

**Evaluation via Extended Orderings:
Empirical Findings from West and East**

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Abstract

The theoretical background of the empirical investigations to be reported to this paper are positionalist aggregation functions which are numerically representable. More concretely, the broad Borda rule is proposed as an aggregation mechanism for the case of a complete set (profile) of so-called individual extended orderings. The Borda rule becomes an interpersonal positional rule and it is modified to reflect considerations of equity. Such considerations are introduced by transforming the original linear weighting system such that an equity axiom well known from the social choice literature is satisfied.

Students both from Osnabrück University and from universities in the Baltic States were confronted with questionnaires that describe six “situations”, most of which reflect different aspects of needs. All situations start from the preference structure which underlies the equity axiom, viz. There is one person who is worst off under two alternatives x and y . This person is better off under x than under y whereas all the other individuals who are introduced successively are better off under y than under x . Three of the points we are focusing on are: (a) What is the percentage of respondents satisfying the equity axiom? (b) How often do the students revise their initial decision when more and more people join the side of the more advantaged? (c) Are there major differences in the empirical results between West and East?

We have found that Western students satisfy the equity axiom to a high degree but they are not willing to follow Rawls’s unique focus on the worst of (group of) individual(s) unconditionally, i.e. independently of the number of persons involved. There are stunning differences between the results from the East and the West. Though the number of students from Osnabrück involved in the study is much higher than the number of students from the three Baltic States, it is fair to say that aspects of neediness and the protection of basic human rights currently are not very high “on the agenda” among the probants from the East who participated in our investigation.

Keywords: distributive justice, Rawlsianism, equity considerations

JEL classification: D71; D63

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1 Introduction

There is no such thing as *the* theory of justice, neither in the realm of philosophy nor in the sphere of economics where we propose to use the term “distributive justice” in order to indicate that here, the issue of justice is most often linked up with a problem of redistribution. Over more than two centuries utilitarianism had been the dominant school of thought for issues of welfare and redistribution. Utilitarianism is outcome-oriented and consequentialist in nature. It focuses on maximizing the sum of individual utilities; however, as several of its critics pointed out, it is largely unconcerned with the interpersonal distribution of this sum. Over the last fifty years or so, both economic theory and philosophy have come up with quite a few new solution concepts. Rawls’s (1971) theory of justice and bargaining theory à la Nash (1950) and Kalai–Smorodinsky (1975) are among the most prominent new approaches. While the latter use the concept of cardinal utility without any trace of interpersonal comparability of utility (utilitarianism is based on cardinal utilities *and* interpersonal comparability), Rawls’s proposal is grounded on ordinal utility and level comparability. Economists have focused on his second principle of justice in particular, the so-called difference principle which requires that social and economic inequalities are to be arranged so that they are to the greatest benefit of the least advantaged members of society. At the heart of Rawls’s maximin or difference principle lies an equity axiom to which we shall come back in due course. Rawls himself chose to judge benefits not in terms of utilities but through an index of “primary goods” which comprise the basic liberties, opportunities and powers, income and wealth. This shows that this concept is not outcome-oriented but means-oriented.

Let us consider the following cake-division problem which was discussed by Sen (1982, pp. 19–20). One unit of cake is to be divided among three people each of whom prefers a larger amount of cake to a smaller amount. In situation I person 1 is “very well-off” while individuals 2 and 3 are “quite poor”, in situation II person 1 is “poor” whereas individuals 2 and 3 are “quite wealthy”. Which of the two alternatives should be chosen in the two situations?

Let the two situations and the alternative divisions be as follows:

	Situation I				Situation II		
	1	2	3		1	2	3
alt. a	4/5	1/10	1/10	alt. a'	1/5	2/5	2/5
alt. b	3/5	1/5	1/5	alt. b'	1/10	9/20	9/20

Since preferences are assumed to be monotonic, individual 1 clearly prefers a to b in case I and a' to b' in case II, whereas persons 2 and 3 prefer b to a in the first situation and b' to a' in the second. In other words, the preference profiles are identical in both cases. Does this statement imply that the division problem should be resolved in exactly the same way in both situations?

Let us suppose that “pieces of cake” lend themselves to some degree of interpersonal comparability. Furthermore, let cake for the moment be the only determinant of individual well-being. Then it is safe to say that under situation I person 1 is better off in *a* than in *b*, and is again better off than persons 2 and 3 in *b* who are again better off under *b* than under *a*. In situation II, individuals 2 and 3 are both better situated under *b'* than under *a'* and are better off than person 1 under *a'* who again fares better under *a'* than under *b'*. When we now focus on the worst position taken by any individual under the two alternatives in cases I and II, we come to the conclusion that in situation I, the worst position under *b* is better than the worst position under *a*, whereas in situation II just the opposite is the case (*a'* better than *b'*). Therefore, the social evaluation of situations I and II may change, once some degree of comparability among the individuals has been established.

The major part of this paper will be devoted to empirical studies on distributive issues in the West and in the East. In the years 1989, 1990 and 1993, 1994 respectively, undergraduate students in economics and business administration at the University of Osnabrück had been asked to evaluate particular situations. These situations that we describe in an Appendix deal with distributive issues of various kinds and it was our intention to learn how students grapple with these situations. The structure of the latter and the type of questions we asked have to be seen in relation to our underlying theoretical model. We consider an approach that uses the positionalist information contained in a particular commodity allocation (as in the example depicted above). As the appropriate collective choice mechanism, we study nonlinear ranking rules. One can expect that answers to distributional issues will depend on the particular problem at stake, on the economic and political environment in which the situation is embedded, but also on the cultural background and the personal experience or “biography” of the persons asked¹. Therefore, we put our problems of distributive content not only before Western students but also before students from the East. Students from the Baltic states of Estonia, Latvia and Lithuania were asked to evaluate the situations that we had earlier presented to the German students at Osnabrück. We feel that in an era of globalization it becomes increasingly important to know how people from different countries think about certain issues that are fundamental for societies' economic and

¹Our empirical research was inspired by the investigation of Yaari and Bar-Hillel (1984) who examined situations of needs, tastes and beliefs, among other aspects.

political development. Answers to questions of common concern may shed some light on why a particular society may support or firmly reject a certain type of (economic) policy. Before we turn to a description and discussion of our various empirical results, a brief statement of the theoretical background of our analysis is called for.

2 Theoretical Background

Let X be a finite set of feasible social states and let $N = \{1, 2, \dots, n\}$ be a finite set of individuals. We define \mathcal{R} as the set of all orderings on X . For every $R \in \mathcal{R}$, xRy for any $x, y \in X$ is to be interpreted as stating that from society's point of view, x is at least as good as y . We next define $T(X \times N)$ as the set of all logically possible extended orderings and $\tilde{R}_i \in T(X \times N)$ as individual i 's extended ordering. $\{\tilde{R}_i\}$ stands for a profile of individual extended orderings. Let us now consider the n -fold cartesian product of $T(X \times N)$, denoted by $\tilde{\mathcal{R}}$, and let us define a mapping $f : \tilde{\mathcal{R}} \rightarrow \mathcal{R}$ as a positionalist aggregation function (*PAF*). In our approach, we have restricted the domain of the *PAF* to $\tilde{\mathcal{R}}^* \subset \tilde{\mathcal{R}}$, thus satisfying Sen's (1970) identity axiom. Next we define an interpersonal rank order rule F such that for any $\{\tilde{R}_i\}$ and any $x, y \in X : xF(\{\tilde{R}_i\})y \Leftrightarrow \sum_i \sum_j \rho_i(x, j) \geq \sum_i \sum_j \rho_i(y, j)$, where $\rho_i(x, j)$ represents the weight (real number) of j 's position under alternative x according to the extended ordering of person i . We wish to say that a *PAF* is numerically representable if and only if there exists an interpersonal ranking rule F such that $xRy \Leftrightarrow xF(\{\tilde{R}_i\})y$.

As particular forms of the rank order rule F specified above one can define (a) the linear ranking rule F_L such that for any $\{\tilde{R}_i\}$ and any $x, y \in X$:

$$xF_L(\{\tilde{R}_i\})y \Leftrightarrow \sum_i \sum_j r_i(x, j) \geq \sum_i \sum_j r_i(y, j),$$

where $r_i(x, k)$ is determined by the number of positions that are ranked below (x, k) by person i , and (b) transformed interpersonal ranking rules F_T such that for any $\{\tilde{R}_i\}$ and any $x, y \in X$:

$$xF_T(\{\tilde{R}_i\})y \Leftrightarrow \sum_i \sum_j \varphi(r_i(x, j)) \geq \sum_i \sum_j \varphi(r_i(y, j)),$$

with $\varphi(\cdot)$ strictly increasing and nonlinear over its domain. Again, a particular form of the latter class F_T are the equity-oriented ranking rules such that for any $\{\tilde{R}_i\}$ and any $x, y \in X$:

$$xF_{EQT}(\{\tilde{R}_i\})y \Leftrightarrow \sum_i \sum_j \varphi(r_i(x, j)) \geq \sum_i \sum_j \varphi(r_i(y, j)),$$

with $\varphi(\cdot)$ strictly concave and $\varphi'(\cdot) > 0$ everywhere.

What kind of properties ought to be fulfilled by interpersonal ranking rules? In Gaertner (1992) several conditions were specified and it was also shown that a so-called stability condition (Gardenfors (1973)) as well as a requirement called strong positionalist independence (Hansson (1973)) can serve as a line of demarcation between linear and nonlinear ranking rules. Our interest in this paper lies with subclass F_{EQT} and in Gaertner (1992) we formulated an equity axiom to be fulfilled by all elements of this class. The basic idea of an equity axiom (see e.g. Hammond (1976) and Deschamps

and Gevers (1978)) is the following: in a situation where person j , let's say, is better off than another person k under two alternatives x and y , and person j prefers y to x for herself, while person k has the opposite preference, the social decision should be in favour of alternative x , i.e. x should be (weakly) preferred to y socially. This would also be the verdict according to Rawls's second principle. In the light of this requirement, the reader should go back to our cake–division example at the beginning of this paper and decide for himself (herself) which of the two alternatives to pick in the two situations. We have argued in Gaertner (1992) that differing degrees of concavity represent different degrees of equity–orientation. One can be “very close” to Rawls's (1971) single focus rule (viz., his difference principle) or “quite far away” from this rule.

How can the proper degree of concavity be determined? First of all, it should be determined by all members of society. On the other hand, however, there is an infinite number of strictly concave transformations of the linear weights $r_i(\cdot)$. In Gaertner (1992) we made a suggestion on how to determine an individual's desired degree of concavity of the interpersonal ranking rule or, for that matter, his or her desired degree of equity–orientation.

Let us consider the following 2–person profile of extended orderings, denoted E^1 :

$$\begin{aligned}\tilde{R}_1 &: (y, 2)(x, 2)(x, 1)(y, 1), \\ \tilde{R}_2 &: (y, 2)(x, 2)(x, 1)(y, 1).\end{aligned}$$

According to the strong equity axiom from the social choice literature (see again Deschamps and Gevers (1978)) and elements from subclass F_{EQT} , x will be declared as preferable to y . We shall now enlarge this basic profile by adding the extended orderings of persons 3, 4, ..., thereby preserving the structure of E^1 . E^2 , for example, is:

$$\begin{aligned}\tilde{R}_1 &: (y, 3)(x, 3)(y, 2)(x, 2)(x, 1)(y, 1), \\ \tilde{R}_2 &: (y, 3)(x, 3)(y, 2)(x, 2)(x, 1)(y, 1), \\ \tilde{R}_3 &: (y, 3)(x, 3)(y, 2)(x, 2)(x, 1)(y, 1).\end{aligned}$$

We then ask all members of society how they would wish to resolve the situations E^1, E^2, \dots . All those individuals who accept the strong equity axiom will, of course, say that for E^1 alternative x should be the preferred state. For a moment, let us focus on just one member of the society. Will he or she find x also preferable in situation E^2 ? If “yes”, will the same verdict hold in E^3, E^4, \dots ? If at some point in this successive questioning the individual wishes to switch from “ x preferable to y ” to “now y should be preferred to x socially”, we would have to find a transformation such that the interpersonal ranking rule brings forth exactly this result. It could, of course, be that given the size of the society, the particular member we are currently focusing on would always want x to be socially preferred to y . Again, a transformation function would have to be picked accordingly.

Clearly, for different members of society there will be differing “switching points”, if at all, so that in order to end up with one societal interpersonal ranking rule, we would have to solve an aggregation problem within our larger aggregation procedure. Also,

society's degree of equity-orientation can be expected to be largely dependent on the issue at stake (for the last two points see again Gaertner (1992)).

3 Opinions about Distributive Justice: Results from Questionnaires

In the Appendix six different situations are described. The structure of all these cases is similar to the one in our E^1, E^2, \dots profiles above. There is always one (group of) person(s) who is worst off under both alternatives x and y . That person is better off under x than under y whereas all the other (groups of) individuals who are introduced successively are better off under y than under x . The six situations were presented to four classes of undergraduate students at the University of Osnabrück during the years 1989, 1990 and 1993, 1994 as well as to students in the three Baltic states during the academic year 1997/98. All students were enrolled in economics or business administration. At the time of the investigation the students had not yet had a course on welfare economics and theories of distributive justice, such as utilitarianism, Rawlsianism and game theoretical solutions.

Five of the six situations which the students were confronted with reflect different aspects of needs; situation 6 depicts a dilemma which might be described as "human rights vs. economic benefits". In all of the cases with the exception of situation 2 the students played the role of an external judge. In other words, their identification with the position and the circumstances of a particular person was only of an indirect nature (the students were implicitly supposed to place themselves in some other person's shoes). In situation 2, however, the identification with members in, what we have called, group 2, group 3, etc. (or put differently: with the beneficiaries of program y) most likely was a direct one. At least in today's Germany, environmental programs are a much discussed issue; people feel directly affected by these programs, and there also exists a perpetual debate on whether the aid programs to developing countries should be extended or not.

Our results on the six situations will be divided into those pertaining to the Osnabrück investigation and those recently obtained in the Baltics. The Osnabrück results will be presented first. They are compiled in Tables 1–8. Tables 1 and 2 refer to the investigation in 1989, Tables 3 and 4 show our findings from the investigation in 1990. Tables 5–8 refer to the years 1993 and 1994 respectively. For brevity's sake, we shall in the sequel only comment on the Osnabrück results from the earlier years. The findings from the later period proved to be very similar.² This shows that Osnabrück students in economics and business administration seem to have a stable judgment over the years.

Table 1 gives the evaluations of 83 undergraduates (cohort 1), Table 2 does the same for 65 undergraduates (cohort 1'). Table 3 reports the answers of 62 undergraduates

²There is one exception that should not be concealed. In 1993, the consideration given to the handicapped person was much lower than in all the other years. We admit that we do not know the reason for this.

(cohort 2), while Table 4 shows the evaluations of 93 students (cohort 2'). Cohorts 1 and 2 received the questions in the way in which they are reproduced in the Appendix. Cohorts 1' and 2' got exactly the same questions. However, in their case we did not use the technical description by means of extended orderings $(y, k)(x, j)(z, i) \dots$ but provided a somewhat lengthier verbal account of the same facts instead. Our intuition was to check whether the way in which the basic situations and their variations were depicted would or could influence the decisions of the students. In order to find an answer to this question we subjected the responses in the 1989 and in the 1990 investigation to the Cramér–von Mises two–sample nonparametric test. The results we obtained are such that with an error probability of 5 %, the hypothesis that for each of the six situations the cumulative distributions of cohorts 1 and 1', and cohorts 2 and 2' are identical cannot be rejected for both years. Exactly the same result holds for the cohorts of the years 1993 and 1994.

Explaining the digits and numbers in Tables 1 to 8, 0 always represents the choice of alternative x , 1 stands for the choice of alternative y . In order to be more explicit, 0000, for example, refers to those students who took a decision in favour of x in all cases, i.e. in the basic situation and in all of its variants. 0001, 0011, and 0111 represent the verdicts of those respondents who decided at one point to revise their original judgment. Sequences such as 0101 are very difficult to interpret, but this particular one, for example, occurred only once out of 303 questionnaires during the period examined. The numbers in the columns of situations 1–6 give the percentages of answers within each of the four cohorts of undergraduates. Relative frequencies of a revision or “switch” are contained in the lower part of each table. All those sequences which begin with 0 represent students who satisfied the equity axiom introduced in section 2. Correspondingly, all those sequences which start with 1 hint at a violation of the equity axiom. The percentages of students who satisfied the equity axiom are given at the bottom of each table.

We now wish to comment on the individual situations.

Situation 1. Here, the decision to give the money to the handicapped person in all cases was very strong indeed (66.3 %, 72.3 %, 66.1 %, 58.1 %)³. Only a small percentage of the respondents wanted the amount of money to go into the education of the intelligent child(ren) right away (7.2 %, 7.7 %, 6.5 %, 9.7 %). These percentages are, of course, tantamount to the relative frequencies of a violation of the equity axiom. The figures are astonishingly constant among all cohorts. Those who wished to revise their original decision which, at the beginning, was in favour of helping the handicapped person were 26.5 %, 19.8 %, 27.3 %, and 32.1 %. The undergraduates were asked to comment on their decision. A frequent explanation for a switch was in terms of numbers of persons who would receive help. In situation 1, the “quantities on either scale” were clearly defined. It is interesting to note that the number of respondents who at some point made a switch in favour of a support for the gifted children did not increase in

³The first percentage always refers to cohort 1, the second percentage to cohort 1', the third percentage to cohort 2, the last percentage to cohort 2'.

a linear way. Actually, this increase was quite diverse among the different cohorts of students.

Situation 2. Here, strong opinions were articulated, either in terms of a resolute decision in favour of help for the starving people in Africa (30.1 %, 46.1 %, 37.1 %, 36.6 %) or in favour of support for the environmental program (34.9 %, 26.1 %, 22.6 %, 30.1 %). Those who were in favour of helping the hungry but wished to revise their original decision at a later stage made up 19.2 %, 6.1 %, 25.7 %, and 25.7 % in the respective cohort. The percentages of respondents violating the equity axiom were 50.6 %, 44.7 %, 33.9 %, and 36.6 % respectively. These frequencies are very high and reflect very well the fact that there were two camps among the students. The most frequent explanations given were “environmental protection means conservation of the earth”, “people in Germany are better off anyway”, but also “people first, then the environment” and exactly the opposite slogan “the environment first, then people”. In situation 2, a unique phenomenon occurred. There was a relatively high percentage of students choosing the sequence 1110, particularly in the 1989 investigation, viz. 7.2 %, 15.4 %, 8.1 %, and 3.2 %. An interpretation of this pattern does not appear to be straightforward. Pure misunderstanding of the relevant question could be one explanation but it could also be that some respondents wanted to revise their decision which originally was in favour of a support for the better-off, at the very last moment. Unfortunately, the students provided very little explanation on this particular issue.

We have already pointed out that situation 2 was a case in which the students no longer acted as an external judge but could directly identify themselves with members of group 2, group 3, etc. There is a second major difference to situation 1. In situation 2, the sizes of group 1, group 2, etc. remained unspecified. This rendered pure number counting impossible which, as explained, was done by a considerable number of students in situation 1. We think that there are quite a few policy measures under which the number of beneficiaries cannot be given in an exact way. In this respect, situation 1 was a very simple case.

Investigation in 1989

Table 1: Relative Frequencies for All Possible Decision Patterns for Cohort 1 Faced with the Interpersonal Ranking [sample size n = 83; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.6630	.3010	.4700	.9640	.8670	.5780
0 0 0 1	1	.0843	.0241	.0241	.0	.0361	.0723
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.1570	.0723	.0482	.0120	.0723	.0723
0 1 0 0	4	.0	.0	.0120	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.0	.0	.0	.0	.0	.0
0 1 1 1	7	.0241	.0964	.1570	.0120	.0120	.0361
1 0 0 0	8	.0	.0	.0241	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.0241	.0	.0	.0	.0
1 0 1 1	11	.0120	.0241	.0120	.0	.0	.0
1 1 0 0	12	.0241	.0361	.0361	.0	.0	.0
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.0723	.0120	.0	.0	.0120
1 1 1 1	15	.0361	.3490	.2050	.0120	.0120	.229

% of switch	26.5	19.2	22.9	2.4	12.0	18.0
% fulfilment of equity axiom	92.8	49.4	71.1	98.8	98.8	75.9

Investigation in 1989

Table 2: Relative Frequencies for All Possible Decision Patterns for Cohort 1' Not Faced with the Interpersonal Ranking [sample size n = 65; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.7231	.4615	.5692	.9692	.8923	.7385
0 0 0 1	1	.04615	.0	.01538	.03077	.04615	.04615
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.07692	.03077	.03077	.0	.03077	.01538
0 1 0 0	4	.0	.0	.03077	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.0	.03077	.01538	.0	.0	.0
0 1 1 1	7	.07692	.03077	.1077	.0	.01538	.03077
1 0 0 0	8	.0	.0	.0	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.01538	.0	.0	.0	.0
1 0 1 1	11	.0	.0	.0	.0	.0	.0
1 1 0 0	12	.0	.01538	.03077	.0	.0	.0
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.1538	.0	.0	.0	.0
1 1 1 1	15	.07692	.2615	.2	.0	.01538	.1692

% of switch	19.8	6.1	15.2	3.0	9.1	9.1
% fulfilment of equity axiom	92.3	55.3	76.9	100	98.4	83.1

Investigation in 1990

Table 3: Relative Frequencies for All Possible Decision Patterns for Cohort 2 Faced with the Interpersonal Ranking [sample size n = 62; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.66129	.37097	.51613	1.0	.90323	.64516
0 0 0 1	1	.06452	.04839	.03226	.0	.04839	.09677
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.09677	.11290	.08065	.0	.03226	.06452
0 1 0 0	4	.0	.01613	.0	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.0	.01613	.0	.0	.0	.01613
0 1 1 1	7	.11290	.09677	.14516	.0	.01613	.01613
1 0 0 0	8	.01613	.01613	.01613	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.01613	.0	.0	.0	.0
1 0 1 1	11	.0	.0	.0	.0	.0	.0
1 1 0 0	12	.0	.0	.0	.0	.0	.01613
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.08065	.01613	.0	.0	.0
1 1 1 1	15	.04839	.22581	.19355	.0	.0	.14516
% of switch		27.3	25.7	25.7	0.0	9.6	17.6
% fulfilment of equity axiom		93.5	66.1	77.5	100	100	83.8

Investigation in 1990

Table 4: Relative Frequencies for All Possible Decision Patterns for Cohort 2' Not Faced with the Interpersonal Ranking [sample size n = 93; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.58065	.36559	.45161	.97849	.86022	.54839
0 0 0 1	1	.08602	.05376	.01075	.01075	.08602	.06452
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.15054	.09677	.07527	.0	.02151	.09677
0 1 0 0	4	.0	.0	.01075	.0	.0	.0
0 1 0 1	5	.0	.01075	.0	.0	.0	.0
0 1 1 0	6	.0	.0	.01075	.0	.0	.0
0 1 1 1	7	.08602	.10753	.17204	.0	.0	.07527
1 0 0 0	8	.0	.02151	.0	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.0	.0	.0	.0	.0
1 0 1 1	11	.0	.01075	.0	.0	.0	.0
1 1 0 0	12	.01075	.0	.0	.0	.0	.0
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.03226	.01075	.0	.0	.0
1 1 1 1	15	.08602	.30108	.25806	.01075	.03226	.21505
% of switch		32.1	25.7	25.7	1.0	10.7	23.5
% fulfilment of equity axiom		90.3	63.4	73.2	98.9	96.7	78.4

Investigation in 1993

Table 5: Relative Frequencies for All Possible Decision Patterns for Cohort 3 Faced with the Interpersonal Ranking [sample size n = 81; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.494	.358	.444	.975	.79	.593
0 0 0 1	1	.062	.037	.062	.0	.099	.099
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.148	.099	.074	.012	.074	.037
0 1 0 0	4	.0	.0	.0	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.0	.0	.0	.0	.0	.0
0 1 1 1	7	.173	.086	.185	.012	.012	.074
1 0 0 0	8	.0	.025	.0	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.0	.0	.0	.0	.0
1 0 1 1	11	.0	.0	.0	.0	.0	.0
1 1 0 0	12	.0	.0	.025	.0	.0	.012
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.074	.0	.0	.0	.0
1 1 1 1	15	.123	.321	.21	.0	.025	.185

% of switch	38.3	22.2	32.1	2.4	18.5	21.0
% fulfilment of equity axiom	87.7	58.0	76.5	100	97.5	80.3

Investigation in 1993

Table 6: Relative Frequencies for All Possible Decision Patterns for Cohort 3¹ Not Faced with the Interpersonal Ranking [sample size n = 79; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.418	.405	.304	.987	.886	.367
0 0 0 1	1	.101	.025	.089	.0	.038	.152
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.228	.063	.127	.0	.051	.139
0 1 0 0	4	.0	.0	.0	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.013	.0	.0
0 1 1 0	6	.0	.0	.013	.0	.0	.0
0 1 1 1	7	.101	.114	.241	.0	.0	.089
1 0 0 0	8	.0	.025	.0	.0	.013	.013
1 0 0 1	9	.025	.013	.0	.0	.0	.0
1 0 1 0	10	.0	.0	.0	.0	.0	.0
1 0 1 1	11	.0	.013	.0	.0	.0	.0
1 1 0 0	12	.0	.025	.0	.0	.0	.013
1 1 0 1	13	.0	.0	.013	.0	.0	.0
1 1 1 0	14	.0	.038	.013	.0	.0	.0
1 1 1 1	15	.127	.278	.203	.0	.013	.228

% of switch	43.0	20.2	45.7	0.0	8.9	38.0
% fulfilment of equity axiom	84.8	60.7	76.1	100	97.7	74.7

Investigation in 1994

Table 7: Relative Frequencies for All Possible Decision Patterns for Cohort 4 Faced with the Interpersonal Ranking [sample size n = 65; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.615	.369	.354	.938	.877	.431
0 0 0 1	1	.062	.0	.077	.031	.062	.077
0 0 1 0	2	.0	.015	.0	.0	.0	.0
0 0 1 1	3	.138	.138	.108	.015	.0	.062
0 1 0 0	4	.0	.0	.0	.0	.0	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.015	.015	.0	.0	.0	.0
0 1 1 1	7	.092	.123	.138	.0	.031	.169
1 0 0 0	8	.0	.015	.0	.0	.015	.015
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.0	.0	.0	.0	.0
1 0 1 1	11	.0	.0	.0	.0	.0	.0
1 1 0 0	12	.0	.031	.031	.0	.0	.015
1 1 0 1	13	.0	.0	.015	.0	.0	.0
1 1 1 0	14	.0	.031	.015	.0	.0	.0
1 1 1 1	15	.077	.262	.262	.015	.015	.231
% of switch		29.2	26.1	32.3	4.6	9.3	30.8
% fulfilment of equity axiom		92.2	66.0	67.7	98.4	97.0	73.9

Investigation in 1994

Table 8: Relative Frequencies for All Possible Decision Patterns for Cohort 4' Not Faced with the Interpersonal Ranking [sample size n = 63; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	.603	.413	.413	.952	.921	.667
0 0 0 1	1	.016	.016	.0	.0	.016	.048
0 0 1 0	2	.0	.0	.0	.0	.0	.0
0 0 1 1	3	.095	.048	.016	.0	.0	.048
0 1 0 0	4	.0	.0	.016	.0	.016	.0
0 1 0 1	5	.0	.0	.0	.0	.0	.0
0 1 1 0	6	.0	.0	.0	.0	.0	.0
0 1 1 1	7	.143	.079	.270	.016	.016	.032
1 0 0 0	8	.0	.0	.0	.0	.0	.0
1 0 0 1	9	.0	.0	.0	.0	.0	.0
1 0 1 0	10	.0	.016	.0	.0	.0	.0
1 0 1 1	11	.0	.0	.0	.0	.0	.0
1 1 0 0	12	.0	.0	.0	.0	.0	.0
1 1 0 1	13	.0	.0	.0	.0	.0	.0
1 1 1 0	14	.0	.079	.032	.0	.0	.0
1 1 1 1	15	.143	.349	.254	.032	.032	.206
% of switch		25.4	14.3	28.6	1.6	3.2	12.8
% fulfilment of equity axiom		85.7	55.6	71.5	96.8	96.9	79.5

Situation 3. Again, quite explicit points of view were revealed. In contrast to case 2, however, a once for all decision in favour of helping the worst-off, i.e. those who were in danger of their lives, occurred much more frequently. It was in almost all cohorts more than twice as strong as the view to support right from the beginning those who suffered from vitamin deficiency. Consequently, the percentages of students violating the equity axiom were considerably lower now (28.9 %, 23.1 %, 22.5 %, 26.8 %). The frequencies of switching were exactly the same as in case 2 for the 1990 investigation but were somewhat higher for the 1989 study (22.9 %, 15.2 %).

Whereas situations 2 and 3 were cases of “urgent needs vs. urgent or severe needs”, situations 4 and 5 can be characterized as “urgent or severe needs vs. luxury goods”. We should like to mention that there was no intention at all to be provoking in these two situations. We wanted to see (a) how strongly the students would actually move into the “right” direction when going from case 3 to case 4 and to experience (b) how discriminating their mind would be when a smaller variation in terms of needs was introduced (from case 4 to case 5).

Situation 4. There was almost no switching (2.4 %, 3.0 %, 0.0 %, 1.0 %) and the violation of the equity axiom was negligible (1.2 %, 0.0 %, 0.0 %, 1.1 %). The view to disregard the wine lovers totally was 96.4 %, 96.9 %, 100 %, and 97.8 % in all cohorts.

Situation 5. The point of view to ignore completely those who would love to consume Bordeaux wines was 86.7 %, 89.2 %, 90.3 %, and 86.0 % in the respective cohorts. The desire to revise the original decision occurred at 12.0 %, 9.1 %, 9.6 %, and 10.7 %. When one compares the last two sequences of percentages to those in situation 4, one can indeed get some confirmation for the “discriminating mind” of the students. The percentage of undergraduates who violated the equity axiom was again negligible in each cohort.

Situation 6. This case was a particularly difficult one since it is about the restoration of basic human rights. The students were asked to evaluate rights against economic benefits. Strong viewpoints were again articulated. The relative frequencies of students saying that human rights should not be traded against a quick economic recovery were 57.8 %, 73.8 %, 64.5 %, and 54.8 %. A resolute decision in favour of a quick revival of the economy was taken by 22.9 %, 16.9 %, 14.5 %, and 21.5 %. The percentages of respondents who at some point revised their decision which originally was in favour of basic human rights were 18.0 %, 9.1 %, 17.6 %, and 23.5 %. A violation of the equity axiom occurred with the following frequencies : 24.1 %, 16.9 %, 16.2 %, and 21.6 %. Some of the explanations given were “no trade-off between basic rights and money if the period of curtailment is indeterminate”, “fundamental rights are more important than well-being”, and “basic needs are more important than basic rights” (in the latter explanation, obviously, basic needs did not comprise fundamental rights).

As already mentioned before, some of the students chose sequences that are difficult to understand and to interpret. It should be mentioned, however, that the occurrence of such sequences was quite rare. In most cases, these involved just one respondent. However, most of these “unintelligible” sequences popped up under situations 2 and 3 where the fulfilment of the equity axiom was lower than in the rest of the cases.

Table 9: Relative Frequencies for All Possible Decision Patterns for the Baltic Cohort Not Faced with the Interpersonal Ranking [sample size n = 67; x coded as 0, y coded as 1]

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0 0 0 0	0	0.03	0.119	0.224	0.731	0.522	0.149
0 0 0 1	1	0	0.06	0.075	0.164	0.194	0.149
0 0 1 0	2	0.045	0.06	0	0.03	0.03	0.015
0 0 1 1	3	0.179	0.134	0.119	0.075	0.149	0.134
0 1 0 0	4	0	0	0.045	0	0	0.015
0 1 0 1	5	0.015	0.015	0.015	0	0	0
0 1 1 0	6	0.045	0.03	0.03	0	0	0.015
0 1 1 1	7	0.343	0.104	0.179	0	0.075	0.149
1 0 0 0	8	0.015	0	0.045	0	0	0.015
1 0 0 1	9	0.015	0.03	0	0	0.015	0
1 0 1 0	10	0.015	0.03	0.045	0	0	0
1 0 1 1	11	0.03	0	0.03	0	0	0.015
1 1 0 0	12	0.015	0.045	0.015	0	0.015	0.015
1 1 0 1	13	0.015	0.015	0.045	0	0	0.015
1 1 1 0	14	0	0.045	0	0	0	0.03
1 1 1 1	15	0.239	0.313	0.134	0	0	0.284
% of switch		0.522	0.298	0.373	0.259	0.418	0.432
% fulfilment of equity axiom		0.657	0.522	0.687	1.000	0.970	0.626

Table 10: Confidence Intervals for the Relative Frequencies for All Possible Decision Patterns, the Baltic Results

Sequ.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit. 6
0000	.008 .105	.061 .221	.139 .340	.612 .824	.403 .640	.082 .256
0001	.000 .056	.023 .146	.032 .166	.093 .273	.116 .307	.082 .256
0010	.015 .126	.023 .146	.000 .056	.008 .105	.008 .105	.003 .082
0011	.104 .290	.071 .238	.061 .221	.032 .165	.082 .256	.071 .238
0100	.000 .056	.000 .056	.015 .126	.000 .056	.000 .056	.003 .082
0101	.003 .082	.003 .082	.003 .082	.000 .056	.000 .056	.000 .056
0110	.015 .126	.008 .105	.008 .105	.000 .056	.000 .056	.003 .082
0111	.239 .465	.051 .203	.104 .290	.000 .056	.032 .165	.082 .256
1000	.003 .082	.000 .056	.015 .126	.000 .056	.000 .056	.003 .082
1001	.003 .082	.008 .105	.000 .056	.000 .056	.003 .082	.000 .056
1010	.003 .082	.008 .105	.015 .126	.000 .056	.000 .056	.000 .056
1011	.008 .105	.000 .056	.008 .105	.000 .056	.000 .056	.003 .082
1100	.003 .082	.015 .126	.003 .082	.000 .056	.003 .082	.003 .082
1101	.003 .082	.003 .082	.015 .126	.000 .056	.000 .056	.003 .082
1110	.000 .056	.015 .126	.000 .056	.000 .056	.000 .056	.008 .105
1111	.151 .356	.213 .435	.072 .238	.000 .056	.000 .056	.188 .404

Let us turn to a discussion of the results from the Baltics (see Table 9). The students were probants from Riga, Tartu and Vilnius, the majority coming from the latter town. After the detailed description of the Osnabrück data, we wish to be relatively brief. The figures in the tables should have become self-explanatory by now.

The overall verdict is that the results from the East are vastly different from those from the West. This judgment manifests itself in a variety of ways. We can start with the last observation from the West referring to the “unintelligible” sequences. These occur much more frequently in the Baltic investigation. We do not know the reason for this. It can be pure misunderstanding of the described situations — we should mention that all the material to which the Eastern students were exposed was in English. However, all these students were enrolled in a program taught in this language. In general, fulfilment of the equity axiom was substantially lower in the Baltics than in Germany (with the exception of situations 4 and 5, of course). Also, the percentage of switches in situations 1 and 6 was much higher in the East. Most stunning indeed are the decisions made in situations 1 and 6, though clear differences also occurred in most of the other cases. Compare the relative frequencies for the sequence 0000 in situations 1 and 6 to the corresponding frequencies for the students from Osnabrück. We calculated the confidence intervals for the frequencies of all chosen sequences from the Baltics based on a normal approximation of the binomial distribution (see Table 10). For the 0000 sequence, the frequencies from the West clearly lie outside the confidence intervals for the corresponding frequencies from the Baltics. There is just one exception (situation 3 in 1993, Table 6). For the sequence 0111, this observation holds true with respect to situations 1, 2, and 6 for most of the results as well. Remember that 0111 is a judgmental position where the first variation after the base situation already elicits a change of orientation in favour of the group that is better off. For the sequence 1111 a similar statement cannot be made. A more detailed picture is given in Table 11 where the differences between the relative frequencies observed for all possible decision patterns are calculated. For this particular table, the data from Tables 8 and 9 was used where the number of probants was roughly the same. A negative sign in the table indicates that the associated relative frequency for pattern 0000, let’s say, is smaller in the Baltics than in Osnabrück. The table shows very clearly that the entries associated with the response 0000 are negative in each and every situation, and the difference is considerable. The majority of the signs associated with the sequences 0111, 0011 and 0001 is positive suggesting that meaningful switches are more likely to occur in the Baltic sample. The pattern observed for the extreme response 1111 is mixed. In cases of negative signs the differences are small, leading to the question concerning the statistical significance of the so far purely descriptive evidence on differences.

Table 11: Differences between Densities $p_{balt} - p_{ger}$.

Sequence	Dec.	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit.6
0 0 0 0	0	-.5733	-.2933	-.1888	-.2210	-.3982	-.5174
0 0 0 1	1	-.0159	.0438	.0746	.1642	.1782	.1016
0 0 1 0	2	.0448	.0597	.0000	.0299	.0299	.0149
0 0 1 1	3	.0839	.0867	.1035	.0746	.1493	.0867
0 1 0 0	4	.0000	.0000	.0289	.0000	-.0159	.0149
0 1 0 1	5	.0149	.0149	.0149	.0000	.0000	.0000
0 1 1 0	6	.0448	.0299	.0299	.0000	.0000	.0149
0 1 1 1	7	.2004	.0251	-.0907	-.0159	.0588	.1175
1 0 0 0	8	.0149	.0000	.0448	.0000	.0000	.0149
1 0 0 1	9	.0149	.0299	.0000	.0000	.0149	.0000
1 0 1 0	10	.0149	.0140	.0448	.0000	.0000	.0000
1 0 1 1	11	.0299	.0000	.0299	.0000	.0000	.0149
1 1 0 0	12	.0149	.0448	.0149	.0000	.0149	.0149
1 1 0 1	13	.0149	.0149	.0448	.0000	.0000	.0149
1 1 1 0	14	.0000	-.0346	-.0317	.0000	.0000	.0299
1 1 1 1	15	.0959	-.0358	-.1196	-.0317	-.0317	.0772

To clarify this question, we used the χ^2 -test. For each of the six situations, we tried to generate evidence against the hypothesis that the distribution of the responses in Osnabrück is identical to the distribution found for the Baltic responses (H_0). The results of the χ^2 -tests are given in Table 12.

Table 12: Summary of χ^2 test results

χ^2 output	Sit. 1	Sit. 2	Sit. 3	Sit. 4	Sit. 5	Sit.6
CHI	57.416	28.423	34.126	22.008	35.557	41.836
p-value	0.000	0.005	0.001	0.005	0.002	0.000
degrees of freedom	13	12	13	5	8	12

The tests produce clear evidence against the null hypothesis in each and every situation considered. If we test at the level $\alpha = 0.05$, the null is rejected in each case. A comparison of the p-values (probability of observing a realization of the test statistic larger than or equal to the one observed under H_0) suggests that the evidence for a difference in the distribution of the responses is especially strong in situation 1 and situation 6.

4 Concluding Remarks

While bargaining theory has been offering an increasing number of experimental results during the last 20 years or so, social choice theory has only seen a few “experimental” findings up to this point. Most of these were gained by means of questionnaires. Among social choice theorists, the best known results stem from an investigation undertaken by Yaari and Bar-Hillel (1984). One should, however, also mention findings by Schokkaert and Overlaet (1989), Schokkaert and Capeau (1990) and Frohlich, Oppenheimer and Eavey (1987 a, 1987 b), the latter pieces coming from the political science literature. Among other things, Bar-Hillel and Yaari found that in problems which reflect needs, many of their respondents chose the “maximin” rule as their guiding principle. We saw that in several of our situations the strict focus on the worst-off group was also a widely

held view (situation 1, situations 4–6) — *among Western students*. Concern for the plight of the handicapped and the issue of basic rights – although a topic in the official political sphere – is still in its infancy in wide segments of the society. As our sample shows, disregard for the disadvantaged individual and for fundamental rights is rather pronounced even among well-educated individuals. The need to catch up economically seems to dominate other considerations. We expected a phenomenon like this but were surprised to see how forceful this attitude currently is. When we compare the relative frequencies for 0000 and 1111, we realize that in the West the former is *larger* than the latter by a factor ranging between 2 and 4.5, in the East the former is roughly 50 % *smaller* than the latter. In situations 2 and 3, the results are less clear-cut. We mentioned above that also Western students became divided over the underlying issues.

Let us return to the theoretical argument from section 2 that in order to determine society’s equity-orientation the proper degree of concavity of the transformation function should be decided upon by all members of society. We have to take a closer look at those instances where the evaluating persons revised their original decision. The tables do not provide us with a homogeneous picture but some conclusions can be drawn. For Western students, switching was highest in situations 1 and 3 and lowest in cases 4 and 5. The latter cases were simple “maximin-situations” for students from both West and East. For situations 2 and 3, with very few exceptions, the sequence 0111 generally occurred more frequently within each group than the sequence 0011 which again occurred more often than 0001. Our data does not reveal that there was more switching when two strongly opposed views were held among the students. On the contrary. The reader should, for example, compare the results in situation 1 with those in situations 2 and 3.

In fact, one of the reasons why we did our empirical study was to see whether bringing in more and more (groups of) persons who have preferences that are strictly opposed to those of the worst-off person or group makes individuals revise their original distributive decision at some point. In other words, we were trying to find out whether something like the integer k^* exists from which point on a distributive judgment is reversed. In four out of the six situations, the fraction of Osnabrück students who revised their decision ranged between $1/10$ and $1/3$. For the Baltic students, this fraction ranged between $1/4$ and $1/2$. There was, of course, a lot of variance among the distributional problems as there was some variance among the individual k_i^* . But that was to be expected. Our investigation showed quite clearly that the evaluations of the members of society, their degree of equity-orientation as well as their readiness to revise their initial verdict largely depended on the issue at stake and on the cultural and political background of the students. Elster (1991) coined the term “local justice” which means that small-scale problems are solved according to a number of different principles.

In an effort to substantiate this finding we applied Friedman’s nonparametric F -test to generate evidence against the hypothesis that individuals do not revise their decision as the context (reflected by our situations 1 to 6) varies. All 15 possible hypotheses H_0 : decision under situation i equals the decision under situation j ($i \neq j$) were tested

using both the Baltic results as well as the evidence from Osnabrück (1994). In both cases we find overwhelming evidence for the existence of context effects. The evidence in favour of such effects tends to be especially strong whenever the hypothesis involves situation 4 or 5 and one of the other situations. In a next step we contrasted the outcomes of the test procedure obtained for the German data with those computed for the Baltic case. This comparison revealed interesting differences. While the students in Osnabrück tend to perceive, process and decide situations 1 and 6 in a similar fashion (we cannot reject the null hypothesis since the observed value of the test statistic is associated with a p-value of 0.614), we find evidence for context dependence in the sample involving the Baltic students since the associated p-value equals 0.0272⁴. In the two cultural settings the decision problems at hand are most likely solved by using different principles. The fact that in the Soviet period there was little concern for individuals subjected to physical and mental disabilities may explain the observed difference. Although we find significant differences in the densities for situation 1 and 6 (see Table 9), we nevertheless see that the percentage of Baltic probants who are primarily concerned with economic growth (28.4%) is close to the percentage of those who would support the education of gifted children, “no matter what” (23.9%). This manifests a certain attitude (or *Weltanschauung*). To those who prefer economic growth to basic rights, capital investment seems to be more important than an improvement in the abilities of a handicapped individual. This shows that the societal background may also matter a lot.

In this paper we have only referred to the aggregated data from the Baltics. The results from Tartu in Estonia are particularly stunning. In situations 1 and 2, for example, not a single person chose the sequence 0000, while 2/3 of the students selected 1111. This may be purely accidental since, unfortunately, there were only 9 respondents. A statistical analysis is unwarranted in such a case.

⁴Since we have already presented a large number of tables, we abstain from reproducing another table at this point.

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Appendix

Situation 1:

A small society has received a certain amount of money which can be used either to provide some help and assistance for a seriously handicapped person or to further the education of a highly intelligent child. The child could receive a good education in languages and in natural sciences, let's say. Let the seriously retarded person be person 1; if the sum of money were used for her support (alternative x), she would be able to learn some very basic things, so that at least in certain areas of daily life she would no longer be totally dependent on the assistance from other people. Let the intelligent child be person 2; the investment into its education represents alternative y . The interpersonal welfare ranking reads:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

Which alternative should be realized in your view, x or y ?

- (a) Imagine that the sum of money which could be used to help the handicapped person, is so large that, on the other hand, this amount would allow to educate not only person 2 but also a second child (person 3) who is even somewhat more intelligent than person 2. Person 3 would, therefore, benefit even a bit more from the education so that the following interpersonal welfare ranking can be assumed:

$$(y, 3)(y, 2)(x, 3)(x, 2)(x, 1)(y, 1)$$

Would you choose x or y under these conditions?

- (b) Imagine that if the money were used to finance alternative y it would be possible to educate still another child (person 4). The reason may simply be "economies of scale" or the fact that a talented teacher will be able to provide a good education for several children simultaneously. Let us assume that all the other characteristics of the situation remain as before. The interpersonal welfare ranking now reads:

$$(y, 4)(y, 3)(y, 2)(x, 4)(x, 3)(x, 2)(x, 1)(y, 1)$$

Which alternative should be picked in your view, x or y ?

- (c) Add another child to the situation (person 5), who could also receive an instruction in languages and the natural sciences out of the given budget. Everything also remains the same and the interpersonal welfare ranking reads:

$$(y, 5)(y, 4)(y, 3)(y, 2)(x, 5)(x, 4)(x, 3)(x, 2)(x, 1)(y, 1)$$

Would you want x or y to be realized?

Situation 2:

Imagine that due to an unexpectedly large profit of the Federal Reserve (or an unexpectedly large budgetary surplus, if you prefer), Government has the possibility to spend several billion marks (DM) either on environmental protection within its own territory (alternative y) or to spend that amount of money to finance an aid program against hunger in various countries of Subsaharan Africa (alternative x). Given the available amount of money, the environmental program would aim at improving the current situation of the North Sea. This would primarily benefit the fishing industry and, perhaps to a somewhat lesser degree, the people who spend their vacation along the North Sea. Henceforth, these two groups are called “person 2”. Those who suffer from famine in Subsaharan Africa are “person 1”. Undoubtedly, both the fishermen and the vacationers in the country are, in terms of welfare, better off than the starving people in Africa, independent of whether alternative x or alternative y will be realized. Which alternative should be chosen according to your view, if the following interpersonal welfare ranking is true:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

- (a) Imagine now that the profit of the Federal Reserve (or the budgetary surplus) has turned out to be higher than anticipated originally. On the one hand, the war against hunger could now be intensified, on the other the environmental program could be extended. The proposal is to improve the quality of the air in the neighbourhood of charcoal power plants. The group benefiting from this measure will be called “person 3”. We shall assume that this group will always be better off than groups 2 and 1 with respect to alternative y , and be definitely better off than group 1 with respect to alternative x . We are postulating the following interpersonal welfare ranking, where y again stands for environmental protection and x stands for relief of hunger (both programs would, of course, now be larger due to the higher amount of financial resources):

$$(y, 3)(y, 2)(x, 3)(x, 2)(x, 1)(y, 1)$$

- (b) Assume that it has become clear that “economies of scale” will occur in the environmental program, once alternative y should be realized. We postulate that a program for cleaner water in rivers should also be feasible which would benefit primarily those citizens of the country (group 4) who live close to the rivers (it seems obvious that cleaner water in rivers would, among other things, increase the stock of fish). In other words, not only would groups 2 and 3 benefit from the environmental program but also an additional group. We want to postulate the following interpersonal welfare ranking, where y again stands for the environmental program and x stand for the aid program for Subsaharan Africa:

$$(y, 4)(y, 3)(y, 2)(x, 4)(x, 3)(x, 2)(x, 1)(y, 1)$$

Which alternative should now be realized, x or y ?

- (c) Imagine that, given the financial resources, again an enlargement of the environmental program appears realistic. It has, for example, been found out that an additional program aiming at a reduction of traffic noise along the highways would be financially feasible. Through this investment, still another group of people (group 5) would experience an increase in its living conditions. We assume that group 5 is better off than all the other groups under alternative y and that it is at least better off than group 1 under alternative x . We postulate the following interpersonal welfare ranking:

$$(y, 5)(y, 4)(y, 3)(y, 2)(x, 5)(x, 4)(x, 3)(x, 2)(x, 1)(y, 1)$$

Which alternative should now be realized according to your view, x or y ?

Situation 3:

Imagine a country which has a severe shortage of western currencies. The governing body of this country has the possibility to purchase on the world market either a certain number of badly needed dialysis machines (alternative x) that cannot be produced within the country, or a certain quantity of vitamin pills as well as tropical fruit (alternative y). This quantity would only be able to satisfy the urgent needs of a relatively small group of persons. The realization of both alternatives together or a combination of both alternatives to some extent is assumed to be infeasible. The group of people suffering from kidney problems is group 1, the group of people benefiting from the import of vitamins and fruits is group 2. There is unanimous agreement in the country that all pregnant women should make up group 2. Since the persons with kidney trouble are clearly worse off than the expectant mothers, the following interpersonal welfare ordering appears to be justified:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

Which alternative should be realized in your view, x or y ?

- (a) Imagine now that the world market price for vitamin pills and tropical fruit has fallen. If alternative y were realized it would be possible to provide not only the expectant mothers, but also all the country's babies and toddlers (group 3) with the needed vitamins. The price of dialysis machines is assumed to rest unchanged, however. The welfare levels of groups 2 and 3 are clearly higher than the level of group 1 both under y and under x so that the following interpersonal ordering for the three groups appears plausible:

$$(y, 3)(y, 2)(x, 3)(x, 2)(x, 1)(y, 1)$$

Would you choose alternative x or alternative y ?

- (b) Let us imagine that there is a further decline in the world market price for vitamin pills and tropical fruit so that it turns out that under the given amount of western currencies also the country's adolescents (group 4) could be provided with vitamins if alternative y were chosen. We then postulate the following interpersonal welfare ordering:

$$(y, 4)(y, 3)(y, 2)(x, 4)(x, 3)(x, 2)(x, 1)(y, 1)$$

Which alternative should be chosen, x or y ?

- (c) The world market price of vitamin pills and tropical fruit declines once more so that under alternative y the given amount of western currencies would now suffice to provide those workers of the country who are engaged in physical labour (group 5) with the needed vitamins. We postulate the following interpersonal welfare ordering:

$$(y, 5)(y, 4)(y, 3)(y, 2)(x, 4)(x, 3)(x, 2)(x, 5)(x, 1)(y, 1)$$

Which of the two alternatives, x or y , should now be chosen?

Situation 4:

Imagine a country which has a severe shortage of western currencies. The governing body of this country has the possibility to purchase on the world market either a certain number of badly needed dialysis machines (alternative x) that cannot be produced within the country, or a certain quantity of expensive wines from the Bordeaux region that are desired by certain segments of the society. The realization of both alternatives together or a combination of both alternatives to some extent is assumed to be infeasible. It is hypothesized that the wines from Bordeaux have such a high price that they could only be purchased by a small group of relatively well-off citizens (group 2). The group of people suffering from kidney problems is group 1. It goes without saying that due to their illness, the dialysis patients are worse off than the potential buyers of expensive French wines so that the following interpersonal welfare ordering seems to be justified, where x refers to the import of dialysis machines and y refers to the import of wines from Bordeaux:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

Which of the two alternatives should be chosen according to your view, x or y ?

- (a) Imagine that the price of Bordeaux wines has fallen so that a second group within society (group 3) would be able to purchase these wines if alternative y were realized. Clearly, the quantity of imported wines could be increased due to the lower market price. The price of dialysis machines is supposed to remain constant. The welfare ordering now reads:

$$(y, 2)(y, 3)(x, 2)(x, 3)(x, 1)(y, 1)$$

Which alternative should be selected now, x or y ?

- (b) Let us assume that a further decrease in price of the Bordeaux wines has occurred so that under the given amount of western currencies an even larger quantity of wines could be imported now. Therefore, due to the lower price per bottle, yet another group within society (group 4) could become a buyer of those wines. We assume the following interpersonal welfare ordering:

$$(y, 2)(y, 3)(y, 4)(x, 2)(x, 3)(x, 4)(x, 1)(y, 1)$$

Which alternative should be realized, x or y ?

- (c) The price of wines from Bordeaux is supposed to fall once more so that, again, another group within society (group 5) would be put in a position to purchase these wines if alternative y were realized. Therefore, the following welfare ordering appears plausible:

$$(y, 2)(y, 3)(y, 4)(y, 5)(x, 2)(x, 3)(x, 4)(x, 5)(x, 1)(y, 1)$$

Would you choose x or y in this situation?

Situation 5:

Once again, imagine a country with a severe shortage of western currencies. The governing body of this country has the possibility either to purchase on the world market a certain amount of inexpensive clothing (alternative x) which would allow the more needy segments of society (group 1) to significantly improve its welfare level, or to import a certain quantity of expensive wines from the Bordeaux region (alternative y) that a small group of rather well-to-do citizens of the country (group 2) would like to acquire. The realization of both alternatives together or a combination of both alternatives to some extent is assumed to be infeasible. We postulate the following interpersonal welfare ordering:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

Which alternative should be chosen according to your view, x or y ?

- (a) Imagine that the price of Bordeaux wines has fallen so that a second group within society (group 3) would be able to purchase these wines if alternative y were realized. This additional group 3 is supposed to be better off in terms of welfare than group 1. We assume that the price of inexpensive clothing remains the same

so that the quantity of imports would not change, should x be realized. The interpersonal welfare ordering now is:

$$(y, 2)(y, 3)(x, 2)(x, 3)(x, 1)(y, 1)$$

Should x or y be chosen?

- (b) Let us assume that a further decrease in price of the Bordeaux wines has occurred so that under the given amount of western currencies an even larger quantity of wines could be imported now. Therefore, due to the lower price per bottle, yet another group within society (group 4) could become a buyer of these wines. We postulate the following interpersonal welfare ordering:

$$(y, 2)(y, 3)(y, 4)(x, 2)(x, 3)(x, 4)(x, 1)(y, 1)$$

Which of the alternatives x or y should now be realized?

- (c) The price of wines from Bordeaux is supposed to fall once more so that, again, another group within society (group 5) would be put in a position to purchase these wines if alternative y were realized. Therefore, the following welfare ordering appears plausible:

$$(y, 2)(y, 3)(y, 4)(y, 5)(x, 2)(x, 3)(x, 4)(x, 5)(x, 1)(y, 1)$$

Would you choose x or y in this situation?

Situation 6:

Imagine a country which had been totally run down economically by a long-lasting dictatorship. Finally, the country could get rid of this dictatorship. Furthermore, imagine that an international bank group is offering a rather large loan (under very favourable conditions of repayment) to this country for economic reconstruction (alternative y). The prerequisite for this loan, however, is, so the consortium declares, that the employees of the country be neither granted a right to strike nor the free choice of one's occupation. This precondition should be valid for the foreseeable future. If the new Government were unwilling to enforce this curtailment of individual rights, no loan would be offered, and, therefore, the country would have to pull itself up by its bootstraps (alternative x). In that case, the country would, of course, have the option to reinstall the right to strike and other basic rights, a measure which had been promised to the citizens of the country after the fall of the dictatorship. If the bank loan were granted, the large enterprises (group 2) were the first to experience an economic recovery. The workers and employees in the firms (group 1) would be hard hit by the restriction of basic rights. The interpersonal welfare ranking, therefore, reads:

$$(y, 2)(x, 2)(x, 1)(y, 1)$$

What should the country do in your view, should it decide in favour of y or x ?

- (a) Imagine that the initial situation would undergo the following modification: The loan which is offered would have such a large volume that an additional group of the population, the self-employed persons with a small or middle-sized business activity, let's say, would benefit from the financial aid (group 3). Let this alternative again be denoted by y . Alternative x remains as before. The following welfare ranking is now postulated:

$$(y, 2)(y, 3)(x, 2)(x, 3)(x, 1)(y, 1)$$

Should the country choose x or y ?

- (b) Imagine again a change of the initial situation: The bank loan offered were so large that under alternative y still another group of the population, the civil servants, let's say, would realize larger economic benefits (group 4). Alternative x remains unchanged. The interpersonal welfare ranking now reads:

$$(y, 2)(y, 3)(y, 4)(x, 2)(x, 3)(x, 4)(x, 1)(y, 1)$$

Which alternative should now be picked by the country?

- (c) A further variation: we shall assume that still another group within the population, the retired members of society (group 5), would experience an improvement of their economic situation under alternative y . Alternative x remains unchanged. The following welfare ranking is now postulated:

$$(y, 2)(y, 3)(y, 4)(y, 5)(x, 2)(x, 3)(x, 4)(x, 5)(x, 1)(y, 1)$$

Which alternative should now be chosen according to your view, x or y ?