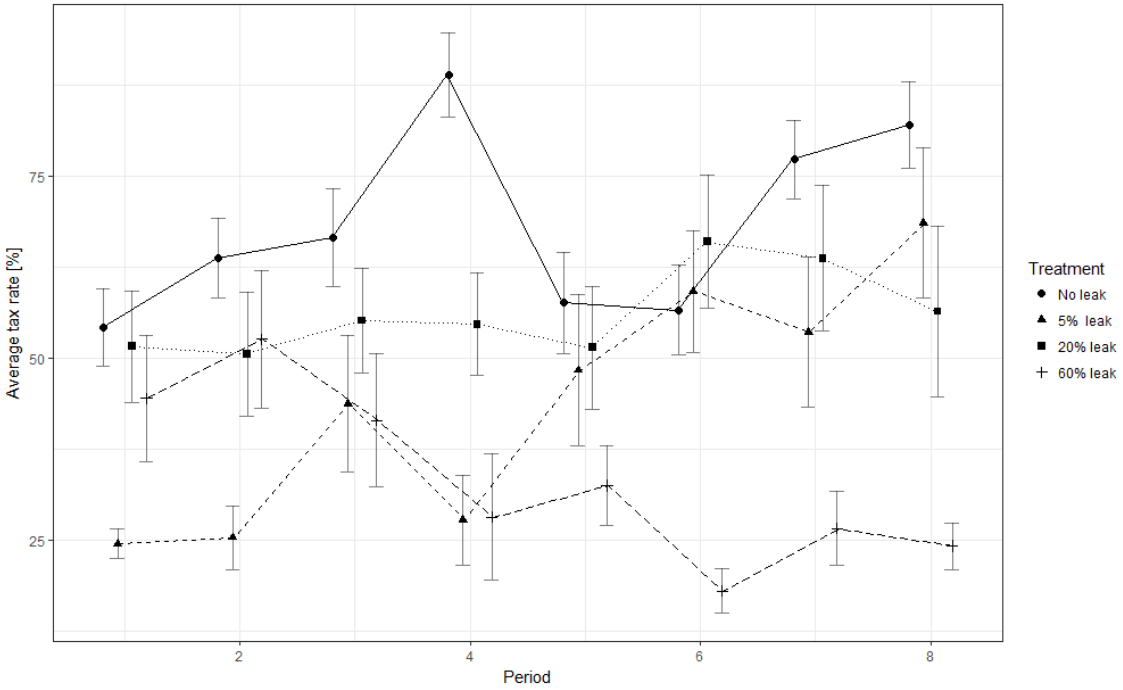

Figure 4: Average tax rate over rounds.

Table 7: Mean rational egoistic preferences and mean ideally prefered tax rate

Leakage	D1	D2	D3	D4	D5	D6	D7	D8	mean
$\lambda = 0$	0.5	0.5	0.6	0.7	0.4	0.4	0.5	0.5	0.51
τ	0.64	0.66	0.74	0.86	0.57	0.60	0.76	0.79	
$\lambda = 0.05$	0.4	0.4	0.6	0.6	0.4	0.4	0.4	0.4	0.45
τ	0.51	0.50	0.53	0.84	0.41	0.57	0.41	0.47	
$\lambda = 0.20$	0.4	0.4	0.4	0.6	0.2	0.4	0.2	0.4	0.38
τ	0.46	0.51	0.61	0.69	0.56	0.52	0.49	0.59	
$\lambda = 0.60$	0.0	0.2	0.0	0.6	0.0	0.2	0.0	0.4	0.17
τ	0.33	0.30	0.33	0.56	0.32	0.32	0.21	0.38	

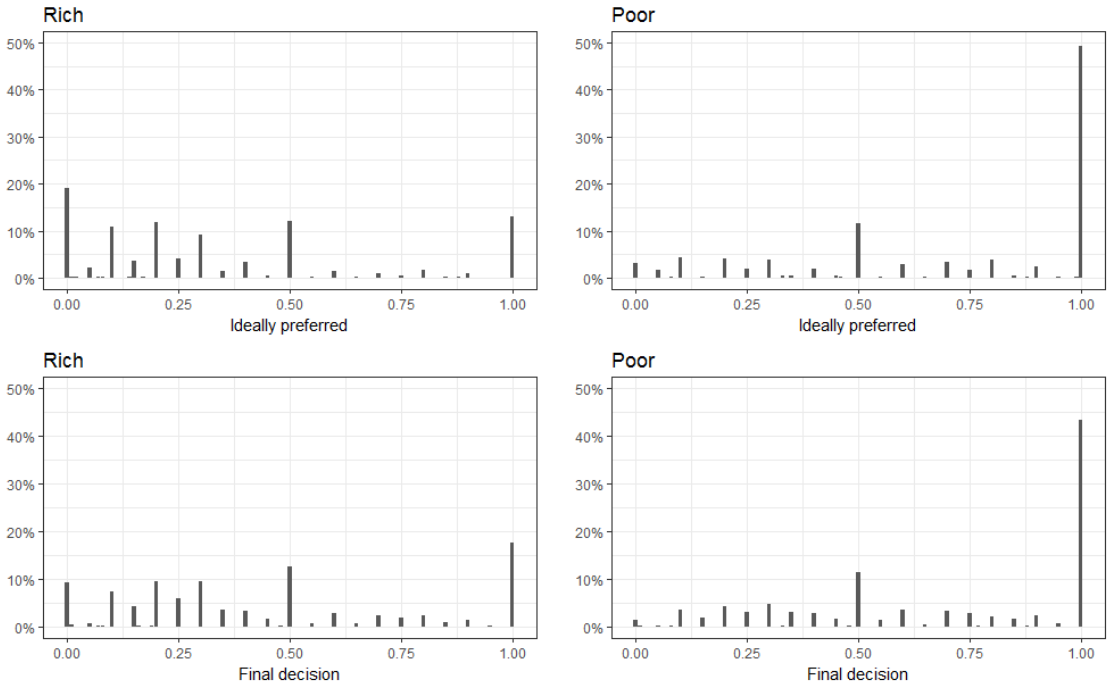

Figure 5: Preferred tax rate by rational prediction.

Table 8: Descriptive

	Obs.	Mean	Std. Dev.	Min	Max
Dependent Vars.					
Ideally prefered (0-1)	2,600	0.49	0.38	0	1
Finaly chosen (0-1)	2,600	0.55	0.35	0	1
Rat.Ideal [0,1]	2,600	0.30	0.46	0	1
Rat.Final [0,1]	2,600	0.22	0.41	0	1
Median Voter					
$\tau = 0\%$ (Rich Dummy)	2,600	0.59	0.49	0	1
$\tau = 100\%$ (Poor Dummy)	2,600	0.37	0.48	0	1
$\tau = 50\%$ (Indifferent Dummy)	2,600	0.04	0.19	0	1
System inefficency					
Leak dummy	2,600	0.69	0.46	0	1
Leak 5% dummy	2,600	0.23	0.42	0	1
Leak 20% dummy	2,600	0.23	0.42	0	1
Leak 60% dummy	2,600	0.23	0.42	0	1
Partisan orientation					
Right to Left (0-1)	2,600	0.64	0.17	0.1	1
Controls					
Female	2,600	0.59	0.49	0	1
Age	2,600	25.08	5.22	17	66
Natural sciences	2,600	0.14	0.34	0	1
Social sciences	2,600	0.25	0.43	0	1
Business sciences	2,600	0.25	0.43	0	1
Other	2,600	0.29	0.45	0	1
Subject pool	2,600	0.51	0.50	0	1

DFG Research Group 2104
– Latest Contributions

2017:

Neuhofer, Sabine, Paetzel, Fabian, Schwaninger, Manuel and Traub, Stefan: Recognition of needs in a dictator game: Experimental evidence on information-sensitive giving behavior. Working Paper Nr. 2017-10.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-10.pdf

Chugunova, Marina, Luhan, Wolfgang and Nicklisch, Andreas: When to Leave the Carrots for the Sticks: On the Evolution of Sanctioning Institutions in Open Communities. Working Paper Nr. 2017-09.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-09.pdf

Tepe, Markus, Lutz, Maximilian, Paetzel, Fabian and Lorenz, Jan: Leaky bucket in the lab. The effect of system inefficiency on voting on redistribution. Working Paper Nr. 2017-08.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-08.pdf

Pritzlaff-Scheele, Tanja and Zauchner, Patricia: Meeting Needs. An Experimental Study on Need-Based Justice and Inequality. Working Paper Nr. 2017-07. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-07.pdf

Paetzel, Fabian, Lorenz, Jan and Tepe, Markus: Transparency diminishes framing-effects in voting on redistribution: Some experimental evidence. Working Paper Nr. 2017-06.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-06.pdf

Schwaninger, Manuel, Neuhofer, Sabine and Kittel, Bernhard: Offers Beyond the Negotiating Dyad: Including the Excluded jn a Network Exchange Experiment. Working Paper Nr. 2017-05.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-05.pdf

Kittel, Bernhard, Neuhofer, Sabine and Schwaninger, Manuel: Need-based Justice in Social Exchange Networks. Working Paper Nr. 2017-04. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-04.pdf

Diederich, Adele and Wyszynski, Marc: Need, framing, and time constraints in risky decision making. Working Paper Nr. 2017-03. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-03.pdf

Kittel, Bernhard, Kanitsar, Georg and Traub, Stefan: Knowledge, Power, and Self-interest. Working Paper Nr. 2017-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-02.pdf

Traub, Stefan and Krügel, Jan Philipp: Risk Taking and the Welfare State: Some Experimental Evidence. Working Paper Nr. 2017-01. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-01.pdf

2016:

Guo, Lisa, Trueblood, Jennifer S. and Diederich, Adele: Thinking Fast Increases Framing Effects in Risky Decision-making. Working Paper Nr. 2016-04. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-04.pdf

Paetzel, Fabian and Sausgruber, Rupert: Entitlements and loyalty in groups: An experimental study. Working Paper Nr. 2016-03. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-03.pdf

Nicklisch, Andreas, Grechenig, Kristoffel and Thöni, Christian: Information-sensitive Leviathans. Working Paper Nr. 2016-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2016-02.pdf

DFG Research Group 2104 at Helmut Schmidt University Hamburg
http://needs-based-justice.hsu-hh.de