

On Choosing a Constitution (at least the part relating to the distribution of income)¹

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Abstract

A Constitution is a collection of principles or axioms determining how society should be organised, and a description of the ordering of the axioms in terms of their importance and of their invocation. We report on an experiment aimed at discovering preferred axioms relating to the distribution of income within society.

Keywords

axioms, constitutions, dispersion, experiments, income distribution, Lorenz curves, preferences, principles, Rawls, social choice, transfers, unique distribution.

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Introduction

A Constitution is a set of principles which 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 on the basis of their general appeal and not by their attractiveness in particular applications. This paper 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 previous experimental studies which have investigated the appeal of axioms in particular applications. We explain further after we have described the axioms being investigated and the experimental design.

The Axioms

As this paper 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 follows⁴.

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".

⁴ The experiment was carried out in Italy. The full instructions are obtainable on request, along with an English translation. 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); for principles 9 and 10 it was spelt out in detail the statement of the principles.

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”.

The Experiment

In each of 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 society would be chosen at random, and the resulting incomes would be the experimental payment to the subjects.

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. At that point 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 singleton⁵.

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 large⁶.

Our experiment is fundamentally different from previous experiments on the axioms underlying the distribution of income. We refer to the work of Amiel and Cowell, the leaders in this field, summarised well in their 1999 book. They report on two kinds of experiment: one (which they call 'numerical') — often though 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 tested⁷; 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

⁵ If it had not, one of the distributions would have been chosen at random; subjects were told this in the Instructions.

⁶ Note that, had we specified an infinite number, 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). So, once again they would be back to choosing between specific distributions rather than deciding general principles.

⁷ 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?

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 upon the distributions in the set. Our software would not allow the axiom to be decisive in such a case. Second, we note that any of axioms 3, 5, 7 and 9 obviously are in conflict with their reverses, though that is not the case for axiom 1 and its reverse⁸. Third, we note that axioms 1, 2, 3, and 4 always imply a unique distribution (from any finitely-sized set) while the others do not. Fourth, we note that axioms 5 and 9 (and 6 and 10) are identical – differing only in the words used to describe them.

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. 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 resulted⁹. We present a synthesis of our results in two tables. Table 1 gives a

⁸ Consider distributions (2,3,10) and (1,5,9). Both 1 and 2 prefer the first.

⁹ Or until no agreed-to principles remained (though this never happened).

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 parenthesis.

As far as Table 1¹⁰, 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 invoked sequentially 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 over-riding popularity of these four decisive principles is noteworthy, suggesting that decisiveness is an important property of a constitution. Overall a decisive principal was implemented first 60% of the time.

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

¹⁰ We note that subjects repeated the experiment three times; the results below are based on aggregate results (there were very few differences between the three repetitions and hence very little evidence of learning).

subject pool, and indeed one 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 of all to reduce the set of possible distributions, and then apply 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.

References

Amiel Y and Cowell F A (1999), *Thinking About Inequality*, Cambridge UP.

Fleurbaey M (2008), *Fairness, Responsibility and Welfare*, Oxford UP.

Table 1

	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
	Totals	830	837

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 !
67%	5	7**	68%	5	7 **
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**	76%	3	(1 3)*
77%	2	10 1	77%	2	9 1
78%	2	9 4 !	78%	2	5**
79%	2	7 3	79%	2	10 1
81%	2	8**	81%	2	10 4
81%	1	7 (1 4) * !	82%	2	5 7
82%	1	10 5 7 9 1 !	83%	2	7 9 1
83%	1	10 9 7 5 2 !	84%	2	10 8 2
83%	1	9 7 3	85%	1	9
84%	1	8 10 1 !	85%	1	7 9 3
85%	1	10 4	86%	1	5 9 2 !
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)*
87%	1	5 3	88%	1	5 3
88%	1	10 3	89%	1	5 1
89%	1	2 4*	90%	1	8 4
89%	1	7 4 !	90%	1	(1 7)
90%	1	10 6 8 3 !	91%	1	7 3
91%	1	8 3 !	92%	1	7 5 3
91%	1	9 7 5 3	92%	1	9 2
92%	1	9 10 3 !	93%	1	8 3 !
93%	1	7 5 3 9 1 ^	93%	1	7 9 6 1 !
93%	1	7 5 3	94%	1	6 1
94%	1	5 1	95%	1	6 3
95%	1	10 9 5 3 !	95%	1	8 6 4
95%	1	8 4	96%	1	9 5 7 1
96%	1	10 3 2 ^	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 !	99%	1	3 7
99%	1	10 7 4 !	99%	1	9 3
100%	1	7 9 10 5 2 !	100%	1	7 9 1 3

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

*Note 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.

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

! These indicate a mix of egalitarian- and anti-egalitarian principles.

^While axiom 3 in general is decisive, in this case just 2 distributions remained both with exactly the same standard deviation.