Income Inequality, Risk, and the Transfer Principle
A Questionnaire–Experimental Investigation

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ABSTRACT

This paper is about distributional perceptions with respect to inequality and risk. The Pigou–Dalton principle of transfers is one of the fundamental axioms in the analysis of inequality. We examine to what degree it is followed by people who evaluate income distributions and, moreover, whether it also plays a role in risk comparisons. Furthermore, we ask whether information on the width of the income interval matters in the sense that a fulfilment of the transfer principle is, perhaps, more likely whenever, for example, transfers occur within a wide income interval. The questionnaire results we discuss are based on the responses of over 300 students from Germany.

JEL classification: C 13, D 63

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1 Introduction

Attitudes to risk and attitudes to inequality affect private and public decision making in various areas. The type of private health insurance or the kind of car insurance a person considers to buy is closely connected with that person's perception of risk. The same holds true for the optimal composition of financial assets. The current discussion on restructuring the European welfare system cannot be separated from the aspect of risk and the EU citizens' attitudes to inequality. The latter also play a significant role in the debate on direct vs. indirect taxation.

In the formal approaches to welfare economics, inequality and risk are closely related. The common ground in inequality and risk analysis are a few principal assumptions that are commonly used as building blocks in an axiomatic analysis. One rather uncontroversial postulate is the anonymity axiom which is a property of equal treatment of individuals or households. Another one is the principle of transfers which many researchers find fundamental for the problem of ordering income distributions in terms of inequality. This principle is, for example, satisfied by the coefficient of variation and the Gini coefficient. The origin of the idea behind the transfer principle can be found in the writings of Pigou (1912) and Dalton (1920). Stated very briefly, this principle says that a transfer from a richer person to a poorer person always reduces inequality. More precisely, Dalton (1920, p. 351) asserted that "we may safely say that, if there are only two income–receivers, and a transfer of income takes place from the richer to the poorer, inequality is diminished. There is, indeed, an obvious limiting condition. For the transfer must not be so large, as more than to reverse the relative positions of the two income–receivers, and it will produce its maximum result, that is to say, create equality, when it is equal to half the difference between the two incomes". And he continued saying "we may safely go farther and say that, however great the number of income–receivers and whatever the amount of their incomes, any transfer between any two of them, or, in general, any series of such transfers ... will diminish inequality" (p. 351). As Amiel and Cowell (1998) observed, the last sentence represents an important refinement of the original idea by Pigou in so far as the principle should apply to any two individuals from a population of n persons. Thus, the idea of rich–to–poor mean–preserving transfers has been generalized considerably. In the context of a comparison of probability distributions in terms of risk, the transfer principle finds its counterpart in a concept concerning mean–preserving spreads.

We have stated above that the theoretical analysis of inequality and risk is based on a relatively small set of basic assumptions or axioms. Do these principal assumptions coincide with the individuals' perceptions of inequality and risk? Students who have been instructed in economics may have absorbed the axiomatic structure consciously or unconsciously. What about students outside economics proper? "What sometimes happens is that certain principles and axioms may have special appeal to those who are used to approaching the topic using a particular formal approach; and these prin-

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ciples, along with the intuitions that accompany them, gradually acquire the status of a received wisdom or orthodoxy. Other approaches – even if intellectually coherent and with an intuitive appeal of their own – then rarely get heard" (Amiel and Cowell (2000)).

In the present paper, we will concentrate explicitly on the transfer principle as a basis for distributional comparisons, both in the context of inequality and risk. The question then is whether students view a particular equalizing income transfer as inequality and risk diminishing and, in particular, whether their views are consistent with the principle of transfers. However, a fulfilment of the latter may be too much to ask for. Therefore, we shall weaken this requirement. Our analysis starts off from two questionnaire versions that we shall call the original versions; they were conceived by Amiel and Cowell (1999). We shall then modify these base versions in particular ways on which we shall say more in the following section. We postulate that 'size' or, more precisely, the width of the income interval matters when people make distributional comparisons or evaluate risk. We believe that this aspect adds an important dimension to the ongoing work on attitudes to inequality and risk.

The structure of the paper is as follows. Section 2 describes the experimental set–up. Section 3 provides the basic set of data and makes a reference to the data that Amiel and Cowell used in their earlier investigation. Section 4 presents the results we have obtained and offers some interpretation. Section 5 provides some conclusions.

2 The Experimental Set–Up

In 1998 and 1999, Amiel and Cowell ran an extensive questionnaire experiment among a little over 900 undergraduate students from seven countries (Argentina, Australia, Belgium, Germany, Israel, Sweden, and the UK). Most of the students were studying economics or business administration, others came from disciplines such as political science, law or the natural sciences. During regular class or tutorial time, each student received just one questionnaire and completed it in about 10–15 minutes. There were two sets of questionnaires given to the students, one for each of the two issues, inequality and risk. Students were simply asked to complete a questionnaire on income distribution. They were not informed that there were actually two separate versions of the questionnaire study. The questionnaires were designed in such a way that just by looking at his or her neighbour's questionnaire sheets, a respondent would be unable to discover the two versions (these can be downloaded from the internet at http://nts4.oec.uni-osnabrueck.de/mikro/inequality.pdf). The reason for having two versions was to obtain simultaneously two samples from the same population, one for inequality, one for risk.

The questionnaires were split up into three parts. In the first part, respondents were asked to rank two alternative lists of incomes A and B in terms of inequality or risk in six different situations. The students were told that there was a country called "Alfaland" which consisted of five regions, with everybody having the same income within a given region, but different incomes from region to region. The income vectors A and B represented the outcome of two alternative policies being considered for implementation in Alfaland next year. In the risk context, respondents were asked to imagine that a potential immigrant to Alfaland would be assigned at random to any one of the five regions and that risk should be evaluated by putting oneself into the shoes of such an immigrant. The five components of each vector of incomes were given without any further explanation. For each of the six situations (questions), B was obtained from A by an equalizing income transfer from a rich to a poor region without reversing the

ranking of the two regions between which the transfer took place. As discussed in the introduction, an equalizing income transfer reduces inequality according to the principle of transfers. Therefore, this principle implies that A is more unequal (is riskier) than B in all six situations.

In the second part of the questionnaire, the students were invited to think about the issue behind the transfer principle. Starting from a hypothetical income change, some possible views about the effects on inequality and risk of that change were given. Students were requested to identify the view that corresponded most closely to their own.

The final part of the questionnaire asked students to give details about themselves (gender, age, political views, income situation, etc.) without, however, jeopardizing the veil of anonymity under which the questionnaire study was conducted. In this study we confine ourselves to looking at gender differences. Females were roughly one year younger than male students because of the military service of the latter group. Between the two cohorts we show there are no statistically significant differences in the other demographic data listed above.

We already referred to the fact that Amiel and Cowell's original versions do not give a reason for the individual components of the different income vectors of inhabitants of Alfaland nor do they provide any information on the length or width of the income intervals. When you consider, for example, the vector (2, 5, 9, 20, 30), does it stand for a wide interval or for a narrow one? Without any further information or reference, an answer would be a mere guess. We have addressed this issue by trying to provide information on this question indirectly by constructing two further versions that, henceforth, are referred to as variants 1 and 2. In the first variant, we give the respondents the impression that the interval at stake is "rather wide". It is said that "due to historical facts, the degree of industrialization among the various regions varies considerably, from high–tech industry to agriculture. Consequently, the incomes of the inhabitants of the different regions also vary considerably". In variant 2 we write that "Alfaland is an agrarian state that is not on a par, in terms of incomes, with highly industrialized countries". Thus, indirectly, we give the impression that in variant 2 the income intervals at stake are "not so wide". It is explained to the respondents that income differences among the five regions are due to differences in climate and fertility of the soil. Both versions 1 and 2 are documented in the Appendix. However, only the first page of each modified version is presented, since the remaining pages contain no more than minute differences to the original versions.

First the original questionnaire–experiments of Amiel and Cowell are replicated in order to see to what degree our German results possibly differ from the international findings. We then focus on whether the additional information on the income intervals matters in the sense that the answering behaviour "visibly" reflects the differences with respect to the base situation. Does the given information have an impact on people's judgments about inequality and risk?

A priori, one could, for example, argue that people may perhaps be more sensitive towards a fulfilment of the transfer principle whenever the transfers occur within a wide income interval, whereas these transfers would not be that important in the sense of reducing inequality if the income interval within which an equalizing transfer takes place is considered to be rather small. For all three versions, viz. the original version and the two variants 1 and 2 , we shall present results from the University of Osnabrück, a university in Northwest Germany.

3 The Data Set

The questionnaires asked students to rank six pairs of income vectors in terms of inequality or risk. The possible answers were "A more unequal/riskier than B", "A and B equally unequal/equally risky", and "B more unequal/riskier than A". For each question, B was obtained from A by a transfer from a richer to a poorer region. Consistency with the principle of transfers requires the respondent to consider A as more unequal (riskier) than B in all six situations.

Table 1 provides a summary of the participants in the study by Amiel and Cowell (2000) between 1998 and 1999, and the versions given were what we have called above the original versions. The data set comprises students from seven countries, viz. Argentina, Australia, Belgium, Germany, Israel, Sweden and the UK. This table refers to investigations We briefly report some of the results from this investigation that involved just over 900 students, since these serve as a reference point for our own results obtained between 1999 and 2000. A summary of the number of Osnabrück students broken down with respect to the three versions O (original), 1 and 2 are given in Table 2. This table also specifies the number of male and female respondents in each case.

Table 1: Students by Countries – Original Version (Amiel and Cowell)
(numbers)

	Total	Inequality	Risk
Argentina	74	38	36
Australia	124	62	62
Belgium	137	87	50
Germany	27	14	13
Israel	180	93	87
Sweden	63	31	32
UK	311	150	161
Overall	916	475	441

Table 2: Students from Germany – All Three Versions
(numbers)

	Total (m/f)	Inequality (m/f)	Risk (m/f)
Original Version (2000)	132 (82/48)	67 (45/22)	65 (37/26)*
Version 1 (1999)	90 (62/27)	46 (24/21)**	44 (38/6)
Version 2 (1999)	92 (64/28)	46 (28/18)	46 (36/10)
Overall	314(208/103)	159 (97/61)	155 (111/42)

* Two respondents did not specify their sex
** One respondent did not specify his/her sex

4 Results

4.1 The Principle of Transfers

One of the issues that can be addressed with the first part of the questionnaires is to what extent the students' responses are consistent with the principle of transfers. As our point of reference, we first present results from the original investigation by Amiel and Cowell (2000). Table 3 gives the proportion of answer A in all six situations both for inequality and risk. Table 4 gives the responses for the original version and the two new versions. We also provide a gender breakdown.

Table 3: Consistency with Transfer Principle – Original Investigation Involving 7 Countries (percentage shares of response A)

absolute numbers		Inequality	absolute numbers		Risk
	⟋ total	16.8		⟋	22.2
475	— male	22.2	441	—	29.8
	⟍ female	7.6		⟍	10.6

Table 4: Consistency with Transfer Principle — All Three Versions, Osnabrück, Germany
(percentage shares of response A)

	absolute numbers		Inequality	absolute numbers		Risk
		⟋ total	13.4		⟋	23.1
Original version (O)	67	— male	15.6	65	—	29.7
		⟍ female	9.1		⟍	15.4
		⟋	10.9		⟋	38.6
version 1	46	—	16.7	44	—	39.5
		⟍	4.8		⟍	33.3
		⟋	10.9		⟋	13.0
version 2	46	—	10.7	46	—	13.9
		⟍	11.1		⟍	10.0

Table 3 informs us that no more than roughly one fifth of the respondents picked policy A in all six situations. Consistency with the transfer principle is higher for risk than for inequality. Disaggregating by gender, consistency increases for male students and reaches almost 30% in the case of risk. Consistency is much lower for female respondents. Moreover, the difference between the male and female subgroup is particularly large in the case of risk.

Table 4 reports the corresponding results for Osnabrück University in Germany. The following observations, among others, can be made.

1. With respect to the original version, the percentage results from Germany are very similar to the results reported in Table 3. This is particularly true for the male students in the situation of risk. Also in our case, consistency with the transfer principle increases more for the male respondents than for the female students when going from inequality to risk.

2. When looking at all three versions and the corresponding samples, almost everywhere there is an increase in consistency with the transfer principle when changing from the issue of income inequality to the issue of risk. This increase is higher for version O and version 1 than for version 2. In version 1, it is remarkably high both for male and female respondents.

In section 2, we raised the question whether providing indirect information on the width of the income interval does perhaps matter. In order to shed some light on this issue, we have compiled Tables 5-7 where we compare all three versions. We make comparisons between inequality and risk *within* each version, compare the evaluations with respect to both inequality and risk *across* versions and provide a gender breakdown. For each of the binary comparisons, we have run a two–sample t test with equal/unequal variances to check for the equality of mean across versions and give the corresponding p–values.[1]

1. The most remarkable point to report is the difference between inequality and risk within version 1 (the p–value equals 0.002). This is mainly due to the evaluating behaviour of the male respondents (p–value is 0.046).

2. Not within the inequality context but within the risk context, there are clear differences in those binary comparisons that involve version 1. The sharpest difference is between versions 1 and 2 (p–value of 0.006) which is due to the male students (p–value of 0.012). The comparison between version O and version 1 shows a p–value of 0.091.

3. The above observations do not hold true with respect to inequality evaluations. The most remarkable point to mention here is a p–value of 1.000 in the binary comparison between versions 1 and 2. Obviously, inequality is viewed in a completely different way than risk by the German respondents.

4. The 92 respondents who evaluated inequality and risk within version 2 obviously view the two quite similarly in the given context.

[1] A two–sample Wilcoxon rank–sum (Mann–Whitney) test was applied in all cases, but since these results were found to be very close to those from the t test, they are not reported here.

Table 5: Comparison Between Inequality and Risk, Within Each Version, with a Gender Breakdown

(percentage shares of response A)

		Mean	Std. Dev.	$p > \|t\|^*$
Version O				
Inequality	(I)	0.1343	0.3436	0.155
Risk	(R)	0.2308	0.4246	
female	I	0.0909	0.2942	0.514
	R	0.1538	0.3679	
male	I	0.1556	0.3665	0.135
	R	0.2973	0.4634	
Version 1				
	I	0.1087	0.3147	0.002
	R	0.3864	0.4925	
female	I	0.0476	0.2182	0.238
	R	0.3333	0.5164	
male	I	0.1667	0.3807	0.046
	R	0.3947	0.4954	
Version 2				
	I	0.1087	0.3147	0.751
	R	0.1304	0.3405	
female	I	0.1111	0.3234	0.931
	R	0.1000	0.3162	
male	I	0.1071	0.3150	0.705
	R	0.1389	0.3507	

* Null Hypothesis: Equality of Mean Across Versions (p–value)

Table 6: Comparison Across Versions, Both for Inequality and Risk, No Gender Breakdown

(percentage shares of response A)

	Mean	Std. Dev.	$p > \|t\|^*$
Inequality			
Inequality, vers. O (I)	0.1343	0.3436	
			0.683
Inequality, vers. 1 (I_1)	0.1087	0.3147	
Inequality, vers. O (I)	0.1343	0.3436	
			0.683
Inequality, vers. 2 (I_2)	0.1087	0.3147	
Inequality, vers. 1 (I_1)	0.1087	0.3147	
			1.000
Inequality, vers. 2 (I_2)	0.1087	0.3147	
Risk			
Risk, vers. O (R)	0.2308	0.4246	
			0.091
Risk, vers. 1 (R_1)	0.3864	0.4925	
Risk, vers. O (R)	0.2308	0.4246	
			0.171
Risk, vers. 2 (R_2)	0.1304	0.3405	
Risk, vers. 1 (R_1)	0.3864	0.4925	
			0.006
Risk, vers. 2 (R_2)	0.1304	0.3405	

* Null Hypothesis: Equality of Mean Across Versions (p–value)

Table 7: Comparison Across Versions, Both for Inequality and Risk, With Gender Breakdown

(percentage shares of response A)

		Mean	Std. Dev.	$p > \|t\|^*$
Inequality				
	I	0.0909	0.2942	
female				0.586
	I_1	0.0476	0.2182	
	I	0.1556	0.3665	
male				0.907
	I_1	0.1667	0.3807	
	I	0.0909	0.2942	
female				0.839
	I_2	0.1111	0.3234	
	I	0.1556	0.3665	
male				0.551
	I_2	0.1071	0.3150	
	I_1	0.0476	0.2182	
female				0.471
	I_2	0.1111	0.3234	
	I_1	0.1667	0.3807	
male				0.540
	I_2	0.1071	0.3150	
Risk				
	R	0.1538	0.3679	
female				0.450
	R_1	0.3333	0.5164	
	R	0.2973	0.4634	
male				0.382
	R_1	0.3947	0.4954	
	R	0.1538	0.3679	
female				0.667
	R_2	0.1000	0.3162	
	R	0.2973	0.4634	
male				0.104
	R_2	0.1389	0.3507	
	R_1	0.3333	0.5164	
female				0.349
	R_2	0.1000	0.3162	
	R_1	0.3947	0.4954	
male				0.012
	R_2	0.1389	0.3507	

* Null Hypothesis: Equality of Mean Across Versions (p–value)

4.2 Equalizing Transfers

What is the percentage of responses that view an equalizing transfer as inequality and risk, respectively, reducing? In other words, how often did the respondents choose A, given all six situations? This is an interesting issue since focusing on the fulfilment of the transfer principle alone neglects a lot of existing information. Remember that a respondent has to pick A in all six questions in order to be counted as someone who satisfies the transfer principle. For all three versions taken together, between 53% and 72% of the respondents view an equalizing transfer as inequality and risk, respectively, reducing under the two aspects of inequality and risk. Table 8 shows that the percentages are always (i.e. for all three versions) lower for inequality. Both percentages are higher for version 1 in comparison with the other two versions. In Amiel and Cowell (2000), it was observed that women are more likely to answer A if the question is about inequality whereas men are more likely to do so if it is in the context of risk. Since this assertion refers to the original version, we compare it with the figures in the upper part of Table 8. We see that this statement does not hold for our data. It does not hold either for versions 1 and 2. In the following observations, we refer to Tables 8a–8c which are not reproduced in this text but can be downloaded from the internet (http://nts4.oec.uni-osnabrueck.de/mikro/inequality.pdf)

Table 8: Do Equalizing Transfers Reduce Inequality/Risk?
Number of A's Across Versions (percentage shares)

	Inequality			Risk		
	absolute numbers			absolute numbers		
Original version (O)	67	⁄	total 52.7	65	⁄	62.8
		—	male 54.8		—	71.2
		\	female 48.5		\	54.5
version 1*	46	⁄	60.1	44	⁄	72.3
		—	61.1		—	72.8
		\	60.3		\	69.4
version 2	46	⁄	58.0	46	⁄	60.1
		—	57.7		—	60.6
		\	58.3		\	58.3

* The apparent inconsistency in the case of inequality is due to the fact that one person did not specify her sex.

1. The difference between inequality and risk is highest within version 1 (the p–value equals 0.039). This is again due to the male respondents.

2. For version 2, there are hardly any differences between inequality and risk. The p–value equals 0.724. For the female respondents, the p–value reaches the value of 1.000.

3. Within the risk context, there is a sharp difference between versions 1 and 2 (p–value of 0.065), again due to the male students.

4.3 The Width of the Income Interval

In sections 4.1 and 4.2 we saw that (a) the difference between inequality and risk is highest for version 1 (where a wide interval range is alluded to) and (b) within the risk context, there is a marked difference between version 1 and version 2 (where a narrow interval range is alluded to). Furthermore, in the risk context, the Mann–Whitney test produces a p–value of 0.098 in the comparison between versions O and 1 and a p–value of 0.598 between versions O and 2. If one adds to this that both in the case of the transfer principle and in the case of the relative number of answers A, spread over all six questions, the difference between inequality and risk is quite small under version 2, while this difference is substantial both for versions O and 1, our earlier conjecture that information on the width of the income interval possibly matters, seems to be supported by the data. Given the absolute number of observations, such a formulation should, of course, be expressed with some caution.

If the width of the income interval plays a role in the evaluations, this aspect should be more "visible" in situation 2 than in the other situations. In situation 2, the transfer involves the richest and the poorest region so that after the transfer, the income gap between the richest and the poorest is definitely smaller. This aspect may matter more when the spectrum of incomes is considered to be wide. In questions 3 and 5, this aspect could also matter, though, perhaps, to a lesser degree. Actually, Table 9 reveals that for situation 2, there is a significant difference in the answering behaviour between version O and version 1, both for inequality and risk. In the risk context, the same is true for situation (question) 2 in a comparison between versions 1 and 2 (that this also holds for question 6 in the case of risk is a bit surprising).

Table 9: A Comparison Across Versions – Two–Sample t Test With Respect to Inequality and Risk: $p > |t|^*$

	1 vs. O	2 vs. O	1 vs. 2
Inequality			
Question 1:	0.55	0.94	0.65
Question 2:	0.04	0.44	0.29
Question 3:	0.31	0.95	0.34
Question 4:	0.40	0.48	0.92
Question 5:	0.91	0.66	0.76
Question 6:	0.70	0.66	0.46
Risk			
Question 1:	0.74	0.38	0.29
Question 2:	0.01	0.97	0.02
Question 3:	0.11	0.94	0.18
Question 4:	0.71	0.12	0.26
Question 5:	0.14	0.76	0.29
Question 6:	0.42	0.13	0.04

* H_o: Equality of Mean Across Versions, Question By Question

The issue of whether the width of the income interval matters can also be dealt with by simply looking at the percentage of answer A given in the individual questions 1–6. The conjecture again is that answer A should be more frequent under version 1 than under any of the other two versions. Table 10 shows that this is indeed the case, with one major exception. This applies to question 4 which in our opinion is the hardest to answer since it considers a larger transfer that neither affects the lowest nor the highest income positions, nor any two incomes that are adjacent. In addition, question 4 is the only one where two regions switch positions in an income ranking. In almost all other cases, the proportion of A's under version 1 dominates the respective proportions under the two other versions.

Table 10: The Proportion of Answer A in All Three Versions, Both For Inequality and Risk

Inequality

	version O	version 1	version 2
Question 1	32.84	45.65	42.56
Question 2	62.69	84.78	74.47
Question 3	56.72	67.39	61.70
Question 4	53.73	45.65	51.06
Question 5	70.15	69.57	65.96
Question 6	40.30	47.83	46.81

Risk

	version O	version 1	version 2
Question 1	46.97	54.55	41.30
Question 2	63.64	86.36	69.57
Question 3	59.09	70.45	63.04
Question 4	72.73	72.73	63.04
Question 5	63.64	75.00	67.39
Question 6	65.15	75.00	56.52

4.4 The Verbal Question 7

In the second part of the questionnaire, we asked the students to think about the issue behind rich–to–poor transfers. We confronted them with a hypothetical income change and some possible views about the effects of that change on inequality and risk respectively. Individuals were allowed to tick more than one response. The "d" in answer (d) reflects the Dalton view. We also gave our respondents the opportunity to review their answers to questions 1–6, but since a change occurred very rarely we do not pursue this issue further.

In Table 11, we summarize our results for all three versions. We also give a gender breakdown. We record the percentage of respondents who have ticked "d" only and those who ticked "d" together with at least one other option. The "'d' only" respondents are the "Daltonians", but we think that it is justifiable to present the proportion of answers that include "d" as well – be it due to some ambiguity arising from the verbal formulations or due to some other difficulties. We also present percentages with respect to answer "b" (as well as percentages of answers that include "b"). The situation described in answer "b" is to some extent less complex than the one in answer "d". Will it (therefore) be picked more frequently?

There are, of course, various differences among the three versions. The more general picture can be summarized as follows:

(a) The overall percentage of answers "d" only as well as answers that include "d" (we shall henceforth abbreviate the latter by "d+") is always higher under risk than under inequality, and this holds for all three versions.

(b) For "d" and "d+", the difference in percentages between male and female respondents is almost always larger under risk than under inequality (an exception is version O). This is consistent with most of our findings from Tables 4 and 8.

(c) It is not true that in general the percentages for "b" and "b+" are higher than the ones for "d" and "d+". Considering all six constellations together, it is often the case that the percentage of "b" is higher than for "d" in the context of inequality, with the opposite occurring for risk. For version O, the percentage for "b" is lower than for "d" in both contexts.

Table 11: Responses in Question 7 – All Versions

(percentage shares)

	Inequality			Risk		
	total	male	female	total	male	female
Version O						
percentage of answers "d" only	25.0	28.3	18.2	35.3	37.5	32.1
percentage of answers that include "d"	30.9	32.6	22.7	36.8	40.0	32.1
percentage of answers "b" only	22.1	23.9	18.2	22.1	25.0	17.9
percentage of answers that include "b"	41.2	41.3	40.9	29.4	37.5	17.9
Version 1						
"d" only	21.7	24.0	19.0	26.7	28.2	16.7
"d+"	21.7	24.0	19.0	35.6	38.5	16.7
"b" only	32.6	28.0	38.1	24.4	17.9	66.7
"b+"	37.0	36.0	38.1	35.6	28.2	83.3
Version 2						
"d" only	14.6	17.2	10.5	32.7	36.8	18.2
"d+"	14.6	17.2	10.5	38.8	44.7	18.2
"b" only	31.2	27.6	36.8	20.4	18.4	27.3
"b+"	37.5	31.0	47.4	28.6	28.9	27.3

5 Concluding Remarks

At the beginning of our investigation, we said that the theoretical analyses of inequality and risk are based on a few key assumptions that are common to both approaches. Does this mean that people perceive situations of inequality and risk similarly or, in other words, are the individuals' orderings of income distributions in terms of inequality close to orderings in terms of risk? One of the main findings of both the study by Amiel and Cowell (2000) and this investigation is that this is not the case. Both studies concentrated on the fulfilment of the principle of transfers and it was found that, roughly speaking, between 15 and 25% of the respondents satisfied this principle. What is notable is that the percentages of people satisfying the transfer principle are very close to each other in both studies. This is despite the Amiel–Cowell investigation being based on evaluations involving seven countries with more than 900 answers, while this study (with respect to version O) comprised only 130 evaluations. Also in both investigations, consistency with the transfer principle was higher for male respondents than for female students, in fact considerably higher for the male respondents, and consistency increased significantly when going from the aspect of inequality to the issue of risk. Apparently, these two aspects are viewed differently by both males and females. The latter seem to perceive inequality and risk differently from men. Why this is the case is very difficult to say, since the demographic data, at least for the respondents in Osnabrück, is very similar between the two groups. However, this gender difference should be the topic of further investigation.

In this study, we also examined whether the width of the income interval matters. The argument was that people would perhaps be more sensitive towards a fulfilment of the transfer principle if the transfer occurs within a wider income interval, whereas a transfer would not be considered that important (in the sense of reducing inequality or risk) if the income interval within which a transfer takes place is viewed as rather small. We think that our study has shown that there is some evidence that the width

of the interval plays a role. Statistical tests showed marked differences in the binary comparisons between the original version and version 1, and between versions 1 and 2 in the context of risk. This indicates that respondents become more "transfer–sensitive" when a transfer occurs within an obviously wider income interval. We stated above that there is an increase in consistency when switching from the issue of income inequality to the context of risk. This difference is markedly smaller for version 2, and this holds equally for both genders. So once again, the width of the interval, or size, seems to matter.

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Appendix

Version 1

Inequality Questionnaire

This questionnaire concerns people's attitude to inequality. We would be interested in **your** view, based on hypothetical situations. Because it is about attitudes there are no "right" answers. Some of the possible answers correspond to assumptions consciously made by economists: but these assumptions may not be good ones. Your responses will help to shed some light on this, and we would like to thank you for your participation. The questionnaire is anonymous.

Alfaland consists of five regions. Due to historical facts, the degree of industrialization among the various regions varies considerably, from high–tech industry to agriculture, as it were. Consequently, the incomes of the inhabitants of the different regions also vary considerably. Within a given region, everyone receives the same income.

Two economic policy proposals A and B are being considered for implementation in Alfaland next year. It is known that – apart from their impact on personal incomes – the two policies would have the same effect on the population. The impact upon the regions' incomes would depend upon the particular state of the Alfaland economy at the time the policy (A or B) is to be introduced.

In each of questions (1) to (6) two alternative lists of incomes A and B (in Alfaland local currency) are given. Each of these pairs represents the outcomes of the A–policy and the B–policy on the five regions in each of six different situations in which Alfaland might find itself next year. In each case please state which policy you consider would result in **higher inequality** in Alfaland by circling A or B. If you consider that the two policies will result in the **same inequality** then circle both A and B.

1) A = (2, 5, 9, 20, 30) B = (2, 6, 8, 20, 30)

2) A = (2, 5, 9, 20, 30) B = (3, 5, 9, 20, 29)

3) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 20, 29)

4) A = (2, 5, 9, 20, 30) B = (2, 10, 9, 15, 30)

5) A = (2, 5, 9, 10, 30) B = (2, 5, 9, 20, 20)

6) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 19, 30)

Version 2

Inequality Questionnaire

This questionnaire concerns people's attitude to inequality. We would be interested in **your** view, based on hypothetical situations. Because it is about attitudes there are no "right" answers. Some of the possible answers correspond to assumptions consciously made by economists: but these assumptions may not be good ones. Your responses will help to shed some light on this, and we would like to thank you for your participation. The questionnaire is anonymous.

Alfaland is an agrarian state that is not on a par, in terms of incomes, with highly industrialized countries. Alfaland consists of five regions that differ considerably with respect to climate and fertility of the soil. Consequently, the incomes of the inhabitants of the different regions also vary considerably. Within a given region, everyone receives the same income.

Two economic policy proposals A and B are being considered for implementation in Alfaland next year. It is known that – apart from their impact on personal incomes – the two policies would have the same effect on the population. The impact upon the regions' incomes would depend upon the particular state of the Alfaland economy at the time the policy (A or B) is to be introduced.

In each of questions (1) to (6) two alternative lists of incomes A and B (in Alfaland local currency) are given. Each of these pairs represents the outcomes of the A–policy and the B–policy on the five regions in each of six different situations in which Alfaland might find itself next year. In each case please state which policy you consider would result in **higher inequality** in Alfaland by circling A or B. If you consider that the two policies will result in the **same inequality** then circle both A and B.

1) A = (2, 5, 9, 20, 30) B = (2, 6, 8, 20, 30)

2) A = (2, 5, 9, 20, 30) B = (3, 5, 9, 20, 29)

3) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 20, 29)

4) A = (2, 5, 9, 20, 30) B = (2, 10, 9, 15, 30)

5) A = (2, 5, 9, 10, 30) B = (2, 5, 9, 20, 20)

6) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 19, 30)

Version 1

Risk Questionnaire

This questionnaire concerns people's attitude to risk. We would be interested in **your** view, based on hypothetical situations. Because it is about attitudes there are no "right" answers. Some of the possible answers correspond to assumptions consciously made by economists: but these assumptions may not be good ones. Your responses will help to shed some light on this, and we would like to thank you for your participation. The questionnaire is anonymous.

Alfaland consists of five regions. Due to historical facts, the degree of industrialization among the various regions varies considerably, from high–tech industry to agriculture, as it were. Consequently, the incomes of the inhabitants of the different regions also vary considerably. Within a given region, everyone receives the same income. An immigrant to Alfaland would be assigned at random, with equal probability, to any one of these five regions. Such a person would therefore have a 20% chance of being on any one of five income levels.

Two economic policy proposals A and B are being considered for implementation in Alfaland next year. It is known that – apart from their impact on personal incomes – the two policies would have the same effect on the population. The impact upon the regions' incomes would depend upon the particular state of the Alfaland economy at the time the policy (A or B) is to be introduced.

In each of questions (1) to (6) two alternative lists of incomes A and B (in Alfaland local currency) are given. Each of these pairs represents the outcomes of the A–policy and the B–policy on the five regions in each of six different situations in which Alfaland might find itself next year. In each case please state which policy you consider would result in **higher risk** for a person immigrating to Alfaland by circling A or B. If you consider that the two policies will result in the **same risk** to a potential immigrant then circle both A and B.

1) A = (2, 5, 9, 20, 30) B = (2, 6, 8, 20, 30)

2) A = (2, 5, 9, 20, 30) B = (3, 5, 9, 20, 29)

3) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 20, 29)

4) A = (2, 5, 9, 20, 30) B = (2, 10, 9, 15, 30)

5) A = (2, 5, 9, 10, 30) B = (2, 5, 9, 20, 20)

6) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 19, 30)

Version 2

Risk Questionnaire

This questionnaire concerns people's attitude to risk. We would be interested in **your** view, based on hypothetical situations. Because it is about attitudes there are no "right" answers. Some of the possible answers correspond to assumptions consciously made by economists: but these assumptions may not be good ones. Your responses will help to shed some light on this, and we would like to thank you for your participation. The questionnaire is anonymous.

Alfaland is an agrarian state that is not on a par, in terms of incomes, with highly industrialized countries. Alfaland consists of five regions that differ considerably with respect to climate and fertility of the soil. Consequently, the incomes of the inhabitants of the different regions also vary considerably. Within a given region, everyone receives the same income. An immigrant to Alfaland would be assigned at random, with equal probability, to any one of these five regions. Such a person would therefore have a 20% chance of being on any one of five income levels.

Two economic policy proposals A and B are being considered for implementation in Alfaland next year. It is known that – apart from their impact on personal incomes – the two policies would have the same effect on the population. The impact upon the regions' incomes would depend upon the particular state of the Alfaland economy at the time the policy (A or B) is to be introduced.

In each of questions (1) to (6) two alternative lists of incomes A and B (in Alfaland local currency) are given. Each of these pairs represents the outcomes of the A–policy and the B–policy on the five regions in each of six different situations in which Alfaland might find itself next year. In each case please state which policy you consider would result in **higher risk** for a person immigrating to Alfaland by circling A or B. If you consider that the two policies will result in the **same risk** to a potential immigrant then circle both A and B.

1) A = (2, 5, 9, 20, 30) B = (2, 6, 8, 20, 30)

2) A = (2, 5, 9, 20, 30) B = (3, 5, 9, 20, 29)

3) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 20, 29)

4) A = (2, 5, 9, 20, 30) B = (2, 10, 9, 15, 30)

5) A = (2, 5, 9, 10, 30) B = (2, 5, 9, 20, 20)

6) A = (2, 5, 9, 20, 30) B = (2, 6, 9, 19, 30)