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Need-Based Justice and Distribution Procedures

Knowledge, Power, and Self-interest

Bernhard Kittel, Georg Kanitsar and Stefan Traub

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Knowledge, Power, and Self-interest

Bernhard Kittel,[a*] Georg Kanitsar,[a] Stefan Traub[b]

[a]*Department of Economic Sociology, University of Vienna, Austria & FOR 2104*
[b]*Department of Economics, Helmut-Schmidt-University, Hamburg, Germany & FOR 2104*

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Abstract The paper reports the results of a laboratory experiment assessing the impact of social position (endowment) and power (structurally advantaged or disadvantaged network positions) on redistributive decisions, which involve a classical efficiency-equality trade-off. The experiment involves three decision conditions: veil of ignorance, informed dictator, and majority vote. We use a three-person social-preference model in order to derive hypotheses on the effect of knowledge and power on tax choices. Our results confirm that disclosing the social position raises the measured self-interest (*Knowledge Effect*) and that mandating a majority vote results in concessions, the size of which depends on the player's structural position in the network (*Power Effect*).
Keywords: Redistribution, Power, Self-interest, Inequality, Network, Experiment

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*Corresponding author. Department of Economic Sociology, University of Vienna, Oskar-Morgenstern-Platz 1, 1090 Wien, Austria; phone +43–1–4277–38311, bernhard.kittel@univie.ac.at.

1 Introduction

Next to reciprocal relations and market exchange, redistribution is a fundamental mechanism of the economic integration of societies (Polanyi, 1957). Redistributive policies cancel out or alleviate differences in life chances and living standards by levying a tax on endowments and distributing the revenue among the members of the society. A stylized fact from the experimental literature reviewed in Section 2 is that revealed preferences for redistribution tend to be higher than would be predicted by self-interested utility maximization. Can we conclude from this observation that subjects are indeed altruistic (Fehr and Gintis, 2007)?

Given that there are notable differences in outcomes across experiments, we believe that such a conclusion would currently be premature. In an extensive examination of different potential determinants of preferences for redistribution, self-interest in those with low endowments, insurance motives, and social preferences have been found to play important roles in explaining high rates of taxation in small experimental societies. Durante, Putterman and van der Weele (2014, 1084) conclude, "not surprisingly, self-interest stands out as the dominant motive in the involved conditions. However, self-interest cannot explain the willingness of a large majority of subjects to sacrifice some earnings to increase equality of earnings among others in the disinterested decision-maker condition, nor can it explain greater reluctance to redistribute when aggregate earnings must be sacrificed (...)."

In this paper, we build on these results and explore the effect of societal conditions on demand for redistribution, as well as the relation between societal conditions and individual characteristics. We study the extent to which contextual and relational factors help shape variation in demand for redistribution. Next to social preferences, we focus on two additional factors that have been repeatedly highlighted as important determinants of redistribution, but, to our knowledge, have not yet been systematically studied in the context of one integrative experimental framework: social position and structural power. The social position of an individual corresponds to the relative standing in the income distribution, her endowment, and determines whether a particular member of society will benefit from redistribution. The structural power of an individual, derived from her position in a network, corresponds to her ability to enforce her will in a collective decision process.

In a nutshell, we expect that knowledge about her own social position and structural power in decision making will induce an individual to choose more selfish tax rates. We further test in how far these structural effects interact with individual characteristics, namely social preferences and risk attitudes. In order to explore these effects, we construct a single experimental design in which subjects are asked to state their preferred tax rate in a sequence of increasingly informed conditions, using a random lottery incentive scheme (Cubitt, Starmer and Sudgen, 1998). First, they have to state a preference behind the veil of ignorance (VOI). Second, they have to state a preference after they have been informed about their social position (INFO). Third, they are allocated to different power positions in three-node networks and have to collectively decide on a tax rate by majority rule (IMPL). One treatment uses a three-line network, which connects the three nodes by two edges. The central, powerful, position is a *Broker*, and we call the two outer positions *Takers*. The other treatment uses a triangle network in which all three nodes are connected by edges and structural power is equal on all three positions (Lovaglia et al., 1995; Braun and Gautschi, 2006). By varying the information condition in a within-subject design, we develop a direct and precise estimate of the effect of the informative content (uninformed, social position, power position) on the stated preferences and behaviors of subjects.

In Section 2, we first review the related literature in more detail, and then proceed in Section 3 to specify a model for redistribution under social preferences and a three-nodes network along with the theoretical expectations for distributive decisions derived for this network structure. Section 4 outlines the experimental design and Section 5 discusses findings. Section 6 concludes.

2 Related Literature

Preferences for redistribution vary across societies and along individual characteristics (Alesina and Giuliano, 2011; Clark and D'Ambrosio, 2015). According to cross-national empirical investigations, a country's welfare system moderates individual attitudes to redistribution. For example, liberal welfare regimes make class differences more salient, conservative regimes foster insider/outsider effects, and universalistic regimes support more egalitarian attitudes (Svallfors, 1997; Linos and West, 2003; Arts and Gelissen, 2001; van Oorschot, Reeskens and Meuleman, 2012). Furthermore, the economic regime has a long-lasting impact on preferences towards social policies that entail redistribution (Alesina and Fuchs-Schündeln, 2007) and the level of progressivity in a country's tax scheme moderates the relationship between individual income and redistributive preference (Beramendi and Rehm, 2016). In sum, the historical and cultural background of societies shapes citizens' perceptions of income inequality, their notion of a fair distribution and their demand for redistributive policies (Alesina and Glaeser, 2004).

At the individual level, preferences for redistribution are usually analyzed in terms of the standard model of self-interest (Meltzer and Richard, 1981).

Accordingly, redistribution is supported by individuals occupying societal positions below the mean income, while members of society above the mean income oppose redistribution. The empirical inadequacy of this explanation led to the inclusion of inter-temporal preferences in the standard model. An interest in social insurance against potential declines in income or a good prospect for upward mobility may alter the optimal level of redistribution (Moene and Wallerstein, 2001; Alesina and Giuliano, 2011; Benabou and Ok, 2001; Piketty, 1995). Other studies have further pointed at the role of other-regarding motives for redistribution, indicating an impact of fairness, reciprocity and equity concerns (Alesina and Angeletos, 2005; Fong, 2001). Findings from survey research support the idea that attitudes toward the welfare state are shaped by an individual's structural position in the societal stratification system and by her ideological perspective (d'Anjou, Steijn and Van Aarsen, 1995; Gelissen, 2000; Roosma, van Oorschot and Gelissen, 2014).

Individual redistributive preferences are highly sensitive to the context and the relationship between subjects. Under induced preference conditions, however, a clear preference for the equity principle combined with a floor constraint seems to emerge, conditional on an agent's relative contribution to the common good (Selten, 1987; Traub, Seidl and Schmidt, 2009; Balafoutas et al., 2013). On the individual level, although self-interest is regarded as the best predictor of distributional choices observed in incentivized experiments, many experimental participants show a concern for others' payoffs, attributed to a variety of motives such as inequality aversion, taste for efficiency and maximin preferences (Durante, Putterman and van der Weele, 2014; Engelmann and Strobel, 2004; Ackert, Martinez-Vazquez and Rider, 2007). Support for redistribution is higher if the determinants of success are perceived to be outside of the individual locus of control, such as an arbitrary allocation of endowments. If factors perceived to be inside the locus of control are regarded as the origin of distributional inequality, preferences for redistribution decrease as the pre-redistribution income is seen as a just desert (Krawczyk, 2010; Cappelen et al., 2013; Trhal and Radermacher, 2009).

The effect of an individual's information about her own income position on the demand for redistribution was studied in experiments testing the Rawlsian theory of justice (Rawls, 1971; Frohlich and Oppenheimer, 1992). In open group discussions justice principles combining the maximization of average income with a floor constraint were chosen most often. Decisions made without knowledge of income positions create more equal distributions, without, however, necessarily reflecting Rawlsian floor preferences. These decisions are partly driven by an interest in insurance against the risk of occupying a low-income position, but also by social preferences for equality (Herne and Suojanen, 2004; Schildberg-Hörisch, 2010).

Turning to redistributive group decisions, some evidence suggests that the equality principle is strongly endorsed in majoritarian bargaining contexts (Diermeier and Morton, 2005). Other results point toward more self-serving attitudes, which are only attenuated by insurance against losses that are not self-inflicted (Esarey, Salmon and Barrilleaux, 2012; Cabrales, Nagel and Rodríguez Mora, 2012). In groups, solidarity and in-group favoritism also influence the demand for redistribution (Bolle and Costard, 2015). Overall, as with individual preferences for redistribution, results of redistribution in groups are highly context-dependent, affected not just by institutional rules, but also by the structural composition of the group, for example the relative size of income classes (Höchtl, Sausgruber and Tyran, 2012).

In experiments on redistribution, structural power has thus far not received noteworthy attention. In double-blind dictator games, subjects endowed with more power, induced through the ability to determine final payoffs, and with more initial resources expect a greater share of a joint stock (Swope et al., 2008). Under certain bargaining conditions, their less powerful counterparts seem to accept such claims of "moral property rights" (Gächter and Riedl, 2005), although there are clear indications of self-serving bias (Gächter and Riedl, 2006).

In contrast to the literature on redistribution, structural power takes a prominent role in sociological network exchange theory. In a typical network exchange experiment subjects engage in bilateral exchange relations in which they divide a joint benefit. Power results from the position in the network and usually allows the agent to extract larger shares of the joint resource. Findings from network exchange seem to strongly support models based on the self-serving utility maximization principle (Willer and Emanuelson, 2008; Braun and Gautschi, 2006; Skvoretz and Willer, 1993). Only recently have social orientations and fairness identities entered the considerations of exchange theorists (Willer, Gladstone and Berigan, 2013; Savage et al., 2016). The effect of structural power on redistributive decisions in networks has, to our knowledge, not been studied yet.

Due to the wide variety of experimental conditions underlying these different perspectives, it is impossible to conclude whether the divergences are due to differences in design or whether they constitute a real theoretical puzzle. Despite extensive empirical and experimental research, the relative contribution of individual self-interest, other-regarding preferences, and contextual conditions to the development of preferences for redistribution and ensuing collective decisions with distributive implications is still insufficiently understood. Hence, building on experimental work on preferences for redistribution (Durante, Putterman and van der Weele, 2014), we consider the addition of social structure and power differences to be this paper's major contribution to the literature.

3 Model and Hypotheses

We start with a simple income-redistribution model with social preferences. In this model, utility-maximizing players with heterogeneous initial endowments reveal their preferences in terms of the weight they put on their own payoffs through the choice of a redistributive tax rate.

The next subsection gives an overview of the model and the experimental setup. Subsection 3.2 introduces the basic set-up. Subsection 3.3 derives first-order conditions for the optimum tax choice in INFO and VOI and gives a numerical example. The last subsection relates VOI and IMPL to INFO and introduces our hypotheses.

3.1 Overview

Figure 1 outlines the basic elements of our approach. We consider three decision conditions: veil of ignorance (VOI), informed dictator (INFO), and implemented tax rate (IMPL). The core of our model and reference condition of the experiment is the INFO condition. It is a variant of the dictator game (Kahneman, Knetsch and Thaler, 1986) in which one member of the society has the dictatorial power to set the preferred tax rate for the entire society. It has been shown in various experimental set-ups of the dictator game that players' preferences may include the benefits of others (Forsythe et al., 1994; Engel, 2011). Unlike common games like the ultimatum game (Güth, Schmittberger and Schwarze, 1982), in which a responder can reject the proposal made by a proposer, the dictator game does not involve any strategic interaction between players. Hence, in our opinion, INFO is best able to assess 'pure' social preferences, not influenced by any strategic consideration, and it therefore forms our benchmark scenario.

Figure 1 about here

The other two conditions operationalize two deviations from this 'pure' decision. In VOI players do not know their future income positions and therefore are assumed to act as involved but impartial dictators (Friedman, 1953; Harsanyi, 1953, 1955; Rawls, 1971). In IMPL the players have to collectively agree on a tax rate. To this purpose they submit their tax proposals to a majority vote after a phase of computer chat. The majority decision is accepted if at least two of the three group members enter the same tax rate. If the group members fail to coordinate, an inefficient default is implemented and the endowments of all players are cut by half. In order to generate power differences, communication takes place in two different network structures. In the EQUAL subtreatment, each player has a separate chat window for communication with each of the two fellow group members. In the UNEQUAL subtreatment, communication is restricted such that one *Broker* can communicate separately with each of the two other group members, whereas the two other members, the *Takers*, can only communicate with the *Broker*.

We argue that switching from both decision conditions, VOI and IMPL, to INFO will result in an increase in the share allotted to oneself, which we term 'Knowledge Effect' and 'Power Effect', respectively. Accordingly, the underlying mechanism unleashing measured self-interest in the switch from VOI to INFO is an increase in knowledge. Conversely, the mechanism containing measured self-interest in the switch from INFO to IMPL is a reduction in power. The reduction in power is assumed to depend on the structural position of the individual in the network.

We furthermore hypothesize that individual characteristics, in particular inequality aversion, efficiency preferences and risk acceptance influence the level of self-interest in the various decision modes and thus moderate the *Knowledge Effect* and the *Power Effect*.

3.2 Basic Set-up

Three players $i \in \mathbb{P} = \{A, B, C\}$ form a group. Initially, each player is endowed with a different number of 'Tokens' $e_i \in \mathbb{R}_+$, where $e_A > e_B > e_C$. We define $\bar{e} = \frac{\sum_{i \in \mathbb{P}} e_i}{3}$ and assume, as in our experiment, $e_B = \bar{e}$. Endowments can be redistributed among players by a tax schedule $T : e \mapsto t$. The individual tax $t_i \in \mathbb{R}$ consists of a proportional tax on Token endowments with constant marginal tax rate $\tau \in [0, 1]$ and a lump-sum benefit $b \geq 0$:

$$t_i = \tau e_i - b \quad \forall\, i \in \mathbb{P} \,. \tag{1}$$

The return of the proportional tax is exclusively used for financing the lump-sum benefit, that is, T is fully redistributive. Redistributing Tokens, however, involves an equity-efficiency trade-off in terms of a 'leaky bucket' (Okun, 1975) of relative size $0 < \ell < 1 - \frac{e_C}{\bar{e}}$, such that

$$b = (1 - \ell)\tau\bar{e} \,. \tag{2}$$

Payoffs are given by

$$y_i = e_i - t_i = (1 - \tau)e_i + b \quad \forall\, i \in \mathbb{P} \,. \tag{3}$$

Players are assumed to exhibit other-regarding preferences (Charness and Rabin, 2002) represented by a utility function $v_i(\mathbf{y}|\rho_i, \sigma_i)$, where $\mathbf{y} = (y_A, y_B, y_C)$ denotes the vector of (monetary) payoffs. We resort to the three-player specification of social preferences by Paetzel and Traub (2017):

$$v_A = (1 - 2\rho)u(y_A) + \rho(u(y_B) + u(y_C)) \ , \tag{4}$$

$$v_B = (1 - \rho - \sigma)u(y_B) + \sigma u(y_A) + \rho u(y_C) \ , \tag{5}$$

$$v_C = (1 - 2\sigma)u(y_C) + \sigma(u(y_A) + u(y_B)) \ . \tag{6}$$

Tokens are mapped by a concave function $u = u(y_i)$, $u_i' > 0 \geq u_i''$, into the utility space. The two parameters $\sigma \geq 0$ and $\rho \geq 0$ are the 'worse-off weight' and 'better-off weight', respectively. Player A is better off than both other players; she therefore weighs the utility of her own payoff with $\phi_A = (1 - 2\rho)$ (her 'own-weight'), and the utility of the payoffs of the worse-off players with ρ. Player B is worse off than A and better off than C; she thus weighs the utility of her own payoff with $\phi_B = (1 - \rho - \sigma)$, A's utility with σ, and B's with ρ. Player C is the worst off in the group; she therefore weighs the utility of her own payoff with $\phi_C = (1 - 2\sigma)$, and both other players' utility with σ. Definition 1 summarizes these considerations:

Definition 1 (Self-interest)**.** *A player's self-interest is given by her own-weight $\phi_A = 1 - 2\rho$, $\phi_B = 1 - \rho - \sigma$, or $\phi_C = 1 - 2\sigma$, respectively.*

3.3 Utility Maximization

In our basic model, self-interest is represented by the unobservable own-weight. Since player B's own-weight contains both σ and ρ, we have to make an assumption on their relationship in order to be able to identify the relationship between ϕ_B and τ. Fehr and Schmidt (1999, 823) suggested "that a player suffers more from inequality that is to his disadvantage" and labelled the asymmetry between the perception of advantageous and disadvantageous inequality in reference to Tversky and Kahneman (1991) 'social loss aversion'. Related to the B player, social loss aversion could mean that the payoff of the worse-off teammate is weighted higher than the payoff of the better-off teammate, $\rho = \alpha\sigma$, $\alpha > 1$.

The first-order conditions for the utility-maximizing tax rates τ corresponding to ϕ_i are given by

$$\frac{\partial v_A}{\partial \tau} = \phi_A u'_A \frac{\partial y_A}{\partial \tau} + \frac{1-\phi_A}{2}\left(u'_B \frac{\partial y_B}{\partial \tau} + u'_C \frac{\partial y_C}{\partial \tau}\right) = 0, \quad (7)$$

$$\frac{\partial v_B}{\partial \tau} = \phi_B u'_B \frac{\partial y_B}{\partial \tau} + \frac{1-\phi_B}{1+\alpha}\left(u'_A \frac{\partial y_A}{\partial \tau} + \alpha u'_C \frac{\partial y_C}{\partial \tau}\right) = 0, \quad (8)$$

$$\frac{\partial v_C}{\partial \tau} = \phi_C u'_C \frac{\partial y_C}{\partial \tau} + \frac{1-\phi_C}{2}\left(u'_A \frac{\partial y_A}{\partial \tau} + u'_B \frac{\partial y_B}{\partial \tau}\right) = 0. \quad (9)$$

The derivative $\frac{\partial y_i}{\partial \tau} = -e_i + (1-\ell)\bar{e}$ is negative (positive) for A and B (C).

If player i's choice of τ was driven by pure self-interest, $\phi_i = 1$, then the first-order conditions (7) to (9) would imply $\tau_A = 0$, $\tau_B = 0$, and $\tau_C = 1$. If she exhibits social preferences, $\phi_i < 1$, her optimal tax rate is monotonously non-increasing (non-decreasing) in ϕ_i for A and B (C) because $u(\cdot)$ is concave.

The monotonic relation between a player's self-interest and her preferred tax rate is graphically illustrated in Figure 2. For our numerical example, we use the parametrization of the experiment with $\mathbf{e} = (100, 67, 33)$, $\ell = 0.25$, and assume $u(\cdot) = \ln(\cdot)$. We additionally set $\alpha = 2$ for the B-player, which is roughly in line with the usual estimates for the parameter of loss aversion found in the literature (for a recent overview see Abdellaoui, Bleichrodt and Paraschiv, 2007). Using this parametrization and logarithmic utility, the first-order conditions can easily be solved for τ_i.[1] The solid (dashed, dotted) line refers to rank A (B, C). A's payoff is decreased by taxation, where $\frac{\partial y_A}{\partial \tau} = -50$. She would thus prefer a tax rate of zero for own-weights above 0.21. Below that value, the utility maximizing tax rate increases monotonously and reaches unity at $\phi_A = 0$. B's payoff is decreased by taxation at a lower rate than A's, $\frac{\partial y_B}{\partial \tau} = -17$. For own-weights of less than 0.41, she would prefer a tax rate exceeding zero. Finally, C benefits from taxation, where $\frac{\partial y_C}{\partial \tau} = 17$. Hence, the preferred tax rate increases in self-interest. Below 0.42 it is zero; at 0.66 it reaches unity.

Figure 2 about here

Observation 1 briefly recaps our previous formal and graphical analysis:

[1] See the Supplementary Materials for the Maple output. The $\ln(y_i)$ utility function implies constant relative inequality aversion, that is, the optimum tax rate is homogenous of degree zero in the total size of the stake. Levitt and List (2007) argue that fairness concerns diminish with the size of the stake, which would be covered by a utility function exhibiting increasing relative inequality aversion, for example, $-\exp^{-ay_i}$, $a > 0$. We do not vary the initial endowments during the experiment. Hence, it is of no importance for the results whether players' preferences exhibit constant or increasing inequality aversion.

Observation 1 (Rank and Demand for Redistribution)**.** *An increase in self-interest in A and B (C) players decreases (increases) their demand for redistribution in terms of the preferred tax rate, respectively.*

Next, we consider the decision condition VOI preceding INFO, indicated by the 'Rank Assignment' arrow in Figure 1. In VOI, players state their preferred tax rates without knowing their future ranks, that is, they maximize the expected utility $EU := \frac{1}{3}\sum_{i\in\mathbb{P}} v_i$ by the choice of τ. The first order condition for VOI is given by

$$\frac{\partial EU}{\partial \tau} = \frac{1}{3}\sum_{i\in\mathbb{P}} \frac{\partial v_i}{\partial \tau} = 0. \tag{10}$$

The impact of informing players about their ranks on the demand for redistribution is measured by means of the *Knowledge Effect.*

Definition 2 (Knowledge Effect)**.** *The Knowledge Effect in player i is given by* $\Delta_i^{KNOW} = \begin{cases} \tau_i^{VOI} - \tau_i^{INFO} & i \in \{A, B\} \\ \tau_i^{INFO} - \tau_i^{VOI} & i = C \end{cases}.$

Thus, the *Knowledge Effect* increases with the distance between τ_i^{INFO} and τ_i^{VOI}. For players driven by pure self-interest, comparing the first order conditions of individual utility maximization (7) to (9) with expected utility maximization (10) yields $\tau_i^{\text{INFO}} = 0 \leq \tau_i^{\text{VOI}}$ for A and B, and $\tau_C^{\text{INFO}} = 1 \geq \tau_C^{\text{VOI}}$. That is, the *Knowledge Effect* is non-negative. More generally, the *Knowledge Effect* is non-negative if self-interest in players is sufficiently strong. In the example displayed in Figure 2, this holds for $\phi_A \geq 0.11$, $\phi_B \geq 0$, and $\phi_C \geq 0.52$.

Due to the monotonicity of the theoretical relation between the optimum τ and ϕ_i, the *Knowledge Effect* can also be expressed in terms of a player's own-weights: $\psi_i^{\text{KNOW}} = \phi_i^{\text{INFO}} - \phi_i^{\text{VOI}} \quad \forall\ i \in \mathbb{P}$. The empirical own-weight corresponding to a player's preferred tax rate fed into the computer under the INFO treatment, τ_i^{INFO}, is denoted by ϕ_i^{INFO} and henceforth called 'measured' self-interest in order to differentiate it from her unobservable 'pure' self-interest, ϕ_i (see the shaded INFO box in Figure 1).[2] Likewise, ϕ_i^{VOI} is the empirical own-weight corresponding to the preferred tax rate τ_i^{VOI} fed into the computer under the VOI treatment. Note that if the concrete functional form of $u(\cdot)$ were known, ϕ_i^{VOI} could be computed using the first order

[2]Figure 2 shows that there is no one-to-one relationship between tax rates and own-weights because tax rates are bounded from above at 100% and below at 0%. Hence, tax data is analyzed by Tobit regression. In Table 7 in the Appendix, we report the means of the measured own-weights. Here, we assumed $\phi_A^j = 0.21$ for $\tau_A^j = 0$, $\phi_B^j = 0.41$ for $\tau_B^j = 0$, $\phi_C^j = 0.42$ for $\tau_C^j = 0$, and $\phi_C^j = 0.66$ for $\tau_C^j = 1$.

condition (7), (8), or (9), belonging to a player's later rank under the INFO treatment. Since the player does not actually know her later rank under the VOI treatment when stating τ_i^{VOI}, the corresponding empirical own-weight is interpreted as the level of measured self-interest that an involved but impartial dictator (Friedman, 1953; Harsanyi, 1953, 1955) would allow to her future self.

3.4 Hypotheses

What are the structural determinants of decision making that lead players to deviate from pure self-interest in their demand for redistribution and which individual factors moderate such deviations? Our first hypothesis is derived from the *Knowledge Effect* (Definition 2) and holds that demand for redistribution is, to a certain extent, driven by knowledge about one's own rank, because the self-insurance motive vanishes (Sinn, 1995).

Hypothesis 1 (Knowledge and Demand for Redistribution)**.** *Knowledge about one's own rank assignment decreases (increases) demand for redistribution in A and B (C) players.*

Our second hypothesis deals with the impact of power on the demand for redistribution. Both in VOI and INFO, players have dictatorial power in the sense that they can autonomously set their preferred tax rates without having to consider the other group members' preferences (the payoffs of the other players simply enter the decision maker's own utility function as externalities). We hypothesize that measured self-interest increases with power:

Hypothesis 2 (Power and Demand for Redistribution)**.** *Power decreases (increases) demand for redistribution in A and B (C) players.*

This hypothesis is tested by means of a third decision condition called IMPL that follows INFO. In IMPL, players simultaneously submit binding tax proposals τ_i^{VOTE} to a majority vote. A proposal $\tau^{\text{IMPL}} \in \{\tau_i^{\text{VOTE}} | i \in \mathbb{P}\}$ becomes effective if submitted by at least two group members. In this case τ^{IMPL} is the tax rate actually applied to a player's endowment. Otherwise, in the default case, all players lose half of their endowments (details about the experimental design are given in the next section).

We focus on successful coordination in IMPL because the agreed tax rate is the one actually affecting payoffs (as in VOI and INFO) and, therefore, has economic relevance both in terms of efficiency and inequality. The individual

τ_i^{VOTE} becomes payoff relevant only if the player agrees with at least one other player and then it can be replaced by τ^{IMPL}.[3]

The impact of a change in a player's structural power on the demand for redistribution is measured by means of the *Power Effect*.

Definition 3 (Power Effect)**.** *The Power Effect in player i is given by* $\Delta_i^{POWER} = \begin{cases} \tau_i^{IMPL} - \tau_i^{INFO} & i \in \{A, B\} \\ \tau_i^{INFO} - \tau_i^{IMPL} & i = C \end{cases}$.

The *Power Effect* accounts for the difference in tax rates that result from a gain in power when switching from IMPL to INFO. In terms of empirical own-weights and measured self-interest, respectively, the *Power Effect* is given by $\psi_i^{\text{POWER}} = \phi_i^{\text{INFO}} - \phi_i^{\text{IMPL}} \quad \forall\, i \in \mathbb{P}$.

In structural terms, IMPL implies a loss of power (see the 'Power Reduction' arrow in Figure 1). Participants can no longer decide as dictators for the group but have to coordinate with one fellow group member on a tax rate. This factor produces tax concessions in the direction of the other group members' preferences with respect to INFO. Note, however, that IMPL entails a free communication phase via chat, which reduces the social distance between group members (Hoffman, McCabe and Smith, 1996; Rankin, 2006; Charness and Gneezy, 2008) and consequently increases the role of social preferences in the decision process (Buchan, Johnson and Croson, 2006). We thus also expect to observe concessions for this reason.[4]

In order to isolate *Power Effects* in this setting, we introduce three power conditions, which differ according to how much decision power is lost as a result from the switch from INFO to IMPL and consequently in the hypothesized size of tax concessions. Players are allocated to one of three power conditions: UNEQUAL-*Broker*, UNEQUAL-*Taker*, and EQUAL. In the UNEQUAL sub-treatment, which uses the three-line network structure, one *Broker* can negotiate with two *Takers*, who are unable to communicate with each other. *Brokers* are expected to use their power advantage in order to minimize the difference between their payoffs in INFO and IMPL. Thus, an $A(B)$ *Broker* can choose between a $B(A)$ *Taker*, whose interest is

[3]Note that considering IMPL instead of VOTE excludes those players from the analysis of the *Power Effect* that were not able to find a group agreement and thus obtained the externally given default as their payoff.

[4]One might argue that concessions vary with communication possibilities, such that members of the triangle network and *Broker*s in the three-line network, who can communicate with both other group members, should develop stronger ties to the group than *Taker*s. Hence, *Taker*s should be less willing to make concessions, which may attenuate the effect of power in the three-line network. We may thus expect the *Power Effects* to be somewhat underestimated.

aligned with her own interest, and a *C Taker* with conflicting interest. It is thus more likely that an agreement between A and B players will emerge than an agreement between $A(B)$ and C. *C Brokers*, in contrast, have to negotiate with A and *B Takers* and the resulting tax rates will mirror the extent to which they can play off the two *Takers* against each other. In the EQUAL sub-treatment, which uses the triangle network structure, all players are assigned to the *Equal* power condition and can bilaterally negotiate in private with each other group member. Players in the *Equal* condition are assumed to lose more decision power than *Brokers*, however they are in a better structural position than *Takers*.

The larger the *Power Effect*, the higher is a player's concession in the negotiation relative to her preferred tax rate revealed in INFO. We expect *Brokers* to make smaller concessions than equal players, and, these, in turn, to make smaller concessions than *Takers*. Hence, the *Power Effect* is a measure of the success of a player in carrying over her preferred tax rate in INFO to the group decision.

While knowledge and power are exogenous conditions that affect the available decision scope, we have to take into account that the demand for redistribution is further dependent on intrinsic determinants of behavior, most notably inequality aversion, efficiency preferences, and risk acceptance. Inequality aversion and efficiency preferences will be elicited at the beginning of the experiment, using the double price-list technique (Kerschbamer, 2015; Balafoutas, Kerschbamer and Sutter, 2012); risk acceptance will be elicited at the end of the experiment using a standardized lottery-selection design (Holt and Laury, 2002) in the modified version of Balafoutas, Kerschbamer and Sutter (2012). Both elicitation methods will be explained in detail in the next section.

A player is called *inequality averse* if she is willing to sacrifice part of her (potential) own payoff in order to reduce the within-group dispersion of incomes. In terms of the model, larger inequality aversion means that $u(y_i)$ exhibits more curvature. Hence, the weight put on the marginal payoff of rich (poor) players decreases (increases). The first-order conditions (7) to (9) therefore imply that more inequality averse players want to redistribute more Tokens from A and B to C irrespective of their own player types.

Hypothesis 3 (Inequality Aversion)**.** *Larger inequality aversion in players induces a higher demand for redistribution.*

A player is called *efficiency loving* if she is willing to sacrifice part of her (potential) own payoff in order to increase the sum total of the group members' payoffs.

Hypothesis 4 (Efficiency Preferences). *Larger efficiency preference in players induces a lower demand for (efficiency reducing) redistribution.*

As redistribution is associated with an efficiency loss ℓ, efficiency loving players should, across all ranks, prefer a lower tax rate.

Third, we address the role of *risk acceptance*. Risk acceptance means that a player is willing to accept mean-preserving spreads. Both in VOI and IMPL players are involved in risky decision environments. Choosing a tax rate from under a veil of ignorance means that players have to deal with the risk of ending up on a low rank with a small payoff. In VOI players maximize expected utility and $u(y_i)$ represents a von Neumann-Morgenstern utility function (see equation (10)). Its curvature reflects a player's risk attitude. Hence, more risk-averse players would insure themselves against the rank-assignment risk by redistributing Tokens from higher to lower ranks. In the IMPL condition, a crucial determinant of the endowment share that can be successfully claimed by a player could be her risk attitude.[5] The larger the risk acceptance, the higher is the share she can obtain. We therefore hypothesize that risk acceptance is a crucial determinant of the size of the *Knowledge Effect* and the *Power Effect*:

Hypothesis 5 (Risk Acceptance). *Larger risk acceptance in players*

a) decreases the demand for redistribution from under a veil of ignorance and therefore decreases (increases) the Knowledge Effect in A and B (C) players.

b) increases the bargaining power of players and therefore decreases the Power Effect in all players.

4 Experimental Design

At the beginning of each session, subjects were seated in three-sided cubicles and then simultaneously received written instructions.[6] After everyone felt comfortable with the rules and procedures of the experiment, subjects answered several control questions and went through two tasks eliciting distributional preferences and risk attitudes. Subjects were told that they could earn additional Tokens in these tasks, the results were however not revealed until the end of the session in order to prevent them from influencing the main part of the experiment.

[5] Risk aversion is one of the main determinants of the bargaining solution in Nash (1953).

[6] The instructions, screenshots, and additional analyses are available in the Online Supplementary Materials.

In the main part of the experiment, individuals were randomly sorted into groups of three. As described in Section 3 and illustrated in Figure 1, each experimental group consisted of three players with ranks $i \in \mathbb{P} = \{A, B, C\}$, associated with a Token endowment $e_i = \{100, 67, 33\}$, respectively. In order to redistribute the endowment within their group, participants could choose a tax rate $\tau \in [0, 100]$ in integer numbers. In the instructions, the functioning of the tax rate was explained to the participants verbally, graphically, with an equation, and by means of a table. In addition, subjects were provided with a calculation box for testing the effects of different tax rates during and before every decision on redistribution. The efficiency loss of 25% of taxation was explained to subjects as administrative cost of redistribution.

The concrete choice of the initial endowments and the efficiency loss aimed at creating a set of possible income distributions bounded by two focal points, the symmetrical distribution $\{100, 67, 33\}$ with $\tau = 0$ (no redistribution) and the equal distribution $\{50, 50, 50\}$ with $\tau = 1$ (full redistribution). Moreover, the parametrization secures that no player prefers the default option $\{50, 33, 17\}$ over any tax agreement in the IMPL decision condition. As illustrated by the numerical example, taxation has a strong negative effect on Player A's payoff, not only because she is deprived of parts of her income, but also due to the efficiency loss which diminishes the lump-sum transfer. Taxation has a smaller negative effect on Player B's payoff, which is only due to the efficiency loss. Player C is the only one who gains from redistribution because the efficiency loss is relatively small as compared to the transfer gain.

In the course of the experiment subjects had to decide on τ in three consecutive *decision conditions*: VOI, INFO , and IMPL. Because of the specific pieces of information required in the three conditions, the sequence in the experiment was fixed at VOI-INFO-IMPL.[7]

VOI First, participants were informed about the general distribution of ranks and endowments in the group, but they were not told which rank they would actually occupy. This situation mirrors a choice under a veil of ignorance, where subjects are in the role of a hypothetical decision maker (Harsanyi, 1979). Each group member independently selected a tax rate τ_i^{VOI} and at the end of the session the choice of

[7] The ordering VOI-INFO-IMPL minimizes the information on others' views and decisions and on the accumulated payoff in the decision conditions VOI and INFO. VOI has to be administered prior to INFO to prevent players entering VOI with a particular reference point from their rank in INFO. IMPL needs to succeed VOI and INFO, since it is the only decision condition in which players receive immediate feedback on the decisions of other players. In turn, the downside of this approach is that we cannot control for possible order effects.

one subject was randomly chosen, implemented and added to the total payoff to be paid at the end of the session.

INFO Second, subjects were sorted into new groups of the same structure and informed about their respective rank in the income distribution (that is, the veil of ignorance was lifted). Compared to VOI, decision makers faced no uncertainty about the actual distribution of endowments. Again, each participant independently selected one tax rate τ_i^{INFO} and the choice of one group member was randomly implemented and added to the total payoff.

IMPL Third, subjects had to reach an agreement on a tax rate within their group. Therefore, they were provided with chat windows prior to the group decision in order to be able to coordinate on a tax rate. After the chat, which was limited to a maximum of three minutes, subjects privately entered a tax rate τ_i^{VOTE} in a subsequent decision screen. Agreement was reached if at least two of three group members entered the same integer number. The group choice τ^{IMPL} was implemented and added to the total payoff. Failure of agreement, that is, if all three tax rates in the group differed, implied that the endowments of all group members were reduced by half. In the following, we will refer to this condition in two ways. We speak of τ_i^{VOTE} if we focus on players' actual voting decisions and of τ^{IMPL} if we refer to the payoff-relevant outcome of the group decision.

There were two sub-treaments differing in the communication mode: In the UNEQUAL condition, communication was restricted according to a three-line network structure. One player, the *Broker*, could communicate with both fellow group members, the *Takers*, in separate chat windows. *Takers* could only send and receive messages from the *Broker* and were barred from communication with the other *Taker*. In the EQUAL condition, all subjects were treated equally, that is, no subject was assigned the *Broker* role, and all group members had two-sided separate chats at their disposal (for example, A could chat with B and C on different windows).

The network design of IMPL is inspired by sociological network exchange theory (NET) using a variant of the Nash bargaining model for exchange networks (Braun and Gautschi, 2006). The EQUAL condition allows all players the same degree of network control (there are three players and three edges) and therefore assigns the same power to each player. In contrast, the UNEQUAL condition allows the *Broker* twice as much network control as the other players (there are only 2 edges which always include the *Broker*) and assigns her almost dictatorial power.[8]

All subjects went through the three consecutive decision conditions VOI, INFO, and IMPL. During the experiment subjects received no feedback on their group members' decisions and the outcome of prior decision conditions in order to avoid reciprocity and wealth effects. Hence, the treatment effect of lifting the veil of ignorance ('knowledge') and the treatment effect of voting ('power') are tested in a within-subjects design. In VOI all subjects were treated equally. In INFO subjects were randomly assigned to their respective ranks $\{A, B, C\}$. Finally, in IMPL they were either assigned to the EQUAL or the UNEQUAL condition. If they were assigned to the UNEQUAL condition, they were either given the *Broker* position in their group, or one of the two *Taker* positions. Accordingly, the treatment effects of rank (not in VOI) and network control (only in IMPL) are tested in a between-subjects design.

Subjects were assigned to the network positions *Broker* and *Taker* in IMPL-UNEQUAL as follows: All subjects in a subsession, consisting of nine individuals, were ranked according to their VOI tax choice. Based on this ranking, each subsession consisted of three three-person groups, one of which had a *Broker* with high VOI tax, one with medium VOI tax and one with low VOI tax. The algorithm allocated the ranks 2, 5 and 8 to the *Broker* role. The remaining subjects were distributed to the groups such that the rank-sum in each three-person group was 15. As there were two possibilities to satisfy this qualification, each session had two subsessions. This was done to assure intergroup homogeneity with respect to the VOI tax choice. In IMPL-EQUAL we used the same matching procedure with all subjects being assigned to the network position 'equal'. The allocation process was communicated to subjects as "...random, however taking account of the decisions in the first part of the experiment, in order to control for the composition of groups". We abstained from a more detailed explanation to prevent confusion of subjects.

As a control for individual differences in self-interest, we further elicited distributional preferences at the beginning of the experiment, using the double price-list technique (Kerschbamer, 2015; Balafoutas, Kerschbamer and Sutter, 2012). Subjects are confronted with two blocks of five binary choices

[8]Consulting Binmore's (1985, p. 273) formula for calculating the power of players in networks, $b_i = \frac{-1}{\ln(\frac{m+n}{1+m+n}c_i)}$, shows that the power of the *Broker* is not entirely dictatorial. Setting $m = 2$ ties, $n = 3$ players, and $c_i = 0.5$ for the *Taker* and $c_i = 1$ for the *Broker* (c_i is a player's relative connectivity) yields a power index of 1.14 for *Takers* and 5.48 for *Brokers*, that is, the *Broker* is 'only' about four times more powerful than each of the *Takers*.

between different allocations. The two blocks were presented in random order. The instructions can be found in the Appendix. In the first block, subjects have to decide between an egalitarian distribution of 10 Tokens among themselves and another random subject, that is, a $\{5, 5\}$ distribution, and an unequal distribution $\{5 + x, 6.5\}$, where $x \in \{-1, -0.5, 0, 0.5, 1\}$. Note that the unequal distribution increases efficiency by 0.5 up to 2.5 Tokens (1.5 ± 1), but it involves *disadvantageous inequality* for the decision maker. A rational subject switches at most once from the egalitarian distribution $\{5, 5\}$ to the unequal distribution $\{5 + x, 6.5\}$ and never in the other direction. If a subject switches to the unequal distribution before or at $x = 0$, she is willing to sacrifice own income in order to increase efficiency. If she switches later, she is willing to tolerate disadvantageous inequality only if she is being compensated for that. A measure of *efficiency preference*, therefore, is given by the willingness-to-pay $WTP_D = -(0.5 \times (x_{-1} + x))/15$, where x_{-1} is the last choice before switching. We set $WTP_D = 0.667$ ($WTP_D = -0.667$) if a subject chooses the unequal (egalitarian) distribution all along. As the main part of our experiment regards redistribution with an efficiency loss, the correlation between the preferred tax rate and the WTP_D is expected to be negative (see Hypothesis 4).

Analogously, the second block, the *advantageous inequality* block, involves five choices between an egalitarian distribution of 10 Tokens and an unequal distribution $\{5 + y, 3.5\}$, where $y \in \{-1, -0.5, 0, 0.5, 1\}$. The unequal distribution decreases efficiency by 0.5 up to 2.5 Tokens and involves advantageous inequality for the decision maker. Own payoff maximization would imply that the subjects switches to the unequal distribution not before $y = 0$. If she switches before that choice, she is spiteful, willing to sacrifice own income in order to minimize the income of the other player. The later she switches, the higher is the compensation she would require in order to tolerate advantageous inequality. A measure of *inequality aversion*, therefore, is given by the willingness-to-pay $WTP_A = (0.5 \times (y_{-1} + y))/15$, where y_{-1} is the last choice before switching. We set $WTP_A = -0.667$ ($WTP_A = 0.667$) if a subject chooses the unequal (egalitarian) distribution all along. The expected correlation between the preferred tax rate and WTP_A is positive, as subjects with higher inequality aversion tend to redistribute more (see Hypothesis 3).

We elicited risk attitudes using a standardized lottery-selection design (Holt and Laury, 2002) in the modified version of Balafoutas, Kerschbamer and Sutter (2012), where the subjects have to decide between a lottery $(10, 0.5; 0, 0.5)$ and a certain payment $(10 \times r)$, $r = (1, \ldots, 10)$. A subject should switch only once from the risky lottery to the safe payment but never in the other direction. If a subject switches before $r = 5$, she is risk-averse;

otherwise, she is risk-loving. The Risk Index is given by $R = r/10$, where higher values reflect more risk acceptance and $R = 1$ if the safe payment is chosen only when it stochastically dominates the lottery.

This method of measuring inequality aversion, efficiency preferences and risk attitudes does not guarantee unambiguous measures because individuals can produce inconsistent results. 39 (12.4 per cent), 31 (9.8 per cent), and 43 (13.6 percent) subjects have generated such measures for WTP_A, WTP_D, and the Risk Index, respectively. In order not to lose these subjects in the analysis, and lacking data for a multiple imputation approach, we have set their values to the mean of the respective variable.

At the end of the session, one random decision from the risk task and two random decisions from the distributional preferences task (one as active and one as passive player) were added to the payment from the main part. Participants were informed about the outcomes in the different parts of the experiment and payment was determined according to the Tokens accumulated in each phase. The Tokens earned in VOI and INFO were entered with weight 0.5 each and the Tokens earned in IMPL were weighted with factor 1, signalling the importance of the third, group vote phase to participants. Finally, a questionnaire containing basic demographic variables was administered to the subjects and they were called to the experimenter's desk separately to collect their payments.

The experiment was conducted in the computer lab of the Vienna Center for Experimental Economics at the University of Vienna using z-Tree (Fischbacher, 2007). Subjects were recruited via ORSEE (Greiner, 2015). Overall, we ran 20 sessions, lasting on average one hour. A total of 315 subjects participated in 20 sessions. Sessions were conducted with 9 to 18 participants, depending on the number of show ups.

5 Results

Table 1 presents a breakdown of the sample. Students enrolled in various disciplines took part in the experiment, earning on average €14.99 (stdv. 2.87). 51.4 % (162) were women, who were slightly more risk averse than male participants. There were no significant gender differences with regard to inequality aversion (WTP_A), while men exhibited significantly greater efficiency preferences (WTP_D). Note that WTP_D and the Risk Index exhibit a small but significant correlation ($\rho = 0.149$, $p = 0.008$), that is, subjects with greater efficiency preferences exhibit *more* risk acceptance. WTP_D and WTP_A are not significantly correlated ($\rho = -0.005$, $p = 0.936$). WTP_A and the Risk Index are not significantly correlated either ($\rho = 0.087$, $p = 0.126$).

Table 1 about here

5.1 Group Results

Before discussing findings on individual behavior in detail, we briefly address the final outcomes at the group level. As the analysis focuses on actual payoffs (τ^{IMPL}), we discard all observations from groups that were not able to agree on a tax rate by majority vote. Three groups with an *A Broker* (equivalent to nine subjects) have to be excluded, seven groups with a *B Broker* (21 individuals), two with a *C Broker* (six individuals), and one group (three subjects) in the EQUAL treatment. A χ^2-test does not reject the null hypothesis that the default rate is independent of the *Broker* assignment ($\chi^2(3) = 4.83$, $p = 0.185$). Altogether, 92 group and 276 individual observations are left for analysis.

Table 2 about here

Table 2 presents the implemented tax rates τ^{IMPL} by the *Broker's* rank. Table 3 tests whether these tax rates differ between treatments. On average, groups agree on a moderate tax rate of 44% (median 40%). Groups which are assigned a *C* subject as a *Broker* agree on a substantially higher tax rate than all other groups. One might interpret the relatively high tax rates on the part of the *A* and *B* subjects as compensation for the *C* subjects' misfortune to be assigned the lowest income position.

Table 3 about here

5.2 Tax Choices under the Three Decision Conditions

Figures 3 and 4 show bar charts of the individually chosen tax rates by decision condition and rank. Focusing this analysis on stated individual demand for redistribution instead of group agreement, we study τ_i^{VOTE}. The bars represent the absolute number of observations for the respective closed intervals.[9] Visual inspection of the bar charts reveals the decisive character of the decision condition: Although in VOI a substantial number of subjects choose to maximize total group payoffs (a 0% tax corresponds to an efficiency loss of 0 Tokens) or the egalitarian solution (a 100% tax corresponds to an efficiency loss of 50 Tokens), a clear majority of subjects prefer a moderate tax rate of 21-60%.

[9] A detailed overview of the mean tax rates and the corresponding own-weights by decision condition, rank, and power position is given in the Appendix.

Figures 3 and 4 about here

The mean tax rate under VOI is $\bar{\tau}^{\text{VOI}} = 44.1\%$, involving an efficiency loss of 22 Tokens. In INFO, the distribution of tax rates becomes more extreme. The number of 0% tax choices goes up from 57 to 82 and the number of 100% tax choices almost doubles from 41 to 79. Yet, the mean tax rate $\bar{\tau}^{\text{INFO}} = 46.1\%$ remains almost identical ($p = 0.403$).[10]

In turn, IMPL reduces the number of extreme tax choices (0%: 43, 100%: 54) and again leaves the mean tax rate $\bar{\tau}^{\text{VOTE}} = 45.9$ unchanged ($p = 0.934$) when compared with $\bar{\tau}^{\text{VOI}}$ ($p = 0.455$). Thus, mean measured self-interest increases when switching from VOI (0.281) to INFO (0.348) ($p \leq 0.01$) and it decreases when switching from INFO to IMPL, using $\bar{\tau}^{\text{VOTE}}$ (0.297, $p \leq 0.01$).[11] Own-weights based on $\bar{\tau}^{\text{VOTE}}$ are a bit higher than in VOI ($p = 0.039$), but the difference is statistically insignificant when applying a non-parametric test ($z = 1.045$, $p = 0.296$, Mann-Whitney Rank-sum test).

5.3 Tax Choices: Regression Models

Table 4 reports the results of regressing chosen tax rates in each decision condition on several independent variables. In order to account for the boundedness of the dependent variable, we employ Tobit models. We report one regression for τ_i^{VOI} and one for τ_i^{INFO}, where we study the effect of inequality aversion and efficiency preferences conditional on the assigned rank. We pool A and B subjects, because their induced preferences are aligned and we neither theoretically expect nor observe differences in choices (Table 7). Finally, we report a regression for the agreed group tax rates τ^{IMPL}, in which we focus on the behavior of A, B and C subjects in the three different network positions (*Taker* and *Broker* in the three-line and equal in the triangle network).

Table 4 about here

In the VOI condition, participants neither know their rank nor their network position. The model thus contains only individual traits. As predicted by Hypothesis 3 inequality aversion significantly increases the tax rate chosen from under a veil of ignorance. A one-unit change of WTP_A (that is, for

[10] T-tests are two-tailed if not otherwise stated. The analysis of tax rates and own-weights is done using t-tests. Since both variables are bounded from below and above, we additionally performed non-parametric tests. The results of these tests are only reported if they contradict the standard tests.

[11] The measured self-interest ϕ_i^j is computed from the foc assuming $u(.) = ln(.)$ and $\alpha = 2$.

example, from the second lowest (-0.5) to the second highest (0.5) possible value) implies an increase in the chosen tax rate by 22.6 percentage points. Hypothesis 4 is supported for the VOI condition, too. The absolute size of the decrease is similar to the impact of inequality aversion. The first part of Hypothesis 5 refers to VOI. As predicted, with increasing willingness to take risks the demand for redistribution decreases significantly. The size of the effect is almost 30 percentage points for a change from extreme risk-taking (0.9) to strongly risk-averse (0.1) behavior. Finally, the coefficient for Gender indicates that, after controlling for willingness-to-pay and risk behavior, male participants' tax rates are still 17 percentage points lower than female participants' rates. We can conclude that under the veil of ignorance tax rate choices are related as expected to individual traits.

Regression 2 refers to the tax choices in the INFO condition. Supporting Hypothesis 1, the coefficient of Rank C (106.3) implies a (linear) predicted difference of 94.1 percentage points between C and A, B players, as reflected in Figure 4. In line with the fact that this is a choice under certainty, the Risk Index does not significantly affect tax choices (p=0.79). Interestingly, the effect of Gender is also practically annihilated (p=0.25). Regarding WTP_A and WTP_D, for A and B subjects we find almost the same effects as observed in the VOI condition, while for C subjects, the effect is now nullified: The coefficient for WTP_A is $33.36 - 28.26 = 5.1$ (p=0.74) and the one for WTP_D is -1.44 (p=0.93).

We now turn to the effects of power in networks (Regression 3). Individual characteristics do not contribute to the explanation of implemented tax rates. The effect of rank (A, B vs. C) varies over network positions. In Hypothesis 2 we proposed that power increases subjects' demand for redistribution. IMPL was assumed to decrease subjects' power as compared to INFO because it forces them into seeking a consensus in order to avoid the default outcome. In this setup, the reference category (i.e., the constant) represents (female) A, B subjects in *Taker* positions.

Changing the rank of the *Taker* into C significantly decreases the tax rate, a result that seems at first sight surprising since C players were overall found to prefer higher tax rates than their A and B counterparts. However, this result is explained by considering the fact that C *Takers* are in a group where $A(B)$ *Brokers'* interests are aligned with $B(A)$ *Takers*. The two coefficients for the network positions indicate that tax rates of A, B subjects in the equal position of the triangle are insignificantly lower than those of *Takers* in the three-line network (p=0.12), and that the tax rates of A, B *Brokers* are significantly lower than those of the same player types in the *Taker* position (p=0.05). These findings support Hypothesis 2. For C subjects, the effects have the same sign, but are larger in size and statistically significant, culminating in a 32 percentage points bonus in the implemented tax rate for *C Brokers* relative to *C Takers*. Furthermore, the difference between *C Brokers* in a three-line network (UNEQUAL) and *C* subjects in a triangle (EQUAL) is 25 percentage points and statistically significant (difference = 24.55, $p = 0.02$).

5.4 Knowledge Effect and Power Effect

In order to test Hypothesis 1 and 2 directly, we look at subjects' *Knowledge Effect* and *Power Effect*, respectively. The mean *Knowledge Effect* is 22.8 percentage points in the direction of the extreme values (s.e. = 1.99, $H_0 : \Delta_i^{\text{KNOW}} = 0$: $p \leq 0.01$). Table 5 reports the results of regressing the *Knowledge Effect* on the hypothesized independent variables, again using a Tobit model. Regression 1 shows that for *C* subjects the effect is significantly larger. In Regression 2 we include WTP_A, WTP_D, Gender and the Risk Index, of which only the latter exhibits a statistically significant coefficient. The inclusion of these control variables does not affect the sign, size and significance of the Rank effect. Regression 3 includes interactions of Rank with WTP_A, WTP_D and the Risk Index. The coefficient estimates reveal that it is a higher efficiency preference in *C*-subjects that causes a greater *Knowledge Effect*. The reason is that subjects opting for a low tax rate in VOI due to their efficiency preference choose a high tax rate after learning that their rank is *C*. This means that *C* subjects, once they received the information on their rank, readily disregarded their efficiency preference and supported higher tax demands (this is confirmed by an insignificant coefficient for Rank *C* x WTP_D in Table 4, model 2). Therefore the *Knowledge Effect* is even greater for those *C* players who preferred a lower tax rate in VOI.

Table 5 about here

The interactive term between Rank and Risk Index tests the first part of Hypothesis 5. Risk acceptance does not influence the size of the *Knowledge Effect* for *A* and *B* subjects, while more risk-accepting *C*-subjects obtain a much larger effect. This reflects the fact that more risk-acceptant subjects opt for a low tax rate under VOI and shift to a high tax rate as soon as they learn that their rank is *C*. In summary, we find Hypothesis 1 clearly supported by the data, while the first part of Hypothesis 5 regarding the role of risk acceptance is supported only for *C* subjects.

The mean *Power Effect* is 22.5 percentage points in the direction of the center (s.e. = 2.53, $H_0 : \Delta_i^{\text{POWER}} = 0$: $p \leq 0.01$). Table 6 reports the results of regressing the *Power Effect* on the hypothesized independent variables.

Remember that the *Power Effect* can also be inversely interpreted as the tax concessions group members made when switching from INFO to IMPL. Regression 1 shows that C subjects had to make significantly higher concessions than A and B-subjects. This effect is robust to the inclusion of several individual characteristics (Regression 2). That C-subjects were in general less successful in enforcing their demands in the final decision is not surprising, given that A and B subjects had theoretically concordant redistribution preferences and were therefore obvious candidates for an agreement.

Table 6 about here

Regression 3 differentiates the effect of individual characteristics by interacting them with the Rank variable. While WTP_A is again statistically insignificant for all ranks, the effect of WTP_D is now observed for A and B subjects. A one-step increase in WTP_D is associated with a 25 percentage points larger concession and the corresponding coefficient for C subjects is $25.1 - 29.1 = -4$, which is far from being statistically significant (p=0.75). The interpretation of this observation is that efficiency-oriented A and B subjects opting for a very low tax rate under INFO are forced to shift to a tax rate in the 20-30 per cent range in the IMPL condition. Similarly, a full-range shift from risk-averse to risk-acceptant behavior is accompanied by a 43.8 percentage points shift away from the preferred tax rate under INFO for A and B subjects. This effect is practically nullified for C subjects (p=0.87). This implies that risk-averse A and B subjects had to make smaller concessions than those who are risk-acceptant, thus rejecting the b part of Hypothesis 5.

Regression 4 adds the network structure. The *Equal* variable indicates that a subject participated in the EQUAL treatment. *Brokers* occupied the powerful position in the network structure of the UNEQUAL treatment and *Takers* (the reference category) were structurally disadvantaged in the UNEQUAL treatment. It can be seen that individuals occupying a *Broker* position were more successful in the group decision. *Brokers* had to deviate significantly less from their preferred tax rate than individuals in the other network positions. Overall, *Brokers*, independent of their rank, made on average 16.7 percentage points smaller tax concessions than *Takers*, which is less generous than Equals. Note that the difference between *Brokers* and *Equals* is statistically not significant (difference = 6.73, $p = 0.21$). This is a clear indication that the asymmetric distribution of power has an effect on the groups' implemented tax rates.

In Regression 5, we differentiate the effect of the *Broker* dummy between A and B subjects, on the one hand, and C subjects, on the other. Considering

A and *B* subjects, the effect of power is 12.6 percentage points smaller for *Brokers* than for *Takers*, the difference being significant at the 0.05 level. The difference between *A* and *B* *Brokers* and *Equals* is not significant (difference = 6.80, $p = 0.55$). The assertiveness of *C Brokers* is even larger, with tax concessions being $12.6 + 12.0 = 24.6$ percentage points smaller than those of *C Takers*, a difference that is statistically significant ($p = 0.02$). The difference in the *Power Effect* between A, B and *C Brokers* is not significant (p=0.24), however, which underlines the effectiveness of the power position.

Overall, we find that the extent to which both the *Knowledge Effect* and the *Power Effect* are realized depends on individual characteristics and social conditions alike. Most notably with respect to individual characteristics, efficiency preferences and risk attitudes appear to be more important predictors than inequality aversion. But even more important is the finding that these effects depend on social context conditions: both the location of an individual's position in the distribution of endowments and the structural power entailed in the network position substantially determine the proximity of the final result to the preferred tax rate in the informed condition.

6 Conclusion

We have studied the joint effect of individual characteristics and social conditions on preferences for redistribution involving an efficiency-equality tradeoff. We prompted expressions of preferred redistributive tax rates under three consecutive conditions, namely dictatorial power under the veil of ignorance (VOI) and in knowledge of the own social position (INFO), and structural power in a collective decision under majority rule (IMPL). We observe both preferred tax rates and their changes, which we term *Knowledge Effect* and *Power Effect*, respectively, from one condition to the next in a within-subjects design. In addition, we use a between-subjects design to analyse three different power positions, being equal power in a triangle, and *Taker* and *Broker* positions in a three-line network. This design allows us to test hypotheses about the effect of information and power on the extent to which individuals maximize their own payoff in a social context.

The *Knowledge Effect* unmasks both efficiency preferences and social preferences behind the veil of ignorance as ephemeral. Efficiency-oriented subjects who receive a small endowment shift to a preference for high taxation despite the large loss in total endowment in redistribution. Equivalently, subjects opting for high taxation behind the veil opt for low taxation after being informed to have received a large endowment. Hence, as soon as subjects are informed about their condition, self-interest overrides community-oriented motives.

The *Power Effect*, in turn, determines to what extent self-interested claims exhibited in the informed condition can be actually enforced in negotiations preparing a final joint decision under majority rule. Although even subjects in a structurally powerful position, the *Brokers*, are forced to retreat from extreme claims, they concede considerably less on average than subjects in the structurally weak position, the *Takers*. Subjects in the equal condition end up about two-thirds of the distance between *Takers* and *Brokers*.

In conclusion, we wish to add a note of caution. Various elements of the research design, such as the restriction to a single sequence, which may generate order effects, the disregard of social distance, which may dampen *Power Effects*, and the restriction to three-person networks, which certainly reduces the scope of variation, may impact on the findings. These require further exploration. Moreover, our design was restricted to a specific facet of power, namely communication, which precludes generalizations to other dimensions of power.

Nevertheless, the evidence clearly shows that individuals decide in a self-interested way as soon as their structural position allows them to do so. This effect holds for all endowment levels. While subjects do certainly vary in consequential ways with respect to their individual characteristics, such as inequality aversion, efficiency preferences, and risk attitudes, these effects are marginalized by the social position and the structural power attributed to subjects.

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Table 1: Breakdown of the Sample

	Total	Female	Male	p
n	315	162	153	—
Risk Index	0.512	0.496	0.530	0.032
	(0.008)	(0.012)	(0.010)	
WTP_A	0.364	0.342	0.388	0.202
	(0.018)	(0.024)	(0.024)	
WTP_D	-0.038	-0.109	0.037	0.000
	(0.021)	(0.029)	(0.028)	

Notes. First row: means, second row: standard errors in parentheses. Risk Index $\{0.1, 0.2, \ldots, 0.9\}$: higher values reflect higher risk acceptance. Willingness-to-accept advantageous (disadvantageous) inequality $WTP_A(WTP_D) \in \{-0.667, -0.5; -0.167; 0.167; 0.5; 0.667\}$: higher values stand for greater inequality aversion (efficiency preference). Missing values are replaced by the respective mean. p is the significance level of a two-tailed t-test on the equality of two means (female vs. male).

Table 2: Group Tax Rates by *Broker* Rank

Treatment	Rank	N	mean	s.e.	median
	A (100)	27	39.63	5.38	40
UNEQUAL	*B* (67)	23	37.00	7.15	40
	C (33)	28	56.46	6.12	50
EQUAL	*No Broker*	14	40.36	8.04	42.5
Total		92	44.21	3.32	40

Table 3: Comparison of Implemented Tax Rates (τ^{IMPL})

		Broker		
		$B(67)$	$C(33)$	*No Broker*
	$A(100)$	2.63	-16.83**	-0.73
		(8.88)	(8.44)	(10.31)
Broker	$B(67)$	—	-19.46**	-3.36
			(8.81)	(10.61)
	$C(33)$		—	16.11
				(10.25)

Notes. Two-tailed t-test: Under H_0 the pairwise mean difference is equal to one. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$.

Table 4: Determinants of Tax Rate Choices

Coefficient	1	2	3
		Decision condition	
	τ_i^{VOI}	τ_i^{INFO}	τ^{IMPL}
WTP_A	22.60***	33.36***	10.11
	(6.70)	(9.25)	(9.22)
WTP_D	-26.23***	-29.73***	9.91
	(6.39)	(11.12)	(6.43)
Risk Index	-37.32**	-8.30	22.01
	(17.34)	(32.53)	(19.61)
Gender (Male)	-17.24***	-9.65	-7.38
	(4.88)	(8.45)	(5.56)
Rank C	—	106.30***	-11.14*
		(10.26)	(6.52)
Rank C × WTP_A	—	-28.26	—
		(18.86)	
Rank C × WTP_D	—	28.29	—
		(19.03)	
Network Position (*Equal*)	—	—	-10.22
			(6.50)
Network Position (*Broker*)	—	—	-12.08*
			(6.23)
Rank C × Equal	—	—	7.41
			(7.61)
Rank C × *Broker*	—	—	31.96**
			(15.45)
Constant	60.80***	10.99	38.37***
	(10.12)	(17.89)	(12.81)
n	315	315	276
F	19.86***	43.48***	1.91*
Pseudo R^2	0.02	0.09	0.01
LL	-1224.27	-945.62	-1086.47

Notes: Tobit model with session-clustered standard errors in parentheses. Lower Limit: 0; Upper Limit: 100. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$. The dependent variable is the tax rate in percent ($\tau^j \in [0, 100]$), where $j \in$ {VOI, INFO, IMPL}. Independent variables: willingness-to-accept advantageous (disadvantageous) inequality $WTP_A(WTP_D) \in \{-0.667, -0.5; -0.167; 0.167; 0.5; 0.667\}$, where higher values represent higher inequality aversion (efficiency preference); Risk Index $(\{0.1, 0.2, \ldots, 0.9\})$, where higher values represent higher risk acceptance; Gender $(\{0 = female, 1 = male\})$; Rank dummy $(\{0 = \{A, B\}, 1 = C\}$; Network Position has three categories: *Taker* (reference category), Equal and *Broker*; and an interaction between Rank and Network Position. Missing values in WTP_A, WTP_D and the Risk Index are replaced by the respective mean.

Table 5: Determinants of Knowledge Effect

	1	2	3
WTP_A	—	-3.59	-0.03
		(6.72)	(6.74)
WTP_D	—	10.3	1.87
		(6.53)	(7.20)
Gender	—	-4.59	-3.28
		(3.58)	(3.71)
Risk Index	—	29.7**	8.11
		(13.9)	(12.8)
Rank C	23.2***	23.4***	-0.42
	(3.77)	(3.94)	(18.4)
Rank C × WTP_A	—	—	-10.4
			(11.6)
Rank C × WTP_D	—	—	25.2**
			(12.1)
Rank C × Risk Index	—	—	56.9*
			(30.8)
Constant	16.2***	4.78	13.7
	(1.91)	(8.45)	(8.46)
n	315	315	315
F	37.71***	12.99***	12.24***
Pseudo R^2	0.01	0.01	0.02
LL	-1485.56	-1481.17	-1476.34

Notes. Tobit model with session-clustered standard errors in parentheses. Lower Limit: -100; Upper Limit: 100. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$. The dependent variable is the Knowledge Effect in percent ($\Delta^{\text{KNOW}} \in [-100, 100]$). Independent variables: willingness-to-accept advantageous (disadvantageous) inequality $WTP_A(WTP_D) \in \{-0.667, -0.5; -0.167; 0.167; 0.5; 0.667\}$, where higher values stand for greater inequality aversion (efficiency preference); Risk Index ($\{0.1, 0.2, \ldots, 0.9\}$), where higher values reflect larger risk acceptance; Gender ($\{0 = female, 1 = male\}$); Rank dummy ($\{0 = \{A, B\}, 1 = C\}$; interaction between Rank and Risk Index, Rank and $WTP_A(WTP_D)$. Missing values in WTP_A, WTP_D and the Risk Index are replaced by the respective mean.

Table 6: Determinants of Power Effect

	1	2	3	4	5
WTP_A	—	-5.18	-6.93	-3.49	-2.82
		(8.33)	(10.6)	(8.30)	(8.57)
WTP_D	—	15.8**	25.1***	16.6**	16.9**
		(6.98)	(9.03)	(6.90)	(6.93)
Gender	—	3.76	2.66	3.15	2.90
		(6.05)	(6.25)	(6.26)	(6.33)
Risk Index	—	27.3	43.8*	27.6	28.4
		(18.9)	(22.6)	(18.6)	(18.4)
Rank C	23.6***	24.3***	47.2**	24.8***	29.1***
	(7.80)	(7.81)	(23.7)	(6.91)	(9.92)
Rank C × WTP_A	—	—	2.48	—	—
			(23.0)		
Rank C × WTP_D	—	—	-29.1*	—	—
			(16.0)		
Rank C × Risk Index	—	—	-48.3	—	—
			(32.9)		
Network Position (*Equal*)	—	—	—	-9.95*	-8.28
				(5.74)	(8.01)
Network Position (*Broker*)	—	—	—	-16.7***	-12.6**
				(5.83)	(5.79)
Rank C × *Equal*	—	—	—	—	-5.25
					(12.6)
Rank C × *Broker*	—	—	—	—	-12.0
					(10.3)
Constant	18.5***	4.55	-2.55	10.2	8.30
	(4.18)	(12.3)	(15.2)	(13.2)	(12.8)
n	276	276	276	276	276
F	9.13***	4.53***	3.39**	6.67***	7.71***
Pseudo R^2	0.01	0.01	0.01	0.01	0.01
LL	-1341.50	-1336.85	-1334.03	-1332.65	-1332.17

Notes. Tobit model with session-clustered standard errors in parentheses. Lower Limit: -100; Upper Limit: 100. $^{*}p \leq 0.10$, $^{**}p \leq 0.05$, $^{***}p \leq 0.01$. The dependent variable is the *Power Effect* in percent ($\Delta^{\text{POWER}} \in [-100, 100]$). Independent variables: willingness-to-accept advantageous (disadvantageous) inequality $WTP_A(WTP_D) \in \{-0.667, -0.5; -0.167; 0.167; 0.5; 0.667\}$, where higher values stand for greater inequality aversion (efficiency preference); Risk Index ($\{0.1, 0.2, \ldots, 0.9\}$), where lower values stand for greater risk aversion; Gender ($\{0 = female,\ 1 = male\}$); Rank dummy ($\{0 = \{A, B\},\ 1 = C\}$; Network Position has three categories: *Taker* (reference category), Equal and *Broker*; and an interaction between Rank and Network Position. Missing values are replaced by the respective mean.

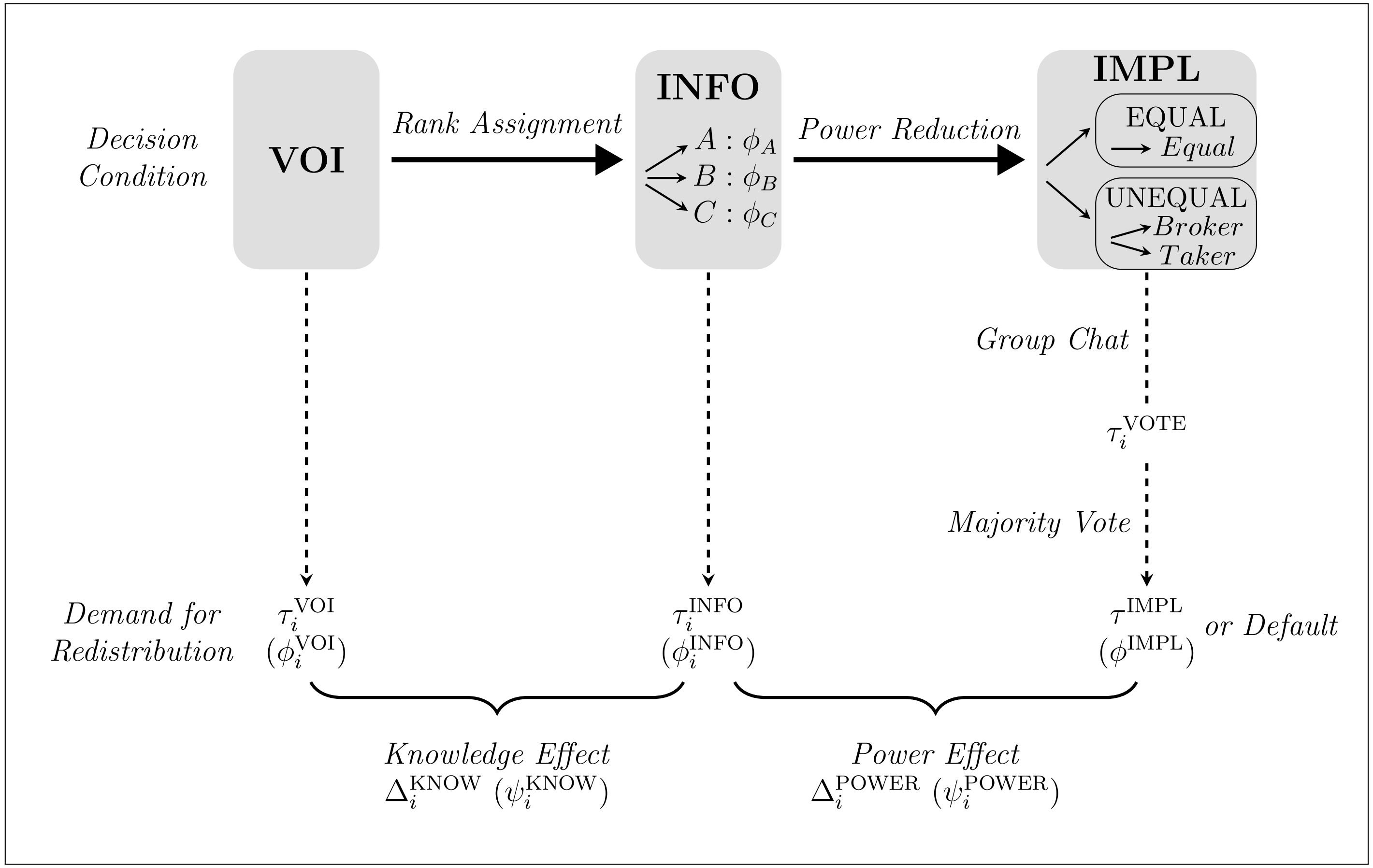

Figure 1: Model and Experimental Setup

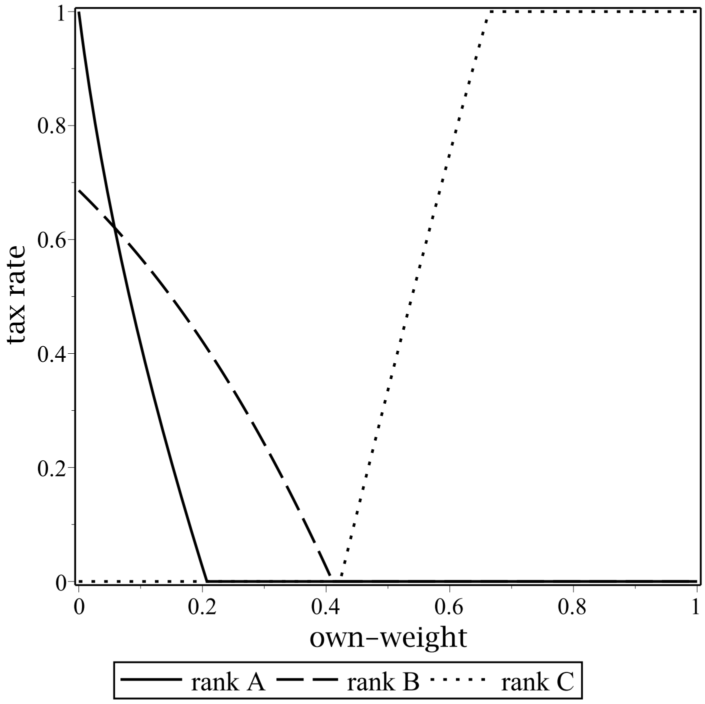

Figure 2: Own-weight and Preferred Tax Rate by Rank

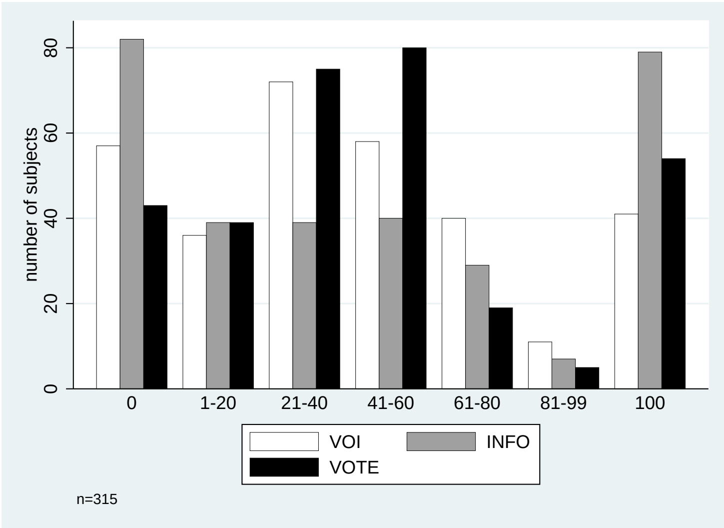

Figure 3: Tax Rates by Decision Condition

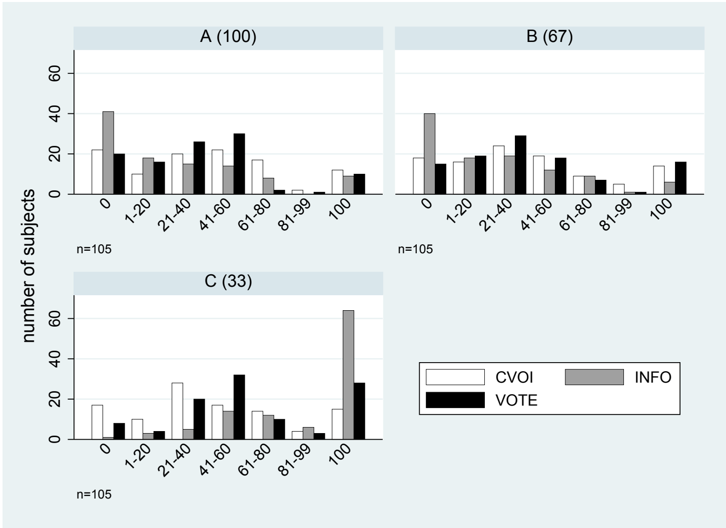

Figure 4: Tax Rates by Decision Condition and Rank

Appendix: Supplementary Table

Table 7: Tax Rate and Measured Own-weight by Treatment

		VOI				INFO				IMPL			
		τ		ϕ		τ		ϕ		τ		ϕ	
	n	mean	std.er.	mean	std.er.	mean	std.er.	mean	std.er.	mean	std.er.	mean	std.er.
Player A (100)													
Equal	15	39.1	7.1	0.112	0.016	27.7	6.9	0.138	0.016	37.3	6.1	0.114	0.014
Taker	60	44.0	4.4	0.105	0.010	27.0	4.2	0.143	0.009	37.6	4.1	0.118	0.009
Broker	30	42.9	6.3	0.107	0.013	31.2	6.5	0.135	0.014	36.7	5.2	0.118	0.011
All	105	43.0	3.2	0.106	0.007	28.3	3.2	0.140	0.007	37.3	2.9	0.117	0.006
Player B (67)													
Equal	15	36.6	7.7	0.228	0.039	22.1	5.8	0.298	0.031	34.3	8.1	0.241	0.040
Taker	60	43.2	4.4	0.211	0.019	24.4	3.9	0.290	0.020	44.4	4.1	0.200	0.018
Broker	30	45.8	6.1	0.185	0.029	32.8	6.4	0.257	0.029	39.6	6.2	0.224	0.028
All	105	43.0	3.2	0.206	0.015	26.5	3.0	0.282	0.015	41.6	3.2	0.213	0.014
Player C (33)													
Equal	15	47.7	7.5	0.535	0.018	80.5	6.4	0.615	0.016	59.1	7.9	0.562	0.019
Taker	60	47.2	4.3	0.534	0.010	85.0	3.4	0.626	0.008	57.7	4.2	0.559	0.010
Broker	30	44.0	6.4	0.527	0.015	82.0	4.3	0.618	0.011	61.0	5.7	0.567	0.014
All	105	46.4	3.2	0.532	0.008	83.5	2.5	0.622	0.006	58.8	3.1	0.562	0.008
All players													
Equal	45	41.1	4.3	0.291	0.031	43.4	5.4	0.350	0.032	43.6	4.5	0.306	0.032
Taker	180	44.8	2.5	0.283	0.016	45.5	3.1	0.353	0.017	46.6	2.5	0.292	0.016
Broker	90	44.2	3.6	0.273	0.023	48.6	4.2	0.337	0.024	45.8	3.5	0.303	0.023
All	315	44.1	1.9	0.281	0.012	46.1	2.2	0.348	0.013	45.9	1.8	0.297	0.012

Note: Entries for IMPL refer to τ^{VOTE}. The measured self-interest ϕ_i^j is computed from the foc assuming $u(.) = ln(.)$ and $\alpha = 2$.

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– Latest Contributions

2017:

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

Greiff, Matthias and Paetzel, Fabian: Less sensitive reputation spurs cooperation: An experiment on noisy reputation systems. Working Paper Nr. 2016-01.
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2015:

Schramme, Thomas: The metric and the threshold problem for theories of health justice: A comment on Venkatapuram. Working Paper Nr. 2015-05. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-05.pdf

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Hinz, Jana and Nicklisch, Andreas: Reciprocity Models revisited: Intention factors and reference values. Working Paper Nr. 2015-02. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-02.pdf

Köke, Sonja, Lange, Andreas and Nicklisch, Andreas: Adversity is a school of wisdom: Experimental evidence on cooperative protection against stochastic losses. Working Paper Nr. 2015-01.
http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2015-01.pdf

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