DFG Research Group 2104
Need-Based Justice and Distribution Procedures

Needs as reference points: When marginal gains to the poor do not matter

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Working Paper Nr. 2017-13

http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-13.pdf

Date: 2017-08

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

Needs as reference points:
When marginal gains to the poor do not matter

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Imagine that only the state can meet the need for housing but decides not to do so. Unsurprisingly, participants in a vignette experiment deem this scenario unjust. Hence, justice ratings increase when the living situation improves. To a lesser extent, this also holds beyond the need threshold, understood as the minimum amount necessary for a decent life. Surprisingly, however, the justice evaluation function is highly convex below this point. The resulting S-shaped curve is akin to the value function in prospect theory, with the need threshold providing the point of reference and inflection. A control treatment without needs-information supports this interpretation. Needs-information furthermore compresses the perceived injustice of arbitrary inequality. As in prospect theory, such reference dependency suggests biases in judgment and decision making. A consequence may be that the lot of the poorest in society does not receive the attention it would otherwise get.

Keywords: Needs, Justice, Vignette experiment, Reference dependency

Acknowledgments: We are indebted to the support and input throughout all project phases by Jan Romann, Nils Springhorn and Mark Siebel. We also thank James Konow, Jakob Koscholke, Michael Schippers, Thomas Schramme, and Kai Spiekermann, as well as participants at DFG research group 2104 meetings, the Philosophical colloquium in Oldenburg, the CEREB colloquium in Erfurt, IMEBESS 2017 in Barcelona as well as the ESA World Meeting 2017 in San Diego for helpful discussions. Funding by the German Science Foundation (DFG Grant SI 1731/2-1) is gratefully acknowledged.

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1 Introduction

Satisfying basic needs plays an important role in conceptions of social justice (Reader, 2005) and as a policy goal (Boarini and Mira d'Ercole, 2006; Esping-Andersen, 1990). A basic need can be understood as an amount of some good that a member of society requires in order not to suffer (Miller, 1999). Because of their fundamental nature, basic needs have also been proposed by many as the principal normative grounding for human rights (e.g., Brock, 2005; Gasper, 2005; Hassoun, 2008; Renzo, 2015).

Some needs are biological (e.g., the amount of calories a person should consume every day), while many others are social in nature (e.g., the amount of money necessary to participate in social life). What separates needs from mere wants is that the former are based on a socially shared understanding (Miller, 1999). An individual may have such a strong preference for eating bluefin tuna that she feels in pain whenever it is not part of her menu. For this want to become a need, however, others must acknowledge that eating bluefin tuna is necessary for her not to suffer (which in this case seems fairly unlikely). As an inter-subjectively acknowledged threshold, needs provide a fundamentally different basis of social justice than other principles, such as egalitarianism, equity theory, utilitarianism as well as the Rawlsian maximin or the Pareto principle, which dominate the literature on distributional preferences (see e.g., Konow, 2003).

What sets need-based justice apart from the latter is its defining question: Do people have enough (Frankfurt, 2015) in order to lead a minimally decent life (Miller, 1999)? This question shows the noncomparative (Feinberg, 1974) thrust of need-based justice: It is first of all human suffering, due to unfulfilled needs, that causes injustice, not how one is treated relative to others. This raises the question precisely how justice is related to need fulfillment. While it seems straightforward to characterize a situation as being just when the needs of all members of society are fulfilled, it is much less obvious how to evaluate situations that depart from this unlikely state of the world.

The main reason for this gap lies in the focus of most accounts of social justice on the comparative dimension of justice, i.e., how one person's due is related to how much other members of society receive. This is clearly an important endeavor and a focus on needs does not make it obsolete (the comparative dimension is always present when members of society differ in important

aspects and need considerations stop carrying much weight when everyone's needs are fulfilled). However, there seems to have been little progress on reaching common principles of comparative justice accepted by involved parties with their differing interests and their selfishly biased perceptions. The hope of a need-based account of justice, however partial it may be, lies in its potential capability to reach a consensus, even among involved parties, that harm should be avoided, regardless of a suffering person's desert, status or responsibility. The silence in the literature on the relationship between need fulfillment and justice is therefore an important gap: If all we can say is that unnecessary suffering is unjust, how can we differentiate between situations with different levels of suffering or decide between situations that involve trade-offs between members of society?

In this paper, we try to partly fill this gap. We will first introduce a conceptual framework in which we will try to make theories of social justice speak about the relationship between need fulfillment and justice. Here, we focus solely on the noncomparative dimension of need-based justice, hitherto largely neglected in both the empirical and the normative literature (the recent and ongoing exceptions on the normative side will be covered in the next section). Against this background, we will then present empirical data based on evaluations of laypersons who act as impartial spectators. As many have argued (see e.g., the discussion in Konow, 2003), the impartial views of real people are an important foundation for a normative theory. Asking laypersons helps the philosopher to go beyond and possibly question her own pre-theoretical intuitions. Not the least, for a theory of justice to be capable of reaching a consensus, it has to be accepted by non-experts. The empirical part relies on vignette experiments. They have become the de facto methodological standard for empirical justice research because they promise both experimental control about predictor variables (in our case: need fulfillment) and external validity for situations that, for ethical or practical reasons, can not be studied in real-life situations (see Bardsley et al., 2009, for overviews see Traub et al., 2005; Gaertner and Schokkaert, 2012). This clearly applies to research on human needs. While this paper is not the first to empirically study the role of needs for justice evaluations (starting with Yaari and Bar-Hillel, 1984, for an overview see Kittel and Traub, 2018), we are not aware of any empirical work, nor a conceptual framework for that matter, that can shed light on the precise relationship between need fulfillment and justice evaluations.

2 Conceptual framework

Needs become a question of justice whenever society holds at least some responsibility for the need fulfillment of its members. If, for instance, a situation of unfulfilled needs comes about through sheer misfortune and without anyone being able to alleviate suffering (e.g., a person is ship-wrecked on a deserted island), one would be hard pressed to speak of an injustice. If, however, there are plausible counterfactual scenarios in which needs would be fulfilled if other decisions would be or had been taken (e.g., other economic or social policies) unfulfilled needs become a matter of justice (for a further elaboration on the—often not straightforward—distinction between injustice and misfortune see Shklar, 1990). Bearing an element of human responsibility in mind, a situation of unfulfilled needs can be deemed less just than a situation in which needs are fulfilled (Kipnis and Meyers, 1985). To formalize this statement, consider a society with homogeneous members, i.e., with equal need thresholds (ν) and equal endowments (ω) of some important good that is considered necessary for a decent life in society. The justice evaluation function J can then be said to be rising in the level of endowment: $J'(\omega) > 0, \text{ for } \omega \leq \nu$, with the need threshold assumed to be constant. This follows straightforwardly from several accounts of justice which acknowledge a noncomparative dimension of justice, such as utilitarianism (e.g., Mill, 1998; Bentham, 2009); prioritarianism (e.g., Parfit, 1997), which puts extra weight on the well-being of those suffering; and sufficientarianism (Frankfurt, 1987; Crisp, 2003; Schramme, 2006). It may even be deduced from the writings of Plato and Cicero (see Siebel, 2017). This monotonic relationship is also part of recent and related works by Siebel (2017), Springhorn (2017) as well as Traub et al. (2017) on the measurement of need-based justice—their models can, however, lead to different results in cases (that are not considered here) where improved need fulfillment increases inequality between members of society. There are two more interesting questions on the noncomparative relationship between need fulfillment and justice: First, how does $J(\omega)$ look like beyond the need threshold? Second, how is justice rising below the threshold, i.e., what can be said about $J''(\omega), \text{ for } \omega \leq \nu$?

For utilitarianism, the answer to the first question is obvious: As long as there is extra utility from a better endowment, the just thing is to provide it, i.e., $J(\omega)$ is rising also in situations of oversupply (i.e., for $\omega > \nu$) up to a pos-

sible bliss point beyond which further endowment creates a disutility (such as overeating food). For sufficientarianism, by contrast, enough is enough. For this line of sufficiency, a person's need is the most plausible candidate. Therefore, $J(\omega)$ may not rise beyond ν. The dedicated measures of need-based justice by Siebel (2017), Springhorn (2017) and Traub et al. (2017) also all agree that *need*-based justice can no longer differentiate between situations in which the needs of all members of society are always fulfilled, again implying that $J(\omega)$ reaches a plateau when $\omega > \nu$. However, this does not preclude other considerations, such as utilitarianism, to enter. Roger Crisp's (2003) account of sufficientarianism can be understood along these lines and suggests utility maximization beyond the sufficiency line (see Arneson, 2002). Therefore, justice evaluations may increase even beyond the need threshold.

To answer the second question, some interpretation is in order. From the perspective of utilitarianism, justice rises in pleasure and falls in pain; more generally, it increases in a person's utility. For the lack of compelling alternatives, let us assume a linear mapping from utility to justice. Consequently, the relationship between endowment and utility determines the functional form of $J(\omega)$. The dominant assumption for this relationship is that of diminishing marginal returns. Putting these elements together suggests a concave relationship between endowment and justice, i.e., $J''(\omega) < 0$. The same conclusion could, unsurprisingly, also be drawn from the perspective of prioritarianism, which gives more weight to the utility of those who are badly off. According to Arneson (2002), injustice is therefore directly linked to a person's suffering (and not to the level of inequality), which is getting progressively worse the lower the endowment is. Concavity is also the cornerstone of Jasso's work on distributive justice, which posits that justice evaluations are well described by the logarithm of the ratio between actual reward over just reward. While the logarithm was first a purely empirical result based on vignette studies (e.g., Jasso, 1978), she later argued for it axiomatically (Jasso, 1990), albeit with little reference to normative theories of justice. As Jasso does not explicitly restrict the domain of just rewards, her theory seems, prima facie, a candidate for measuring need-based justice (see Springhorn, 2017 and Siebel, 2017 for a critical discussion of this approach). This would imply a concave relationship between endowment and justice and is indeed also explicitly modeled, as part of their own measures of need-based justice, by both Springhorn (2017) and Siebel (2017). Concavity is also assumed in Traub et al. (2017).

Sufficientarianism, by contrast, might give a different answer by putting a particular moral significance on a person reaching the sufficiency line. In the most extreme form, this suggest a jump in $J(\omega)$ at the need threshold from its minimum to its maximum value. In any case, sufficientarianism would give us a convex instead of a concave relationship between need fulfillment and justice for all $\omega \leq \nu : J''(\omega) > 0$.

Lastly, note that any purely comparative notion of justice, such as egalitarianism, implies a flat justice evaluation at its maximum value since households are always treated equally. The implausibility of this implication is precisely what drives the leveling-down objection (Nozick, 1974; Raz, 1986; Temkin, 1993) against egalitarianism and shows that we also need an explicit treatment of the noncomparative dimension of need-based justice.

3 Design of the study

In the main treatment ("Needs") of our vignette study, we ask subjects to imagine that only the state can meet people's need for housing. Depending on the scenario, the state may or may not decide to do so. Needs are presented as a fictitious amount of living space (1,000 units per household) that residents of the region consider necessary for a decent life. Participants are told that space of this size means "to live in close quarters" but is "just enough to lead a decent life". They are also informed that households do not differ in any other meaningful way (ruling out considerations of, e.g., desert) and prefer more to less living space. The means at the state's disposal are sufficient to build up to 2,000 units per household. See the exact wording of the vignette in the Appendix. In the control treatment ("No Needs"), the vignette is the same apart from the parts that relate to needs, which are taken out.

Subjects rate 11 scenarios that differ in the endowment with living space provided by the state for each household. The endowment ranges from 0 to 2,000 units in steps of 200 units. There are two different rating tasks: In the global rating task, subjects rate each scenario separately on a scale from 0 to 100%, where 100% is presented as "perfectly just" and lower numbers mean correspondingly lower degrees of justice. In the relative rating task, subjects evaluate the perceived difference in justice between two scenarios that are adjacent in terms of endowment (e.g., 0 vs. 200 units) on a 11-points

Likert scale. On this scale, 1 represents indifference ("equally just / unjust") while 11 means that one scenario is deemed "much more just". There are two different versions of both treatments, each given to half of the participants. The most important differences concern the sequence in which the endowments are presented, either ascending or descending, which of the two rating tasks came first and the intital slider position in the global rating task, either left or right. The two versions aim to control for order and anchoring effects.

The study was run with 116 participants of the WiSo experimental laboratory at the University of Hamburg in 2016, in a subject pool consisting largely (93%) of students of various disciplines, with a median age of 25 years at the time of the study and slightly more self-identified females among those 76% of participants who responded to the gender question (56% female, 42% male, 2% other). With respect to their own living situation, the median living space per person reported by the participants is about 27 square meters. Participants were invited through the software hroot (Bock et al., 2014), and the survey was implemented with LimeSurvey. Participants received a flat payment of 10 Euros for taking part in a session that took about one hour and consisted of the study described here as well as another part related to need-based justice. The latter part was only administered and introduced after the present study and could therefore not have had any influence on it.

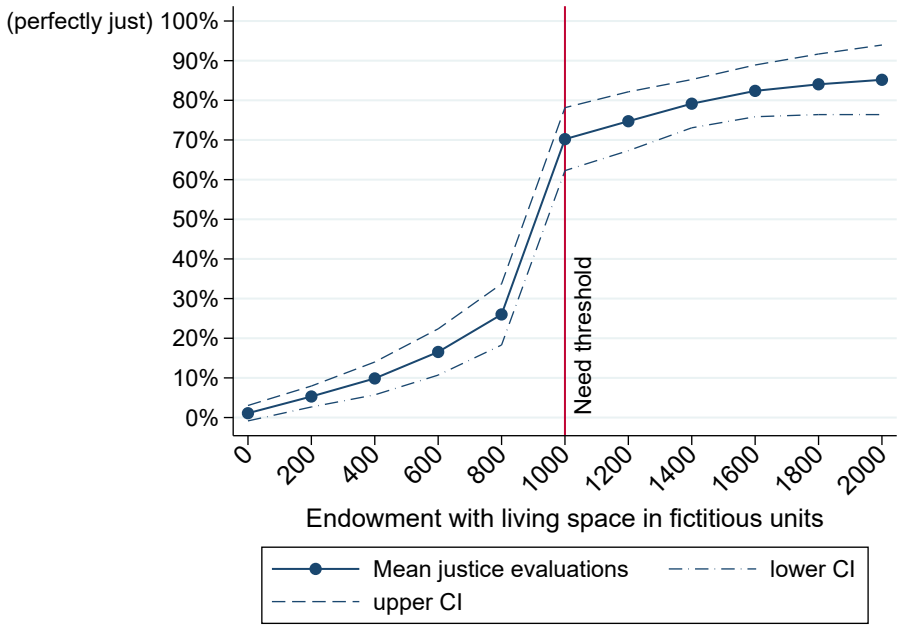
4 Results

We start by looking at the rating in the global rating task in the main treatment.[1]

The mean justice ratings in Figure 1 reveal several results. First, study participants agree to a large extent that not providing any housing is unjust (in fact, more than 95% of participants evaluate this scenario with the minimum value of 0) and therefore reject a purely comparative notion of justice. Second, justice evaluations consequently increase when households' lot is be-

[1]For all analyses of the global rating task, we drop 7 out of the 116 observations (5 in "Needs" and 2 in "NoNeeds") because they left the sliders for all scenarios at their starting positions. As these 7 subjects also had the fastest "response" times, they most likely accidentally or purposefully left the screen without attempting any evaluation. Dropping these observations should therefore improve data quality. However, the basic results reported here would not change if we included them. Note furthermore that all observations are included in the pairwise rating task because subjects had to make a choice before being able to proceed.

Figure 1: Mean justice ratings ("Needs" treatment)



ing improved. This holds true, albeit to a lesser extent, beyond the need threshold. Therefore, subjects do not subscribe to a version of sufficientarianism that sees questions of justice to end when needs are met. Fourth and most interestingly, justice evaluations rise over-proportionally below the need threshold. The jump in justice ratings from about 27% to about 70% when endowment rises from 800 to the need threshold of 1,000 units is particularly striking. Overall, the justice evaluations are best described by an S-shaped sigmoid function, with a point of inflection at the need threshold. Before we dig deeper into interpreting and explaining the s-shape, we first note that all four results pass tests of statistical significance, as can be seen from table 1.

The panel Tobit regression, which takes into account the large extent of censored data at both the minimum and maximum of the response scale (30% at 0 and 22% at 100, respectively) and deals with the nested data-structure, confirms the visual inspection. In this regression, the variable "below endowment" is coded as 1 for all endowments up to the need threshold of 1,000 units. Therefore, the variable "endowment" captures the effect of increasing endowment on justice evaluations in the domain of oversupply. If we fit the relationship between endowment and justice evaluation only linearly, as in model 1, we find a statistically highly significant positive coefficient. This

variables	model 1 justice evaluation	model 2 justice evaluation
endowment	0.927***	1.434***
	(0.0414)	(0.127)
not above threshold * endowment	0.156***	-1.293***
	(0.0537)	(0.224)
endowment^2		-0.00353***
		(0.000591)
not above threshold * endowment^2		0.0131***
		(0.00230)
constant	-52.88***	-41.58***
	(6.651)	(7.879)
panel level standard deviation	25.28***	25.03***
	(3.289)	(3.130)
standard deviation of the error term	36.63***	32.44***
	(1.752)	(1.555)
observations	572	572
number of participants	52	52
standard errors in parentheses $***\ p < 0.01, **\ p < 0.05, *\ p < 0.1$		

Table 1: Panel Tobit Regression ("Needs" treatment)

coefficient becomes even larger for endowments up to the need threshold, as shown by the statistically significant positive coefficient of the dummy variable "not above threshold".

In model 2, we allow for quadratic effects. As it turns out, in the oversupply domain, the quadratic term (endowment^2) is negative and statistically significant, which implies a concave relationship between endowment and justice evaluations. Up to the need threshold, by contrast, the quadratic relationship between endowment and justice ratings is positive: the linear combination of endowment^2 and not above threshold * endowment^2 (.0096) is highly significantly different from zero (p$<$ .001). This highlights the convex relationship that was already apparent from Figure 1.

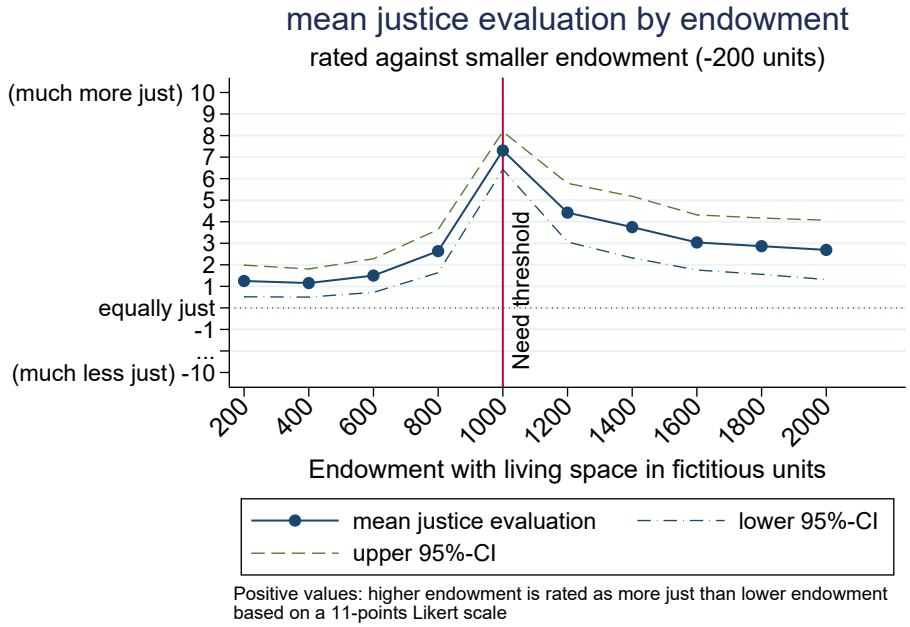
This convex relationship below the threshold is at odds with the implications of utilitarianism, prioritarianism, and recent theories of need-based justice (Siebel, 2017; Springhorn, 2017; Traub et al., 2017). It may be interpreted in sufficientarian lines but seems normatively problematic. The convex relationship in line with the sufficientarian doctrine implies that a marginal improvement that puts individuals at the sufficiency line should be preferred

to larger improvements strictly below this line. It seems difficult to imagine that individuals themselves would have such risk-loving preferences implied by this doctrine. By contrast, a concave relationship suggested by other accounts of justice puts priority on the direst situations. Furthermore, a concave relationship could also explain (endogenously) a preference for equality without requiring the assumption that inequality is bad per se, because improving the lot of the worst-off has moral precedence over improving the situation of the better off.

Before proceeding further, it is important to rule out that the convex functional form is not an artifact of measurement on one global scale that is bound from below and above or of aggregation. Concerning the method of measurement, Figure 2 depicts the results of the relative rating task, which provides subjects for every pair-wise comparison with a new scale. Since participants first had to decide which of the two levels of endowment they perceived as more just and then the magnitude of the difference on an 11-points Likert scale, the scale effectively runs from -10 to +10, with negative values indicating that the smaller endowment was judged as more just. The graph displays the marginal increases in justice evaluations starting from the lower level, i.e., the first point on the left of the graph shows that participants, on average, judged an endowment of 200 as about 1 point on the Likert scale more just than an endowment of 0. Figure 2 corroborates the two main results of the global rating task: first, justice ratings are monotonically increasing even beyond the need threshold (the marginal ratings are all highly significantly different from zero based on a one-sample t-test); second, reassuringly for our experimental design but not for most normative theories, there is again a convex relationship between endowment and justice ratings below the threshold. While marginal increases in justice are flat up an endowment of 600 (p-values of a paired t-test are all considerably larger than .1), they rise when approaching the need threshold ($p < .001$) and then fall again ($p < .001$) before leveling off to a virtually flat curve (all p-values are considerably larger than .1).

The second worry is that justice may be a binary construct (distinguishing only between just and unjust) for some but not for others such that once we aggregate over the responses of different participants, we get the S-shaped function. The individual-level graphs displayed in the Appendix show that only three participants (about 6%) make judgments of only 0% or 100% (with a jump from 0 below the need threshold to 100 at and above the threshold).

Figure 2: Average marginal changes in justice ratings in "Needs" treatment



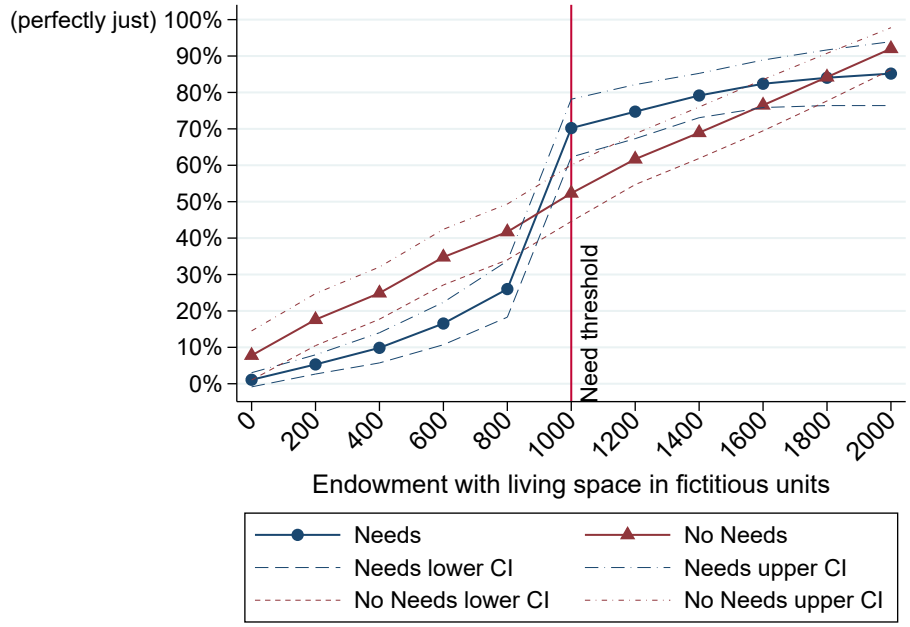
The overwhelming majority of participants, by contrast, do see shades of gray but nevertheless increase their justice evaluations most when the endowment reaches the need threshold.

Therefore, the S-shaped function still remains to be explained. In some ways, sufficientarianism focuses on a reference point for evaluating good and bad. As is known from the large field of judgment and decision making in social psychology, reference points can make preferences reference-dependent and decisions prone to biases. Indeed, the S-shaped function we found looks akin to the value function, which is a crucial ingredient of prospect theory (Kahneman and Tversky, 1979). The study participants may have considered the endowments beyond the need threshold as the "gain domain" and endowments below the threshold as the "loss domain". The value function, which is based on the relativity of perception, suggests concavity in the gain domain and convexity in the loss domain, resulting in an (inverted) S-shaped function.

To test the reference-dependency conjecture, we look at the results of the control treatment ("NoNeeds"), in which no information on needs was given. Strikingly, justice evaluations are almost perfectly linear and cross the justice evaluations of the "Needs" treatment when endowments reach the threshold. A repeat of the regression analyses in Table 1 for the "NoNeeds" treatment

shows no evidence either of convexity below the threshold but, more surprisingly, of (mild) concavity as the linear combination of coefficients (-.0042) is statistically significantly negative (p = .005, see Table 2 in the Appendix). Statistical tests reveal that justice evaluations are (weakly) significantly different between the two treatments up to an endowment of 1,400 units.[2]

Figure 3: Mean justice evaluations across treatments



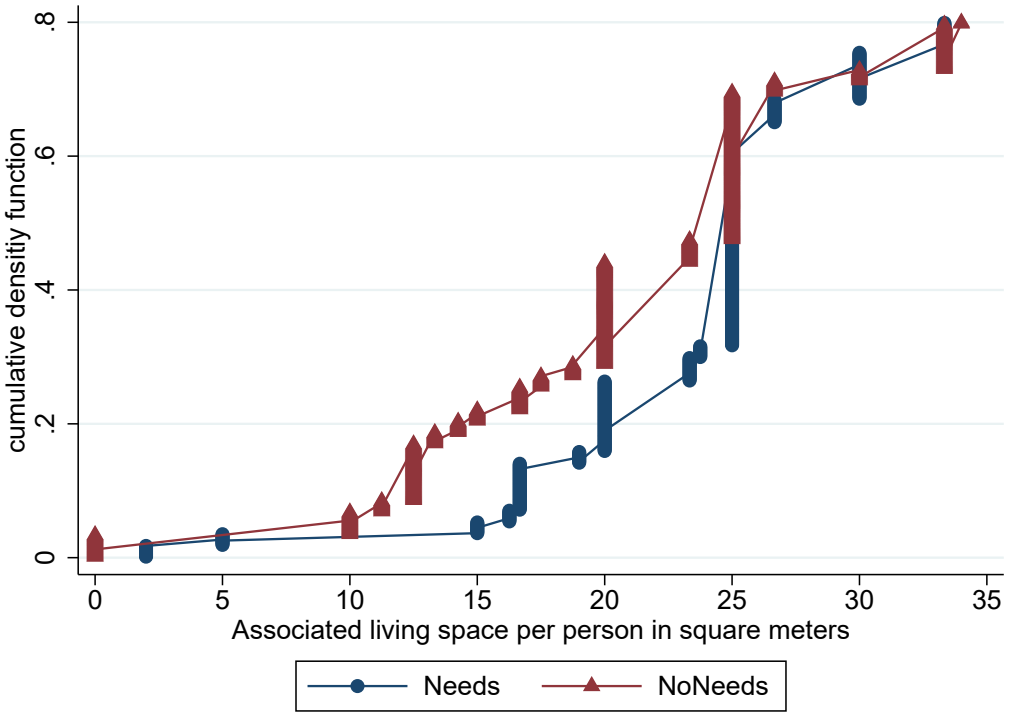
Comparison with the control treatment supports the conjecture that participants' evaluations are driven by reference dependency. Sure enough, however, the "NoNeeds" treatment is different from the "Needs" treatment in more ways than just the threshold. In the "Needs" treatment, subjects know that 1,000 units mean "living in close quarters", whereas no such benchmark is available in the "NoNeeds" treatment.

To find out whether participants imagined different sizes of living space when rating the scenarios, a post-experimental question elicited how much living space per person in square meters participants associated with the fictitious amount of 1,000 units. Interestingly, while Figure 3 shows that there are clearly differences in the distribution, there is still a large overlap (note that

[2]The p-values are smaller than .01 apart from when endowment is 0 (p = .07), 120 (p = .011) and 140 (p = .032). The p-values are considerably larger than .1 for endowments larger than 140.

the CDF is cut at .8 for reasons of visibility as the distributions are heavily right-skewed in both treatments). Strikingly, the median is exactly the same in both treatments: 25 square meters. Since 25 square meters per person are a non-trivial amount of living space, in particular for a student population, this also shows that the S-shaped function cannot plausibility be driven by problems of divisibility, i.e., that living space below the need threshold is so small as not to be usable.

Figure 4: Cumulative density function of associated living space by treatment



Despite the fact that subjects had a similar association of living space in real-world units, the need threshold not only changed the relationship between endowment and justice ratings, it also tends to make participants' ratings more coherent in an inter-subjective sense. We find that the variance between the evaluations of different participants are significantly smaller in the "Needs" treatment than in the "NoNeeds" treatment for endowments up to 600 (the p-value of a variance ratio test is .022 for an endowment of 600 and $< .001$ below). In this range of considerable undersupply with living space, participants agree to a larger extent in the "Needs" compared to the control treatment that this situation is unjust. The only other statistically significant difference in

variance is found for the maximum endowment of 2,000, where partipants' ratings are more coherent in the "NoNeeds" treatment. In order to compare the coherence between the treatments across all levels of endowment, we also look at the panel-level standard deviation of the panel Tobit regressions (see Table 1 and 2), which is significantly higher in the "NoNeeds" treatment than in the "Needs" treatment. This means that there is more variance at the level of the participants—less inter-subjective agreement—in the "Needs" treatment than in the "NoNeeds" treatment.

5 Discussion

Taken together, the evidence strongly points to needs providing a reference point relative to which justice is evaluated. What remains to be discussed further is whether this reference dependency is normatively undesirable. As noted earlier, sufficientarianism strongly argues for such a reference point but has at the same time received much flak for it. The criticism focuses on the implication that the well-being of those who are relatively well off (close to the sufficiency line) should be prioritized relative to those who are far away from sufficiency. It has to be said that this study cannot reveal whether participants would support this implication as we explicitly focused on the noncomparative dimension of need-based justice. It also remains to be studied whether the apparent reference dependency of justice evaluations also mean biases in judgment and decision making, as was shown in other domains in a myriad of academic work since Kahnemann and Tversky opened this field. In terms of political consequences, one may fear that reference dependency leads to the lot of the poorest in society not receiving the attention they would otherwise get. There is indeed some—albeit debated—evidence along these lines, sometimes summarized as Director's law (Stigler, 1970, for a discussion see Feld and Schnellenbach, 2007; Pamp and Mohl, 2010), that public spending largely benefits the middle class at the expense of both the rich and the poor. It would be an important endeavor for future research to test for reference dependency as a contributing factor.

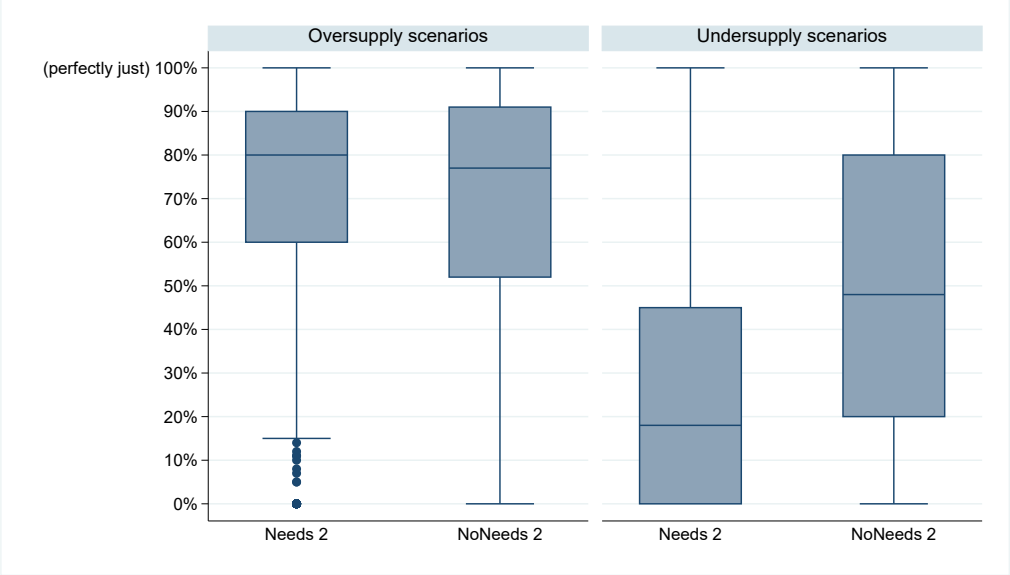
6 Extension and outlook: Needs as reference points in the presence of comparative (in)justice

In the preceding section, we highlighted some potential, normatively undesirable implications the reference dependency in justice perceptions might bring about. In order to partly shed light on these, we now look into the results of a related study ("study 2"). Study 2 is closely related to the present study (henceforth "study 1") and was run in the same subject pool with 117 participants, who did not take part in study 1. It differs from study 1 only with respect to the following elements: First, the wording of the text allows for the possibility that endowment with living space might differ between households. Second, scenarios describe distributions of living space between four representative households from different villages. Third, participants rate on one screen, but separately, two different scenarios on the global scale that is also used in study 1. Participants rated 30 different pairs of scenarios, i.e., 60 scenarios in total, which were presented in a random order. The scenarios are chosen in order to test for monotonicity and sensitivity of the justice evaluation function below and above the threshold in the presence of inequality between households. Furthermore, by comparing the justice ratings in the Needs treatment ("Needs 2") to a control treatment with identical distributions but no information on households' needs ("NoNeeds 2"), we can furthermore test for the existence and the consequences of a reference point induced by the need threshold when another reference point is available: the egalitarian distribution among the homogeneous households.

In terms of the results, we start by splitting the scenarios into undersupply and oversupply scenarios, i.e., those scenarios in the "Needs 2" treatment in which all four households have less or more living space, respectively, than the need threshold. We then compare the evaluations in the "Needs 2" treatment to the evaluations in the control treatment, in which participants rated the same distributions of living space but without any information on households' needs. Strikingly, the evaluations are almost indistinguishable and not statistically different ($p > .1$, t-test at the level of the 117 independent observations) above the threshold, as is apparent from the boxplot of responses displayed on the left side of Figure 5. By contrast, they are substantially and

statistically significantly different ($p < .001$, t-test) below the threshold (see also the box plot on the right side of the same figure). This again shows that unfulfilled needs are seen as a source of injustice in its own right, i.e., beyond the injustice of arbitrary inequality.

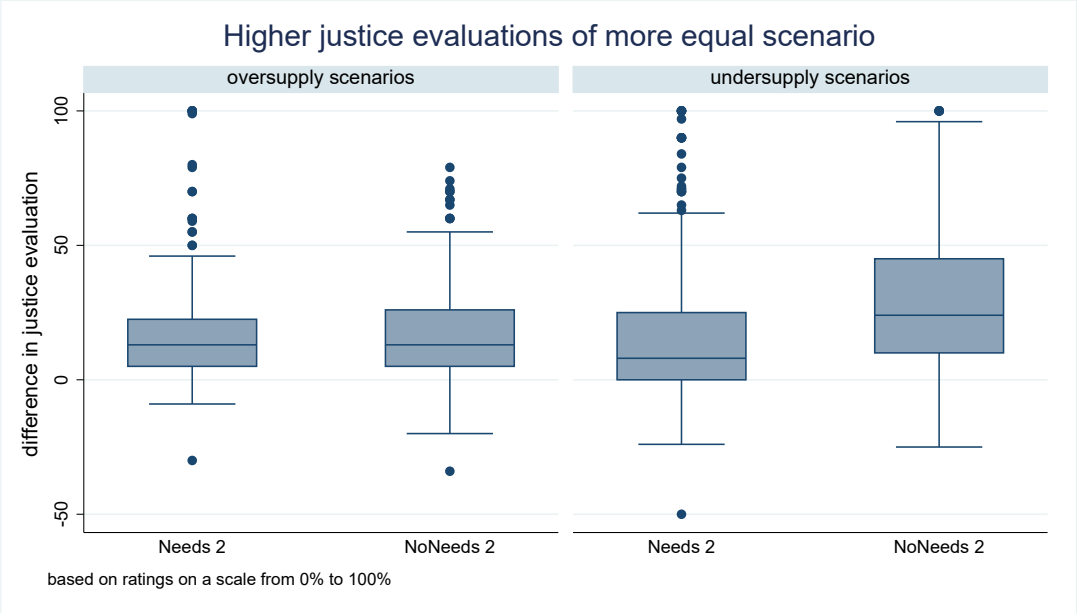
Figure 5: Boxplots of justice evaluations by treatment for oversupply and undersupply scenarios



Given the perceived injustice of unfulfilled needs and the convex relationship between endowment and justice ratings found in study 1, do we find evidence that participants would prioritize, in terms of their justice evaluations, the relatively well-off compared to the poorer households? As it turns out, this is not the case. Figure 6 depicts the difference in justice evaluations between those pairs of scenarios that only differ in terms of inequality (i.e., differences between scenarios can be described as rank-preserving transfers). Positive values indicate that the more equal scenario was rated as more just.

The right side displays this difference for the undersupply scenarios and shows that participants, on average, rate, in both treatments, the more equal scenario as more just. If participants were to evaluate the scenarios in the "Needs 2" treatment purely based on the convex relationship between endowment and justice found in study 1, we would expect the opposite: more unequal scenarios would be more just because bringing some households closer to (or at) the need threshold would matter more than reduced need fulfillment for those further away. When, therefore, in the absence of any reason

Figure 6: Boxplots of comparative injustice by treatment for oversupply and undersupply scenarios



to treat households differently, equality is available as a point of reference, it dominates justice evaluations. However, this does not mean that need information does not matter. As the box plots on the right side also clearly show, the perceived injustice of arbitrary inequality is considerably smaller ($p < .001$, t-test at the level of the independent observations) in the "Needs 2" treatment—for undersupply cases. By contrast, for oversupply cases (see the box plots on the left side), there is no such difference ($p > .1$, t-test). Hence, equality (the comparative dimension) and need fulfillment (the noncomparative dimension) interact, functioning as two reference points and again leading to results that are normatively debatable: Surely, taking away from those who have less than others should be considered more unjust when we also know that these persons are needy. By contrast, however, the participants in our study see the injustice of unjustified inequality as less severely in the "Needs 2" treatment than in the "NoNeeds 2" treatment. As in study 1, we also find that inter-rater variance tends to be smaller in the "Needs 2" treatment compared to the "NoNeeds 2" treatment: Whereas according to variance-ratio tests the variance is significantly smaller in 13 scenarios in the "Needs 2" treatment compared to the control treatment, the reverse only holds true in four scenarios. In all remaining 45 scenarios, no significant difference can be

detected. As in study 1, looking at the results of a panel Tobit regression gives us a more general idea across all scenarios: Supporting the tendency that the variance-ratio tests suggested, the panel-level standard deviation is significantly smaller ($p = .011$, Wald test) in the "Needs 2" treatment. This means that the participants' idiosyncratic characteristics are less influential in the "Needs 2" treatment for determining justice evaluations, which are, hence, more coherent when needs information are provided.

To conclude, the results of study 2 alleviate to some extent the concerns raised in study 1 that participants would favor the relatively well-off at the expense of the poorest. However, we find that unfulfilled needs compress justice evaluations such that the additional injustice of arbitrary inequality is judged less severely than without any information on unfulfilled needs. This seems normatively problematic and warrants both further discussion and inquiry into its antecedents and consequences.

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7 Appendix

7.1 Vignette Texts

7.1.1 Introduction Screen

"Welcome to our study,

In this study on justice we are interested in your opinions and assessments. Therefore we will present to you a number of varying scenarios, and we ask you to imagine them as real. Please take the time to place yourself into the scenarios and to come to your own personal assessment. In this study there are no right or wrong answers.

We will assess your evaluations as well as the evaluations of all other participants in this study. All data will be saved anonymously so that no details can be attributed to any person. The results of the study will be published. Thereby they will influence future research and shall be used to inform politics."

7.1.2 Vignette texts of the "Needs" and "NoNeeds" Treatments

The vignette texts of the "Needs" and "NoNeeds" treatments differ only on the information given with regards to needs, which was left out in the "NoNeeds" treatment, as is indicated in the following by square brackets.

"Please imagine the following:

In the region of Bergtal a new village is going to be established. It is the task of the Public Housing Association of Bergtal to build housing.

All households in this region want to live in the largest living space possible. [The residents of the region have collectively decided on a minimum amount of living space, under which living a decent life in this community is not possible.] Between the households in the region there are no noteworthy differences [and the minimum amounts are the same for each household: Each household should have 1,000 regional – i.e. common to the region – area units of living space in order to be able to live a decent life. To have a living space with the equivalent area means for a household to live in close quarters, but it will be just enough to lead a decent life].

There are enough means to be able to build up to 2,000 regional area units of living space for each household. The Regional Parliament decides how much

living space will actually be built for the residents of the new village. The decision has otherwise no noteworthy consequences. For the construction of living space no additional area would be consumed. The new village will be built on the area of an old village that was abandoned after a fire destroyed the houses.

In its decision the Regional Parliament wants to take into account how impartial people – like you – judge the justice of different scenarios. Your task is therefore to indicate for each scenario how just you hold the distribution of living space to be."

7.1.3 Task Descriptions of the "Needs" and "NoNeeds" Treatments

Participants recived two different task descriptions, one for the justice evaluations of the 11 scenarios each for themselfs and one for the pairwise evaluations. The first task was describes as follows:

"The following scenarios differ in how much living space shall be built for each household according to the decision of the Regional Parliament.

Please indicate for each following distribution how just you regard it to be. 100 percent means that you judge the distribution to be completely just. Percentages close to 100 percent mean that you judge the distribution to be almost completely just. Percentages far from 100 percent mean that you judge the distribution to be significantly less just. Please familiarize yourself now with each of the given distributions before answering the questions."

The second task was described as follows:

"For this purpose on the coming pages we will present to you each time two differing scenarios. We will ask you furthermore to indicate on a scale from 1 (equally just or unjust) to 11 (much more just) how just you regard each scenario compared to the other one to be."

7.1.4 Vignette texts of the "Needs 2" and "NoNeeds 2" Treatments

The vignette texts of the "Needs 2" and "NoNeeds 2" treatments differ only on the information given with regards to needs, which was left out in the "NoNeeds 2" treatment, as is indicated in the following by square brackets.

"Please imagine the following:

In the region of Bergtal the new villages of Aytown, Beetown, Ceetown, and Deetown are going to be established. It is the task of the Public Housing

Association of Bergtal to build housing.

All households in this region want to live in the largest living space possible. [The residents of the region have collectively decided on a minimum amount of living space, under which living a decent life in this community is not possible.] Between the households in the region there are no noteworthy differences [and the minimum amounts are the same for each household: Each household should have 1,000 regional – i.e. common to the region – units of living space in order to be able to live a decent life. To live within the equivalent living space means for a household to live in close quarters, but it will be just enough to lead a decent life.]

There are enough means to be able to build up to 2,000 regional units of living space for each household. The Regional Parliament decides how much living space will actually be built for the residents of the new village. The decision has otherwise no noteworthy consequences. For the construction of living space no additional area would be consumed. The new village will be built on the area of an old village that was abandoned after a fire destroyed the houses.

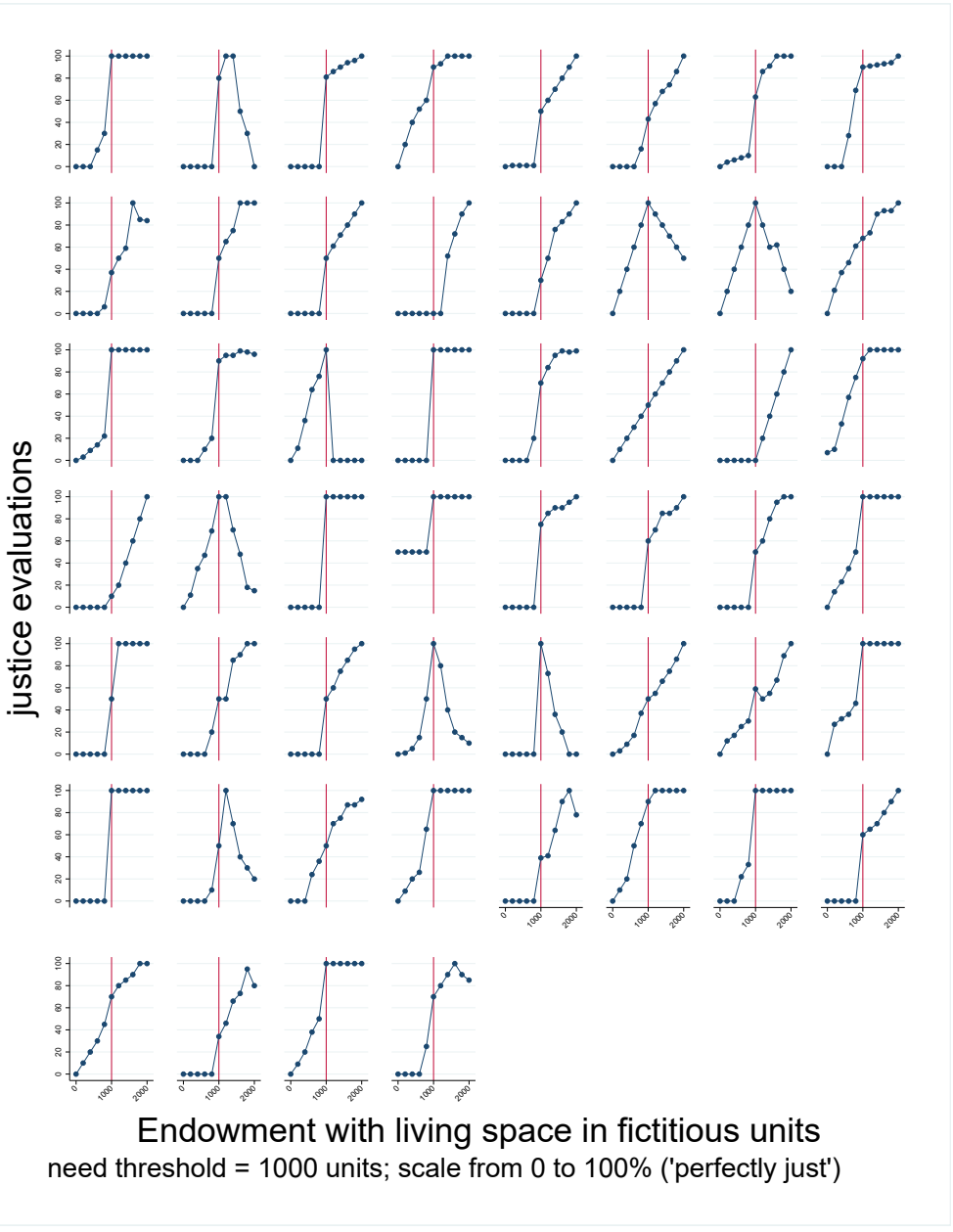
7.1.5 Task Descriptions of the "Needs 2" and "NoNeeds 2" Treatments

"The following scenarios differ in how much living space shall be built for each household according to the decision of the Regional Parliament.

Please indicate for each following distribution how just you regard it to be. 100 percent means that you judge the distribution to be completely just. Percentages close to 100 percent mean that you judge the distribution to be almost completely just. Percentages far from 100 percent mean that you judge the distribution to be significantly less just. Please familiarize yourself now with each of the given distributions before answering the questions."

7.2 Individual-level justice evaluations in "Needs" treatment

Figure 7: Justice evaluations by each participant ("Needs" treatment)



7.3 Regression of justice evaluations in "NoNeeds" treatment

variables	model 1 justice evaluation	model 2 justice evaluation
endowment	0.604***	0.671***
	(0.0201)	(0.0789)
not above threshold * endowment	0.0617**	0.430***
	(0.0309)	(0.141)
endowment^2		-0.000143
		(0.000394)
not above threshold * endowment^2		-0.00402***
		(0.00144)
constant	-9.818	-16.65**
	(6.237)	(6.895)
panel level standard deviation	43.01***	43.45***
	(4.744)	(4.812)
standard deviation of the error term	23.21***	23.20***
	(0.924)	(0.925)
observations	649	649
number of participants	59	59
standard errors in parentheses $***\ p < 0.01, **\ p < 0.05, *\ p < 0.1$		

Table 2: Panel Tobit Regression ("NoNeeds" treatment)

7.4 Overview of scenarios in study 2

	scenario 1 for every houshold in:				scenario 2 for every houshold in:			
scenario pair	**Aytown**	**Beetown**	**Ceetown**	**Deetown**	**Aytown**	**Beetown**	**Ceetown**	**Deetown**
1	600	600	700	700	400	400	900	900
2	600	600	800	800	400	400	1000	1000
3	600	600	800	800	500	500	900	900
4	600	600	1200	1200	400	400	1400	1400
5	600	600	600	600	400	400	800	800
6	1300	1300	1400	1400	1100	1100	1600	1600
7	500	500	1500	1500	500	500	1300	1700
8	500	500	1500	1500	300	700	1500	1500
9	500	500	1500	1500	300	700	1300	1700
10	500	500	1300	1700	300	700	1500	1500
11	300	300	700	700	100	100	900	900
12	300	300	400	400	100	100	600	600
13	600	600	700	700	550	550	750	750
14	1300	1300	1700	1700	1100	1100	1900	1900
15	1600	1600	1700	1700	1400	1400	1900	1900
16	1300	1300	1400	1400	1250	1250	1450	1450
17	600	600	1200	1200	600	600	1400	1400
18	0	0	0	0	0	0	1000	1000
19	1000	1000	1000	1000	1000	1000	2000	2000
20	300	300	400	400	300	300	600	600
21	700	700	800	800	700	700	1000	1000
22	300	300	400	400	200	200	600	600
23	900	900	1100	1100	700	700	900	900
24	1600	1600	1700	1700	1600	1600	1900	1900
25	1600	1600	1700	1700	1500	1500	1900	1900
26	500	500	500	500	700	700	700	700
27	1300	1300	1300	1300	1500	1500	1500	1500
28	600	600	700	700	900	900	400	400
29	300	300	400	400	600	600	300	300
30	900	900	1100	1100	90	900	700	700

Table 3: Overview of scenarios in study 2

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2017:

Traub, Stefan, Bauer, Max, Siebel, Mark, Springhorn, Nils and Weiss, Arne: On the Measurement of Need-based Justice. Working Paper Nr. 2017-12. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-12.pdf

Benker, Meike, Jan Philipp Krügel and Traub, Stefan: Risk-taking under Different Welfare-state Regimes: Some Experimental Evidence. Working Paper Nr. 2017-11.
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Neuhofer, Sabine, Paetzel, Fabian, Schwaninger, Manuel and Traub, Stefan: Recognition of needs in a dictator game: Experimental evidence on information-sensitive giving behavior. Working Paper Nr. 2017-10.
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Tepe, Markus, Lutz, Maximilian, Paetzel, Fabian and Lorenz, Jan: Leaky bucket in the lab. The effect of system inefficiency on voting on redistribution. Working Paper Nr. 2017-08.
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Pritzlaff-Scheele, Tanja and Zauchner, Patricia: Meeting Needs. An Experimental Study on Need-Based Justice and Inequality. Working Paper Nr. 2017-07. http://bedarfsgerechtigkeit.hsu-hh.de/dropbox/wp/2017-07.pdf

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