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On choosing a constitution (at least the part relating to the distribution of income)

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On choosing a constitution (at least the part relating to the distribution of income)

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A constitution is a collection of principles or axioms determining how society should be organized and a description of the ordering of the axioms in terms of their importance and invocation. We report on an exploratory experiment aimed at discovering preferred axioms relating to the distribution of income within society. Unlike most previous experiments, we inquired *directly* into preferred axioms, rather than *indirectly* (done by asking subjects to choose between distributions). In addition to learning that the experimental design was, in principle, appropriate, we discovered that preferences expressed in this direct way appear to differ from preferences expressed indirectly. Interestingly, we also get an insight into the *order* in which people prefer principles to be implemented, thus suggesting something about relative importance.

I. Introduction

A constitution is a set of principles that determine the way a country will be governed and a description of the order in which the principles should be invoked. In social choice theory, the principles are referred to as axioms. In designing a constitution, axioms are chosen based on their general appeal and not by their attractiveness in particular applications. This article is concerned with axioms that relate to the distribution of income in some population: we experimentally explore the appeal of a small set of frequently quoted axioms as general principles. In so doing, we discover the axioms that ‘should’ form the part of a constitution dealing

with the distribution of income. Our work is in stark contrast to the previous experimental studies that have investigated the appeal of axioms in particular applications. We explain further after we have described the axioms being investigated and the experimental design.

II. The Axioms

As this article is meant to be illustrative rather than definitive, we deliberately select a small set of frequently invoked axioms: Rawls, Dispersion, Transfer, Group Transfer and Lorenz. We double them by considering also their reverses. Briefly, they are as follows:¹

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¹ The experiment was carried out in Italy. The full instructions are available in Italian at <http://www-users.york.ac.uk/~jdhl/hey> and pasca mark 1/Istruzioni Trattamento 1 and <http://www-users.york.ac.uk/~jdhl/hey> and pasca mark 1/Istruzioni Trattamento 2, with English versions at <http://www-users.york.ac.uk/~jdhl/hey> and pasca mark 1/Instructions Treatment 1 and <http://www-users.york.ac.uk/~jdhl/hey> and pasca mark 1/Instructions Treatment 2. It should be noted that the principles were first expressed succinctly as above, with more detail being given later. In particular, for principles 1 and 2, subjects were told that this principle would be implemented lexicographically; for principles 3 and 4, subjects were told that the standard deviation would be used as the measure of dispersion; for principles 5 and 6, subjects were told that this principle could be implemented several times; for principles 7 and 8, subjects were told that this principle could be implemented several times and they were asked to specify the group size(s); and for principles 9 and 10, the statement of the principles it was spelt out in detail.

- (1) Rawls [2. Reverse Rawls]: ‘If the poorest [richest] person in distribution 1 has a higher income than the poorest [richest] person in distribution 2, then distribution 1 is preferred.’
- (3) Dispersion [4. Reverse Dispersion]: ‘The distribution where the dispersion of income is the smallest [largest] is preferred.’
- (5) Transfer [6. Reverse Transfer]: ‘The distribution improves if we take €1 from some individual and give it to a poorer [richer] individual.’
- (7) Group Transfer [8. Reverse Group Transfer]: ‘The distribution improves if we take €1 from a group of individuals and give it to a group of poorer (richer) individuals.’
- (9) Lorenz [10. Reverse Lorenz]: ‘If the n poorest [richest] people in distribution 1 have a greater proportion of the total income than the n poorest [richest] people in distribution 2, for all values of n , then the distribution improves.’

III. The Experiment

In each of the 10 sessions of the experiment, we had either 10 (Treatment 1) or 11 (Treatment 2) subjects. Subjects were told that the purpose of the experiment was to decide the distribution of income/payments of €150 over 10 people, these being the members of a mini-society composed of the 10 subjects in the experimental session in Treatment 1 and of 10 of the 11 subjects in Treatment 2. The 11th in Treatment 2, chosen at random at the end of the experiment, would be the Social Planner, whose preferences over the axioms would determine the distribution and who would receive a fixed payment of €15 for his or her participation. In Treatment 1 one of the 10 subjects, similarly chosen at random at the end of the experiment, would be the Social Planner. Given a chosen distribution, the actual distribution over the 10 members of the society would be chosen at random, and the resulting incomes would be the experimental payment to the subjects. The reason for having two treatments was to see whether financial incentives might affect the answers.

The actual distribution was selected from a set of 100 distributions generated randomly, all with the same mean, €15, and with all incomes between €0

and €30. All subjects were aware of this process but were not informed about the actual values of the 100 distributions until the end of the experiment; the reason for this was to concentrate the subjects’ minds specifically on general principles. At the end of the experiment, the 100 distributions were shown to all participants, along with the set of preferred distributions implied by the Social Planner’s implemented axioms. In the experiment, all such sets consisted of a singleton.²

The purpose of the experiment was to establish the preferred principles/axioms, and hence to simulate the invocation of a constitution. Any constitution should be robust enough to choose from a set of possible distributions. We chose 100 as being a sufficiently large number without being excessively large.³

Our experiment is fundamentally different from the previous experiments on the axioms underlying the distribution of income in that financial incentives were involved. We refer to the work of Amiel and Cowell, the leaders in this field, summarized well in their 1999 book. They report on two kinds of experiment: one (which they call ‘numerical’) – often although not always with appropriate financial incentives – in which subjects are asked to make a series of pairwise choices between specific distributions; and the second (which they call ‘verbal’) – invariably not financially motivated – in which subjects are asked whether they agree with certain axioms. We note that with the first type there are two problems: first, it is often not clear which axiom is being tested;⁴ second, it is not clear from an answer that if a subject prefers the distribution favoured by axiom x whether this means that the subject *always* likes axiom x ; contrariwise, it is not clear from an answer that if a subject prefers the distribution *not* favoured by axiom x whether this means that the subject *never* likes axiom x , or whether the specific example is simply an exception. With the second type of question, there is not only the problem of the lack of a financial incentive, the question is not even set in the context of constitutional choice over income distributions. In our experiment, in contrast, this was crucially the focus of the experiment.

Before turning to our results, we ought to make some further observations on the axioms we chose to include in our experiment. First, we should admit that axiom 7 (and its reverse) *could* be internally contradictory depending on the distributions in the set. Our

² If it had not, one of the distributions would have been chosen at random; subjects were told about this in the Instructions.

³ Note that, had we specified an infinite number, the subjects could have worked out, for example, that one of the possible distributions would be completely equal (€15 for all) and another would be completely unequal (€150 for one and €0 for everyone else). Therefore, once again they would be back to choosing between specific distributions rather than deciding general principles.

⁴ One example taken from Amiel and Cowell (1999) is a choice between (1, 4, 7, 10, 13) and (1, 5, 6, 10, 13). Is this a test of the Transfer principle, or of Dispersion or indeed of Rawls?

software would not allow the axiom to be decisive in such a case. Second, we note that any of the axioms 3, 5, 7 and 9 obviously are in conflict with their reverses, although that is not the case for axiom 1 and its reverse.⁵ Third, we note that the axioms 1, 2, 3 and 4 always imply a unique distribution (from any finitely sized set) whereas the others do not. Fourth, we note that the axioms 5 and 9 (and 6 and 10) are identical differing only in the words used to describe them.

IV. Experimental Results

Subjects were first asked to state which axioms they agreed with. They were then asked which agreed-to principles they wanted to implement; note crucially that they could not implement principles with which they had not agreed. The software then tried to implement these principles on the 100 distributions or on the distributions remaining at that stage from the 100. If there was a conflict, the software told the subject so and asked him or her to select a different set of axioms to implement. If there was no conflict, but a unique distribution did not result from the implementation of the axioms, subjects were asked to specify more agreed-to axioms to implement. This process continued until a unique distribution resulted.⁶ We present a synthesis of our results in two tables. Table 1 gives a summary of the agreed-to principles. Table 2 shows the principles implemented in the order in which they were implemented. If a subject implemented more than one principle at the same time, we record this by putting the principles' numbers in parentheses.

As far as Table 1,⁷ which tabulates the rate of agreement with principles, is concerned, it seems that differences between the treatments are minor. Over both treatments there is more (64% against 36%) agreement with for what one might call *egalitarian* principles (numbers 1, 3, 5, 7 and 9) as distinct from *anti-egalitarian* principles (2, 4, 6, 8 and 10).

In Table 2 again there do not seem to be major differences between the two treatments. We note, however, a rather large number of instances in which subjects sequentially invoked a mixture of egalitarian and anti-egalitarian principles. We also note that this practice was considerably more prevalent in Treatment 1 (where the subject was going to be a member of society). This seems to illustrate well a tension between the social intentions of the subjects and their self-interest. The four most frequently implemented principles were Dispersion, Rawls, Reverse Dispersion and Reverse Rawls. The overriding popularity of these four decisive principles is noteworthy, suggesting that decisiveness is an important property of a constitution. Overall, a decisive principle was implemented first 60% of the time.

V. Conclusions

The main objective of this experiment was illustrative: to show that it is possible to elicit *directly* and with appropriate incentives the principles that people feel should be in the part of a constitution determining the distribution of income in society. We make no claim to representativeness in our subject pool, and indeed one

Table 1. Summary of agreed-to principles

	Axiom	Treatment 1	Treatment 2
1	Rawls	121	135
2	Reverse Rawls	98	94
3	Dispersion	79	101
4	Reverse Dispersion	76	59
5	Transfer	92	95
6	Reverse Transfer	20	26
7	Group Transfer	95	105
8	Reverse Group Transfer	25	21
9	Lorenz	121	123
10	Reverse Lorenz	103	81
Total		830	840

⁵ Consider the distributions (2, 3, 10) and (1, 5, 9). Both 1 and 2 prefer the first.

⁶ Or until no agreed-to principles remained (although this never happened).

⁷ We note that the subjects repeated the experiment thrice; the results below are based on the aggregate results (there were very few differences between the three repetitions and hence very little evidence of learning).

Table 2. Order of implementation of the axioms

Treatment 1 – total number of times is 150			Treatment 2 – total number of times is 165		
Cumulative (%)	Number of times	Axioms and order	Cumulative (%)	Number of times	Axioms and order
18	27	3	25	42	3
35	26	4	41	26	1
52	25	1	53	20	4
59	11	2	61	13	2
63	6	10 2	65	6	10 3 ^a
67	5	7 ^b	68	5	7 ^b
69	4	9 1	70	4	10 2
71	3	9 3	72	3	7 1
73	3	(1 7)	74	3	(5 9) 1
75	3	5 ^b	76	3	(1 3) ^c
77	2	10 1	77	2	9 1
78	2	9 4 ^a	78	2	5 ^b
79	2	7 3	79	2	10 1
81	2	8 ^b	81	2	10 4
81	1	7 (1 4) ^{a,c}	82	2	5 7
82	1	10 5 7 9 1 ^a	83	2	7 9 1
83	1	10 9 7 5 2 ^a	84	2	10 8 2
83	1	9 7 3	85	1	9
84	1	8 10 1 ^a	85	1	7 9 3
85	1	10 4	86	1	5 9 2 ^a
85	1	8 1	87	1	(3 5)
86	1	5 7 3	87	1	9 4
87	1	7 1	88	1	(3 5 7) ^c
87	1	5 3	88	1	5 3
88	1	10 3	89	1	5 1
89	1	2 4 ^c	90	1	8 4
89	1	7 4 ^a	90	1	(1 7)
90	1	10 6 8 3 ^a	91	1	7 3
91	1	8 3 ^a	92	1	7 5 3
91	1	9 7 5 3	92	1	9 2
92	1	9 10 3 ^a	93	1	8 3 ^a
93	1	7 5 3 9 1 ^d	93	1	7 9 6 1 ^a
93	1	7 5 3	94	1	6 1
94	1	5 1	95	1	6 3
95	1	10 9 5 3 ^a	95	1	8 6 4
95	1	8 4	96	1	9 5 7 1
96	1	10 3 2 ^d	96	1	9 7 1
97	1	(6 10) 4	97	1	(5 7) 4
97	1	(7 9) 1	98	1	9 (1 3)
98	1	9	98	1	7 5 9 10 3
99	1	9 10 2 ^a	99	1	3 7
99	1	10 7 4 ^a	99	1	9 3
100	1	7 9 10 5 2 ^a	100	1	7 9 1 3

Notes: (x y z) indicates that x, y and z were implemented simultaneously.

^aThese indicate a mix of egalitarian and anti-egalitarian principles.

^bNote that while certain axioms are *not* decisive, there may be cases of sets of distributions for which such axioms are *de facto* decisive.

^cNote that while certain axioms may sometimes be in conflict, there may be cases where the distributions are such that there is no *de facto* conflict.

^dWhile axiom 3 in general is decisive, in this case just two distributions remained with exactly the same standard deviation.

of our next objectives is to run the experiment on a larger and more representative sample and collect demographic information. However, our objective is wider; we intend to enlarge the set of axioms under consideration, extending them to include considerations

of *Fairness, Responsibility and Welfare* (to steal from the title of Fleurbaey, 2008). One crucial point is that of discovering how people choose between apparently conflicting axioms. We have already noted in Treatment 1 a tension between the social intentions

of the subjects and their self-interest. More generally, subjects seem to be happy to invoke simultaneously conflicting principles sequentially, that is an individual might apply the transfer principle first to reduce the set of possible distributions, and then apply the reverse Rawls to select a unique distribution from the reduced set. Such a sequential, rather than simultaneous, invocation of principles is a possibility that theorists might like to consider.

Acknowledgement

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