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## SEARCHING BY QUESTIONNAIRE FOR THE MEANING OF INCOME INEQUALITY

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### Abstract

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Amien and Cowell (1992) have recently performed an experimental test by questionnaire to investigate whether a sample of individuals corroborate the general consensus found in the literature about a number of axioms on the meaning of 'inequality'. They obtained some mixed results. In this article we report on a replica of the experiment with some novelties: we introduce the role of political attitudes toward income redistribution to clarify the interpretation of some results; the questionnaire is enlarged in an attempt to give more room to notions of inequality intermediate between the relative and absolute polar cases; and we provide a systematic treatment of the degree of consistency exhibited by the respondents.

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### Key Words

Inequality; Experimental Economics.

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## I. INTRODUCTION

In a recent survey of the field of welfare economics, Hammond (1985) has stressed that one of the difficulties of collecting factual information about fundamental ethical matters, is that the interpersonal comparisons involved are very abstract and remote from the day-to-day decisions of the people. However, he expressed some hope that such an abstraction can be circumvented by following the approach pioneered by Yaari and Bar-Hillel (1982): to confront the population directly with explicit distributional judgements, extracting afterwards the implicit interpersonal comparisons or value judgements, rather than the other way around.

In the same vein, Amiel and Cowell (1992) -referred to as AC hereafter- have succeeded in eliciting people's views on a number of distributional issues relevant to all known attempts to measure economic inequality. There are several criteria about the meaning of 'inequality' that almost all types of approaches in the literature have in common. Since these are central for the making of comparisons of income distributions in a useful way, AC maintain that the fact that these criteria are widely held among the specialists does not mean that they should pass unchallenged.

To appreciate the force of their results, we will briefly review the intuitive content of the standard axioms under scrutiny.

(1) Taking for granted what the concepts of 'income' and 'income receiver' mean, most practitioners would approve of a condition on symmetry or anonymity, which says that if people are identical in all relevant characteristics other than income, then inequality comparisons should treat them equally, regardless of whom they personally are.

(2) Usually, inequality rankings are taken to be independent of either a simple change in the scale of incomes or the origin from which one measures them, giving rise to measures of relative or absolute inequality, respectively. As pointed out by Kolm (1976a) in his seminal contribution, this is not only a technical question on normalization, but a value-laden issue. The fact is that, possibly for historical reasons, for its inherent plausibility, and/or because of its technical convenience, the vast majority of theoretical papers and more than 95 % of the empirical work deals with scale-invariant or relative inequality rankings<sup>(1)</sup>.

(3) Next, what is known as the Population Principle ensures that rankings and inequality measures are invariant under replications of the population, opening the way to the comparison of income distributions with a different number of individuals. Such useful implication is certainly behind its almost universal acceptance among the specialists.

(4) The Pigou-Dalton Principle of Transfers is at the core of all existing inequality approaches. It states that a small income transfer from a rich to a

poor person produces a decrease in inequality, no matter what the incomes of all the other members of the population might be.

(5) Finally, an assumption which permits a decomposition of inequality by population subgroups has been widely investigated for its convenience in empirical applications. But combined with the rest of the axioms already presented, it has somewhat surprising and drastic implications: the classes of relative, absolute or intermediate inequality measures, gets reduced in each case to a single parametric family of decomposable indices, where the parameter which identifies each member of the family is interpreted as an indicator of the degree of aversion to inequality<sup>(2)</sup>.

Armed with these or similar axioms, anyone can claim that income inequality in one situation, place or period is higher or lower than in another. Thus, as AC indicate "Statements of this sort are commonly taken to be a yardstick of economic performance; they sometimes provide a basis for social comment; and it has been known for policy-makers to act upon them." Which is why they decided to perform an experimental test to investigate whether people's opinions tend to corroborate the general consensus found in the literature about the above standard assumptions.

The experiment confronted a group of 1.108 students, from eight colleges and universities in four countries, with a carefully designed questionnaire organized in two parts: a numerical section, containing a set of simple choices between successive pairs of specific income distributions; and a verbal section, in which respondents have to choose among several alternative views about the effect on inequality of hypothetical changes in the income distribution. The issues raised in the second section are closely linked to the numerical questions in the first; and to allow for the 'learning by doing' that takes place as one proceeds through the experiment, during the second part respondents are given the opportunity to change their original answers to the numerical questions.

College students were considered as an appropriate 'target' sub-population for a number of reasons. In particular, given the nature of the questionnaire -whose Spanish and English versions are in Appendix 1- they were chosen as a compromise between the narrow specialist and the well-meaning but innumerate layman.

The questionnaire refers to all the axioms examined, except anonymity which could not be easily integrated in this context. According to AC, the results are mixed:

i) On the one hand, there is clear support for the principle of population, as well as for the following broad interpretation of 'the conventional view' on the admissible normalization rule: 'inequality judgements should respect either the scale-invariance principle, or the translation-invariance, or should conform to some intermediate position between the two.' However, in both cases there was a significant dissenting

minority which could not be completely dismissed as providing merely unperceptive or unreasoning replies.

ii) With regard to the remaining two axioms that play such an important part in the logic and structure of inequality measures, there appear to be greater difficulties. Respondents were split almost down the middle on whether it is possible to decompose inequality. More controversially, a solid majority did not appear to agree with the transfer principle, as it is usually expressed.

iii) As it is well known<sup>(3)</sup>, anonymity, scale-invariance, the population principle, and the transfer principle completely characterizes the usual Lorenz quasi-ordering. The replacement of scale-invariance by other notions of inequality lead to analogous dominance criteria<sup>(4)</sup>. But when the authors test for *systems* of axioms, they find that there is a very low agreement with the usual Lorenz ordering, both numerically and verbally (14 and 20 %, respectively). The addition of the decomposition axiom, which leads to the Generalized Entropy family of relative inequality measures, lowers the percentage of approval to only a 9 % of the sample. On the other hand, AC find even less support (6 or 13 %) for the concept of absolute Lorenz domination.

We do not plan to discuss here the difficult decisions made by AC in relation to the target population and the questionnaire. It suffices to say that we believe in the interest of the general approach; we also confess to be at least as impressed as the authors with some of the unconventional results, although we are not always in complete agreement with their interpretation or the lessons they obtained from them. Therefore, what we propose is to replicate the exercise with Spanish subjects in order to write a companion paper within the same framework. In so doing, we would like to offer something novel in relation to the following three points.

(A) We believe that it is useful to distinguish between two different value judgements: a person's attitude towards the extent of income redistribution she is prepared to demand and/or accept for actual implementation in her own society, and the invariance concept of inequality in the event of changes in total income embodied in her ranking over income vectors. As we will see, we are not certain which of these two issues is addressed by AC's questions on scale and translation invariance. Also, we shall suggest the enlargement of the questionnaire in an attempt to give a greater chance to people's views about notions of inequality intermediate between the relative and absolute polar cases. Finally, we will offer an alternative diagnosis of the ethical and practical problems involved in this aspect of inequality measurement.

(B) As Sen (1973) warned long ago, inequality as a notion does not have any innate property of completeness. However, the questionnaire does not leave any room for it. What it does is, for each issue, to offer two alternative routes to the respondent, one numerical and one verbal, plus the opportunity to rectify as one goes along. Thus, it should come as no

surprise that people's answers show different degrees of consistency, a question raised by AC but that, in our opinion, deserves more attention and a systematic treatment which fully exploits the interrelationships present in the questionnaire.

(C) In view of the serious departures from the conventional professional view, AC observe in the concluding section that it would be interesting to know more about the connection between people's cultural and intellectual background and their perceptions of economic inequality. With this aim in mind, in a sample of 393 individuals we have included college students of different fields (244 students of Economics at the Universities of Alicante, Bilbao, Zaragoza, and Complutense of Madrid, as well as 33 students of Industrial Engineering and 11 of Psychology from the University of Madrid), 86 professors of Economics from the above Universities, and 19 persons working at the trade union Comisiones Obreras. Also, we kept a brief record of personal characteristics of the respondents which includes the sex and the educational background of their parents.

The rest of the paper is organized in four sections. Section II develops our argument in favor of certain modifications of the experiment. Section III reports the empirical results on each of the individual axioms, while Section IV presents the results on systems of axioms and the influence of cultural and other factors. Section V offers some conclusions.

## II. MODIFICATIONS OF THE EXPERIMENT

### II.1. Politics and the invariance question

It would be very convenient if we all had a notion of inequality independent of efficiency considerations. Then, among other things, we would be able to separate changes in total income from distributional changes, and we will have no difficulty providing answers to questions of the following sort: suppose we are given an allocation  $s$  (the *status-quo*) of a total income  $S$  among the  $n$  members of a population, as well as a different total  $S'$ ; then with which criterion should we select a distribution  $s'$  of the new total so that it has the same inequality as  $s$ ?

An illustration is provided in Figure 1 for the two person case. Under anonymity, we can restrict our attention to the subset of the non-negative orthant to the left of the 45 degrees line. The segment  $CD$  contains all possible allocations of a total income  $S'$  greater than the quantity  $S = s_1 + s_2$  associated with the *status quo*  $s$ .

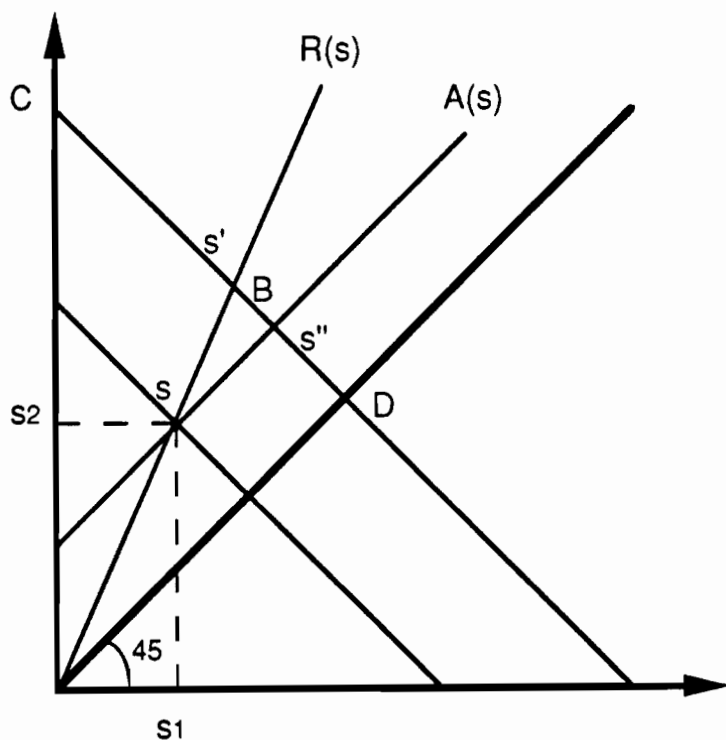


Figure 1

All distributions along the ray  $R(s)$  exhibit the same relative inequality as  $s$ . While all those along the ray  $A(s)$ , like  $s''$  where the amount  $\Delta S = S' - S$  is distributed in equal *per capita* quantities, have the same absolute inequality as  $s$ . To the left of  $s'$ , the rich person would receive a larger proportion of  $\Delta S$  than the poor, whereas to the right of  $s''$  the poor

would get a greater absolute quantity than the rich. Both of these proposals are rather extreme, but any linear combination between  $s'$  and  $s''$  or, more generally, between the rays  $R(s)$  and  $A(s)$ , give rise to more reasonable intermediate inequality concepts. Let us identify all 'acceptable' distribution rules by a parameter  $\lambda$  in the interval  $[0,1]$ , with the rays  $R(s)$  and  $A(s)$  obtaining for  $\lambda = 1$  and  $0$ , respectively.

Of course, the choice of  $\lambda$ , that is, the choice of a concept of inequality invariant to changes in total income, involves a value judgement. Consider distribution B in Figure 1: as long as less inequality is preferred to more, for values of  $\lambda$  close to 1 society is better off at B than at  $s$ , but the opposite is the case for values close to 0 which represent a more demanding or more egalitarian point of view.

Just to appreciate the subtlety of the options involved, consider the ways in which the decision may depend on circumstances not yet spelled out:

i) Individuals may have different views about the appropriate  $\lambda$  depending on whether we face an increase in total income relative to  $s$ , arising, for instance, from economic growth, or a decrease in total income because of the need to collect an income tax.

ii) As illustrated in Figures 2 and 3, history may matter. Firstly, depending on how unequal the initial situation is, the cones spanned by the  $R$  and  $A$  rays through  $s$  or  $t$  in Figure 2 are very different. Thus, for instance, for all  $\lambda$  in  $[0,1]$  the distribution E is simultaneously more unequal than  $s$  but less so than  $t$ .

Secondly, in judging the situation F in Figure 3, which distribution,  $s$  or  $t$ , is taken as the origin at rather different levels of total income, has different implications: for some intermediate value of  $\lambda$ ,  $s$  and F exhibit the same inequality, while for all values of  $\lambda$  the distribution F has less inequality than  $t$ . This example illustrates the potential importance of the level of affluence from which we judge, as well as a slightly different point: a large hypothetical increase in total income, as in the comparison between  $s$  and F, or a small one, as in going from  $t$  to F, may lead to a different inequality assessment.

Possibly, to avoid the obvious complications derived from allowing inequality judgements to depend on information other than the pair of income vectors under comparison, the existing literature rules out such considerations altogether. AC do not investigate the dependence of people's notion of inequality on the location or the total income of the original position. But they attempt to test whether people behave differently in view of hypothetical increases or decreases of total income. In any case, we believe that they face two types of difficulties: some arising from the way politics might influence people's answers; and some arising from the specific form of their questions on this matter.

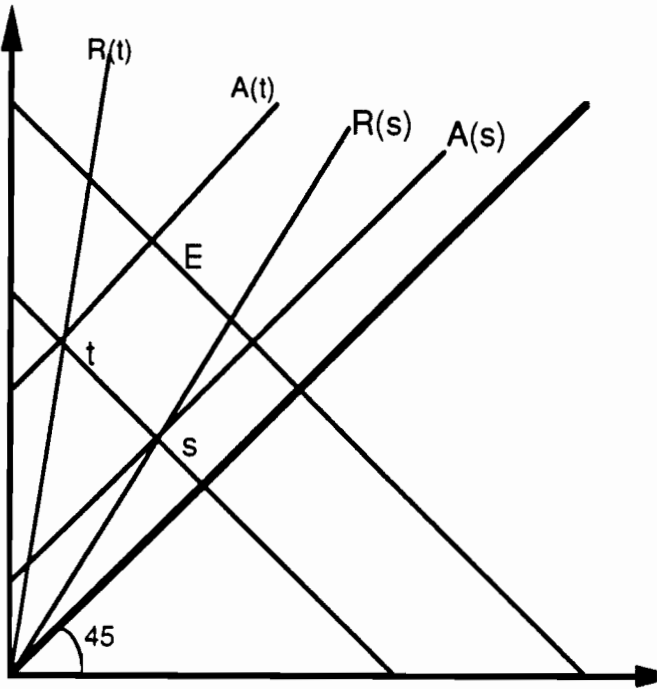


Figure 2

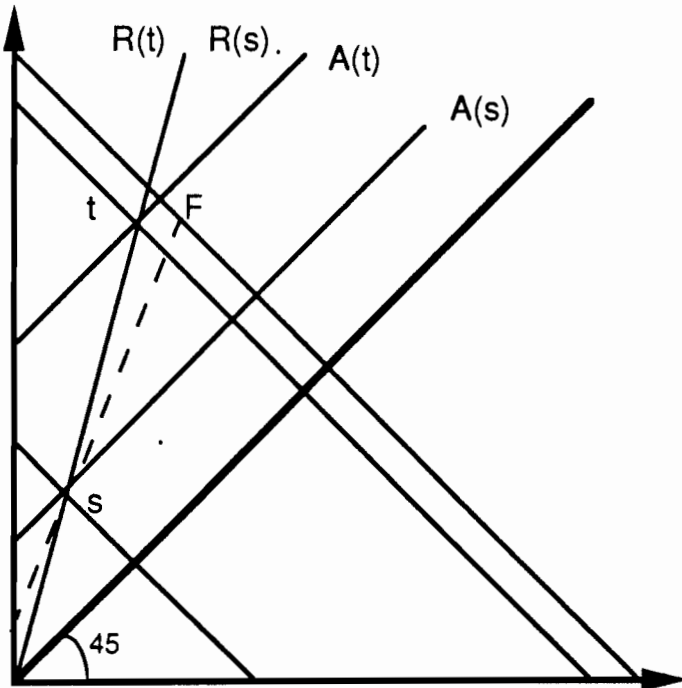


Figure 3



We suggest that, in this context, it is useful to identify political views with attitudes towards redistribution, measured or manifested by the extent by which one is prepared to depart from proportionality. Thus, we claim that if the economy, say, is growing, those more inclined to the left of the political spectrum will find socially desirable to move along a ray well to the right of  $R(s)$ . More conservative people would accept minor departures in that direction, or would even tolerate movements along a ray somewhat to the left of  $R(s)$ , which imply that, although the poor would improve in absolute terms, the rich would gain more than in proportion to the share they enjoyed at the *status quo* <sup>(5)</sup>. We believe also that political attitudes are affected by the nature of the initial position: the more unequal is the *status quo*, the greater the acceptance of larger redistributions in favor of the poor.

On the other hand, everybody that accepts a progressive income tax would accept a downward movement from the initial position along a ray to the right of  $R(s)$ , and therefore beyond the range of admissible values for  $\lambda$ . At the other extreme, very few people would recommend that taxes should be paid in equal absolute amounts along the ray  $A(s)$ . A plausible explanation for this, is that any politically sensible person has a different approach on how to distribute the fruits of growth or the income tax.

Notice that attitudes towards redistribution embody a value judgement logically (and politically) distinct from the choice of an appropriate  $\lambda$ . However, it may be difficult for people to distinguish between them or, perhaps, there is a natural association between political orientation and preferences for  $\lambda$ . Thus, we would expect that, when total income is increasing, the more radical a person is, the lower the  $\lambda$  she would prefer. At least, this seems to be the intuition behind Kolm's (1976a) suggestion that measures of relative (or absolute) inequality could be termed rightist (respectively, leftist). The problem is that, although AC's questions are presumably a device to learn about people's choice of  $\lambda$ , the answers will be influenced by their attitudes to redistribution as well as their views on the appropriate value of that parameter.

Going now into the specific form of the AC questions on this matter, we need to make the following comments. They considered only the two cases corresponding to  $\lambda$  equal to 1 or 0 by means of 2 numerical and 2 verbal questions (questions 1 and 2, and 5 and 6, respectively, in our questionnaire). However, the change in total income in the two numerical questions was not of the same magnitude.

*A priori*, we believed that strong egalitarians with a preference for  $\lambda = 0$  were rare, and more likely to show up if the increase in total income was smaller in question 2 than in question 1. Because of this, and to facilitate the comparison with AC's experiment, we thought that it was acceptable to maintain such an asymmetry between the first two numerical questions. On the other hand, in an attempt to free the respondents on the usual concentration on the polar cases, we thought that it was worth while to offer

a third, intermediate choice by means of questions 3 and 7. To provide a sharp test with the standard notion of relative inequality, we made the change in total income in question 3 as close as possible to that of question 1.

## II.2. The question of consistency

As mentioned in the Introduction, inequality rankings need not be complete. Alternatively, people may have fuzzy views about some of the issues, rather than the precision presupposed in the experiment. For these and, perhaps, other reasons, being forced to provide clear cut answers to intriguing ethical questions is not an easy matter, as anybody can verify by simply going through the questionnaire. Just the comparison of 3-dimensional vectors might be hard for many people, which is why AC always include a verbal section for each topic, as well as the opportunity to rectify the original answers to the numerical questions.

Given this structure, as soon as we consider two (or more) questions on the same topic, there exists the possibility of studying the degree of consistency shown by the respondents. This should be particularly advisable in those instances detected by AC -and confirmed in the Spanish case- in which the frequency distribution of the answers to the verbal section differs significantly from the numerical one.

The interest of this systematic effort is twofold. Firstly, were we to detect a large degree of inconsistency, we would had to conclude that the respondents lacked a clear view of the issues or, more likely, that the framing chosen was a poor vehicle to elicit the people's views on these elusive matters. Secondly, there is an obvious interest in finding out whether there is or not an association between the absence of self contradiction and a higher (or lower) degree of agreement with the traditional views upheld in the economic literature.

### III. RESULTS: THE INDIVIDUAL AXIOMS

#### III.1. The invariance issue

Recall that the first group of questions refer to the effects on inequality of certain redistributions of a greater total income by means of numerical comparisons for a population of three persons. In question 1 distribution B is formed by doubling the incomes in distribution A; in question 2 distribution B results from an addition of 4 units to each of the incomes in distribution A; and in question 3 distribution B is formed by adding 6 units to everyone and distributing 10 more according to the original shares. These questions correspond to a value of  $\lambda = 1, 0$  or  $5/14$ , respectively. In either case, the question is: under transformation  $A \rightarrow B$  does inequality go down, up, or stays the same?

To facilitate the comparison with AC's experiment, we shall start with questions 1 and 2 (q1 and q2), as well as with the corresponding verbal counterparts (q5 and q6). The simple tabulations are given in Table 1, while the cross-tabulations for the whole sample are given in Tables 2 and 3, respectively<sup>(6)</sup>.

TABLE 1: simple tabulations

	N	<u>Double income (q1)</u>			<u>Add 6 units (q2)</u>		
		Down %	Up %	Same %	Down %	Up %	Same %
ALL	393	13	43	44	60	8	31
AC	1.108	14	35	51	59	9	31

	N	<u>Double income (q5)</u>			<u>Add fixed sum (q6)</u>		
		Down %	Up %	Same %	Down %	Up %	Same %
ALL	393	14	51	34	66	5	30
AC	1.108	12	40	47	58	6	35

TABLE 2: numerical questions

		<u>Add 6 units (q2)</u>		
		Down %	Up %	Same %
<u>Double income (q1)</u>	Down	11 (8)	1 (2)	2 (5)
	Up	19 (15)	4 (3)	19 (17)**
	Same	30 (37)*	3 (5)	10 (9)

**TABLE 3: verbal questions**

		<u>Add fix sum (q6)</u>		
		Down %	Up %	Same %
<u>Double income (q5)</u>	Down	11 (7)	0.5 (1)	3 (4)
	Up	30 (21)	3 (2)	18 (17)**
	Same	25 (30)*	1 (3)	8.5 (9)

Clearly, these last two tables, where the numbers in parentheses correspond to AC's results, are the relevant ones. The position of a person who believes in scale-invariance (respectively, translation-invariance) is marked with a single (double) asterisk. In our opinion, the group answering that inequality goes up when all incomes are doubled, and down when equal amounts are added to everyone, are perfectly respectable 'intermediate' people. Furthermore, those answering that inequality goes down, or up, in both situations, can be called 'right-extremists' or 'left-extremists', respectively.

Notice that, contrary to what AC state, in both samples respondents seem to be influenced by whether the questions were presented in numerical or verbal form. Those supporting a relative inequality concept go down, those in favor of an absolute notion remain the same, and those in between go up:

	<u>AC sample</u>				<u>Spanish sample</u>			
	Relative %	Absolute %	Intermediate %	SUM %	Relative %	Absolute %	Intermediate %	SUM %
Numerical	37	17	15	69	30	19	19	68
Verbal	30	17	21	68	25	18	30	73

We think that this result justifies introducing questions 3 and 7, and worrying explicitly about the degree of consistency shown by the respondents when we consider all the questions simultaneously. Tables 4A and 4B present the cross classification by type of inequality concept and the degree of consistency as defined in Appendix 2.

**TABLE 4A**

	<u>Type of inequality</u>						
	Relative %	Absolute %	Intermediate %	Ext. right %	Ext. left %	Other %	ALL %
<u>Consistency</u>							
Maximum	47	30	6	50	20	-	31
Good	19	36	79	15	20	-	38
Acceptable	16	28	2	30	47	-	18
Minimum	2	2	12	6	13	-	6
Unacceptable	15	4	1	-	-	100	7
ALL	100	100	100	100	100	100	100

TABLE 4B

	Type of inequality						
	Relative %	Absolute %	Intermediate %	Ext. right %	Ext. left %	Other %	ALL %
<u>Consistency</u>							
Maximum	49	22	5	22	2	-	100
Good	16	21	55	5	2	-	100
Minimum	13	9	57	13	9	-	100
Unacceptable	70	15	4	-	-	11	100
ALL	32	23	27	14	4	1	100

A high percentage, 87 %, of the Spanish sample show at least an acceptable degree of consistency. A considerable amount, 22 % of the total sample, exhibited 'good' or 'maximum' consistency after making use of the opportunity for rectification. The fact that 'intermediate' persons exhibit in great numbers 'good' rather than 'maximum' consistency is understandable because only those that accept precisely the value  $\lambda = 5/14$  are classified at the top of that scale. 'Right-extremists' seem to be rather consistent, but this is not the case with 'left-extremists'; this may indicate that only the first of these two residual groups is really meaningful.

When we restrict ourselves to the 344 persons that show at least an acceptable degree of consistency, the distribution, from right to left of the political spectrum, is the following:

Extreme-right	Relative	Intermediate	Absolute	Extreme-left
15 %	31 %	27 %	24 %	4 %

Thus, 82 % of them -or 71 % of the total sample- support an acceptable view on the effect of income transformations, including a relative, an absolute or an intermediate notion of inequality. On the other hand, only 4 % of the consistent respondents are classified as 'extreme-left', a group whose coherence deserves further examination.

AC develop an interesting analysis of people's reactions to increases *versus* decreases in individual incomes in the second part of q6, which allows to collect evidence on the question: will the removal of one unit from everybody have exactly the opposite effect on inequality from that brought about by the addition of one unit? They assert that for those answering 'yes' to this question, which are said to be 'reverse consistent', neither history nor other considerations different from the pair of income vectors with which one is confronted does matter. They report that 80 % of their sample exhibit this kind of consistency<sup>(7)</sup>. They seem to imply that we should be satisfied since this is the convention adopted in the academic literature.

We suggest a different interpretation of their results. We claim that the *only* sensible answer to the second part of q6, no matter your political

persuasion, is that inequality goes up when the same amount is deducted from everybody's income (the poll-tax case). In AC's Table 6, 65 % of the sample are sensible in this sense. The problem is that, in a clear case of confusion between political and technical points of view, 53 % of the sample are, simultaneously, (politically) sensible and reverse consistent in AC sense; of course, they are the 'relative' or 'intermediate' persons who have no difficulty in recognizing a politically regressive proposition when they see one. We must conclude that to discriminate between these two interpretations further research is needed.

### III.2. Population replication

Exactly as in AC's work, we investigated respondents' views on this principle with one numerical question (q4) and one verbal question (q8). In each case respondents were invited to consider the effect on inequality of replicating the population. The summary of responses to both of them is given in Table 5.

TABLE 5

	N	<u>Numerical (q4)</u>			<u>Verbal (q8)</u>		
		Down %	Up %	Same %	Down %	Up %	Same %
ALL	393	28	12	60	20	16	64
AC	1.108	31	10	58	22	9	66

More interesting is the information on the consistency of the answers to the two questions, according to the definition provided in Appendix 2. The cross tabulation of this concept and the degree of approval of the principle itself is presented in Table 6.

TABLE 6

	<u>Degree of consistency</u>			<u>Degree of consistency</u>		
	Maximum %	Unacceptable %	ALL %	Maximum %	Unacceptable %	ALL %
<u>Population ple.</u>						
Agree	95	5	100	66	32	63
Disagree (Up)	89	11	100	14	18	14
Disagree(Down)	81	19	100	20	47	23
Neither	-	100	100	-	3	-
ALL	91	9	100	100	100	100

A 91% of people display maximum consistency, 13 % after rectifying their original numerical answer. Among the consistent persons, 66 % agree with the principle. What is at variance with the academic consensus is that 34 % of the consistent people -or 31 % of the total sample- disagrees with it. Notice, however, that, among the inconsistent responses, those disagreeing represent a large majority: 68 %.

On the other hand, as might be expected, 94 % of the respondents with a good or better degree of consistency in relation to the invariance issue show a maximum of consistency here. Only 'left-extremists' disagree with the axiom well above the average for the sample: 60 % of them *versus* 37 % for the population as a whole.

### III.3. Transfer principle

As AC indicate, this is a place where one has to be very careful about what one means. Since the numerical question (q9) involves 5-dimensional vectors, it has been possible to consider a 'progressive' transfer between adjacent incomes which do not affect neither the poorest nor the richest persons. If people maintain that distribution B -after the transfer- is *more unequal* than A, then we take this as strong disagreement; however, contrary to AC, if they regard A and B as equivalent, we do not think that the disagreement is milder but rather of a different kind. The verbal question (q12) provides a very clear statement of the principle; thus, following AC, if respondents pick answer (b) -that is, essentially "don't know"- we should take this as strong disagreement with the principle. However, answer (c) -"none of the above"- logically means that inequality went up or remained constant; in our opinion, this reflects a disagreement of a different sort, consistent, by the way, with alternatives 'B' and 'A and B' in q9. The results, in the form of simple tabulations to both questions, are in Table 7.

**TABLE 7**

	N	Numerical (q9)			Verbal (q12)		
		Agree %	Disagr-1 %	Disagr-2 %	Agree %	Disagr-1 %	Disagr-2 %
ALL	393	54	22	24	57	37	6
AC	1.108	35	42	22	60	24	14

Notice that, in the Spanish sample, the turn around in the answers from the numerical to the verbal question is rather different than in the AC case: from 54 to 57 % of agreement with the principle but 22 to 37 % of disagreement of the first type. Out of the 16 % which take the opportunity of rectifying the original answer to q9, a majority turns to accepting the axiom. This is again a place in which an explicit notion of consistency, as the one offered in the Appendix 2, may help to understand better the results of the experiment.

Table 8 presents the cross tabulation of such a notion together with the degree of agreement with the axiom. Notice that only 22 % of the sample were utterly inconsistent. On the other hand, 54 % agree with the transfer principle; among them, 89 % (or 48 % of the total sample) show maximum consistency, and the rest an acceptable degree of it. In this respect, recall that AC report that only 36 % of the respondents were prepared to

accept the axiom both when expressed in the example and when stated verbally. However, as much as 24 % of the Spanish sample disagree with the principle; they split down the middle between maximum or acceptable consistency and, therefore, their opinions cannot be dismissed lightly.

TABLE 8

	<u>Degree of consistency</u>			<u>Degree of consistency</u>			ALL %
	Maximum %	Acceptable %	Unaccept. %	Maximum %	Acceptable %	Unaccept. %	
<u>Transfer ple.</u>							
Agree	89	11	-	81	31	-	54
Disagree-Type 1	44	56	-	7	27	-	9
Disagree-Type 2	47	53	-	12	42	-	15
Neither	-	-	100	-	-	100	22
ALL	59	19	22	100	100	100	100

It might be interesting to note that there is a high correlation between the degree of consistency here and the corresponding concept for the invariance question. Also, as illustrated in Table 9, it turns out that supporters of relative or intermediate concepts of inequality tend to accept also the principle of transfers. Surprisingly enough, those attached to an absolute notion of inequality and, above all, left-extremists are disproportionally represented both among the inconsistent and among those against this 'progressive' principle; probably, this means that the last political denomination is a misnomer for a residual group which has trouble following the experiment.

TABLE 9

	<u>Type of inequality</u>					
	Relative %	Absolute %	Intermediate %	Ext. right %	Ext. left %	ALL %
<u>Transfer Principle</u>						
Agree	60	43	60	50	33	54
Disagree	24	30	20	26	20	24
Neither	17	27	20	24	47	22

### III.4. Decomposability

Following AC, to investigate whether there is a consensus view on decomposability by population subgroups three questions were used: if respondents gave the *same* rankings in each of the two numerical questions (q10 and q11), we take this as (weak) agreement with the principle. The results are given in Table 10, where the answers to the verbal question (q13) are also included.



**TABLE 10**

	N	<u>Numerical</u> (q10 and q11)		<u>Verbal</u> (q13)		
		Same %	Different %	Agree %	Disagr-1 %	Disagr-2 %
ALL	393	68	32	43	52	5
AC	1.108	57	41	40	45	11

Notice that 68 % of the sample, of which 6 % comes once rectification is allowed, agree with the principle when tested in numerical form (*versus* 57 % in the AC experiment). The affirmative answers in the verbal question are less numerous in both samples: 43 % and 40 % in the Spanish and the AC case, respectively. The cross tabulation of both sections for the Spanish group is as follows:

**TABLE 11**

<u>Numerical part</u>	<u>Verbal part</u> (q13)		
(q10, q11)	Agree %	Disagree-1 %	Disagree-2 %
Agree	35	25	8**
Disagree	10**	16*	5*

We suggest that the cases marked with a single asterisk, which amount to 21 % of the sample, can be taken to disagree unequivocally with the axiom. The responses in the slots with a double asterisk, 18 % of the total, show instead a contradictory opinion. A 35 % of the people express a consistent agreement, and the remaining 25 % can be considered to show only a weak disagreement.

### III.5. Welfare independence

Consider a pair of transfers of the same amount but opposite sign: a progressive transfer at the lower end of the distribution, and a regressive one at the upper end of it. According to the independence axiom first suggested by Kolm (1976a,b)<sup>(8)</sup> inequality should go down. Since the alternative B in q10 and q11 is obtained from the alternative A by means of a pair of such transfers, we may use them for an indirect test of the support this axiom has in the Spanish sample.

We know already that 267 persons, or 68 % of the sample, gave the same answer to questions q10 and q11. But only 126, or 32 % of the total, thought that alternative B showed less inequality than alternative A in both situations, in agreement with this last axiom. From another point of view, answer B was chosen in q10 and q11 by 45 and 42 % of the respondents,

respectively; but this support declined to the quoted 32 % when both questions were considered together.

To test the strength of the conviction, or the consistency, of such percentage of people in apparent agreement with this axiom, we searched for those of them who accepted also the simple transfer principle. Only 66 persons, or about 17 % of the sample, seemed to accept both axioms simultaneously. However, it is clear that this issue deserves further investigation which, among other things, should include a verbal statement of the problem.

## IV. FURTHER RESULTS

### IV.1. Relations among axioms

First of all, how many people provide consistent answers to all of the following: the invariance issue, the population principle and the transfer principle? In relation to the population principle, the respondents were originally classified as exhibiting an acceptable (value 1) or an unacceptable (value 0) degree of consistency. Let us dichotomize the answers to the transfer principle giving a value of 1 to all persons having an acceptable or maximum degrees of consistency, and a value of 0 to the rest. With respect to the invariance issue, we will give a value of 2 to people with a maximum or good degree of consistency, a value of 1 to those with an acceptable or minimum showing, and a value of 0 to those whose consistency was classified as unacceptable. Then, a useful definition of 'joint consistency' may differentiate among the following categories:

	<u>Invariance</u>			<u>Population ple.</u>		<u>Transfer ple.</u>	
	2	1	0	1	0	1	0
<u>Joint consistency</u>							
Maximum	x	-	-	x	-	x	-
Good	-	x	-	x	-	x	-
Minimum	(x or x)		-	x	-	-	x
Rest	(either		-	or -)		-	x

Thus, a person will be classified in the two lowest categories if she is inconsistent in her responses to the principle of transfers, although in the 'minimum' case she would have an acceptable record as far as the two other axioms are concerned. The only difference between the first two categories is the degree of consistency shown with respect to the invariance issue. The distribution of the sample is as follows:

<u>Joint consistency</u>	<u>Number of people</u>	<u>Percentage in %</u>
Maximum	208	53
Good	57	15
Minimum	71	17
Rest	57	15

Since 84 persons, or 22 % of the sample, exhibited an unacceptable degree of consistency with regard to the transfer principle, the remaining 10 % which fails to reach the upper categories must show minimum or below minimum consistency in either of the two other axioms.

On the other hand, as much as 68 % of the sample, or 265 people, are classified with a good or maximum degree of joint consistency. On the

grounds that this last population group includes those whom we can presume that truly understood the questions posed, we want to know whether their answers differ systematically from the rest of the sample. If we label these 265 persons as 'consistent', and the remaining 128 as 'inconsistent', the distribution of their answers to the different issues are as follows:

	<u>Consistent</u> %	<u>Inconsistent</u> %		<u>Consistent</u> %	<u>Inconsistent</u> %
<u>Invariance issue</u>			<u>Population ple.</u>		
Relative	32	32	Agree	66	58
Absolute	22	23	Disagree	34	42
Intermediate	29	23			
Rest	17	21	<u>Descomponibility</u>		
<u>Transfer ple.</u>			Agree	37	31
Agree	50	23	Weak disagr.	27	20
Other	50	67	Other	36	48

Only the transfer principle turns out to be much more acceptable among the consistent people. With regard to the other axioms the differences are not large. Nevertheless, as expected, in every case the views expressed by the consistent subsample are closer to the consensus maintained in the academic literature.

Finally, what is the behavior of the Spanish sample with regard to *systems* of axioms? Only 109 persons -or 130 if extreme-rightists are included- accept simultaneously a relative (52), an absolute (25) or an intermediate (32) invariance concept, as well as the principle of population and the principle of transfers. As many as 98 of them, plus the 21 extreme rightists, are also jointly-consistent. The frequency distributions of these two types of people, the sample as a whole, and the AC sample are as follows:

	<u>Consistent</u> %	<u>Inconsistent</u> %	<u>Whole sample</u> %	<u>AC sample</u> %
<u>Lorenz dominance</u>				
Relative	8	4	13	14 - 20
Absolute	8	3	6	6 - 13
Intermediate	11	2	8	?
Extreme-right	8	-	5	?
Rest	55	91	67	?

Among those 98 persons -or 27 % of the total sample- who accept a relative, absolute or intermediate Lorenz dominance criterion, only 71 accept in addition the descomponibility axiom or are mildly against it. That is, 18 % of the total sample, or only 13 % if we require also joint-consistency. Half of them, namely, 9 % of the total, support a relative view of inequality and, therefore, without knowing it, the Generalized Entropy family of inequality measures. Exactly the same percentage reported by AC in this matter.

## IV.2. Cultural influences

How do the Spanish respondents compare with the population from Germany, Israel and the U.S. studied by AC? In Tables 1, 2, 3, 5, 7, and 10 we have reported the frequency distributions of the two samples for a number of questions common to both experiments. Given the sample sizes involved and a casual inspection of the evidence, it should come as no surprise that the differences observed are statistically significant. However, given the large cultural distance between the two populations, we are quite impressed by the similarities encountered:

- The sum of supporters of a relative, absolute or intermediate view of inequality, as well as the degree of acceptance of the population principle, are practically the same in both samples.

- In spite of the fact that there is a considerable difference in the degree of acceptance of the transfer principle -which is greater in the Spanish sample- it is truly remarkable that the small degree of acceptance of the Lorenz criteria in the two versions for which the comparison is possible, is of the same order of magnitude. Moreover, when we add the decomposibility axiom, a comparable decline of support is observed in both cases.

Do personal characteristics play a role in the pattern of responses? For the Spanish sample we have information on the sex of the respondent and the educational achievement of their parents. We have chosen joint-consistency and the Lorenz criteria (for absolute, intermediate, relative and extreme-right notions of inequality) as the variables to be explained. The frequency distributions are as follows:

	Sample size	JOINT-CONSISTENCY				LORENZ	
		Max. %	Good %	Min. %	Rest %	Agree %	Reject %
SEX							
Male	208	53	15	16	15	34	66
Female	185	52	14	21	14	32	68
EDUCATION							
Higher	140	60	14	17	9	41	59
High School	64	45	14	19	22	30	70
Lower	189	50	15	19	16	29	71
TYPE							
Econ student	244	50	15	20	16	28	72
Other student	44	48	23	16	14	36	64
Trade unionist	19	42	32	26	-	37	67
Econ professor	86	67	6	13	14	45	55
ALL	393	53	15	18	15	33	67

Notice that the small subsamples of trade unionists and non-economic students provided similar answers, which were not that different from those of the larger group of economic students. Economic professors, however, showed greater consistency and closer agreement with the received view established by their colleagues in the field of inequality.

We found some correlation between EDUCATION and TYPE, and we wanted to make sure that SEX had no explanatory power. Thus, we estimated a logit model for JOINT-CONSISTENCY and LORENZ, in which 'other students' and 'trade unionists' were aggregated into a single group. The results of the maximum likelihood analysis of variance were as follows:

Source	JOINT-CONSISTENCY			LORENZ		
	DF	Chi-Square	Prob	DF	Chi-Square	Prob
INTERCEPT	3	89.86	0.00	1	18.54	0.00
SEX	3	2.62	0.45	1	0.08	0.78
EDUCATION	6	7.98	0.24	2	4.07	0.13
TYPE	6	15.36	0.02	2	7.02	0.02
Likelihood ratio	36	32.38	0.64	12	13.97	0.30

It is confirmed that SEX has no influence, that TYPE matters in a predictable way, and that EDUCATION has little influence in the presence of TYPE.

## V. CONCLUSIONS

1. This type of questionnaire is not easy to respond, if only because people may have fuzzy and/or incomplete views on a concept with so many facets as income inequality. Nevertheless, a large majority of the Spanish sample provided consistent answers to the numerical and verbal parts of the normalization issue (87 %), the population principle (91 %), or the transfer principle (78 %). In so doing, a considerable number of individuals took advantage of the opportunity to rectify their original answers to the numerical questions. Moreover, it should be emphasized that 68 % of the sample maintained acceptable consistency when the three sets of questions were considered simultaneously.

2. In spite of the cultural and occupational diversity among the participants in the two experiments, with the exception of the transfer principle the response patterns were not utterly different from those obtained in the AC case. On the other hand, within the Spanish sample, the multivariate analysis showed that the group to which one belonged mattered, but the parents educational background or the sex of the respondents exercised a small or no influence whatsoever.

In our opinion, these two conclusions show that one need not abandon this experimental approach because large numbers of people could not cope with the complexities of the issues as expressed in the questionnaire, or because of the huge and/or unexplained variability of the response patterns due to cultural differences.

3. What aspects of the actual answers should cause us some concern? To begin with, that only 32 % of the sample support a relative view of inequality should not be a problem at all. If the vast majority of specialists prefer this notion for technical or other reasons, and because of the influence of political attitudes to redistribution or other unknown concerns people in large numbers declare to favor instead absolute or intermediate versions of inequality, then perhaps it is time to change the consensus and use more often other notions of inequality as Kolm (1976a,b) and Bossert and Pfingsten (1990), for example, have recommended.

What might give us some pause is that, even within the jointly consistent subsample, 34 % disagree with the population principle, while 50 % rejects the transfer principle. Also, 21 % of the total sample show an unequivocal disagreement with the possibility of decomposing inequality, while an additional 25 % manifest a weak disagreement with it. Finally, like in the AC case, the percentage of people supporting the different Lorenz criteria is very small, and much smaller still if, in addition, decomposability is required.

One cannot escape the conclusion that the four axioms discussed, which are usually taken for granted by the academic specialists, are not obvious at all for important segments of the two experimental groups. However, there is some qualifying evidence: the jointly inconsistent people

-which represent a 32 % of the Spanish sample- reject much more often the transfer principle (67 % *versus* 50 %), and the Lorenz criteria (91 % *versus* 55 %) than those with a good or maximum degrees of joint consistency.

4. We would like to gain a better understanding of the reasons for the discrepancies with the received view: do people fail to agree in greater numbers because of firm ethical views which deserve further investigation by the specialists, or would they change their answers if they were exposed to a full explanation of the axioms in question and the practical consequences of its rejection?

On the other hand, we would like to know more about people's views on other aspects discussed in Section II in relation to the type of inequality one adscribes to: does the initial position matter? are there differences when one considers decreases *versus* increases in total income? do large *versus* small changes in total income induce different responses? Other properties of inequality measures, like the independence axiom briefly treated in Section III.5, or the distributional homotheticity discussed by Blackorby and Donaldson (1978), could be taken up also in other experiments.

In the meanwhile, the simple fact that in this area little is purely technical -and most is essentially political- could be taken deeper at heart by the profession. Following the authorized voice of Atkinson (1989), we ought to follow procedures and, above all, report empirical estimates, making clear their dependence on the various axioms involved. Whether inequality went up or down under the null hypothesis that the current consensus among the specialists commands universal approval, is less interesting than to know, precisely, under what set of value judgements inequality did indeed change.



## NOTES

(1) Besides Kolm (1976a,b), Blackorby and Donaldson (1980) and Bossert and Pfingsten (1990) are fundamental references on absolute and intermediate inequality measures, respectively. Among the few empirical contributions beyond relative indices, see Blackorby et al. (1981) and Bishop et al. (1989).

(2) See Shorrocks (1980), Blackorby et al. (1981) and, for a survey, Ebert (1988).

(3) See, for example, Foster (1985).

(4) See Shorrocks (1983), Moyes (1987) and Chakravarty (1988).

(5) Surprisingly enough, Miller (1970), quoted by AC, suggests that '... it is conceivable that a proportionate income increase means more to the poor than to the rich'.

(6) Here and in the following Tables, because of rounding errors not all frequency distributions add up to 100 per cent.

(7) Unfortunately, we lost the answers to this question in the Spanish case.

(8) See also Shorrocks and Foster (1987).

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## APPENDIX 1: THE QUESTIONNAIRE

### FIRST PART

In each of the first four questions you are asked to compare two distributions of income. Please state which of them you consider to be the **more unequally** distributed by circling A or B. If you consider that both of the distributions have the **same inequality**, then circle both A and B.

- |     |                |                          |
|-----|----------------|--------------------------|
| (1) | A = (6, 9, 15) | B = (12, 18, 30)         |
| (2) | A = (6, 9, 15) | B = (10, 13, 19)         |
| (3) | A = (6, 9, 15) | B = (14, 18, 26)         |
| (4) | A = (6, 9, 15) | B = (6, 6, 9, 9, 15, 15) |

In each of the next four questions you are presented with a hypothetical change and three possible views about the change, labelled a, b, c. Please circle the letter alongside the view that corresponds most closely to your own.

- (5) Suppose we double the 'real income' of each person in a society, when not all the initial incomes are equal.
- a. Each person's share remains unchanged, so inequality remains unchanged.
  - b. Those who had more also get more, so inequality has increased.
  - c. After doubling incomes more people have enough money for basic needs, so inequality has fallen.

In the light of the above, would you want to change your answer to question 1? If so, please write your new response -A or B or A and B.

- (6) Suppose we add the same fixed amount to the incomes of each person in a society, when not all the initial incomes are equal.
- a. Inequality has fallen because the share of those who had more has fallen.
  - b. The same amount has been added to every person, so inequality remains the same.
  - c. Inequality has increased.

In the light of the above, would you want to change your answer to question 2? If so, please write your new response -A or B or A and B.

- (7) Suppose that, when not all the initial incomes are equal, we add an amount to the incomes of each person in the following manner: the richer the person initially the greater the amount she receives, but the poorer the person the greater is the improvement in her relative position (or her share in total income) after the change.
- a. Each rich person's share has fallen, so inequality has fallen.
  - b. The rich are richer than before but, on the other hand, the poor improve their relative position, so inequality remains unchanged.
  - c. The initial ordering from the richest to the poorest person remains unchanged and the difference between the highest and the lowest incomes has increased, so inequality has increased.

In the light of the above, would you want to change your answer to question 3? If so, please write your new response -A or B or A and B.

- (8) Suppose we replicate a three-person society by merging it with an exact copy of itself (so that we now have a society of six people consisting of three sets of identical twins).

- a. The income inequality of the six-person community is the same as that of the three-person community because the relative income shares remain unchanged.
- b. The income inequality of the six-person community is less than that of the three-person community because in the six-person community there are some people who have the same income.
- c. The income inequality of the six-person community is greater than that of the three-person community .

In the light of the above, would you want to change your answer to question 4? If so, please write your new response -A or B or A and B.

## SECOND PART

In each of the next three questions you are asked to compare two distributions of income. Please state which of them you consider to be the **more unequally** distributed by circling A or B. If you consider that both of the distributions have the **same inequality**, then circle both A and B.

- |      |                       |                       |
|------|-----------------------|-----------------------|
| (9)  | A = (1, 4, 7, 10, 13) | B = (1, 5, 6, 10, 13) |
| (10) | A = (4, 8, 9)         | B = (5, 6, 10)        |
| (11) | A = (4, 7, 7, 8, 9)   | B = (5, 6, 7, 7, 10)  |

In each of the next two questions you are presented with a hypothetical change and three possible views about the change, labelled **a, b, c**. Please circle the letter alongside the view that corresponds most closely to your own.

- (12) Suppose we transfer income from a person who has more income to a person who has less, without changing anyone else's income. After the transfer the person who formerly has more still has more.
- a. Income inequality in this society has fallen.
  - b. The relative position of others has also changed as a consequence of this transfer. Therefore we cannot say, a priori, how inequality has changed.
  - c. Neither of the above.

In the light of the above, would you want to change your answer to question 9? If so, please write your new response -A or B or A and B.

- (13) Suppose there are two societies, A and B, with the same number of people and with the same total income, but with different distributions of income. Society A is now merged with C, and society B is merged with C' where C and C' are identical.
- a. The society which had the more unequal income distribution before the merger still has the more unequal distribution after the merger.
  - b. We can't say which society has the more unequal distribution unless we know the exact distributions.
  - c. Neither of the above.

In the light of the above (and your answer to question 10), would you want to change your answer to question 11? If so, please write your new response -A or B or A and B.

### REMARKS ON THE DIFFERENCES WITH AC'S QUESTIONNAIRE:

1. Questions 3 and 7 are new.
2. The numerical distributions in questions 1, 2 and 4 are now different for reasons explained in the text.
3. Question 6.b has been slightly rewritten.
4. No comments on the reasons for their answers were asked from the respondents.
5. The order of the questions has been modified.

## SPANISH VERSION

### PRIMERA PARTE

En las primeras cuatro preguntas se pide que compare dos distribuciones de renta. Por favor, indique cuál de ellas considera Vd. que está **más desigualmente** distribuida marcando con un círculo la respuesta A ó B. Si piensa que ambas tienen la **misma desigualdad**, trace un círculo tanto sobre A como sobre B.

- |     |                |                          |
|-----|----------------|--------------------------|
| (1) | A = (6, 9, 15) | B = (12, 18, 30)         |
| (2) | A = (6, 9, 15) | B = (10, 13, 19)         |
| (3) | A = (6, 9, 15) | B = (14, 18, 26)         |
| (4) | A = (6, 9, 15) | B = (6, 6, 9, 9, 15, 15) |

En las cuatro preguntas siguientes se describe un cambio hipotético y tres opiniones posibles sobre el mismo, identificadas por las letras a, b, c. Por favor, señale con un círculo la letra de la opinión con la que esté Vd. más de acuerdo.

(5) Suponga que, a partir de una situación inicial en que las rentas no son iguales, doblamos la renta de cada una de las personas de la sociedad.

a. Como la participación de todas las personas en el total permanece constante, la desigualdad no varía con el cambio.

b. Como se obtienen cantidades mayores cuanto más rico seas, la desigualdad ha aumentado.

c. Como después de doblar todas las rentas más gente tendrá suficiente dinero para satisfacer sus necesidades básicas, la desigualdad ha disminuido.

A la luz de esta pregunta, ¿desea Vd. cambiar su respuesta a la pregunta 1? En ese caso, indique aquí su nueva respuesta:      A ó B ó A y B

(6) Suponga que, a partir de una situación inicial en que las rentas no son iguales, añadimos la misma cantidad fija a las rentas de cada persona de la sociedad.

a. La desigualdad ha disminuido porque la participación sobre el total de los más ricos se ha reducido.

b. Al haberse añadido la misma cantidad a todo el mundo, la desigualdad permanece constante.

c. La desigualdad ha aumentado.

Suponga que en lugar de añadir deducimos una cantidad fija de la renta de todas las personas. Entonces la desigualdad . . .

a. permanece constante

b. aumenta

c. disminuye.

A la luz de esta doble pregunta, ¿desearía Vd. cambiar su respuesta a la pregunta 2? En ese caso, indique aquí su nueva respuesta:      A ó B ó A y B

(7) Suponga que, a partir de una situación inicial en que las rentas no son iguales, añadimos una cantidad a cada persona de la manera siguiente: la cantidad es mayor cuanto más rica sea la persona inicialmente, pero supone un aumento relativo mayor para los más pobres.

a. Como la situación relativa de los más ricos ha empeorado mientras que ha mejorado la de los más pobres, la desigualdad ha disminuido.

b. Como por una parte los ricos son más ricos que antes pero, por otra, los pobres mejoran su posición relativa, la desigualdad ha permanecido constante.

c. Como no se ha alterado la ordenación inicial de pobres a ricos y ha aumentado la diferencia entre la renta más alta y la más baja, la desigualdad ha aumentado.

A la luz de esta pregunta, ¿desca Vd. cambiar su respuesta a la pregunta 3? En ese caso, indique aquí su nueva respuesta:      A ó B ó A y B

(8) Suponga que replicamos una sociedad de tres personas añadiéndole una copia exacta de sí misma (de modo que ahora tenemos una sociedad de seis personas que consiste en tres pares de gemelos idénticos).

a. La desigualdad de la renta en la comunidad de seis personas es la misma que en la de tres personas porque las participaciones relativas de la renta permanecen constantes.

b. La desigualdad de la renta en la comunidad de seis personas es menor que en la de tres porque en la comunidad mayor existen algunas personas que tienen la misma renta.

c. La desigualdad de la renta en la comunidad de seis personas es mayor que en la de tres.

A la luz de esta pregunta, ¿desea Vd. cambiar su respuesta a la pregunta 4? En ese caso, indique aquí su nueva respuesta: **A ó B ó AyB**

## SEGUNDA PARTE

En las tres preguntas siguientes se pide que compare dos distribuciones de renta. Por favor, indique cuál de ellas considera Vd. que está **más desigualmente** distribuida marcando con un círculo la respuesta A ó B. Si piensa que ambas tienen la **misma desigualdad**, trace un círculo tanto sobre A como sobre B.

- |      |                       |                       |
|------|-----------------------|-----------------------|
| (9)  | A = (1, 4, 7, 10, 13) | B = (1, 5, 6, 10, 13) |
| (10) | A = (4, 8, 9)         | B = (5, 6, 10)        |
| (11) | A = (4, 7, 7, 8, 9)   | B = (5, 6, 7, 7, 10)  |

En las dos preguntas siguientes se describe un cambio hipotético y varias opiniones posibles sobre el mismo, identificadas por las letras a, b, c, ... Por favor, señale con un círculo la letra de la opinión con la que esté Vd. más de acuerdo.

(12) Considere un par cualquiera de personas y suponga que transferimos alguna renta desde la más rica a la más pobre, de manera que la persona que era más rica inicialmente continúa siéndolo después de la transferencia. No se altera la renta de nadie más en la sociedad.

a. La desigualdad de la renta ha disminuido.

b. La posición relativa de los demás también ha variado como consecuencia de esta transferencia. Por tanto, no podemos decir *a priori* cómo ha variado la desigualdad.

c. No estoy de acuerdo con ninguna de las dos respuestas anteriores.

A la luz de esta pregunta, ¿desea Vd. cambiar su respuesta a la pregunta 9? En ese caso, escriba aquí su nueva respuesta: **A ó B ó AyB**

(13) Suponga que hay dos sociedades A y B con el mismo número de personas y con la misma renta total, pero con diferentes distribuciones de ese total. La sociedad A se une a la C, mientras que la sociedad B se une a la C', donde C y C' son idénticas.

a. La sociedad que tenía la distribución de la renta más desigual antes de la unión tiene todavía la distribución más desigual después de la misma.

b. No podemos decir qué sociedad tiene mayor desigualdad a menos que conozcamos las distribuciones exactas.

c. No estoy de acuerdo con ninguna de las dos respuestas anteriores.

A la luz de esta pregunta (y su respuesta a la pregunta 10), ¿desea Vd. cambiar su respuesta a la pregunta 11? En ese caso, escriba aquí su nueva respuesta: **A ó B ó AyB**

## APPENDIX 2: DEFINITIONS OF CONSISTENCY

**DEFINITION 1.** Invariance issue: questions q1, q2, q3, q5, q6, q7

For the **maximum** degree, a respondent must answer all questions consistently, i.e.:

	q1	q2	q3	q5	q6	q7
Relative	A & B	A	A	a	a	a
Absolute	B	A & B	B	b	b	c
Intermediate	B	A	A & B	b	a	b
Extreme-right	A	A	A	c	a	a
Extreme-left	B	B	B	b	c	c

For **good**, i) all AC questions -q1, q2, q5 and q6- consistently in the above sense, ii) the three numerical ones plus the associated verbal, or iii) the three verbal ones plus the associated numerical. For **acceptable**, i) q1, q2 plus the associated verbal, ii) q5, q6 plus the associated numerical, iii) the three numerical, or iv) the three verbal. For **minimum**, i) q1 and q2, or ii) q5 and q6. For **unacceptable**, the rest, including q1 and q5, q2 and q6, or q3 and q7 correctly.

**DEFINITION 2.** Population principle: questions q4, q8

For the **maximum** degree, a respondent must answer both questions consistently, i.e.:

	q4	q8
Agreement	A & B	a
Disagreement (Up)	B	c
Disagreement (Down)	A	b

All the rest are **unacceptable**.

**DEFINITION 3.** Transfer principle: questions q9, q15

For the **maximum** degree, a respondent must answer both questions consistently, i.e.:

	q9	q15
Agreement	A	a
Disagreement - Type 1	B	c
Disagreement - Type 2	A & B	c

For **acceptable**, the above answers to q9 and answer 'b' to q15. All the rest are **unacceptable**.