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Transparency diminishes framing-effects in voting on redistribution: Some experimental evidence

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Abstract

This study analyzes whether enabling people to get informed about redistributive consequences is an effective measure to prevent equivalence framing in the domain of voting on redistribution. Utilizing a simplified version of the Meltzer-Richard model, an equivalent frame is induced by letting subjects vote either on a proportional tax rate or an outcome equivalent minimum net income. In a series of laboratory experiments we find that framing effects both on the individually preferred and collectively agreed level of redistribution are tremendously strong if the information tool is not available (low transparency condition). Once subjects have access to the information tool (high transparency condition), the framing effect on individually preferred tax rates is significantly reduced, and after group communication, the framing effect is washed out from the collective decision. Thus, the availability of the information tool has an asymmetric effect on the level of redistribution if subjects have to set a redistributive tax rate and lowers redistribution if subjects have to set a minimum income level.

Keywords: redistribution, voting, framing, transparency, minimal income

JEL classification: C91, C92, D72

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1 Introduction

The question of whether people decide rationally is certainly one among the most contested questions in social sciences (Druckman 2004, p. 671). Framing studies in the wake of Tversky and Kahneman (1981) and Tversky and Kahneman (1986) present the most stunning and influential demonstrations of irrational behavior. A framing effect occurs when different but, logically equivalent (e.g. same expected utility), phrases cause individuals to alter their preferences.[1] These so called equivalence framing effects violate a basic tenet of rational choice theory that individuals' preferences do not change from alternative ways of eliciting the same preference (Druckman 2004, p. 671).

Empirical evidence obtained through hundreds of framing effect experiments have let social scientist to opt for decision models that reject the rational choice assumption. There is still limited research exploring the political conditions under which equivalence framing effects occurs.[2] Since Druckman (2004), a growing number of studies have explored the robustness of framing effects in political settings by taking into account the moderating effects of political conditions such as elite competition, public deliberation or subjects prior opinions and values (Druckman 2001; Barker 2005; Lau and Schlesinger 2005; Gross and DAmbrosio 2004; Haider-Markel and Joslyn 2001; Brewer, Graf, and Willnat 2003).

This study aims to move beyond the question which political factors moderate or mediate the occurrence of framing effects by asking whether the provision of information tools enable subjects to take fully informed rational decisions and dissolve the effect of equivalence framing.

In doing so, this study deviates from previous framing studies in several ways: While previous studies exploring the robustness of framing effects in political contexts focusing on individual decisions, usually in a hypothetical choice setting, this study explores individual and collective decisions

[1] The term framing is used differently across disciplines. In the social sciences, there are at least two conceptualization; equivalence frames, which are at the center of this study and issue framing. The latter refers to situations where a speaker leads individuals to focus on these considerations when constructing their opinions by emphasizing a subset of potentially relevant considerations (Druckman 2004, p. 672).

[2] The probably most popular example in economics is the literature analyzing the difference between the "willingness to accept" and the "willingness to pay" (Coursey, Hovis, and Schulze 1987).

in the context of a laboratory experiment with monetary rewards. Specifically, we utilize a simplified version of the Meltzer-Richard model (Meltzer and Richard 1981) and let subjects vote on a proportional tax rate or a mathematically equivalent minimum net income. In line with claims for an exploration of equivalence framing in political contexts (Druckman 2004) the experimental setup enables us to observe the process of aggregating individual preferences for redistribution into a collective decision. Allowing subjects to communicate through the exchange of proposals for a tax rate or, respectively, a minimum income captures the deliberative character of the aggregation process in further depth.

The experimental design proceeds in two steps. First, we induce an equivalent frame by letting subjects vote either on a proportional tax rate or a minimum income, while keeping the voting and redistribution mechanisms unchanged (see Lorenz, Paetzel, and Tepe 2016). Second, we test whether the framing effect prevails when the redistributive consequences are more transparent. Transparency is implemented by offering subjects an information tool which enables them to test the consequential distribution for each tax rate or minimal income before they make proposals or take final decisions. Introducing such a calculation tool can be seen as an artificially high degree of transparency. Manipulating the frame (tax/min) and the availability of an information tool (yes/no) results in a 2×2 treatment design.

The question of how the distorting effect of equivalence framing can be mitigated through the provision of information tools is highly relevant for normative and practical reasons. From a normative perspective it is certainly troubling that citizens' preferences are not invariant but can be easily manipulated by skillful politicians by small changes in the presentation of policy issues. Since these tactics are part of everyday political competition, its particularly relevant for practical reasons to understand how the provision of enabling information tools can help to mitigate the distorting effect of equivalence framing.

First, we find that framing the vote about redistribution as a decision about finding an agreeable minimum income compared to a proportional tax rate increases both the individually preferred and the finally implemented level of redistribution substantially (see Lorenz, Paetzel, and Tepe 2016). The framing effect is traced back to different distributional principles be-

ing more accessible depending on how voting on redistribution is presented (compare Konow 2003; Lindenberg 1990). Second, the framing effect is completely canceled out after deliberation if subjects have access to the information tool. The individually preferred tax rate which is stated right before the deliberation has started, is still biased but also influenced significantly. The availability of the information tool has an asymmetric effect on decisions. Transparency increases the level of redistribution if subjects have to set a redistributive tax rate and lowers redistribution if subjects have to set a minimum income level. Finally, probing deeper on the usage of the calculation tool, we find that the effect of an intensive usage of the calculator on decisions is to some extent affected by the framing. Heavy users in the tax frame prefer a significant lower level of redistribution, whereas, the intensive usage of the calculator has no effect on decisions in the minimal income frame.

The article proceeds as follows. The next section presents the experimental vehicle. The third section derives a set of hypotheses on the effect of equivalence framing and information tools in voting on redistribution. The fourth section explains the experimental design and procedure. The fifth section presents the empirical findings. The final section concludes and discusses implications.

2 Theoretical framework

2.1 Voting on redistribution

In democratic societies the level of redistribution is decided by the people through public deliberation and election of governments which propose redistribution policies to find majorities. An overview on the political economy of redistribution literature is given by Alesina and Giuliano (2011). An overview of experimental evidence on the political economy of redistribution can be found in Esarey, Salmon, and Barrilleaux (2012), Barber, Beramendi, and Wibbels (2013), Grosser and Reuben (2013) Agranov and Palfrey (2015) and Kittel, Paetzel, and Traub (2015).

The starting point of this study is to take into account that public discussion about the appropriate level of redistribution can focus on different aspects, e.g. on the minimal necessary income (minimum income) or the proportional burden (tax rate) to be taken by individuals to reduce income

inequality. In this section we describe in detail how the redistribution mechanism works and how we incorporate equivalence framing.

Building on previous theoretical (Meltzer and Richard 1981) and experimental work (Kittel, Paetzel, and Traub 2015), we define a mechanism of redistribution for N individuals with *endowments* $x_1, \ldots, x_N$ as

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

where y_i is the *income* of individual i after redistribution under the implemented *tax rate* τ. The average income is denoted $\bar{x} = \frac{1}{N} \sum_{j=1}^{n} x_i$. If instead of a tax rate a *minimal income* m is implemented, the necessary tax rate to achieve m is computed by

$$\tau = \frac{m - \min_j x_j}{\bar{x} - \min_j x_j}, \tag{2}$$

when the minimal income is within its natural bounds $\min_j x_j \leq m \leq \bar{x}$. Each tax rate corresponds to a minimal income and vice versa.

The collective decision problem to settle on a τ or an m is mathematically identical regarding the social choice of a final distributional outcome. Henceforth, we refer to a decision about τ as the TAX frame and a decision about m as the MIN frame. We analyze the level of redistribution by comparing the individually preferred and collectively agreed tax rates in the TAX and MIN frame. To do so, the entries in the MIN frame are translated into the corresponding tax rate based on Equation (2). If differences occur these differences are the result of an equivalence framing effect.

Individuals with endowments below average ($x_i < \bar{x}$) maximize their income through full redistribution ($\tau = 100\%$), which is their rational choice under egoistic payoff-maximizing preferences. Analogously, endowments above average ($x_i > \bar{x}$) lead to an egoistic payoff-maximizing preference for no redistribution $\tau = 0\%$. Individuals with endowments being exactly $\bar{x}$ are indifferent because they will receive the average income under any tax rate. The distributional conflict in the group is thus polarized except for indifferent individuals.

In this one-dimensional conflict decided through majority rule, the subject with the median preference is pivotal. Hence, any non equal distribution of endowments falls into one of three categories: a majority for full redis-

tribution, or for no redistribution, or the median voter is indifferent. In the latter case the median voter can flip a coin or decide with regard to her welfare preferences (Camerer 2003; Traub, Seidl, and Schmidt 2009). Under the premises of self-interested rational agents, equivalence framing (TAX/MIN) has no effect on the individual nor collectively preferred level of redistribution.

3 Equivalence framing, transparency and hypotheses

There is a rich and growing literature on the role of framing in taxation. Seidl and Traub (2001), Cubitt, Drouvelis, and Gaechter (2011), and Willinger and Ziegelmeyer (1999), for example, considers how frames affect individual perceptions of different tax schemes (see for a review: Fochmann and Weimann 2013).[3] Fochmann and Weimann (2013) conclude that the literature about tax salience highlights that the higher the salience of a tax, the higher is the perception of paying taxes. Sausgruber and Tyran (2011) claim for further investigations of how biased perceptions of taxation and redistribution affect subject's decisions and, more importantly, how subjects could be de-biased. They provide evidence for a tax-shifting bias. Taxing sellers is more popular than taxing consumers even if taxes on sellers are inefficiently higher. Chetty, Looney, and Kroft (2009) develop a theoretical framework for welfare analysis which accommodates transparency effects. They emphasize that making welfare consequences more salient would lead to more efficient policies. Yet, none of these studies explore how equivalence framing and 'de-framing' matter in concrete majority decisions on redistributive taxation, which is at the very center of this study.

In order to understand the mechanism that is responsible for equivalent framing effects, Druckman (2004, p. 674) suggests going back to the original works of Tversky and Kahneman (1981) and Tversky and Kahneman (1986) which constituted prospect theory. Druckman (2004, p. 674) points out that prospect theory explains risk behavior given a particular frame –

[3]Seidl and Traub (2001) use data from interviews with 221 German employees. They find that one third of subjects evaluated their actual taxes as "too high" or "far too high", but, stipulated fair tax burdens which are not lower than current ones. This finding indicates that a proportion of subjects are not aware of how their fairness ideal relates to their position with respect to taxation.

gains frame vs. loss frame – but provides little insight into the psychological process under which a framing effect occurs. A psychological explanation of equivalent framing effects is given by Jou, Shanteau, and Harris (1996, p. 9) who show that equivalency "framing is a form of manipulating the salience or accessibility of different aspects of information." In prospect theory the frames induce individuals to think and decide in terms of losses or gains by making the given domain accessible in their memory (Druckman 2004, p. 674). Accessibility is considered as a "passive, unconscious processes that occur automatically and are uncontrolled" (Higgins and King 1981, p. 74). Since Lau (1989) it is well known that construct accessibility also matters for electoral choice. Construct accessibility can also explain the effect of equivalent framing in voting on redistribution.

Lindenberg (1990) discusses the consideration of framing-effect in human behavior as a methodological bridge between sociology and economics. He highlights that changes in behavior can be traced back quite often to "frame switches" which consider that certain utility arguments can be situationally submerged into the background, while other arguments submerge to the front. Under the treatment condition TAX, individuals are lead to think about redistribution in terms of something that is taken away from them, while the MIN treatment lead them to think about helping the least well-off group member. If the decision is focused on taxes, voters mainly think about equity and equality. Konow (2009) proclaims that fairness depends on the eye of the beholder. If the eye of the beholder is focused on agreeing on a minimal income the willingness to redistribute is higher than when it is focused on taxation.

(H1) Individually preferred and collectively agreed redistribution is higher in the MIN frame compared to the TAX frame.

From a normative perspective, the framing effect can be regarded as problematic, since equal societal choices on redistribution are steered in fundamentally different directions only because of a different way of presenting these choices. Changing the frame in which the issue of redistribution is deliberated, provides leverage for politicians to manipulate the final outcome of a group's redistributive decision. Transparency seems to be a good candidate to protect the electorate of getting manipulated. Transparency can be also secured through independent political institutions.

In this study, we increase transparency of redistributional consequences by allowing subjects to use a calculation tool. Introducing such a calculation tool can be seen as an artificially high degree of transparency. The calculation tool is available for the subjects when they have to decide on either a tax rate or a minimal income. The calculation tool transfers every tax rate or minimal income into the respective ex post income distribution and can be used by subjects as often as they want to before making a proposal or their final decision.

The availability of a calculator alters the access to information and leads individuals to avoid being driven by a particular frame. The availability of a calculator is expected to make voting on redistribution close to rational again. Drawing on the framing approach we expect that subjects overestimate the individual costs of redistribution in the TAX frame and underestimate these costs in the MIN frame. The calculator enables subjects to objectify their costs. We expect the following asymmetric effect of transparency on frame-specific decisions:

(H2) The availability of a calculator lowers redistribution in the MIN frame and increases redistribution in the TAX frame.

4 Experimental design and procedures

Table 1 gives an overview of the treatments. Treatments differ with respect to *transparency* triggered by the presence of a calculator (NOCALC vs. CALC, corresponding to low respective high transparency) and the *frame* (TAX vs. MIN), respectively.

Table 1: Overview Treatments

	Transparency	
frame	No Calculator	Calculator
tax	TAX/ NOCALC	TAX/ CALC
min income	MIN/ NOCALC	MIN/ CALC

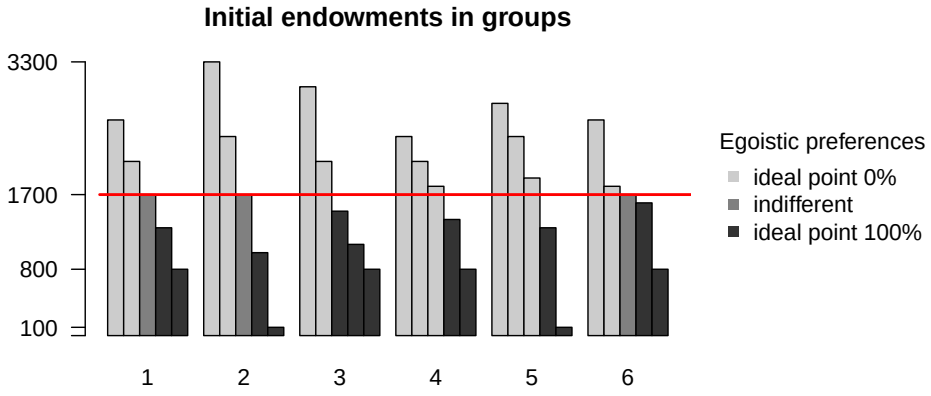
Subjects were recruited from the University of Oldenburg using the software ORSEE (Greiner 2015). Implementing a between subjects design (2 sessions for each treatment) and a total of 8 sessions with 20 subjects each,

delivered a data set from 160 participants altogether. Subjects played six rounds. Rounds vary with respect to the ex-ante endowment distribution. Our experiment delivered 960 individual observations from 160 participants in 6 rounds each.[4]

Subjects were randomly assigned to groups of five in each round without having the chance to identify themselves (stranger matching with no feedback). In each round subjects received endowments from the pre-specified distributions as displayed in Fig. 1 via random assignments. Each distribution had an average endowment of $\bar{x} = 1700$. In the Figure, endowments are color-coded following rational egoistic preferences. If an endowment is lower (higher) than the average, the corresponding bar is color-coded black (bright gray). If the initial endowment is equal to average endowment, the corresponding bar is color-coded in dark gray. The laboratory experiment was conducted with z-tree (Fischbacher 2007) and consisted of the following stages:

1. **Information about endowments and individually preferred decision.** Subjects were informed about their own endowments and the endowment of all other group members. In this stage subjects were privately asked to enter their ideally preferred minimum income respective tax rate.
2. **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 its proposal. All other proposals appeared immediately after confirmation. The endowments were displayed throughout the whole communication stage. Subjects could only communicate through the numerical proposals to coordinate their final decisions. The treatment variation on transparency (NOCALC/CALC) was considered on that stage in the experiment. In TAX/CALC and MIN/CALC, participants could use a calculation tool which calculated the ex-post distribution for either a specific tax rate or a specific minimal income. Subjects could use this calculator as often as they wanted without cost. Calculation results remained private.

[4]The instructions for the treatments without a calculator are provided together with the data-set online in the dataverse Lorenz, Paetzel, and Tepe (2015). Instructions also include a sample screen of the decision screen. Treatments with a calculation tool only differ with respect to the availability of the calculator on the decision screen.



dist.	S1	S2	S3	S4	S5	std. dev.	skewness	kurtosis
1	2600	2100	1700	1300	800	696	0	-1.84
2	3300	2400	1700	1000	100	1235	0	-1.83
3	3000	2100	1500	1100	800	875	0.39	-1.75
4	2400	2100	1800	1400	800	624	-0.29	-1.78
5	2800	2400	1900	1300	100	1056	-0.42	-1.67
6	2600	1800	1700	1600	800	640	0	-1.44

Figure 1: Distributions of ex-ante income. The horizontal line marks the average income which divides the egoistic payoff-maximizing preferences.

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 for 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 about the result of the collective decision and about their net income in the six rounds at the end of the sixth round. The payoff in Euro has been defined by a subject's average earnings over six rounds. The exchange rate was: 1 experimental token = €0.005.

5 Results

This section is subdivided into two parts. In the first part, we present results on the aggregate level by focusing on means of both individually preferred and implemented tax rates between treatments. In the second part, we are analyzing the individually preferred tax rate to control for several individual characteristics.

5.1 Aggregate level

In this part, we analyze whether the framing effect found by Lorenz, Paetzel, and Tepe (2016) (comparing TAX/NOCALC and MIN/NOCALC) also exists when a high level of transparency is introduced (TAX/CALC and MIN/CALC). To allow for comparability between both frames (TAX and MIN) in the empirical analysis, we have to transfer the minimal incomes into the corresponding tax rate. Comparing treatments without a calculation tool with treatments having the calculation tool allows us to detect how transparency might have an effect on decisions. We hypothesize that the stark differences between TAX/NOCALC and MIN/NOCALC diminishes if transparency is increased. Differences between TAX/CALC and MIN/CALC should be lower.

The dependent variable is the level of redistribution which we quantify as the redistributive tax rate τ. Groups decided indirectly about τ via

Equation (2) in the MIN frame and directly in the TAX frame. For the purpose of the empirical analysis we focus on τ. We start with the analysis of the finally implemented redistributive tax rate (after deliberation). In the following, we show that making the redistributive consequences transparent and allowing for deliberation, the framing effect is canceled out.

The histograms in Fig. 2 give a first visualization of implemented levels of redistribution among the four treatments when observations are pooled over rounds. The means of the implemented tax is significantly higher in MIN/NOCALC than in TAX/NOCALC (0.923 vs. 0.560; pooled over all rounds; t-test: $t = 15.842$ with $p < 0.001$ and Mann-Whitney: $z = 11.611$ with $p < 0.001$). This framing effect is already known from Lorenz, Paetzel, and Tepe (2016).

For analyzing the effect of transparency on implemented tax rates, we have to compare the treatments without calculator and with calculator. The comparison of means between TAX/NOCALC (mean= 0.560) and TAX/CALC (mean= 0.695) shows that taxes are significantly higher in TAX/CALC than in TAX/NOCALC (two sided t-test: $t = 4.503$ with $p < 0.001$ and Mann-Whitney: $z = 4.375$ with $p < 0.001$). When subjects have to set a redistributive tax rate, an increased level of transparency yields a higher level of redistribution.

The comparison of means between MIN / NOCALC (mean= 0.923) and MIN / CALC (mean= 0.722) shows that the minimum income is significantly lower in MIN / CALC than in MIN / NOCALC (two sided t-test: $t = 8.307$ with $p < 0.001$ and Mann-Whitney: $z = 6.173$ with $p < 0.001$). When subjects have to set a minimal income, an increased level of transparency yields a lower level of finally implemented redistribution. Transparency has an asymmetric effect on decisions. Transparency increases the level of redistribution if subjects have to set a redistributive tax rate and lowers redistribution if subjects have to set a minimum income level.

Comparing the treatments with high levels of transparency (TAX / CALC and MIN / CALC) shows that the implemented levels of redistribution are not significantly different from another (two sided t-test: $t = 0.895$ with $p = 0.3711$ and Mann-Whitney: $z = 1.234$ with $p = 0.217$). Comparing the levels of redistribution after deliberation clearly shows that the framing effect disappears when we allow for a high level of transparency.

We now turn to the analysis of the individually preferred tax rate. Re-

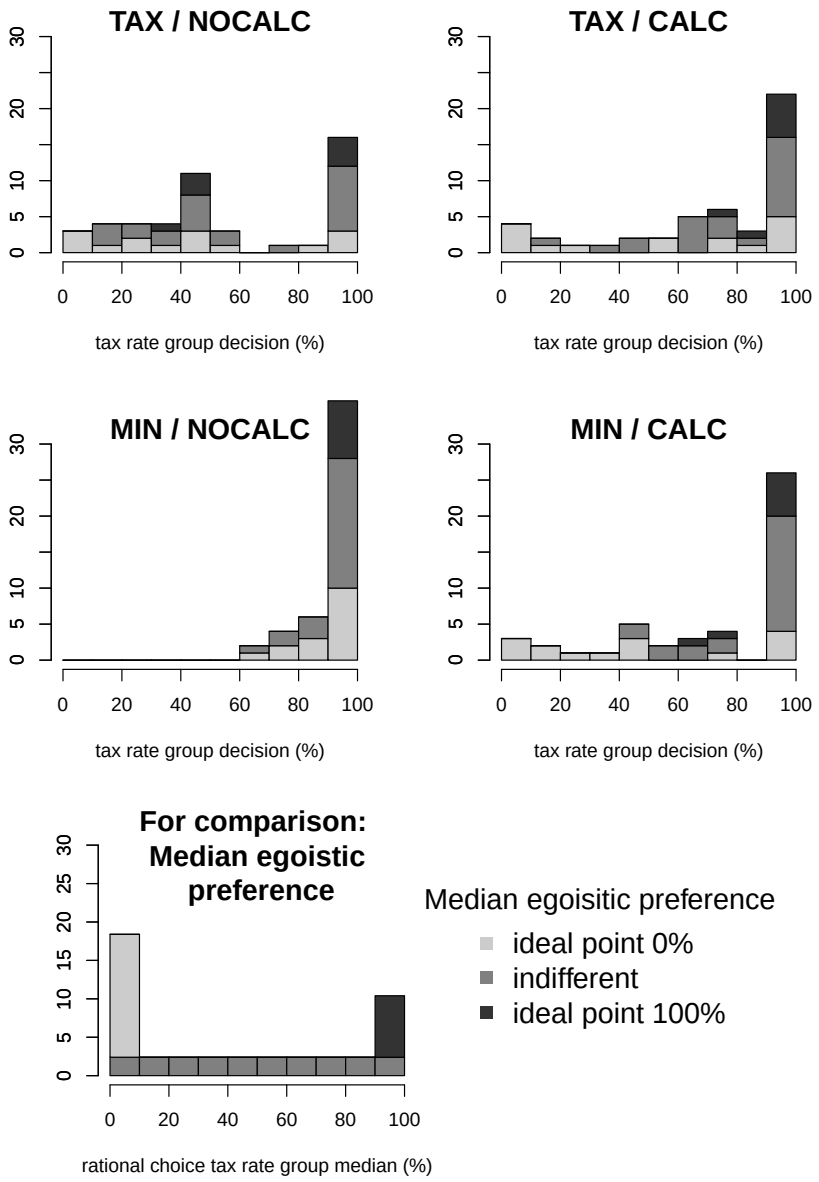


Figure 2: **Tax rates implemented in groups.** Histograms for the redistributive tax rate in TAX/NOCALC, TAX/CALC, MIN/NOCALC, MIN/CALC, and for comparison a histogram of the median voters rational egoistic preferences (equal for all four treatments). Bin intervals are right-closed. Example: 50 belongs to bin $(40, 50]$. $N = 48$ group decisions in each panel.

member that this is the preferred tax rate which is stated right before the deliberation process has started. It is possible that the stated tax rate is to some extend affected by the framing effect even if there is high transparency. We will show that only after deliberation, the framing effect is completely cleared away.

Comparing the histograms for each treatment in Figure 3 with each other, clearly shows that there is a framing effect in treatments with low transparency (compare TAX / NOCALC and MIN / NOCALC). The means of the individually preferred tax is significantly lower in TAX / NOCALC than in MIN / NOCALC when rounds are pooled (t-test: $t = 13.467$ with $p < 0.001$ and Mann-Whitney: $z = 10.711$ with $p < 0.001$).

Comparing treatments with calculator and without calculator for each frame enables us to analyze the effect of transparency on individual decisions. The comparison of means between TAX/NOCALC (mean= 0.477) and TAX/CALC (mean= 0.587) shows that taxes are significantly higher in TAX/CALC than in TAX/NOCALC (two sided t-test: $t = 3.325$ with $p = 0.001$ and Mann-Whitney: $z = 2.919$ with $p = 0.004$). When subjects have to set a redistributive tax rate, an increased level of transparency yields a higher level of redistribution. The comparison of means between MIN/NOCALC (mean= 0.856) and MIN/CALC (mean= 0.715) shows that the minimum income is significantly lower in MIN/CALC than in MIN/NOCALC (two sided t-test: $t = 5.060$ with $p < 0.001$ and Mann-Whitney: $z = 4.372$ with $p < 0.001$). When subjects have to set a minimal income, an increased level of transparency yields a lower level of redistribution.

Comparing the treatments with high levels of transparency (TAX/CALC and MIN/CALC) shows that the individually preferred level of redistribution is higher in MIN/CALC (mean= 0.715) than in TAX/CALC (two sided t-test: $t = 3.911$ with $p < 0.001$ and Mann-Whitney: $z = 3.743$ with $p < 0.001$). We find that framing has an effect on the individually preferred redistributive tax rate, however, the framing effect is still present but is significantly decreased when transparency is higher.

Up to this, we pooled the observations from the six rounds. Now we check whether the treatment effects are robust due to the different endowment distributions. Figure 4 gives a visualization of the observations from each round – and consequently each distribution – separately for the NOCALC and the CALC treatments.

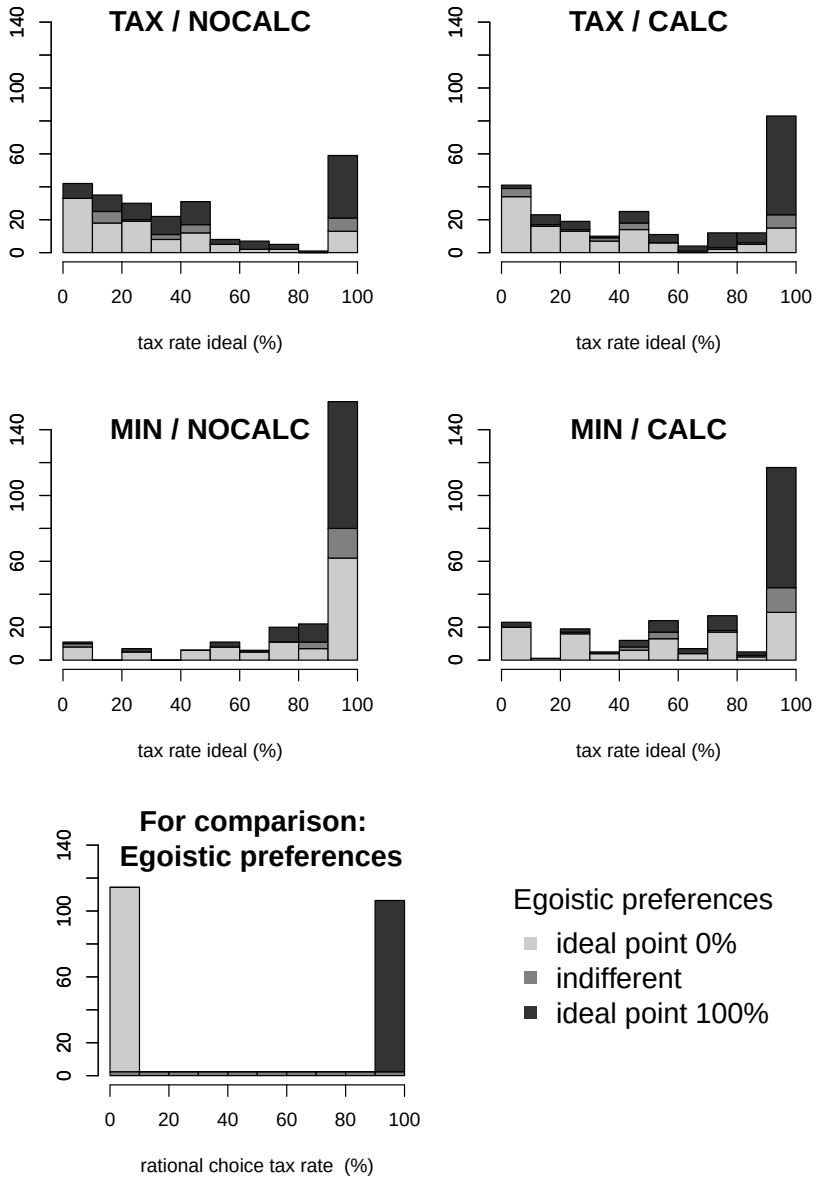


Figure 3: **Ideally preferred tax rates of individual subjects.** Histograms for the redistributive tax rate in TAX/NOCALC, TAX/CALC, MIN/NOCALC, MIN/CALC, and for comparison a histogram of rational egoistic preferences (equal for all four treatments). Bin intervals are right-closed. Example: 50 belongs to bin $(40, 50]$. $N = 240$ individual tax rates in each panel.

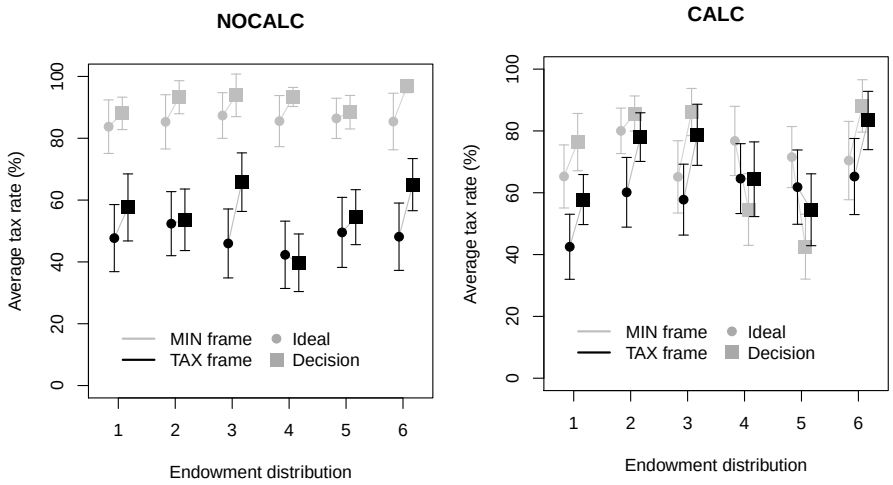


Figure 4: Means of individually preferred and finally implemented tax rates grouped by the different distributions of endowments. The left panel presents observation from TAX/NOCALC and MIN/NOCALC. The right panel presents observations from TAX/CALC and MIN/CALC. Error bars are 95%-confidence intervals. Each connected pair of data points represents means of the same 40 subjects.

The comparison of the individually preferred tax rates with no calculation tool available (left panel in Figure 4) shows that the means of the individually preferred tax rates (labeled as dots) for each single distribution (round) are higher in MIN/NOCALC than in TAX/NOCALC (two-sided t-tests with always $p < 0.001$). In contrast, the individually preferred tax rates in treatments with high transparency (CALC) are not significantly different except for the two first rounds (round 1: $t = 3.043$ with $p = 0.003$ and round 2: $t = 2.895$ with $p = 0.005$). The result from above, that there is still a framing effect on individually preferred tax rates, can be traced back to these differences in the first two rounds.

It can be taken from Figure 4 that the finally implemented tax rate (labelled as squares) is only different in the first round between TAX/CALC and MIN/CALC. Figure 4 also shows that there is, in most of the cases, a substantial movement from the individual stated tax rate to the finally implemented tax rate; in particular with high transparency (panel on the right). The movement is upward for distributions 1, 2, 3, and 6 and downwards for distributions 4 and 5. The movement can be explained with the strategic situation defined by the distribution (compare also Figure 1). Only

for distributions 4 and 5, the majority of players has an income above the mean income and, therefore, the majority prefers a lower level of redistribution, the corresponding movement is downwards. In the appendix A, we provide some examples about the dynamics of the numerical negotiation in some groups. These examples might help to understand the pattern of movements from average preferred taxes to finally implemented tax rates, which is beside the main focus of this paper.

In the following, we will check whether the effect of transparency on implemented taxes is robust with regard to the different endowment distributions. Table 2 presents the means of implemented tax rates between treatments and the results from two sided t-tests comparing the means of sessions with and without the calculation tool for each frame separated. It turns out that over all rounds (first row in Table 2) and for most of the single rounds (distributions), there is a treatment-effect from transparency in both frames which cannot be traced back to observations of e.g. the first rounds.

Table 2: Means of implemented taxes

round	TAX frame			MIN frame		
	CALC	NOCALC	t-test	CALC	NOCALC	t-test
all	0.695	0.560	p<0.01	0.722	0.923	p<0.01
p1	0.578	0.576	p=0.98	0.764	0.881	p=0.03
p2	0.780	0.536	p<0.01	0.856	0.933	p=0.06
p3	0.788	0.658	p=0.07	0.861	0.939	p=0.14
p4	0.644	0.397	p<0.01	0.546	0.934	p<0.01
p5	0.545	0.545	p=0.99	0.426	0.884	p<0.01
p6	0.834	0.650	p<0.01	0.881	0.968	p=0.05

Table notes. Means of implemented taxes per treatment. Comparison between sessions with calculator and sessions without calculator. Two-sided t-tests for all rounds and for each round.

On the group level, we find that transparency has a significant asymmetric effect on decisions. Transparency increases the level of redistribution if subjects have to set a redistributive tax rate and lowers redistribution if subjects have to set a minimum income level. With high transparency,

implemented levels of redistribution do not differ after deliberation. This effect is robust also if we look at decisions in single rounds. In the following subsection, we check whether our findings are robust if we also control for several individual characteristics.

5.2 Individual level

In this subsection, we focus on the individually preferred tax rate and check whether our findings are robust when we also control for several individual characteristics. In a series of auxiliary regressions, we have controlled for the effect of subjects' socio-demographic characteristics (obtained from a post-experimental questionnaire) and subjects' social preferences (obtained from a pre-experimental test using the measurement device suggested by Kerschbamer (2015)) and several other determinants. It turns out that independently of the selected model (OLS, Fixed or Random) and different compositions of controls, the treatment-dummies are always significant and vary only to a small amount between regression models. See the models with random effects Tobit regressions in Table 3. The following regressions on the individual level provide some interesting results which lie not primarily in the focus of our analysis.

The dependent variable in all regressions in Table 3 is the individually preferred tax rate. Dummy-variables are labeled using the "d." prefix. It can be taken from model I that all treatments have on average a higher individually preferred tax rate than in the baseline treatment TAX/NOCALC. Wald-χ^2-tests confirm that all coefficients differ significantly in regression I.[5] These differences are significant for all remaining regressions (Models II-VI).

The dummies Rich and Poor are always significant and of the expected signs. Having a higher income than the mean income (defined as being Rich) yields significantly lower preferred tax rates. Subjects with a lower income than the mean prefer a significantly higher tax rate (the coefficient Poor is positive). Analyzing the effect from inequality of the distribution on decisions shows that only the skewness of the distribution has a substantially negative effect on the individually preferred tax rate, whereas, neither the standard deviation nor the kurtosis have an effect on the tax rate.

[5] TAX/CALC versus MIN/CALC ($\chi^2 = 8.02$ with $p = 0.005$); TAX/CALC versus MIN/NOCALC ($\chi^2 = 36.64$ with $p < 0.001$); MIN/CALC versus MIN/NOCALC ($\chi^2 = 10.37$ with $p = 0.001$).

Table 3: Individually preferred tax rates and controls

	I	II	III	IV	V	VI
dep. variable	ind. tax	ind. tax	ind. tax	ind. tax	ind. tax	ind. tax
d. TAX/CALC	0.109**	0.109**	0.109**	0.105**	0.155***	0.129**
	(0.045)	(0.043)	(0.043)	(0.042)	(0.044)	(0.057)
d. MIN/CALC	0.237***	0.238***	0.238***	0.239***	0.239***	0.218***
	(0.045)	(0.043)	(0.043)	(0.042)	(0.044)	(0.057)
d. MIN/NOCALC	0.383***	0.383***	0.383***	0.377***	0.378***	0.344***
	(0.045)	(0.043)	(0.043)	(0.042)	(0.041)	(0.053)
d. Rich		-0.220***	-0.232***	-0.232***	-0.240***	-0.239***
		(0.034)	(0.034)	(0.034)	(0.034)	(0.036)
d. Poor		0.079**	0.078**	0.076**	0.070**	0.066*
		(0.034)	(0.034)	(0.034)	(0.034)	(0.036)
Skewness			-0.129***	-0.129***	-0.122***	-0.120***
			(0.036)	(0.036)	(0.036)	(0.038)
Sd			0.000*	0.000*	0.000*	0.000*
			(0.000)	(0.000)	(0.000)	(0.000)
Kurtosis			0.079	0.080	0.060	0.049
			(0.071)	(0.071)	(0.071)	(0.075)
d. Effi. Pref.				0.035	0.031	0.044
				(0.049)	(0.048)	(0.056)
d. Inequa. Aver.				0.113**	0.107**	0.103**
				(0.047)	(0.047)	(0.052)
d. Inequa. Loving				0.027	0.031	0.019
				(0.095)	(0.094)	(0.098)
d. Spiteful				0.031	0.028	-0.004
				(0.066)	(0.066)	(0.076)
d. Egoistic				-0.060*	-0.057*	-0.082**
				(0.033)	(0.033)	(0.039)
d. Heavy Calc./TAX					-0.132***	-0.130***
					(0.042)	(0.041)
d. Heavy Calc./MIN					-0.001	0.001
					(0.044)	(0.044)
Female						0.038
						(0.035)
Engineering						0.022
						(0.059)
Others						0.029
						(0.044)
Languages						0.091*
						(0.052)
Economics						0.098*
						(0.058)
Constant	0.467***	0.535***	0.607***	0.583***	0.555***	0.515***
	(0.032)	(0.042)	(0.122)	(0.126)	(0.125)	(0.139)
Wald-χ^2	79.962***	301.324***	322.471***	343.142***	358.288***	300.015***

Table notes. Random-effects Tobit panel model. $N = 960$. Dependent censored variable: Individually preferred tax rate from [0,1]. Social preference types subjects' social preferences derived from the measurement device suggested Kerschbamer (2015). *$p \leq 0 > .1$, **$p \leq 0.05$,***$p \leq 0.01$.

We elicit social preference types using the measurement procedure by Kerschbamer (2015). It turns out that only inequality aversion has an effect on the individually preferred tax rate (compare the coefficient of d. Inequa. Aver. regressions IV-VI). Subjects who are classified as inequality avers

prefer a significantly higher redistributive tax rate.

We also checked whether utilizing the calculation tool more intensively might also have an impact on tax rates. We classify subjects into the category 'Heavy Calculator' if they use the calculator more often than the average utilization of 8 calculations. Interestingly, we find that only in TAX/CALC, the dummy 'Heavy Calculator' has a negative impact on the tax rate. There is no effect in MIN/CALC. It can be taken from Table 3 that the treatment effects are robust even if we control for a bunch of individual characteristics. Providing a calculation tool in TAX/CALC and MIN/CALC has an asymmetric effect on preferred tax rates even if we control for several individual characteristics.

Additionally, we want to analyze in more detail whether the intensity of utilizing the calculator has an effect on how biased a subject decides. We hypothesize that utilizing the calculation tool in MIN/CALC decreases the individually preferred tax rate, whereas in TAX/CALC, the tax rate should be higher for participants using the calculator intensively because decisions should be less biased. Table 3 shows that we cannot find evidence for such an effect. Table 4 presents only observations for individually preferred tax rates in TAX/CALC and MIN/CALC. The results confirm the results from Table 3. It seems that the intensity of using the calculator has no effect on the individually preferred tax rate in MIN/CALC and a negative effect in TAX/CALC.

Table 4: Individual tax rates and usage the calculator

	I	II	III
Variable	indi. tax	indi. tax	indi. tax
d. MIN/CALC	0.128***	0.126***	0.079
	(0.047)	(0.047)	(0.053)
d. Heavy Calc		-0.062*	-0.123**
		(0.037)	(0.051)
d. Heavy Calc/MIN			0.128*
			(0.074)
cons	0.575***	0.598***	0.621***
	(0.033)	(0.036)	(0.038)
Wald-χ^2	7.352***	10.355***	13.560***

Table notes. Random-effects Tobit panel model. $N = 480$ Dependent variable: Individually preferred tax rate (0;100). *$p \leq 0 > .1$, **$p \leq 0.05$,***$p \leq 0.01$.

Another way to look at the usage of the calculation tool is presented in

Table 5. Regressions I-III analyzes the effect on the individually preferred tax rate for each treatment separated. The interaction variables of 'Heavy Calc' with the dummy of being either rich or poor shows an insignificant relationship. Even though we find treatment-specific differences in decisions stemming from the intensity of utilizing the calculation tool, we cannot trace back treatment differences in tax rates to those differences in utilizing the calculator. This result may not come as a surprise if subjects vary in the number of calculation they require to take informed proposals or decisions.

Table 5: Individual tax rates, income position and the calculator

	TAX: I	TAX: II	TAX: III	MIN: I	MIN: II	MIN: III
Variable	indi. tax	indi. tax	indi. tax	indi. tax	indi. tax	indi. tax
Heavy Calc	-0.122**	-0.152***	-0.094	0.005	0.007	0.033
	(0.052)	(0.043)	(0.129)	(0.052)	(0.046)	(0.133)
d. Rich		-0.245***	-0.205*		-0.324***	-0.323***
		(0.070)	(0.105)		(0.073)	(0.097)
d. Poor		0.202***	0.234**		0.003	0.028
		(0.070)	(0.104)		(0.073)	(0.098)
Heavy Calc × Rich			-0.075			0.005
			(0.142)			(0.146)
Heavy Calc × Poor			-0.056			-0.070
			(0.142)			(0.148)
cons	0.621***	0.660***	0.626***	0.702***	0.852***	0.839***
	(0.039)	(0.071)	(0.100)	(0.036)	(0.071)	(0.092)
Wald-χ^2	5.482**	122.217***	122.721***	0.009	58.480***	59.360***

Table notes. Random-effects Tobit panel model. Dependent variable: Individually preferred tax rate (0;100). N=240 *$p \leq 0.1$, **$p \leq 0.05$,***$p \leq 0.01$.

6 Discussion and concluding remarks

Many social scientists consider equivalence framing as a powerful demonstration of the irrationality of human behavior. This study transfers equivalence framing to the domain of voting on redistributive taxation to test its robustness in this particularity salient political setting. The basic idea is to create an equivalence framing effect in voting on redistribution and than to test whether the provision of a simple information tool dissolves this effect.

Utilizing a simplified version of the Meltzer-Richard model we find that if subjects information about the redistributive consequences of their choices is low, a strong framing effect occurs. If subjects have to set the level of redistribution by deciding about a tax rate without having the possibility to use a information tool, both the individually preferred tax rate and the implemented tax rate is about 50% lower than in case of deciding on a minimal income (Lorenz, Paetzel, and Tepe 2016).

This paper analyzes if this framing effect also occurs if we increase transparency of the redistributive consequences. It turns out that increasing the transparency has an asymmetric effect on both, the individually preferred and finally implemented level of redistribution. In the minimal income framing, a high degree of transparency decreases both the preferred and implemented level of redistribution. In the tax frame, transparency has a contrary effect on redistribution. Here, a higher transparency increases the level of redistribution. When subjects have the possibility to calculate the ex post endowment distributions given different tax levels or different minimal income levels, then, subjects are fully aware of the redistributive consequences and decide on average on the same level of redistribution (TAX / CALC and MIN / CALC).

This asymmetric effect of transparency of the redistributive consequences and its magnitude is of great interest also for policy makers because it helps to understand how framed decisions can be 'de-framed'. For example, the well known negative effect of a "tax framing" on redistribution can be de-framed by providing also information of the redistributive consequences of taxation. This finding adds to the literature analyzing how voters can be de-biased (compare: Sausgruber and Tyran 2011).

However, in real elections voters typically decide on more abstract ideological positions of parties (left vs. right), where the desired level of redistri-

bution is typically seen as a very important determinant of the ideological position (Downs 1957; Inglehart and Klingemann 1976; Sartori 1976). In this perspective our results confirm that it might be crucial for election results which policy frame is more present in public debate (Chong and Druckman 2007). Our results show that not only the way of presenting the issue, but also transparency about consequences has a large impact on decisions and outcomes. Transparency and deliberation can lead to 'unframed' (unbiased) decisions even if the issue is presented fundamentally different. Our experimental findings points to a conceivable solution to hamper potential manipulations. Making the electorate more aware of the redistributive consequences of different political redistributive propositions would lead to a decreased framing effect.

A Appendix: Negotiation dynamics examples

Three strategic group situations can be distinguished based on the distributions and rational egoistic payoff maximizing preferences of all players as shown in Figure 1. Figure 5 shows examples of how these strategic situations can shape the negotiation process.

1. **The median voter is indifferent**, while two voters favor 0% and two 100% (Distributions 1, 2, and 6, cf. Panels A and B in Figure 5.). In this situation the indifferent voter has the same payoff for all possible group decisions, Thus, she can use second order preferences about more equal or unequal distributions for her decision. This can lead to intermediate decisions, cf. Panels A and B in Figure 5.

2. **There is a 3:2 majority in favor of 100% tax rate** (respectively 1700 as a minimal income). (Distribution 3, cf. Panels C and D in Figure 5.)
   The three can force a decision for full redistribution. This sometimes happens. There is a general trend that on average decisions increase compared to the ideally preferred ones. The loosing coalitions often shows a "begging" behavior, i.e. they propose values closer and closer to the current decision of the potentially winning coalitions to try to attract at least on of them to make a concession. Sometimes this works, but often not. Sometimes also rich people show preferences for high tax rates up front.

3. **There is a 3:2 majority in favor of 0% tax rate** (respectively the lowest income as minimal income). (Distributions 4 and 5, cf. Panels E and F in Figure 5.)
   The three can force a decision for no redistribution. This sometimes happens. There is a general trend that on average decisions decrease compared to the ideally preferred ones. The loosing coalitions often shows a "begging" behavior, i.e. they propose values closer and closer to the current decision of the potentially winning coalitions to try to attract at least on of them to make a concession. Sometimes this works, but often not. Sometimes also rich subjects show preferences for high tax rates up front.

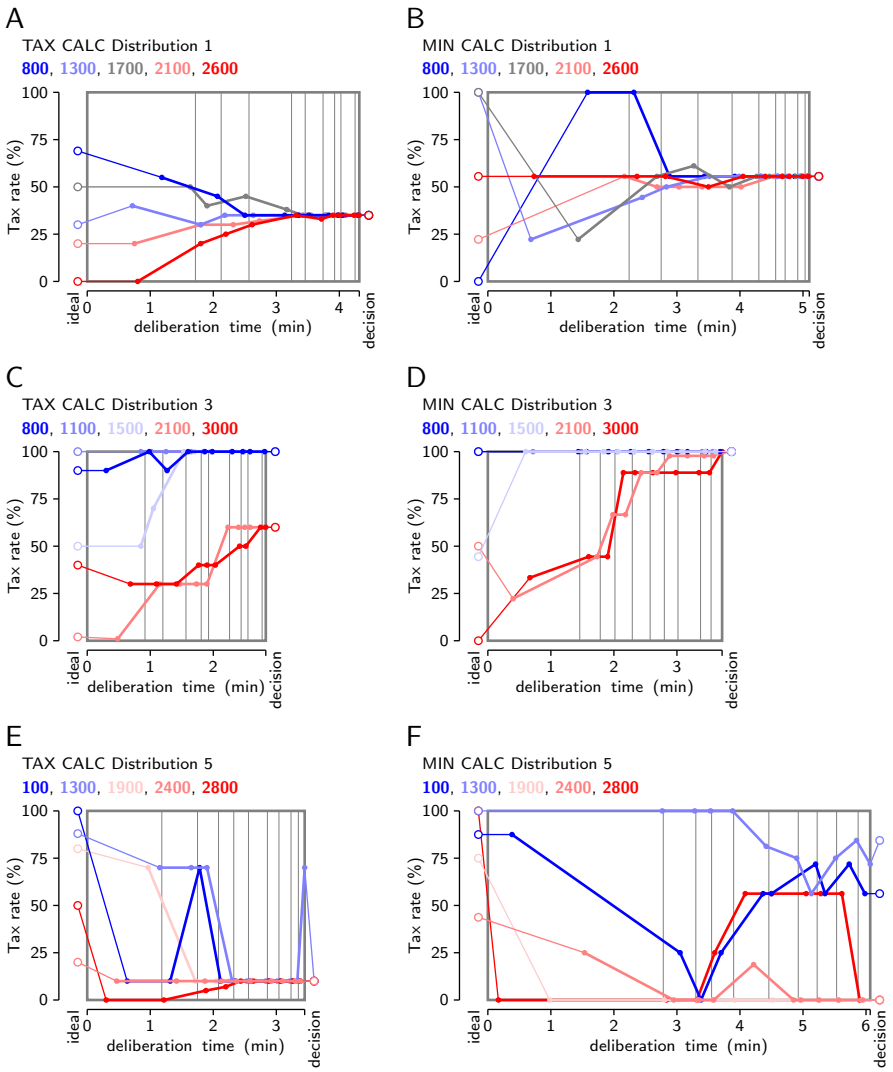


Figure 5: Six examples of negotiation dynamics. Color code: Red subjects have a rational egoistic preference for 0%. Blue subjects have a rational egoistic preference for 100%, and gray subjects are indifferent. The numerical endowments of subjects are color-coded in the second line of the title. The group decisions were: A 35%, B 55,6%, C 100%, D 100%, E 10%,F 0%.

These strategic situations explain the movements from ideally preferred tax rate to the decision when the possible redistributive outcomes are very transparent through the calculator, cf. Figure 4 panel on the right hand side. The upward movement in distribution 3 can be explained by the 3:2 majority in favor of the 100%. Analogously, the downward movement for distributions 4 and 5 is a consequence of the 3:2 majority in favor of 0%. The upward movement for distributions 1, 2, and 6 are probably a result of pro-social preferences of the indifferent voters.

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