Context and self-serving bias in equity choices

Steven G.M. Schilizzi and Md. Sayed Iftekhar

School of Agricultural & Resource Economics
and Centre for Environmental Economics & Policy
The University of Western Australia, Crawley WA 6009, Australia

Steven.Schilizzi@uwa.edu.au
Mdsayed.Iftekhar@ uwa.edu.au

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Abstract

Self-serving bias (SSB) deflects the choice of preferred equity norms in the direction of one's own expected benefits. We investigate under double-blind controlled experimental conditions the influence of several contextual factors on the magnitude and direction of SSB in distributional equity decisions: relative socio-economic position, Rawls' veil of ignorance, presence of monetary incentives, and equity-efficiency trade-offs. Relative socio-economic position is found to matter, with higher levels of relative wealth leading to stronger SSB; however, the richest position seems to exhibit aversion to Dannenberg's 'advantageous inequality'. Rawls' veil-of-ignorance condition is found to minimize SSB but not to reduce it to zero, even when no real incentives are at stake. The presence of equity-efficiency trade-offs are found to increase SSB, but interaction with wealth can actually reduce SSB. Overall, subjects did not maximize their expected benefits, although some positions in certain scenarios did (19%). As all distributional consequences were made transparent and risk aversion was only relevant in the veil-of-ignorance condition, results suggest genuine equity concerns were present, even where incentives would have pushed for maximum SSB. The study also identifies conditions under which SSB is minimal, though these conditions may not be achievable outside the laboratory.

Key words: Equity preferences; Equity-efficiency trade-offs; Context-dependence; Self-serving bias; Veil of Ignorance; Incentivization

Highlights

- We study how subjects' revealed preferences over different distributional equity norms vary under various experimental treatments
- In general, subjects did not exhibit maximum self-serving bias in their choice of equity norms, suggesting genuine concerns for distributional equity
- The degree of SSB was greater for the more richly endowed subjects, but not for the absolute richest, suggesting some aversion to 'advantageous inequality' (Dannenberg et al. 2010)
- Rawls' veil of ignorance condition trumped the effects of incentivization and of equity-efficiency trade-offs; it also minimized SSB but did not reduce it to zero, even when no incentives were at stake

1. Introduction

If you were asked whether a resource or burden allocation is 'fair and square', would you say what you really believe is equitable? In other words, would you choose an equity norm that 'truly' expresses your view of what is fair? Or would you choose some other norm, for instance one that better reflects your own interests? Stated in this manner, the question is too general to be answered. We need to specify in particular whether you were a stakeholder or just a third-party observer; in other words, whether the allocation included you or not. This question is of importance: when we ask "what is the fairest allocation?" for a given project or policy, what exactly do we mean by 'fair' or 'equitable' if we mostly express our own interests? How will we ever agree that the allocation is fair or not, or fairer than another?

It seems natural to assume that as a stakeholder, a person's equity judgement is likely to be swayed by her own interests, whereas as a third-party observer, she is more likely to reveal her 'true' view of equity. In other words, one's equity views and the extent to which they are affected by one's own vested interests are likely to be context dependent. And being party to the allocation decision is not the only contextual factor; there are potentially many others. But first, what do we mean when we say that an equity judgment is affected by one's own interests?

As Ubeda (2014) points out, there has been some confusion, in the literature on equity and other-regarding preferences, between the notion of self-interest and that of self-serving bias (henceforth SSB). In the context of distributional equity or the 'pie-sharing problem', self-interest refers to an absence of equity concerns and to a lack of other-regarding preferences altogether. The corresponding behaviour is typically modelled as some version of profit or own-benefit maximization. By contrast, SSB explicitly refers to the choice of a distributional equity norm[1], but in such a way that the choice of a specific norm, among other possible norms, is guided by the maximization of one's own expected benefits. A good example of this is given by the Kyoto negotiations on how the total amount of greenhouse gas abatement effort was to be allocated across the different nations of the world, in particular between developed and developing countries (e.g. Cazorla & Toman, 2001). For instance, China tended to prefer a per capita emissions norm while Australia tended to prefer a total emissions norm; or developed countries preferred current per annum emissions in contrast to developing countries preferring historical accumulated emissions.

SSB has also been defined in the context of, and in opposition to, what may be termed 'self-serving beliefs'. In an exchange between Kaplan and Ruffle (1998) and Babcock and Loewenstein (1998), the authors agreed that the notion of SSB extends beyond issues of equity or fairness but

[1] One can also use the terms 'equity principle', 'equity criteria' or 'fairness rules'. We consider these to be synonymous here.

argued over whether it should be understood as purely strategic or whether it should also include cognitive bias about one's own abilities and beliefs by others. In this study we shall only focus on forms of bias related to the choice of an equity norm and based on perceived own-benefits. Our problem does however contain a cognitive aspect, since it assumes the decision maker has the ability to compute and predict the distributional consequences of different equity norms. But in this study, we neutralize this aspect by providing experimental subjects with complete information on distributional consequences. We shall thus define SSB as an alignment of one's relative preferences for different equity norms that reflects a one's own expected benefits, conditional on the equity norm being implemented for resource distribution. More precisely, maximum SSB values all equity norms in proportion to their expected own-benefit outcomes[2].

The question we address in this paper is whether this choice of a self-serving equity norm is specific to the decision maker, or whether it also depends on the nature of the context in some way. More precisely, if such is the case, we are interested in knowing whether such context-dependence, as first made explicit by Konow (2001), is in any way systematic and predictable. We thus ask two specific questions: 1) Do people behave in a self-serving manner when selecting a distributional equity norm? 2) If so, what are the contextual factors influencing this self-serving behaviour?

To address these questions, we have resorted to controlled laboratory experiments. The reason for choosing an experimental approach is that it alone allows for systematic control of contextual factors and precise knowledge of individuals' salient characteristics and equity preferences. Such information is hard, if not impossible, to obtain in the field, if only because equity issues are often politically very sensitive. Controlled lab experiments also allow for the control of what information is available to subjects and how it is distributed amongst them, something clearly impossible to achieve in the field. Although this is not the first experimental study of equity preferences or of self-serving bias, there have not been many that investigate this precise connection, and none, to our knowledge, that ask how this connection is affected by context.

2. Background

The first relevant study of SSB was done by social psychologists Messick and Sentis (1979): they established the existence of SSB (which they called egocentric bias) by studying allocations to oneself versus to others as a function of context. Their results were substantial and demonstrated a SSB towards over-payment to oneself in situations where equal amounts of effort had been invested or when everyone had identical endowments. Their results also showed that fairness was invoked more

[2] In other words, the preference for and utility of an equity norm is uniquely determined by its expected benefits to oneself: a norm N is preferred to a norm M if, and only if, the expected benefits to oneself from implementing N are greater than those expected from implementing M.

often for others while larger rewards were sought more often for oneself. Their work was in some sense seminal in that it examined not just direct influences but also more subtle interactions. Thus, although SSB dominated, they demonstrated a secondary, weaker effect they called 'generosity bias' when other subjects could not control their own outcome (i.e. role of luck or chance), and which elicited more fairness – unless of course strict equality was the preferred reference norm. A second fairness bias (opposed to SSB) was the importance given to the proportionality norm reflecting the amount of effort input, but distorted by SSB nonetheless. When there was conflict between rewards to self and to others, as in the static pie-sharing problem, subjects mostly resolved the conflict by preferring fair to large outcomes for oneself. Overall, their results suggest that fairness is an important determinant of preference when outcomes to others are involved.

Recently, Durante et al. (2013) situated SSB in the broader context of perceptions of fairness and preferences for redistribution, showing that self-interest, in addition to an insurance motive (in the presence of uncertain outcomes), was also associated with genuine social concerns; however, self-interest was shown to be the dominant factor. Dannenberg et al. (2010), in the context of climate negotiations, add that the strength of these social concerns trade off with the magnitude of the net selfish benefits to be expected, each pulling in opposite directions. Thus, for very large stakes, expected own benefits can trump fairness considerations.

SSB also became well established in the context of judicial settlements (see in particular Loewenstein et al., 1993) and in the bargaining literature (see in particular Babcock et al., 1995). Both strands showed that non-settlement of disputes or of bargaining outcomes were not so much determined by pure selfishness or the maximization of own expected benefits, but rather (as recently clarified by Ubeda, 2014) by genuinely trying to find the 'fairest' solution, albeit one that suffered SSB: the choice of fairness or equity norm reflected benefits expected from its implementation. Loewenstein et al. (1993) also showed that, in perceptions of a fair settlement, features of the judicial case at hand (i.e., context) mattered more than the costs each side would bear contingent on non-settlement of the dispute.

Favarelli (2007) picks up from where the above authors had left and directly asks the question, "Are judgments of fairness context-dependent?" He examines trade-offs between equity and economic efficiency with four equity norms (egalitarianism, maxmin, utilitarianism and utilitarianism with a floor constraint), and finds that providing meaningful social context to the trade-offs, as opposed to abstract or 'contextually sterile' settings, favours equity-based considerations. In addition, clarifying the context in which distributional decisions are made favours consensus on what is 'fair': rather than creating divergence, meaningful context generates convergence of equity views.

Rodriguez-Lara and Moreno-Garrido (2012) also make it clear that, in a dictator game with three possible equity norms (equality, accountability and libertarian)[3], dictators chose the norm that maximized their own financial payoffs. Ubeda (2014) goes further and asks two key questions. First, do subjects in experiments hold on to the same preferred equity norm when context changes? And second, how does SSB affect norm choice consistency when context changes? She uses three equity norms (egalitarian, liberal egalitatarian and libertarian), with strict selfishness and charity (altruism) as opposite benchmarks. The answer to the first question is 'yes' for pure selfishness and strict equality but 'no' for the other equity norms. This 'no' is however moderated by the answer to the second question: the more self-serving their choice of equity norm, the more it is sensitive to a change of context. This is because a change of context changes the net benefits expected from implementation of the chosen norm. Inconsistent participants apply the equity norm that is most beneficial to them in a given context: rather than sticking to one norm, they switch between equity norms in order to maximize their payoff while at the same time appearing to behave fairly. She also notes, only in passing, but this is perhaps crucial, that while the definition of pure selfishness and strict equality do not themselves depend on context, the definition of the other equity norms are themselves context-dependent. As an example, Rawls' maxmin norm focuses say on "the poorest", but who is to be considered as belonging to this category – the 10% poorest or the 50% poorest? – is itself context-dependent. This may bear heavily on her results and would warrant further analysis.

Ubeda's (2014) paper is probably the most relevant to the present work. Just as she extends results by Favarelli and by Rodriguez-Lara and Moreno-Garrido, our work extends Ubeda's in three directions. First, we explicitly ask, in a general manner, what contextual factors affect the magnitude of SSB, and we endeavour to quantify their influence. Second, we extend the number of equity norms to the number so far identified in the literature (as by Rose et al., 1998b, by Cazorla & Toman, 2001 and by Ringius et al., 2002). Third, we are also the first to explicitly distinguish the separate roles, on the choice of equity norm, played by individuals' socio-economic characteristics, such as age, income or education, and by the decision-making context itself, such as the existence or not of a trade-off with efficiency, the magnitude of the stakes or how well individuals know how they might be affected by the choice of different equity norms. Not only do we distinguish them, but we study their respective roles as well as their interactions. As for measuring SSB, we do so relative to two definitions of self-serving behaviour, a myopic and a strategic form, detailed hereafter.

The rest of the paper is organized as follows. Section 3 explains how the myopic and strategic benchmarks are defined and computed; section 4 describes the experimental design and setup; section 5 presents the results, discussed in section 6; and section 7 concludes.

[3] They define accountability by splitting the surplus as a function of subjects' correct answers and libertarian by splitting it as a function of monetary contributions.

3. Experimental design and implementation

3.1. Defining context for equity judgements

The purpose of this study is to understand what factors affect equity judgments and in particular self-serving bias. Two sets of variables affect individuals' choices: their socio-economic position or relative status in society (e.g. their income, education level, profession, etc.), and the nature of the context defining the equity problem: the resource or burden being allocated; the amounts at stake; who is involved; the distribution of information; or the presence and strength of trade-offs. Both dimensions can be quite complex and entangled in the real world, but they can be clearly defined and controlled for in the lab. We first detail the contextual dimension, then the socio-economic position. We then explain how equity judgments, or preferences, were elicited in this setup.

Regarding the context in which equity judgments needed to be made, we designed 3 treatments which defined 8 scenarios in a full factorial:

- the presence or absence of equity-efficiency trade-offs;
- the presence or absence of Rawls' veil of ignorance;
- the presence or absence of incentivization with real money.

The choice of these treatments was suggested by the literature reviewed above; however, it has only explored the influence of each treatment separately: to our knowledge, their combined effects have not yet been studied. For example, our design allowed the impact of an equity-efficiency trade-off to be itself dependent on whether it happened in the presence or the absence of Rawls' veil of ignorance. Each of the three treatments involved four out of the eight scenarios.

In treatments with equity-efficiency trade-offs, a tension was introduced between allocating money to subjects with smaller or with larger initial endowments. To do this, we linearly correlated initial endowments with a multiplicative factor that increased the amount available for allocation by a certain percentage. Thus, allocating money to richer subjects also increased the size of the cake to be shared out by a greater amount than if allocated to poorer subjects. Implementing Rawls' veil of ignorance condition (Rawls, 1971) means that participants do not know which position they occupy in a group; e.g., whether they start off 'poor' or 'rich' relative to the others. They only learn 'who they are' at the end of the session, after having made their equity judgments. Finally, half the treatments were run as incentivized experiments, with allocation of real money, while the other half were run as opinion surveys, with no money involved.

The above combination of context factors resulted in the setup given in Table 1.

Table 1 about here

The purpose of this setup was to focus on differences between the eight scenarios and to allow comparisons in several (three) dimensions. None of the scenarios should be examined in isolation; the focus is on analysing the differences between them.

Table 1 also shows the nested order in which each treatment was purposefully implemented. Previous testing with post-graduate students had suggested it would not have been meaningful for undergraduate students to play the veil-of-ignorance treatment before playing the full-information treatment, which provided knowledge of their position in the group: it seemed to appear too abstract. This concern was deemed to outweigh any risk of carryover effect, and it would also allow us to compare our conclusions with those obtained earlier, in particular by Schildberg-Hörisch (2010) and Krawczyk (2010). Playing the no trade-off first was motivated, first, by its greater simplicity: the presence of a trade-off with efficiency (or productivity) added an additional level of complexity to the choice problem; and secondly, by the focus of our analysis on how the addition of such trade-offs modifies the 'pure equity' decision, taken as the benchmark. Finally, answering the non-incentivized survey before playing the incentivized game was chosen specifically to minimize carryover effects, which would not have been negligible had we gone from incentivized to 'in principle' equity judgements. Thus, participants played the known position treatments (coded K in Table 1) before playing the veil-of-ignorance (coded U); within each subset of 4, they played the treatments without the trade-off (E) before those with the trade-off (P); and within each sub-subset of 2, they answered the non-incentivized survey (T) before playing the incentivized game (M). It was made clear in the non-incentivized treatments that "This is a survey: we are interested in your personal judgments (…) in principle" (see Appendix 1).

Any specific ordering carries the risk of introducing learning and carryover effects from one treatment to the next. However, each scenario introduced a different 'game' and explicitly drew attention to the differences in rules (see Appendix 1 for details): as a result, there was nothing to learn from one scenario to the next, and no scenario was played twice. As for carryover effects, they should be minimal from scenarios S2 to S3 and from S6 to S7 (see Table 1), because introduction of the equity-efficiency trade-off radically changes the game, and likewise from S4 to S5, by introducing the veil of ignorance; and changes from T to M (1 to 2, 3 to 4, 5 to 6 and 7 to 8), as mentioned above, were specifically chosen to minimize any carryover effects. We therefore conclude that there was no possible learning and carryover effects, if they existed at all, would have been minimal.

We turn now to the other set of explanatory factors, those described by one's socio-economic position in society. For an equity problem to have meaning, stakeholders must differ in at least one salient way. We therefore designed our experiments with groups of 10 participants, each differing in two or three salient characteristics, depending on treatments. 10 such groups had been organized but only 9 were effective in the end, with a total of 90 participants. All groups were identical in structure.

Individuals in the group differed according to their initial wealth endowment and to a characteristic representing a need principle, the 'number of dependents'. This could represent family size, a community's size or a country's population. Wealth endowments determined individuals' initial relative positions in their group and could represent real or hypothetical money, depending on whether it was an incentivized or hypothetical scenario; endowments were given and not earned by participants. They ranged from 5 to 25 experimental dollars and the number of dependents was 0, 1 or 2. Mimicking family size, one dependent doubled the needs and 2 dependents tripled them. A player with 2 dependents would need an allocation three times greater than a player with no dependents so as to achieve the same level of welfare. The distribution of all 10 positions in a group is given hereafter in the top three rows of Table 2.

In treatments where a trade-off between equity and efficiency was introduced, participants differed by a third characteristic, their 'individual productivity factor' or IPF. An IPF of 1.33 meant that $1 allocated to a participant (position #4 in Table 2) translated into $1.33 available for distribution to the whole group. More money given to the richer participants meant a bigger cake to share, and vice versa: the richer participants were the more 'socially productive'. In treatments without an equity-efficiency trade-off, a fixed and equal sum of money ($50) was available to all groups for allocation between group members; in treatments with trade-off, the amount available for distribution to the group was endogenous to players' decisions and could vary across groups, mostly between $70 and $80.

Given these initial conditions, defined by group members' initial wealth endowment, number of dependents and IPF, the next step was to make available a certain amount of money (real or hypothetical, depending on the scenario), and to ask each group member how this amount should most fairly or equitably be distributed across the group. The next section details what the options were, and the following section how group members could choose among these options.

3.2. Equity norms

The standard approach in the economics literature to studying equity choices is to focus on how a given amount of money is split, or allocated, between two (sometimes three) individuals. This is typically played out in highly stylized situations such as the dictator, the ultimatum or the trust games. The focus is then on what percentage of a given amount is given rather than kept for oneself. This approach may be termed 'direct but implicit', in that it focuses directly on actions (choices) that can then be interpreted in terms of implicit equity preferences, though other interpretations are also possible. In this specific study, this approach would have translated in asking each group member how the given amount (e.g. $50) should be distributed among the 10 group members. Instead, we chose to reverse the perspective and to adopt an 'explicit but indirect' approach, by focussing on explicit expressions of equity (i.e. equity judgements) that lead, indirectly, to implied resource allocations. Individuals choose an explicit equity norm rather than directly allocate some quantity,

expecting that implementing the norm will lead to a specific resource allocation. We can then investigate preferences for different equity norms and focus on the choice of norm rather than on the allocation itself. This approach can be seen as having two advantages: it can generate much richer information on the nature of equity preferences (see below), and it more closely reflects real-world situations, which are often too complex to be captured by a 'share the pie' model. Stakeholders get around this complexity by appealing to equity norms that translate into resource allocation principles, leaving the details of implementation to those responsible.

From the literature cited earlier, especially Cazorla & Toman (2001), Ringius *et al*. (1998, 2002) and Rose *et al*. (1998a, 1998b, 2002), and brought together in Schilizzi & Black (2009), we defined and operationalized thirteen different equity norms that appear to be quite universal. In this paper, however, we shall refer only to those nine that are defined as distributional (outcome) equity norms[4] (see Appendix 2 for precise descriptions), namely: egalitarian (Egal); Rawlsian maxmin (Mm); 'interests of the future' or IOF (an expression of intergenerational equity); inverse proportionality (IP); vertical equity (VE), a more extreme form of IP; horizontal equity (HE); Pareto compensation (Par); exclusions rule (Exc); and sovereignty (Sov).

3.3. Equity judgements and social choice mechanism

Given the option of choosing among the set of equity norms listed above, how are group members to make their choice? In asking this question, we need to keep in mind that different group members will very likely make different choices; yet the end result must be a specific allocation to the group. We therefore need some function that will transform a set of heterogeneous individual choices into a single specific allocation: a social choice mechanism. We first specify the individual choice mechanism, then the social choice mechanism – keeping in mind, however, that the latter will influence the former if the social choice mechanism is pre-announced and is common knowledge.

Eliciting equity judgments. Given the set of equity norms listed above, the simplest task would have been to ask each participant to choose, in each scenario, his or her most preferred norm. The norm obtaining the highest number of 'votes' could then be implemented (as a social choice mechanism) to allocate the available amount of money. But this blunt approach would have yielded a rather poor data set (one observation per player). Nor was it appropriate for players to rank equity norms, as this proves to be a very difficult, if not impossible task: each norm may reflect a different worldview and different norms cannot, even in principle, be compared. Another option could have been to ask participants to choose between two norms in a sequence of binary choices. But this

[4] The other four are defined as process-equity norms: market justice, consensus, sovereign bargaining and acquired rights or grandfathering. Although they were included in the experiments, they are not relevant for the specific question addressed in this paper (self-serving bias).

approach would have been very cumbersome and demanding if the complete combination (equal to 96 choices with 13 norms) was needed.

A simpler and less demanding task was to ask participants to consider each norm separately and to rate each of them on a 21-point Likert scale ranging over [–10, +10], and this in each of the 8 experimental scenarios. Each participant thus provided 8 x 13 = 104 ratings, done in two consecutive sessions of roughly one hour each. In addition to the most preferred norm (of which there may be more than one if there are ties), this approach measures the degree of intensity with which each norm is supported or opposed. A rating of 0 reflects indifference or hesitation about a specific norm in the given context. A rating of –10 expresses extreme opposition and +10 full and unconditional, or passionate, support. In all scenarios, subjects were given the following instructions:

Please give your degree of AGREEMENT or DISAGREEMENT by putting an "**X"** somewhere on this scale:

– 10 = I totally and very strongly **disagree** and fiercely **oppose** this rule

0 = I am unsure

+ 10 = I totally and very strongly **agree** and actively **support** this rule

Social choice mechanism. In principle, we were only interested in how changes in context modify equity ratings; and this was all that was needed in the non-incentivized, survey-like treatments. But in the incentivized treatments, as is the case in practice, distributional equity is about allocating some concrete benefit (or burden). There must therefore be a function (a social choice mechanism) that translates a given set of individual preferences into a specific allocation across group members. This social choice mechanism creates the condition for subjects to prefer one equity norm over another, as well as an incentive to strategize when one's own benefits are at stake.

The mechanism we chose for this study reflects the goal of better understanding how changes in context influence the extent of SSB in equity judgments. After much discussion, we chose to aggregate ratings over all 13 norms by adding up, for each equity norm, the ratings by all 10 group members, whether positive or negative. The norm that received the highest total score was chosen to allocate the money across the group. Participants knew this in advance and could use this information in their equity ratings, thereby allowing for SSB to be expressed. Note that this mechanism is democratic and politically egalitarian, in that it gives each group member an equal weight, similar to

the "one man, one vote" system. In applications where powerful individuals or groups can prevail, other mechanisms may need to be chosen.

Once the most preferred norm was identified for the group, it must translate into payments for each individual. Payments derive from the definition of each equity norm, as shown in Table 2, in the case where there are $100 to be distributed in total to a group of 10.

Table 2 about here

A pre-determined fixed amount of $50 was allocated to each group in the 2 paid scenarios without equity-efficiency trade-offs (S2 and S6 in Table 2); in the other 2 (S4 and S8), the individual allocations above were multiplied by their IPF values shown in the bottom row of Table 2. Then the $50 were augmented according to the norm-specific productivity impact factors (PIF) shown in the last column of Table 2. Thus, if the egalitarian rule was chosen, the PIF was 1.50 and the total amount allocated was $75.

3.4. Potential issues

This approach potentially raises both a measurement and an elicitation problem.

First, measuring equity preferences in this manner clearly assumes cardinality, which is controversial. However, equity measurements are typically made in the context of choosing among alternatives as part of, or in association with benefit-cost analysis, which, like much of applied economics, also assumes cardinality[5]. It is however possible, in analysing the data, to control and adjust for any systematic bias in the way different individuals might use the scale; e.g. if some rate high on all norms while others rate low.

Second, eliciting preferences as done in this setup can pose problems of incentive compatibility and consequentiality, the former in incentivized scenarios and the latter in the non-incentivized. For incentivized treatments, incentive compatibility does not appear to be an issue, since the goal of the study is precisely to see how changes in context affect the extent of SSB, which is a strategic behaviour. However, does context solely influence the degree of SSB, or does it also affect the underlying 'true' equity preferences, assuming any exist independently of a specific context? Our experiments do not allow us to disentangle the two if the latter case is true: we can only examine the 'bundle' as observed through expressed ratings. However, in any policy context, it is expressed ratings that matter, not some unexpressed underlying preferences: thus it is useful to first assume their invariance and see if this assumption is productive. If not, further analyses could be done, based for example on Stigler and Becker's (1977) Z-goods theory.

[5] The use of BWS (best-worst scales) was not appropriate for this type of study.

The non-incentivized treatments raise a different issue, that of consequentiality. If participants' ratings were not going to affect them in any tangible way, why should they bother making the effort to rate complex notions of equity? This question can of course be asked of any survey, including most choice experiments; but in the field, respondents usually perceive their answers to have some consequence, at least potentially. To create similar conditions, we first 'primed' our participants by explaining the purpose of our research and how it should help policy makers decide what was fair; we made it clear that the results of the experiment would contribute to our research effort and, hopefully, to greater fairness in the world. To maximize relevance, we referred to fairness in setting student fees for higher education, in prioritizing access to and pricing of health care, and in electricity pricing, all contentious issues for our experimental subjects. In other words, we maximized the chances that the survey treatments, though not incentivized, nevertheless appeared as consequential as any other survey in the field. In this case, any incentive compatibility problem should be less salient, as there are in principle no incentives for strategizing.

3.5. Procedures

The formulation of each equity norm differed depending on the specific scenario: in the survey treatments, equity norms were given general formulations, whereas in the incentivized treatments they specified the amounts involved (Appendix 3 illustrates this with one norm as it was seen by participants). In treatments involving equity-efficiency trade-offs, the resulting overall increment in the amount available for distribution was specified for each of the equity norms. This reflected the distributional outcome implied by a specific norm as well as by individual IPFs of each participant in the group. Thus, for each norm, every participant knew both how much the group would receive in total and how much each member would receive individually (see scenarios 4 and 8 in Appendix 1 and Tables A1 and A2). Avoiding any computational burden allowed us to neutralize any possibility of error in the expectation of norm-specific outcomes. Before participants started any rating, each norm was explained and illustrated using examples on PowerPoint (see Appendix 4), and a sheet giving sample formulations for each norm was presented and gone over orally. A Question & Answer session checked for any misunderstandings. A basic information sheet for the whole experiment was also handed out and explained (Appendix 5).

A detailed 'modus operandi' for experimenter and assistants is provided in Appendix 6.

Participants were first-year University students at the Christian-Albrechts University of Kiel, in Germany. They were mostly students in agricultural or environmental sciences and economics, and nearly all originated from the northern region of Schleswig-Holstein.

All ratings were kept anonymous in terms of identifying specific names, but we made sure that 'anonymous identifiers' in the form of {letter-&-number} (e.g. A3 = group A, position 3) allowed us to relate to all other experimental information. However, for real payments, students needed to come

and receive the sum of all their gains and, for administrative purposes, sign off on a special form. Participants themselves knew which equity norm was implemented for each scenario and therefore how much each position earned, but they did not know which participant was in which position. Nominal positions remained private information throughout the experiment.

4. Calculating a self-serving benchmark

In order to understand to what extent participants' choice of equity norms were self-serving, and how that choice might be influenced by context, we needed to have a standard, or benchmark, against which to measure the degree of SSB (self-serving bias). We used the idea that the further the experimentally observed choices deviated from the SSB benchmark, the smaller the degree of SSB. The SSB benchmark was defined so that it corresponded to the choice of equity norm that maximized the individual's own expected payoffs. We considered two different behaviours for determining expected ratings: myopically self-serving (MSS) behaviour and strategically self-serving (SSS) behaviour. The first corresponds to *level-k = 0* rationality and the second to *k* = 1 (Crawford *et al*, 2008). Each leads to the construction of a different benchmark. We describe each in detail below.

Expected rating based on myopic behaviour

Under the assumption of myopic behaviour (MSS), it is assumed that participants are not strategic and do not care about how other people rate different equity norms. They are only concerned with their own payoffs. As a result, their ratings are solely based on their own pay-offs related to the different equity norms. This is a reasonable assumption if we consider that in real life calculating expected ratings for other people might be cognitively demanding. Let $i \in I$ and $j \in J$ denote player and equity norm respectively. v_{ij} and r_{ij}^{m} are, respectively, pay-off and expected rating under myopic behaviour for norm j by player i. We have used a linear transformation to map pay-off to expected ratings based on the following rules:

$$if\ v_{ij} \geq \frac{1}{|J|}\sum_{j\in J} v_{ij}\ ;\ r_{ij}^{m} = \frac{10}{\left(\max_{j\in J} v_{ij} - \frac{1}{|J|}\sum_{j} v_{ij}\right)} \times \left(v_{ij} - \frac{1}{|J|}\sum_{j\in J} v_{ij}\right)$$

$$if\ v_{ij} < \frac{1}{|J|}\sum_{j\in J} v_{ij}\ ;\ r_{ij}^{m} = \frac{-10}{\left(\frac{1}{|J|}\sum_{j} v_{ij} - \min_{j\in J} v_{ij}\right)} \times \left(\frac{1}{|J|}\sum_{j\in J} v_{ij} - v_{ij}\right) \qquad \text{(Equation 1)}$$

The equation states that for a player position, a positive rating is assigned to the equity norms with individual shares not lower than the average share for the player position and the equity norms with

shares lower than the average share gets a negative rating. For example, as it can be estimated from Table 2, the average share of the equity norms is 12.19 for player position 1. IP, Mm and VE equity norms have individual shares higher than the average. So, according to equation 1, they receive positive ratings and the rest of the norms receive negative ratings. The level of rating depends on how far or close individual shares are with respect to the average share. For example, for player position 1, VE receives maximum rating of 10 as it has the highest share. The norm with the second highest share 'IP' gets a rating of 5 ($\approx \frac{10}{(35.46-12.19)} \times (23.49 - 12.19)$). On the other hand, for player position 1, the "Exc" equity norm gets a negative rating of -10 as it has the lowest share. The norm with the second lowest rating "Sov" gets a rating of -9 ($\approx \frac{-10}{(12.19-2.74)} \times (12.19 - 3.33)$). This process is repeated for all player positions in the group of 10.

Construction of expected rating based on strategic behaviour

In the case of strategic behaviour (SSS), it is assumed that people care about how their final payoffs also depend on other participants' ratings: they try to rate each equity norm strategically, by taking account of other people's expected ratings, so as to maximize the resulting pay-offs to themselves. In order to calculate expected ratings based on strategic behaviour, we have used the following steps.

First, we need a probability mapping of individual preferences. It is assumed that the preference ranking (p_{ij}) of player i for norm j is maximal (i.e., equal to +10) if the payoff attached to norm j is the highest. The norm with the second highest payoff is ranked 9 and so forth. The norm with the lowest payoff is ranked 1.

Secondly, each player is considered to be the pivot player (i^*) one at a time. For the pivot player, the cumulative preference ranking for an equity norm (CP_{ij}), of all players excluding the pivot player is calculated (i.e., $CP_{ij} = \sum_{i \in I, i \neq i^*} p_{ij}$.) The distribution of cumulative preference rankings for all equity norms is then used to calculate the probability (Pr_{ij}) of a norm being selected ($Pr_{ij} = \frac{CP_{ij}}{\sum_{j \in J} CP_{ij}}$). This probability is multiplied by the individual pay-offs to calculate the expected pay-offs ($\pi_{ij} = v_{ij} \times Pr_{ij}$). This process is repeated for all player positions.

Finally, the expected pay-off values are used to calculate the expected ratings under strategic expectations (r_{ij}^s) for norm j by player i. Linear transformation functions similar to those presented in equation 1 are used to map expected pay-offs to expected strategic ratings with the only difference being that π_{ij} are used instead of v_{ij}.

The average expected ratings based on MSS and SSS behaviour for different player positions are presented in Figure 1 below. In general, both benchmarks provide expected ratings in the same

direction (except for player positions 3 and 10), even though not of similar magnitude. For example, the mean expected ratings (across all equity norms) with the MSS and SSS behaviour benchmarks are –0.37 and –0.16 respectively. However, for player position 3, the mean expected MSS rating is 0.14 and the SSS rating is -0.38. On the other hand, for player position 10, the mean expected MSS and SSS ratings are – 0.30 and +0.02 respectively. Overall, predicted ratings based on these two benchmarks differ significantly (two-tailed Wilcoxon Signed Rank test $z = -12.06$, $p < 0.0001$). Therefore, we use both of them to see which one can better describe the experimentally observed ratings.

Figure 1 about here

5. Results

In this section we analyse our experimental data and findings[6]. We begin by examining the overall differences between ratings observed in our experiments and those expected from a purely myopic or a purely strategic behaviour, as defined above. We examine whether the differences are larger or smaller in different treatments. Then in the second part of the analysis, to further understand the treatment impacts on individual ratings, we test whether the differences are significant for individual player positions.

Difference between observed and predicted ratings

Overall, people do not behave in a self-serving manner: there is a significant difference between observed behaviour and the behaviour predicted under both myopic and strategic assumptions. The mean rating across all equity principles and treatments is 2.52, which is significantly different from the expected mean ratings for SSS (two-tailed Wilcoxon Signed Rank test $z = -28.81$, $p < 0.0001$) and MSS (Wilcoxon Signed Rank test $z = -30.83$, $p < 0.0001$) behaviour predictions. Moreover, the absolute difference between observed and predicted ratings are significantly lower for the strategic behaviour assumption ($\mu = 6.16$) than for the myopic behaviour assumption ($\mu = 6.38$), using the two-tailed Wilcoxon signed Rank test ($z = -10.10$, $p < 0.0001$). This suggests that the observed rating is slightly better described by a strategically self-serving (SSS) behaviour than by a myopically self-serving (MSS) behaviour.

It is also clear from Figure 2 that the different contextual treatments strongly influence the degree of participants' self-serving behaviour: the differences between observed and predicted ratings are not

[6] It is not possible to provide here the full data set which is too large, but upon request it is available from the first author.

equal in all treatments. For example, the average absolute difference between observed and predicted ratings based on the strategic behaviour assumption is lowest ($\mu = 5.22$) in the treatment with equity-efficiency trade-off (Equity-Efficiency trade-off = Yes), known group position (Veil of Ignorance = No) and monetary incentive (Incentivization = Yes). On the other hand, the average difference is highest ($\mu = 6.97$) in the treatment without equity-efficiency trade-off (Equity-Efficiency trade-off = No), with veil of ignorance (Veil of Ignorance = Yes) and with no monetary incentive (Incentivization = No). Similar patterns emerge for the difference between observed and predicted ratings based on the myopic behaviour assumption.

Figure 2 about here

Impact of contextual factors

In order to further examine the influence of treatment conditions, we have run a series of panel regression models. We have regressed the difference between observed and predicted ratings against a set of personal socio-economic characteristics (such as wealth (Wealth); number of dependents (Deps); and productivity factor (Prodty)) and a set of contextual treatment variables. The latter include a dummy variable 'M' for the presence or absence of a monetary incentive (present = 1, absent = 0); a dummy variable 'P' for the presence or absence of an equity-efficiency trade-off (present = 1, absent = 0); and a dummy variable 'K' for the presence or absence of Rawl's veil of ignorance (known position = 1, unknown position = 0). We also consider a set of variables representing interactions between socio-economic characteristics and treatment variables. For example, the interaction variable 'MWealth' is generated by multiplying the dummy variable 'M" with the wealth variable of individual player position. Similar process is followed to generate other interaction variables.

In the first model, we have included only the main effects of individual characteristics and treatment variables. In the second model, additional variables on the interaction terms of the treatment variables have been included. In the third model, a further set of interaction terms between personal characteristics and treatment variables have been included. Testing of these different models allows us to test the robustness of the main and interaction effects of the treatments. Since the treatment dummy variables are static we used a random effect regression model.

We start with the results corresponding to the strategic behaviour benchmark. We note that an individual player's wealth has a significant negative effect on the absolute distance between observed behaviour and the strategic benchmark ($\beta = - 0.14$, $p < 0.01$, Model 3, Table 3). The main effect of wealth is consistent across all three models. The negative signs associated with wealth indicate that greater wealth increases strategic SSB. The number of dependents also has a negative sign ($\beta = - 0.29$,

$p < 0.10$, Model 3, Table 3), indicating that participants with a greater number of dependents behave more closely to the strategic self-serving benchmark: more dependents increases self-serving behaviour. Among the treatment variables, the effect of Rawls' veil of ignorance is consistent ($\beta = -0.83$, $p < 0.05$, Model 3, Table 3). The differences between observed and predicted self-serving ratings are smaller (imply a greater SSB) if players know their relative 'social' position. The significant negative impact of the interaction term between the presence of an equity-efficiency tradeoff and individual wealth (PWealth: $\beta = -0.05$, $p < 0.01$, Model 3, Table 3) indicates that in the presence of a payoff for productivity the negative impact of wealth is higher compared to the case with no payoff for productivity.

Table 3 about here

Use of the myopic behaviour benchmark produces similar results. As with the strategic benchmark, the following all reduce the absolute difference between observed and predicted ratings (i.e., increase self-serving behaviour): wealth ($\beta = -0.16$, $p < 0.01$, Model 3, Table 4), veil of ignorance ($\beta = -0.99$, $p < 0.01$, Model 3, Table 4), the interactions between monetary incentive and known position ($\beta = -0.71$, $p < 0.01$, Model 3, Table 4), and the interaction term between the presence of an equity-efficiency trade-off and individual wealth ($\beta = -0.07$, $p < 0.01$, Model 3, Table 4). The 'dependents' variable shows the same sign as in the full model with the strategic benchmark, but in this case it is statistically insignificant.

Table 4 about here

In order to understand the influence of the individual productivity factors (IPFs) used to create equity-efficiency trade-offs, we have estimated regression models only for treatments that include these factors. Recall that in the equity-efficiency treatments, individual players' income is multiplied by their IPF, as described in the previous section (see Table 5). We observe that the IPF is the predominant factor in reducing differences between observed and predicted self-serving ratings, for both strategic ($\beta = -34.09$, $p < 0.01$, Table 5) and myopic ($\beta = -31.71$, $p < 0.01$, Table 5) behaviour. Contrary to the signs presented for the full dataset, the impact of wealth on the difference is positive when we consider treatments with IPFs.

Table 5 about here

Individual player analysis

After presenting aggregate results, in this sub-section we analyse how different scenario treatments influence individual player ratings. Figure 3 suggests that the difference between observed and predicted ratings is larger for players in poorer positions than for those in richer positions; that is, participants with larger initial endowments exhibit stronger SSB than those with smaller endowments. A series of signed rank tests indicate that for some player positions in some treatments (15 out of 80, or 19%) there is no significant difference between observed and predicted ratings at the 5% level of significance (Table 6): in these cases, players fully exhibit self-serving behaviour by preferring the equity norms that best serve their own interests. These behaviours correspond to the most richly endowed positions (#7, 8, and 9), though, interestingly, the richest position of all, #10, appears less self-serving than the previous three. These trends are confirmed by the detailed graphs given in Figure 4, where some of the histograms in Figure 3 are further disaggregated across equity norms: the closer the (blue) observed ratings curve is to either of the two maximum SSB curves, the greater the degree of SSB. Clearly, the observed ratings in scenarios 2 and 4 are much closer to the theoretical maxima than in scenarios 5 and 7, while they are very similar in 2 and 4 on the one hand, and in 5 and 7 on the other hand. In the most incentivized scenarios 2 and 4, some curves nearly coincide for the positions with highest initial wealth (9 and 10).

Figure 3 about here

Table 6 about here

Figure 4 about here

6. Discussion

Our first question was whether people behave in a self-serving manner when choosing among different distributional equity norms. We find that in terms of overall, average behaviour, participants did indeed behave in a self-serving manner, but they rarely demonstrated maximum self-serving bias, either in terms of purely myopic or purely strategic behaviour. Some social concern for distributional equity always seemed to be present.

It was also clear that the type of self-serving behaviour is more strategic than myopic: participants seem to take into account the most likely choices made by others, who, being in a different socio-economic position, are likely to choose different equity norms. This is not unlike strategic voting behaviour, where a voter, supporting candidate A over B, votes for C if C has better chances to win against B than A does.

Our second question asked what factors influence the self-serving choice of equity norms. We investigated two types of factors, context and socio-economic characteristics. Context was defined in

terms of incentivization, the existence of a trade-off between equity and efficiency (or productivity), and knowledge about one's position in society – Rawls' veil of ignorance (VOI). The clearest result is the role of Rawls' VOI condition, which leads to the lowest self-serving bias in all cases. This may of course be due to risk aversion in an insurance against one's own uncertain future condition; but Schildberg-Hörisch (2010) and Krawczyk (2010) suggest that risk aversion is not the only factor that matters here: genuine social preferences are also at work. More specifically (Schildberg-Hörisch: p. 1062), "Many subjects prefer more equal allocations not only for insurance purposes but also due to impartial social preferences for equality. Our results imply that behind the VOI, maximin preferences are compatible with any degree of risk aversion if impartial social preferences for equality are sufficiently strong". However, in our present results, even under VOI the degree of SSB was not equal to zero; it was just minimal: VOI did not avoid SSB altogether, a result which still warrants further investigation. Another effect of VOI is that it makes the other contextual factors, incentivization and the presence of a trade-off with efficiency, almost redundant: their additional impact on SSB is very small.

When participants knew their position in the group in terms of initial wealth and number of dependents, both incentivization with real monetary stakes and introducing a trade-off with efficiency did matter and led to stronger SSB compared to the no incentives and no trade-off scenarios. Notably, the presence of an efficiency trade-off significantly increased SSB. This can be explained in that this trade-off affects the total amount available for distribution but without any participant knowing in advance by how much they might individually gain. If they are maximizing their expected gains under this uncertainty, this increases the self-serving motive in choosing an equity norm.

Taking all context factors together, the scenario that led to the highest degree of SSB was the one with known position, incentivized and with an efficiency trade-off. Conversely, the combination leading to the weakest SSB was diametrically opposite and involved no incentive, no trade-off and VOI. These results have clear implications for the real world. In most situations people know their position in society and also face real stakes; but there may or may not be a trade-off with efficiency. Regardless of whether there is a trade-off or not, both situations lead to the highest SSB as observed in our experiments. Dannenberg et al. (2010: p.106) reflect on the chances of success of climate change negotiations regarding countries' greenhouse gas abatement efforts: "first, parties have to be endowed with sufficiently strong equity preferences (empirically doubtful); second, parties must expect sufficiently high net benefits from mitigation policies" (which are uncertain). If success were to rely on equity considerations alone, prospects would be bleak. Better to focus on the expected net benefits to each party.

The second type of factor to influence SSB was defined by the socio-economic characteristics of individuals, that is, their position in the group. Here, initial wealth endowment had the greatest positive impact on SSB. This is not necessarily immediately obvious, as results by Barr et al. (2011) warn us; but their study focused on whether the source of the initial endowment was earned or

randomly assigned. Barr et al.'s work remind us that we need to consider the influence of wealth conditional upon it having been randomly assigned rather than earned – something which can be the topic of further investigation.

A particularly interesting result concerns the interaction between initial wealth and the trade-off with efficiency (or productivity). Taken separately, both factors clearly increase SSB; but their interaction suggests that, in the presence of the trade-off, more wealth can weaken SSB rather than strengthen it. To understand this, recall that gains to the poorest in the group barely increases the amount available for distribution, whereas distributing gains to the richest significantly increases the amount. As a result, participants at either end of the wealth spectrum have interests that work in opposite directions when an efficiency trade-off is present. For the rich, introducing the trade-off works in the same direction as their own expected wealth-maximizing motive; by contrast, the poor face contradictory incentives, since more distributed to themselves also means less available for distribution.

The number of dependents, which can represent family size for a household or population size for a country, had a similar enhancing effect on SSB. One could interpret this finding by appealing to some 'size of interest' notion; but in our experiments, more dependents only meant that gains would need to be shared out across more "mouths to feed", thereby significantly reducing the participant's actual gains. The simplest interpretation is that the number of dependents exacerbated the self-interest motive. The final effect may be the same as in biological or political systems, but the underlying mechanism is different. This identity of effect was in fact the design goal that had been sought.

We also studied how SSB might be influenced by the specific 'socio-economic' position in the group occupied by an individual, and how context might affect which position leads to the strongest SSB. Our results suggest, first, that SSB is stronger for the 'higher' positions, that is, those with a greater wealth endowment (irrespective of the number of dependents) – a result that lines up with the overall influence of wealth discussed earlier. More precisely, there are some positions which, in certain scenario combinations, lead to insignificant deviations from maximum SSB; that is, they reflect a purely self-serving behaviour.

Positions 7, 8 and 9 are those that come closest to pure self-serving behaviour, including even two of the VOI conditions. Clearly, greater wealth is conducive to stronger SSB. By contrast, the other positions (except #10) never lead to maximum SSB, or only marginally. However, position 10, the richest, only leads to maximum SSB in one out of the eight scenarios. This may reflect a genuine concern for others because of this conspicuously privileged position: Dannenberg et al. (2010: p.106) already suggested in their conclusion that participants show strong aversion to 'advantageous inequality' (when an individual dislikes being better off than others) but moderate aversion to 'disadvantageous inequality' (when an individual suffers from being worse off than others). In other words, subjects were more averse to being comparatively better off than being comparatively worse off. It might be worth exploring more deeply if this contrast between the first and second most

privileged positions generalizes to other setups. This could have implications for both upward and downward fairness in hierarchical organizations, calling 'upward fairness' the perception of fairness by a subordinate and 'downward fairness' the actions of a decision maker towards his or her subordinates.

7. Conclusions

Main findings. Three findings stand out from this study. First, subjects did not overall behave in a fully self-serving manner; rather, in the context of our experiments, the deviations from pure SSB must be interpreted as concern for some form of equity or fairness. This concern can be understood as entering individuals' utility function either as a willingness to sacrifice one's own selfish benefits, or as an additional form of benefit, derived from the perceived fairness of the distribution. The first is a deontological à la Kant interpretation, where the individual feels compelled by his or her sense of duty towards others to sacrifice purely selfish benefits. The second involves 'other-regarding preferences' where the individual derives part of his utility from others' welfare. Distinguishing between these two is however beyond the scope of this paper.

The fact that (partial) SSB was much more strategic than myopic suggests participants accounted for others' most likely choice of equity norms rather than just considering their own expected payoffs. This is very likely due to the fact that all distributional consequences had been computed in advance and were made directly visible to participants; if this had not been the case, the cognitive load would have been much heavier and behaviour might then have aligned more closely to the myopic than to the strategic benchmark. However, in this study the differences in outcomes between the myopic and strategic benchmarks turned out to be small (Fig 1).

Secondly, context was shown to play a determining role. The degree to which self-serving behaviour was observed varied markedly across group positions, that is, across individual socio-economic characteristics, as well as across scenario treatments. As initially suggested by Konow (2001), self-serving bias is thus highly context-dependent; but, we can now add, it is not randomly so. On the contrary, this context-dependence is highly structured and, given a specific type of context, is highly predictable on the basis of observable socio-economic data, such as age, income, education level and so forth.

Results pertaining to the role of implementation context carry lessons for policy: given a distribution of socio-economic characteristics of the population, such as high versus low income inequality, certain policy or institutional contexts are more conducive to SSB than others. This link between the institutional and political fabric of society and how people differ in their equity preferences has not yet been fully examined.

In this study, we explored three types of context treatments as well as all their combinations: the role of real incentives; the presence of trade-offs between equity and economic efficiency; and the role of information on one's social position. All three played a specific role which also interacted with each other. Further contexts can and should be explored, as it is unlikely their number is unlimited or even large: once correctly characterized, a study representative of a whole category of contexts may be possible. But first, a rigorous characterization of 'context' for equity analysis is needed, as context can vary along several dimensions. For example, field of application may be the access to medical care or to higher education. There is no reason why equity preferences should be the same in both of these contexts, perhaps because they involve different perceptions of entitlements. The link between entitlements and equity has not yet been fully investigated.

Thirdly, our results suggest that greater wealth and more 'mouths to feed' (number of dependents) induce greater and more systematic self-serving behaviour. However, as Barr et al. (2011) clearly demonstrated, we must condition our results on a possible endowment or OPM (other people's money) effect, as all endowments were randomly allocated and not earned through the completion of some task. Although obtained through a different research question (the role of relative economic status on notions of distributional equity), their results indicate that wealthier people will give greater importance to individual effort than poorer people, who did not seem to differentiate between endowments based on personal effort and those based on chance.

Methodological limitations. From a methodological point of view, a limitation of this study is to have assumed, as a working hypothesis, that any underlying 'true' equity preferences are invariant to changes in context, and that only revealed preferences, which include a degree of SSB, are sensitive to context. 'Bundling' the two together has, however, proven to be informationally productive. Whether the results obtained are sufficient or not depends on what they will be used for. For practical policy purposes, only revealed preferences tend to matter. For a deeper understanding of whether, first, any 'true' equity preferences independent of any context actually exist and, second, whether they are different from their revealed expression once the context has been specified, a 'disentangling' strategy would be needed.

More generally, as context or experimental treatments are made to vary, one can define several benchmarks against which to evaluate revealed equity preferences. First is the one used in this study: the degree of SSB and how far observations deviate from a 'pure' SSB strategy. Other benchmarks include (1) totally random ratings, particularly relevant for the non-incentivized treatments, and aimed at measuring how consequential each survey-like scenario appeared to players; (2) ratings based on the construction of an equity metric that best reflects the group's collective preferences, aimed at measuring to what extent individual players might incur a loss of utility if the 'fairest' norm, as seen by the group as a whole, is implemented. Results using each of these benchmarks will be presented in a forthcoming paper. Constructing a measure that reflects, or directly eliciting, any 'true' underlying preferences could provide a third benchmark.

Further developments. The findings from this study also suggest at least seven further developments. First, they can be complemented, and completed, by adding another treatment. Instead of compared no monetary stakes to monetary gains, one could compare (real) gains to one's own group with (real) gains to some other, anonymous, group. Rather than the role of incentivization, this would address under controlled experimental conditions the role of 'impartial spectator' that Konow (2009) examined using a community survey. Can his conclusions be reproduced in the lab and would the position of impartial spectator really be conducive to unbiased choices of equity norms, that is, with zero or close to zero SSB?

A second extension would be to observe how stable people's preferences of equity norms are in presence of repetition or iterations. Once people are exposed to repeated interactions they might be willing to change their preference either due to pure strategic reasons or out of concern for others' welfare. The goal would be to disentangle the effect of these two motivations and identify which factors play the greatest role.

A third extension would be to replicate some of our scenarios with earned (rather than random) endowments and test whether contextual parameters affect SSB in the same way.

A fourth extension would be to replicate this study with different types of subjects. Although the results obtained here seem to be in line with those obtained by Durante et al. (2013), the less than maximum SSB observed in this study may or may not be specific to our experimental subjects, University students in northern Germany. Students in other countries with different value systems, as well as non-student populations, could shed more light on the generality of this result.

Fifthly, one could test whether the dominance of strategic over myopic SSB observed in our study is robust to manipulation of information given to participants on distributional consequences. For instance, participants could be split into two groups, one receiving the information and the others not. The latter would have a much heavier cognitive load trying to figure out what the distributional consequences, and in particular their own gains, might be, a situation closer to that encountered in the field.

Sixthly, does it matter how we analyse equity in allocation decisions? Most studies to date investigate the direct, implicit approach by asking subjects to split a given amount between two (sometimes three) people. Here we implemented the indirect, explicit approach by asking groups of (ten) subjects to rate a dozen equity principles separately, a procedure closer to how things happen in the real world. But, under comparable conditions, do these two approaches lead to the same results?

Finally, the degree to which different equity norms depend on context must itself depend on how they are defined, as noted by Ubeda (2104). Equality, for example, can be defined irrespective of context: we say its definition involves zero parameters. The definition of other equity norms involves one or several parameters, the choice of which is itself context-dependent. For example, Rawls' maxmin requires us to specify who are "those most in need" that must be treated differently. A study of equity and SSB context-dependence cannot be complete without empirically investigating how

people's definition of a parameterized equity norm is itself affected by context. This should help dissipate the ambiguities present in much of the discourse on equity as well as in some of the analytical work.

The present study can thus be seen as a stepping stone towards a more complete understanding of how different dimensions of context affect self-serving bias in fairness judgments, and in particular, which dimensions tend to minimise such bias and which tend to maximize it.

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Table 1 : Experimental treatments (3) and scenarios (8)

Treatments: Scenarios	Definitional code	Incentivization (Y/N)	Equity-Efficiency trade-off (Y/N)	Veil of ignorance (Y/N)
S 1	TEK	N	N	N
S 2	MEK	Y	N	N
S 3	TPK	N	Y	N
S 4	MPK	Y	Y	N
S 5	TEU	N	N	Y
S 6	MEU	Y	N	Y
S 7	TPU	N	Y	Y
S 8	MPU	Y	Y	Y

Note on code: T = (cheap) talk; M = (real) money; E = (pure) equity; P = productivity; K = known position; U = unknown position. Codes give definitions of scenarios in terms of the treatments.

Table 2: Share of $100 to each individual according to each equity norm

Position	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Wealth	5	7	9	12	14	16	18	21	23	25	
Dep'ts	0	1	2	0	1	2	0	1	2	1	
Norms											***PIFs***
IP	23.49	16.27	12.44	10.07	8.46	7.29	6.41	5.71	5.16	4.70	***1.34***
Egal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	***1.50***
Exc	2.74	5.00	18.46	1.46	11.75	15.61	12.74	6.63	13.95	11.67	***1.55***
HE	5.00	10.00	15.00	5.00	10.00	15.00	5.00	10.00	15.00	10.00	***1.53***
IOF	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	***1.50***
Mkt*	5.94	11.54	11.49	7.28	11.42	8.00	18.94	2.72	11.34	11.33	***1.55***
Mm	20.00	20.00	20.00	20.00	20.00	0.00	0.00	0.00	0.00	0.00	***1.22***
Par	7.90	7.90	15.09	7.90	9.53	12.66	10.33	7.90	11.32	9.47	***1.50***
Sov	3.33	4.81	6.30	7.78	9.26	10.74	12.22	13.70	15.19	16.67	***1.64***
VE	35.46	21.82	14.60	10.13	7.09	4.89	3.22	1.92	0.86	0.00	***1.19***
IPFs	**1.00**	**1.11**	**1.22**	**1.33**	**1.44**	**1.56**	**1.67**	**1.78**	**1.89**	**2.00**	**---**

*) Payments for the 'market justice' (Mkt) norm represent one particular realization of this process rule, the results of which depended on a computer-simulated market-equilibrium outcome.

IPFs = Individual Productivity Factors

PIFs = Productivity Impact Factors

Table 3: Random effect panel regression models: Changes in absolute difference between observed and predicted ratings based on strategic self-serving (SSS) behaviour for different incentivized, known position and equity-efficiency treatments.

Model	1		2		3	
Wealth	-0.17	**	-0.17	**	-0.14	**
	(0.01)		(0.01)		(0.02)	
Deps	-0.14	**	-0.14	^	-0.29	^
	(0.08)		(0.08)		(0.16)	
M	-0.42	**	-0.30		-0.30	
	(0.12)		(0.25)		(0.38)	
P	-0.35	**	-0.43	^	0.26	
	(0.12)		(0.25)		(0.38)	
K	-0.98	**	-0.66	**	-0.83	*
	(0.12)		(0.25)		(0.38)	
MP			0.26		0.26	
			(0.35)		(0.35)	
MK			-0.54		-0.53	
			(0.35)		(0.34)	
PK			-0.14		-0.13	
			(0.35)		(0.34)	
MPK			-0.09		-0.09	
			(0.49)		(0.49)	
MWealth					-0.01	
					(0.02)	
PWealth					-0.05	**
					(0.02)	
KWealth					0.01	
					(0.02)	
MDeps					0.13	
					(0.16)	
PDeps					0.06	
					(0.16)	
KDeps					0.12	
					(0.16)	
Constant	9.69	**	9.61	**	9.35	**
	(0.19)		(0.22)		(0.34)	
Wald	428.42	**	434.38	**	442.52	**

Note: **, * and ^ indicate significance at 1%, 5% and 20% levels of significance respectively.

Table 4: Random effect panel regression models: Changes in the absolute difference between observed and predicted ratings based on myopic self-serving (MSS) behaviour for different incentivized, known position and equity-efficiency treatments.

Model	1		2		3	
Wealth	-0.19	**	-0.19	**	-0.16	**
	(0.01)		(0.01)		(0.02)	
Deps	-0.13		-0.13		-0.23	
	(0.08)		(0.08)		(0.16)	
M	-0.50	**	-0.29		-0.31	
	(0.12)		(0.24)		(0.38)	
P	-0.19		-0.31		0.60	
	(0.12)		(0.24)		(0.38)	
K	-1.10	**	-0.74	**	-0.99	**
	(0.12)		(0.24)		(0.38)	
MP			0.24		0.24	
			(0.34)		(0.34)	
MK			-0.71	*	-0.71	*
			(0.34)		(0.34)	
PK			-0.08		-0.08	
			(0.34)		(0.34)	
MPK			0.14		0.14	
			(0.48)		(0.49)	
MWealth					-0.01	
					(0.02)	
PWealth					-0.07	**
					(0.02)	
KWealth					0.01	
					(0.02)	
MDEps					0.05	
					(0.16)	
PDeps					0.08	
					(0.16)	
KDeps					0.08	
					(0.16)	
Constant	10.17	**	10.07	**	9.75	**
	(0.19)		(0.23)		(0.34)	
Wald	509.99	**	522.68	**	535.69	**

Note: **, * and ^ indicate significance at 1%, 5% and 20% levels of significance respectively.

Table 5: Random effect panel regression models: Changes in absolute difference between observed and predicted ratings based on strategic and myopic self-serving behaviour for scenarios with equity-efficiency treatments.

Model	SSS Rating		MSS Rating	
Wealth	1.50	*	1.36	*
	(0.60)		0.60	
Deps	-0.06		-0.03	
	(0.20)		(0.20)	
Prodty	-34.09	**	-31.71	**
	(12.14)		(12.13)	
M	4.63		5.92	
	(10.66)		(10.65)	
K	-11.56		-9.87	
	(10.66)		(10.65)	
MK	-0.45		-0.58	^
	(0.34)		(0.34)	
MWealth	0.26		0.35	
	(0.69)		(0.69)	
KWealth	-0.71		-0.60	
	(0.69)		(0.69)	
MDeps	0.28		0.25	
	(0.24)		(0.24)	
KDeps	-0.09		-0.07	
	(0.24)		(0.24)	
MProdty	-5.89		-7.62	
	(14.02)		(14.01)	
KProdty	14.37		12.04	
	(14.02)		(14.01)	
Constant	35.24	**	34.16	**
	(9.23)		(3.70)	
Wald	296.07	**	359.97	**

Note: **, * and ^ indicate significance at 1%, 5% and 20% levels of significance respectively.

Table 6: Players in different treatments with insignificant difference between observed and predicted ratings at the 5% level of significance calculated with a Wilcoxon Signed Ranks Test

Scenario	Incentive	Equity-Efficiency Tradeoff	Veil of Ignorance	Myopic behaviour (player's position)	Strategic behaviour (player's position)
S1-TEK	No	No	No	6, 7, 9	6, 7, 9
S5-TEU	No	No	Yes		2
S3-TPK	No	Yes	No	7, 8	7, 8
S7-TPU	No	Yes	Yes		
S2-MEK	Yes	No	No	8, 9, 10	7, 8, 9, 10
S6-MEU	Yes	No	Yes	7,	7, 9
S4-MPK	Yes	Yes	No	8, 9	8, 9
S8-MPU	Yes	Yes	Yes	7	8

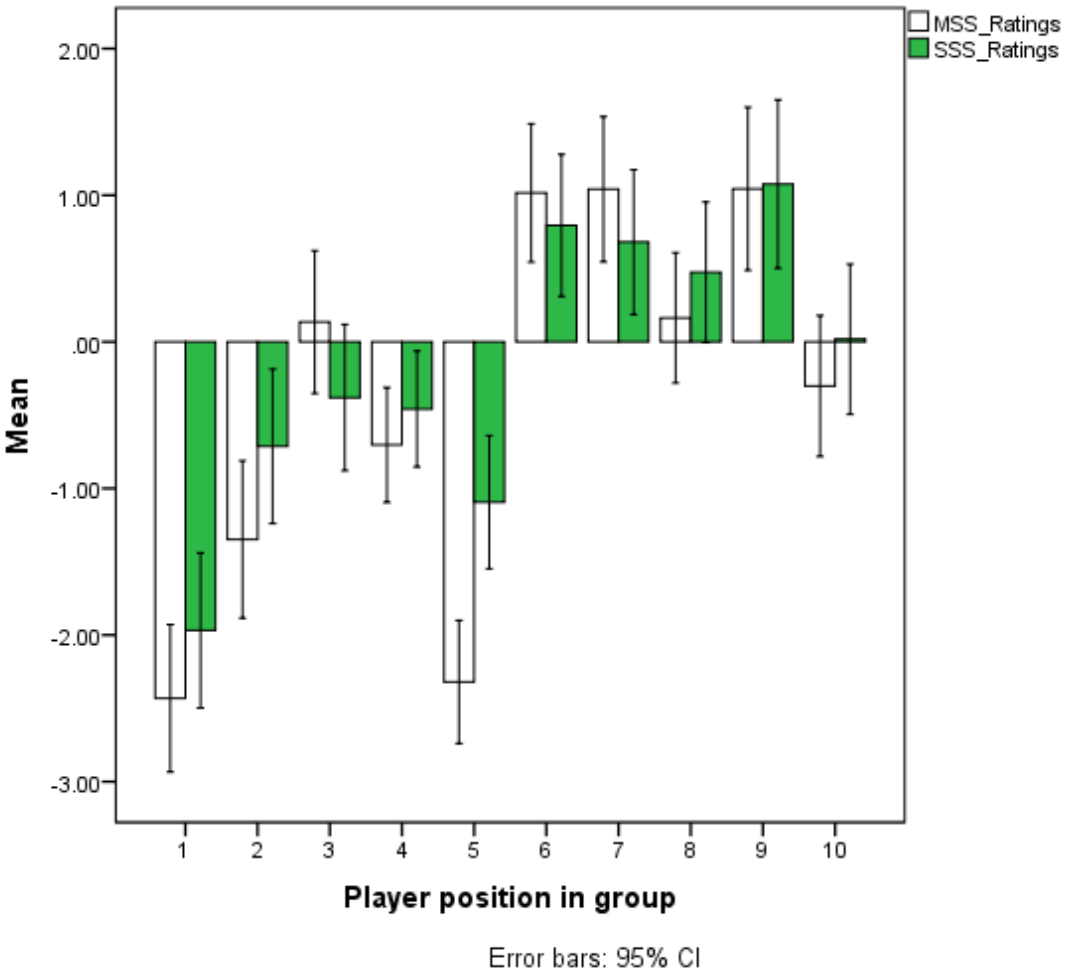
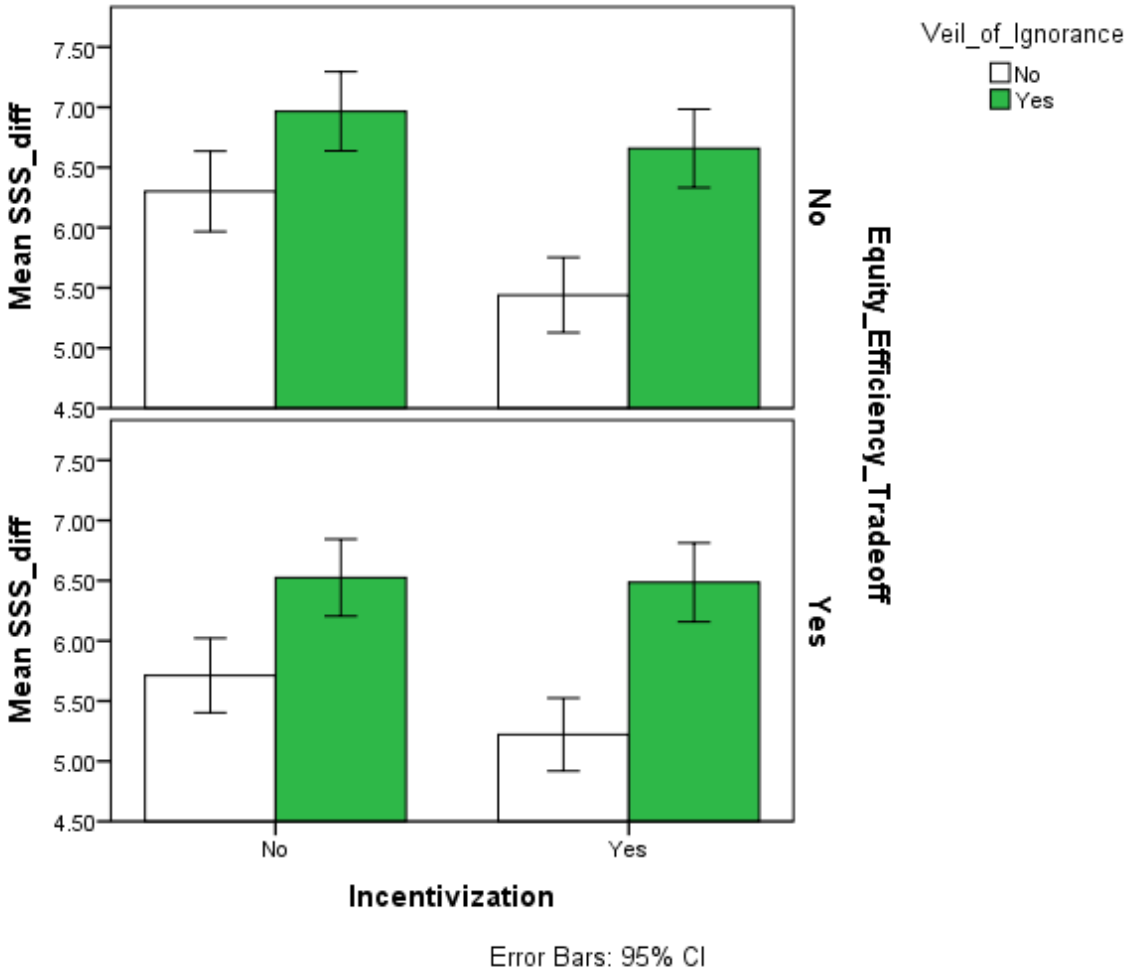


Figure 1: Average expected ratings based on myopic and strategic behaviour assumptions for different player positions, position 1 (poorest endowed) to 10 (richest endowed).


Veil_of_Ignorance
No
Yes
Mean SSS_diff
7.50
7.00
6.50
6.00
5.50
5.00
4.50
No
Yes
Equity_Efficiency_Tradeoff
Incentivization
Error Bars: 95% CI

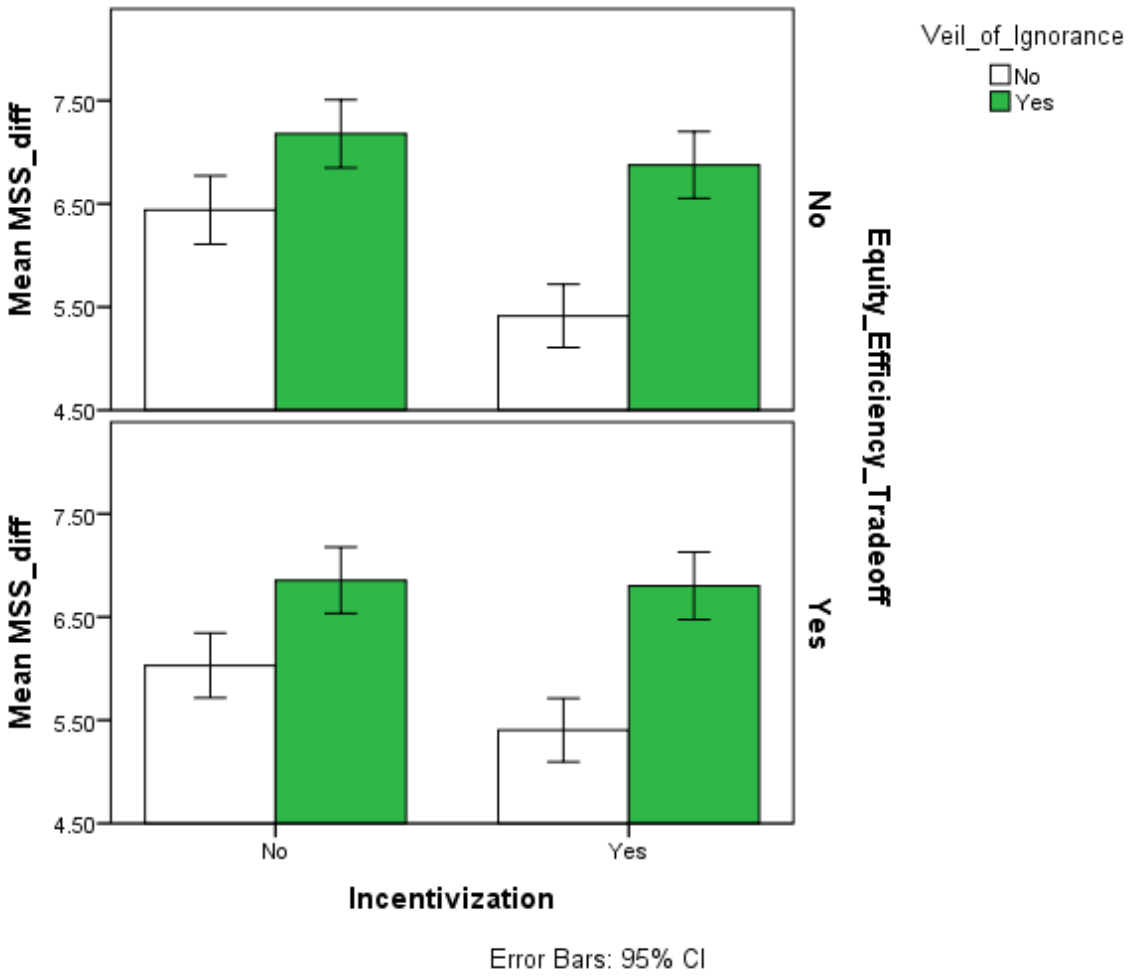
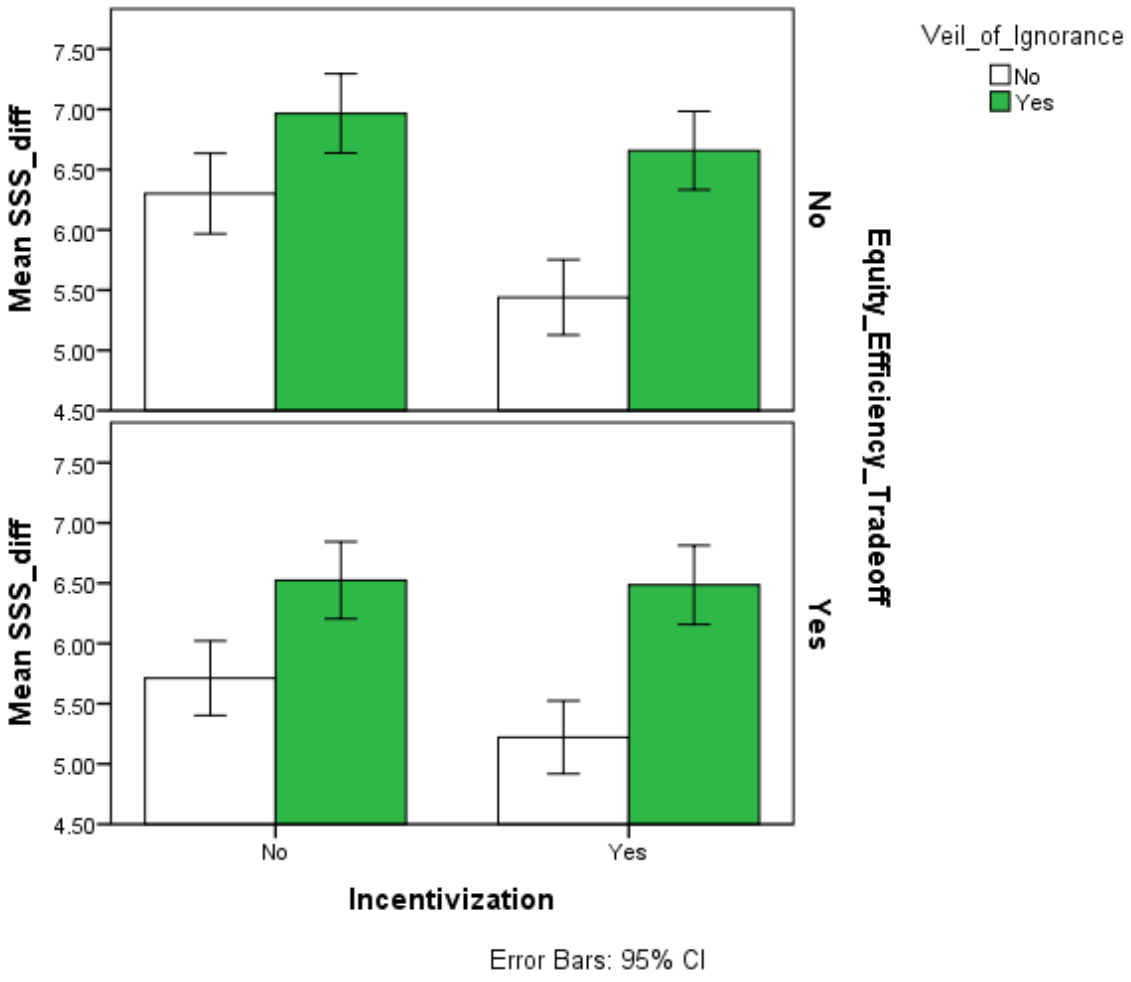


Figure 2: Average absolute difference between observed rating and expected rating based on strategic and myopic behaviour for different incentivized, known position and equity-efficiency treatments


Veil_of_Ignorance
No
Yes
Mean SSS_diff
7.50
7.00
6.50
6.00
5.50
5.00
4.50
No
Yes
Equity_Efficiency_Tradeoff
Incentivization
Error Bars: 95% CI

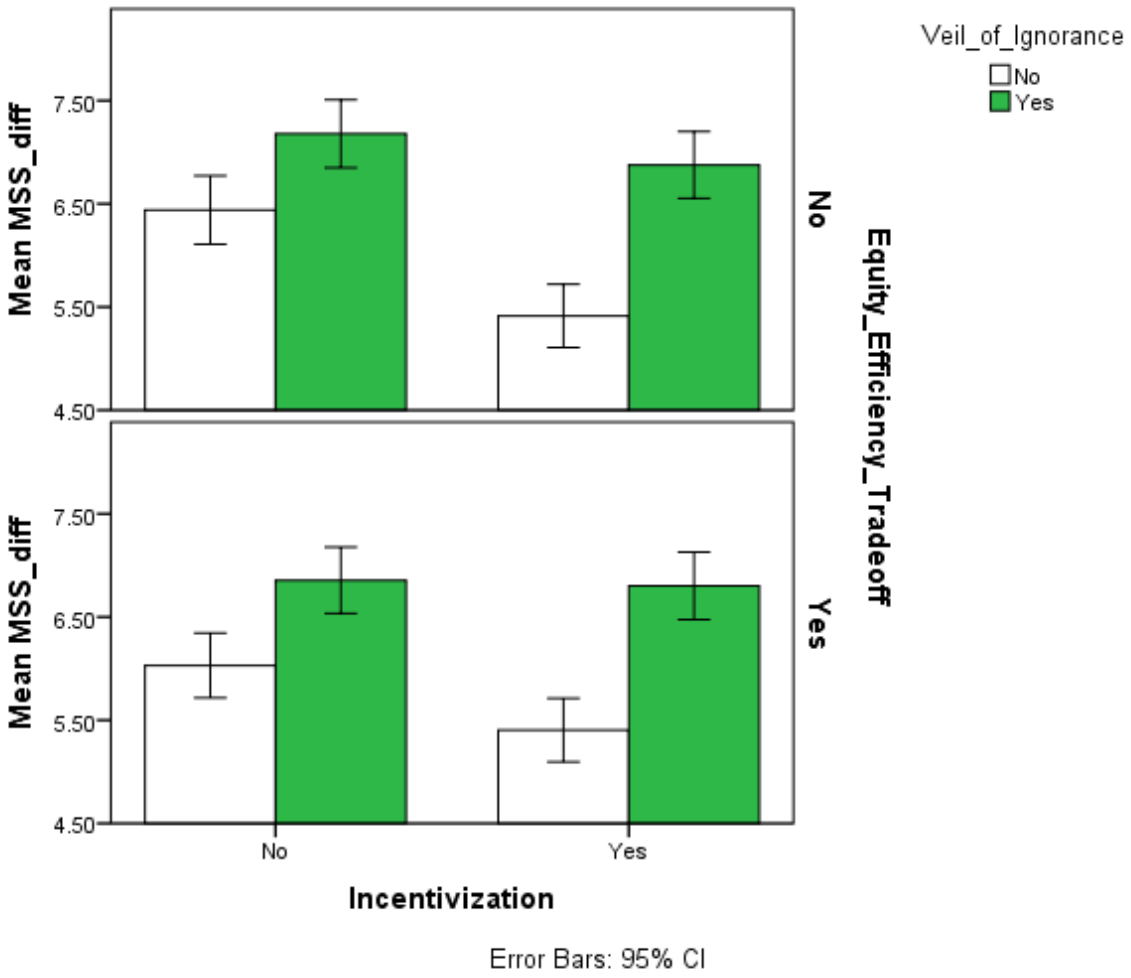


Figure 2: Average absolute difference between observed rating and expected rating based on strategic and myopic behaviour for different incentivized, known position and equity-efficiency treatments

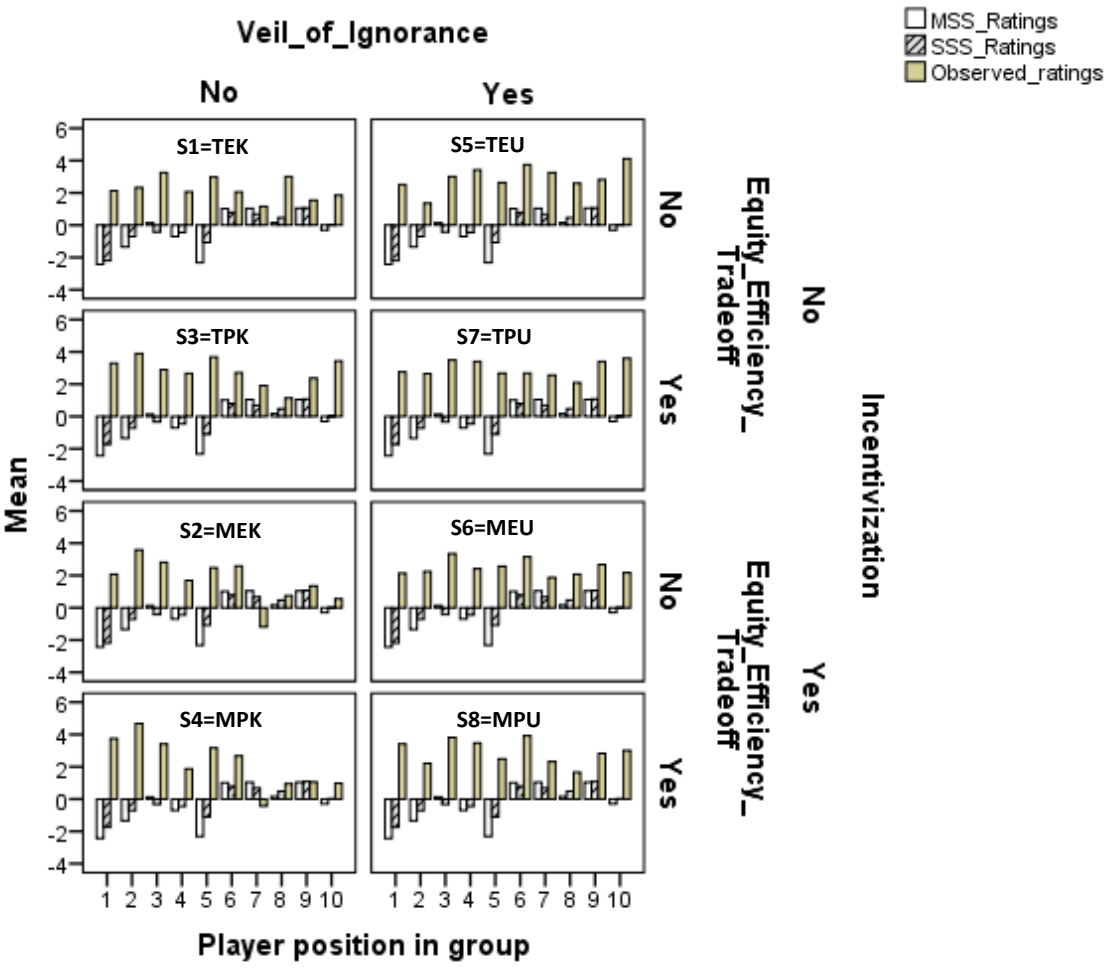
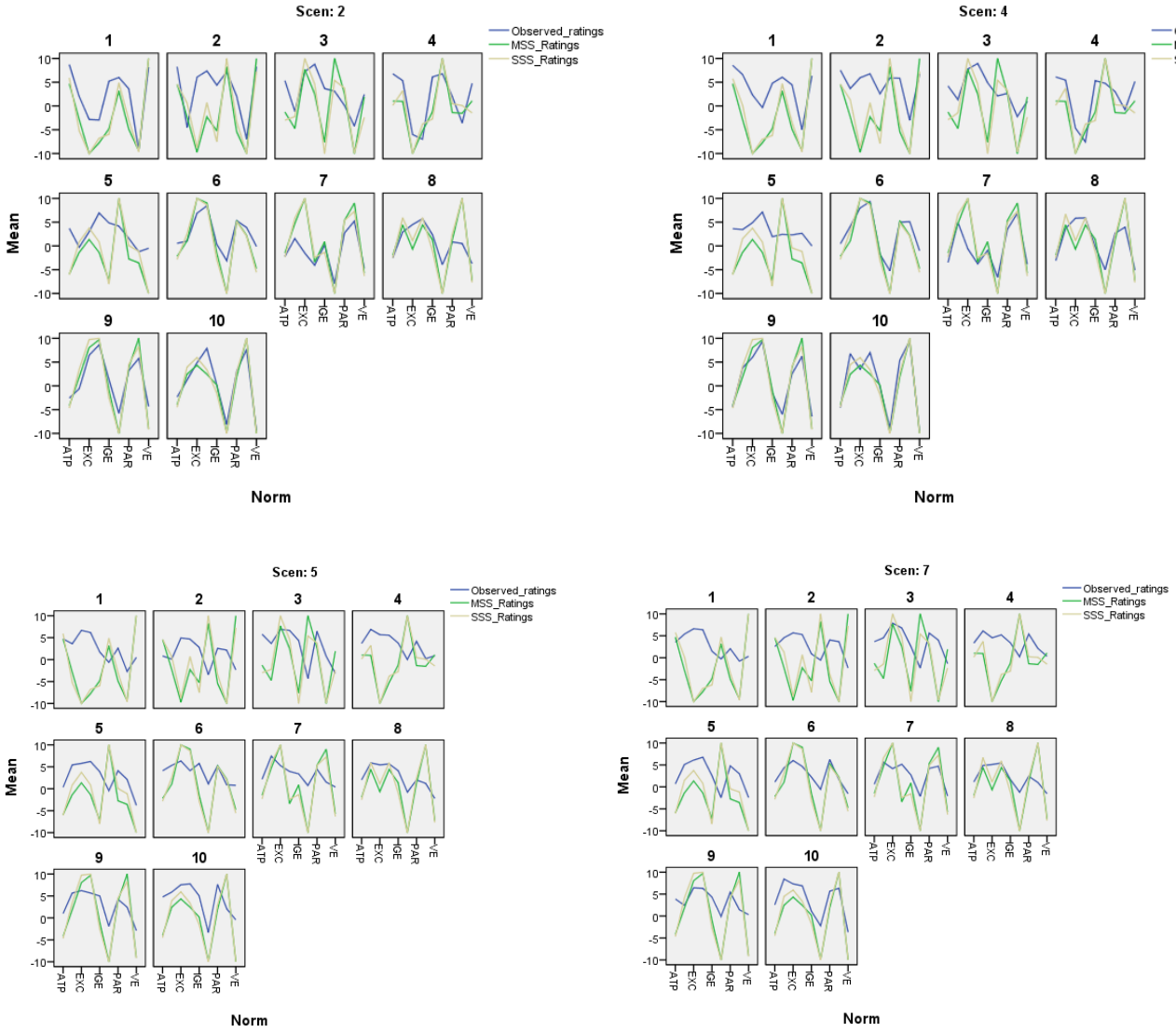


Figure 3: Average observed, myopic self-serving and strategic self-serving ratings for players' positions for different incentivized, known position and efficiency treatments.

Note: Scenarios 2 and 4 are at the opposite spectrum of scenarios 5 and 7.

T/M=without/with money; E/P = without/with productivity trade-off; K/U = without/with VOI

Figure 4: Ratings by position (1-10), norm and scenario. (Scenarios 2 and 4 are the opposite spectrum of 5 and 7. MSS = myopic, SSS=strategic)



1. Ability to Pay (= Inverse Prop)
2. Egalitarian
3. Exceptions
4. Horiz Equity
5. IOF (Future)
6. Maxmin
7. Pareto
8. Sovereignty
9. Vertical Equity