Thinking About Inequality

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Preface

This book started life during a conversation at the LSE in the late 1980s. One author suggested to the other the shocking thought that the standard approach to the study of economic inequality and income distribution might be all wrong. Somehow this led to an even more shocking thought: that we might investigate whether this was so by asking other people, lots of them. This led to a full-scale research project which has resulted in a number of papers (see Amiel and Cowell, 1992, 1994a, 1994b, 1995, 1996, ?, 1997, 1998a, 1999) in the Bibliography) and finally to this volume which draws together the main results of the research project.

The number of people to whom we have become indebted in the course of preparing this book is enormous. First, our thanks go to Hayka Amiel who started the thought running that eventually led to the research for this book (see Chapter 1 for this story). We would also like to acknowledge the input of Avraham Polovin, who has collaborated with us in our related work on risk, and of Eytan Sheshinski, who acted as joint supervisor (with Frank Cowell) of Yoram Amiel’s PhD thesis: some of the ideas which have been developed in this book had their origin in Yoram’s thesis. Our thanks too for the patience of Mary Roye, Erik Schokkaert and colleagues at the Ruppin Institute who read the text and provided many useful comments. We are also grateful to Tony Atkinson, Gary Fields, Serge Kolm and Amartya Sen for helpful discussions, Janet Stockdale for helping us with the questionnaire design, and to all those colleagues who patiently ran questionnaire sessions in classes or lecture groups: Gideon Amit, Gershon Ben-Shahar, Stuart Birks, Dieter Bös, Sorel Cahan, John Creedy, Rolf Cremer, Wolfgang Eichhorn, Gideon Fishelson, John Formby, Wulf Gaertner, Jim Gordon, Charles Greenbaum,
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We also wish to acknowledge the Hebrew University, the Ruppin 
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Chapter 1

Introduction

1.1 A Look at Inequality Analysis

Thinking about inequality is not always a fashionable topic amongst economists. But thinking about inequality actually goes on all the time. Perceptions of inequality affect economic choices and political decisions. A sensitivity to inequality coupled with compassion for the poor motivates charitable giving by individuals and states. Notions about inequality appear to inform popular views about the appropriateness or otherwise of pay awards. And any parent with two or more children needs no formal analysis to be persuaded of the importance of distributive justice. Fashionable or not, thinking about inequality plays a part in the judgments and actions of politicians, planners and ordinary people.

Of course the study of economic inequality has not just been a matter of fashion. It has been an integral part of the general historical development of political economy and economics, and the approach to the topic has changed with the passage of time. While this is not the place for an extensive treatise on the history of economic thought about inequality, a brief sketch to introduce conventional wisdom on the subject may help to put into context what we want to tackle in this book.

This century has witnessed a shift in emphasis in thinking about inequality. It used to be commonplace to set the analysis of economic injustice within a particular social or institutional framework - such
CHAPTER 1. INTRODUCTION

as Ricardo’s or Marx’s class-based theories of political economy. Alternatively, issues of inequality used to be cast in terms of specific models of income distribution - such as Vilfredo Pareto’s famous Laws of distribution. However in more recent times there has been a move away from these narrowly focused perceptions of the problem to an approach founded upon general principles. What principles?

A cursory review of recent literature suggest that the principles encompass a wide range of theoretical and applied economics. But all the same it is possible to simplify them down to a relatively few essentials. In practice we may usefully distinguish four major building blocks that are required in the analysis of income distributions:

- The definition of income.
  We need to specify carefully, or to be told clearly, what the thing called “income” is.

- The income recipient.
  We also need to be clear about nature of the entities - persons, families, households or whatever - that receive those incomes.

- The reference group.
  We should explicitly define the “universe”: the collection of persons or groups within which inequality comparisons are to be made.

- The calibration system.
  The “inequality thermometer” - the inequality measurement tool - has to be precisely specified.

These four main components of inequality analysis get unequal treatment in the literature. As a sweeping generalisation we may state that items one, two and four in this list get a lot of attention; item three does not.

For example, theoretical economists focus principally on the fourth item in the list: the specification of a system of calibration. This forms a natural extension to a substantial literature on social choice.
1.1. A LOOK AT INEQUALITY ANALYSIS

and welfare economics. The way the analytical problems are formulated has close connections with other related issues such as the assessment of risk, the meaning of individual utility, the construction of index numbers of prices and income. In fact inequality presents a classic theoretical measurement problem, and is typically treated in a classic fashion by setting out a system of axioms that appear to be reasonable and in formulating key propositions that follow from the axiomatic base.

On the other hand applied economists and statisticians usually pay close attention to the first two issues: it is widely recognised that practical matters in defining income (or wealth, consumption expenditure, or whatever) or the family unit that is the income receiver are essential to understanding levels and trends of inequality within most economies.

But as far as the third point on the list is concerned - the appropriate reference group - one is immediately struck by the lack of references in the mainstream economics literature. Why this apparent neglect of one of the main components of income distribution analysis? Perhaps the answer is that to many researchers the issue seems obvious or self-defining. For example, in an empirical study, the sample is what it is. The population to which the sample represents - so it might be argued - does not really need more than the most cursory discussion. Yet in principle the “universe set” on which income distributions are to be defined and inequality to be assessed is a matter of theoretical as well as practical debate. For example in the world of Plato or Aristotle the issue of distributional justice was applied only to free men since, in a social system that tolerated slavery, economic injustice for slaves was not a particularly relevant concept (of course, women did not get a look in). Similar difficulties have been raised in connection with modern theories of justice: who is to be counted within the ambit of such theories, or who is to be party to the social contract? The voting public? All adults? The whole population? If the jurisdiction of nation-states can abruptly change even this last broad definition may be imprecise. Matters become yet more complicated if we try to take account of all the citizens of the world or persons yet unborn. The question has also been raised as to whether the principles that are applied to people
CHAPTER 1. INTRODUCTION

should also be applied to cats, dogs and other animals.¹

Even on the empirical level the issue of the reference group which can have a dramatic impact on the picture that emerges about the pattern of world inequality. As a simple instance of this consider the study of international income comparisons by Summers and Heston (1988, 1991). Their hundred-plus countries are divided into six broad groups (Africa, North and Central America, South America, Asia, Europe, Oceania) so that it is possible to obtain a broad-brush picture of world income inequality in 1985 and 1988. But at first glance this broad-brush picture looks rather extraordinary: we find in 1985 per capita income in Oceania was remarkably low - below Asia and South America so that it ranked fifth out of the six world regions (were the New Zealanders and Australians really so hard-pressed?); but in 1988 per-capita income in Oceania had seemingly jumped so that it ranked third out of six (after Europe, but above South America). The answer to this conundrum is not hard to find: in the 1985 data compilation the relatively poor Indonesia - with its 160 million inhabitants - was classified as being part of Oceania; in 1988 it was lumped in with Asia. So, by respecifying the groups only very slightly - in effect just relabelling one country - a substantially different story emerges of income inequality amongst different regions of the world. Clearly too, whether one counts Indonesia as an Asian country or part of Oceania is going to have a dramatic impact on the perceived inequality within Oceania.

This brief mention of theoretical and practical difficulties is not intended to imply that clear comparisons of inequality are usually impossible or meaningless. But it serves to highlight the importance of what might appear to be mere background features of the problem in making sensible inequality comparisons.

1.2 A Second Look

In our view there are deeper problems associated with the issue of the reference group. In fact it is arguable that the issue lies at the

¹See for example Sen’s discussion of Rawls’ concept of the “original position” (Sen 1970, page 124).
root of some of the more intractable problems in the assessment of income distribution. One of these problems - which we shall be taking up later in the book - is the relationship between the analysis of economic inequality and the analysis of poverty. Over recent years each of these two related topics has been extensively developed in terms of a mathematical approach founded upon a set of formal assumptions or axioms. But they have been developed separately, each using a distinct set of axioms as an intellectual basis. The intellectual divorce between the two branches of the subject can to some extent be explained in terms of different approaches to the idea of a reference group as we shall see further in Chapter 7.

The way that reference groups are perceived also has a bearing upon some basic propositions in inequality analysis. In effect what people mean by inequality can be crucially dependent on their perception of the relevant reference groups and in the ways that these groups are interlinked. The problem of the reference group and the way in which it relates to people’s thinking about inequality is actually a convenient introduction to the case for a second look at the basics of inequality and income distribution analysis.

As an example of what is involved here try a simple experiment. Figure 1.1 shows two possible income distributions in a very elementary economy. Each distribution - top and bottom - contains five persons who have been arranged on an income scale in positions corresponding to their incomes, and the two distributions have the same total income (§35). The units of income are irrelevant in the experiment (the “§” sign has an unspecified value) but let us suppose that income tells us all that we might need to know about the “well-offness”, economic status or whatever of the persons; and we might as well assume that the five anonymous persons are as identical as the caricature suggests them to be. The experiment is simply this: write down which of the two distributions appears to you at first sight to be the more unequal and, if possible, give your reasons for your answer.

Now, noting that the difference between the two distributions directly affects only two of the persons in the experiment, consider the slight modification of the diagram that is presented in Figure 1.2. Here we have explicitly divided the population of five into two
Figure 1.1: A simple distributional experiment.

component groups, left and right, as indicated by the shading, but the distributions are in reality just the same as in Figure 1.1. Notice that in each of the two subgroups taken separately it is arguable that the situation at the bottom of the diagram represents greater inequality than that at the top. The richest person in the left-hand group has a higher income ($5 rather than $4) and the poorest person in the right-hand group has a lower income ($6 rather than $7); so in both cases the income gaps within each reference group widen as we go from the top of the diagram to the bottom. However, that is not the end of the story.

As a final step in the experiment have a look at Figure 1.3, which again merely retouches the picture that was originally displayed in Figure 1.1. In this case we have highlighted just the two persons whose incomes are directly affected in going from one distribution to the other. Put in this fashion there appears to be no argument whatsoever as to which distribution is the more unequal: disregarding for the moment the persons whose income-positions remain unchanged in going from one distribution to the other (the people with incomes $1, $10, $13) it is clear that there has been an unambiguous reduction in the gap between the two remaining persons: the gap closes
from ($4, $7) to ($5, $6). Put another way if we consider the top income distribution as the “before” picture of inequality, and the bottom distribution as the “after” picture, then there has been a redistribution of $1 from a richer to a poorer person: according to this view inequality must have fallen.

So we seem to have at least two stories about what is going on in this trivial problem of inequality comparison. How does one go about resolving the apparently contradictory pictures of inequality that emerge from even a very simple experiment such as the one we have been considering? Indeed is there any point in trying to resolve such contradictions? Evidently the way that one tries to answer this sort of question will strongly influence one’s entire conception of the meaning of inequality comparisons.

The conventional approach to the subject has been twofold. On the one hand there is the horny-handed practical approach to evaluating empirical income distributions: having argued about the right way to measure income, and whether we should view income receivers as individuals, families, households or other groups, you pick

Figure 1.2: A simple distributional experiment, second view.
a measure of dispersion off the shelf and you estimate this along with mean income and other statistics (we shall be looking at some of these off-the-shelf measures later in the book). Alternatively there is a theoretical approach to the problem that appears to be full of the intellectual promise that accompanies analytical rigour: this method is to introduce a particular set of axioms which collectively define what is meant by inequality comparisons and hence what is meant by economic inequality itself. It is essentially the picture of inequality characterised by Figure 1.3 that is taken to be the standard paradigm for the majority of theoretical and empirical work in the economics literature.

The ambiguity of answers from the simple experiment raises issues that are considerably wider than the particular principle or principles which may be brought to bear on the particular distributional problem highlighted in Figure 1.1. It prompts the question as to whether the way in which inequality is conventionally presented in the literature on economics and in other related disciplines is in some sense “appropriate”.

Figure 1.3: A simple distributional experiment, third view
1.3 A GUIDE TO THE BOOK

1.3 A Guide to the Book

Those who know the economics literature on inequality will say that we have presented the pictures in our little experiment the wrong way round. That is actually quite true. We deliberately put the unorthodox view of the inequality comparison experiment first, and followed up with the standard story. The reason for this has little to do with the grand sweep of the history of thought on the subject, and much to do with a small domestic incident.

A few years ago the first author, Yoram Amiel, was asked by his wife Hayka (who is a school teacher and not an economist) to explain the topic of his research. To put the main ideas over concisely he gave her a little numerical example as an illustration - something close to the experiment that we have just been considering, in fact. Faced with the choice between the two distributions, Hayka gave the “wrong” answer. Yoram concisely pointed this out: the answer should have been clear, unambiguous and the exact opposite to hers - according to the standard theory of inequality measurement. Hayka’s reply was similarly concise: “So change the theory”. We make no claim to be changing the theory of inequality measurement in this book. But this issue did prompt an extensive research project which, amongst other things, resulted in this book. Along the way it also raised a number of provoking questions which we make no claim to have resolved. Is the standard theory “right” and, furthermore, what does it mean for a theory to be “right” in this context? These questions have in turn prompted the theoretical and empirical analysis which is reported in the following chapters.

Chapters 2 to 4 are principally about the problem of inequality in its purest form, the problem of dividing a cake of fixed size amongst a fixed number of people: Chapter 2 gives a summary guide to the standard approach to the literature on inequality measurement, 3 explains the method we used to investigate the assumptions underlying the approach - a series of specially structured questionnaires - and 4 reports the results of these investigations. These chapters also deal with elementary issues of how one can compare situations that have different sizes of cake or different numbers of people sharing the cake.
CHAPTER 1. INTRODUCTION

Chapters 5 to 7 extend the approach to three areas closely related to the pure inequality problem: social welfare (Chapter 5), the relationship between income growth and perceptions of inequality (Chapter 6), and poverty (Chapter 7). Each of these additional topics requires additional assumptions on top of the structure used for the pure inequality problem, and we subject these to the same sort of investigative strategy; they also provide us with an opportunity to check our results on the pure inequality issue.

Chapter 8 does a comparison of responses to our various questionnaire studies across countries and across academic disciplines, while Chapter 9 sums up and suggests directions in which thinking about inequality may yet go. Finally, those readers who like to have assumptions and propositions tidied up in a concise mathematical format may want to use Appendix A which sets out the main results in the conventional approach to inequality measurement: all this material has been parked in this unglamorous location because, although it has its uses, it is no substitute for thinking about inequality.
Chapter 2

What is Inequality? The Economists’ View

2.1 The Axiomatic Approach

As we mentioned in Chapter 1 the standard approach to the problem of inequality comparisons is based upon a formal structure that is usually expressed in terms of precise assumptions - or axioms - and mathematical propositions. So, in order to grasp what is going on and what it is that we are investigating in the rest of this book, it may be helpful to have a brief introduction to the axiomatic methodology.

The axiomatic methodology is a grand name for an essentially simple approach to our subject. It consists of a rule-based system of thought which enables us to state precisely what we mean by inequality comparisons, and thereby what we mean by inequality. The axioms are formal assumptions which are taken as fundamental: they are not derived from even more basic assumptions; they do not have to be based on any real world experience or observation; they require no appeal to any external value system. Whether the axioms are “true” or not, and what is meant by the “truth” of a set of axioms are moot points. What are the circumstances under which the axiomatic approach is valuable, and what is one trying to achieve by adopting this approach?

Perhaps a rough-and-ready description of the principal advantage of the axiomatic approach is that it acts as a systematic antidote
to the trial-and-error approach of picking apparently suitable ready-made statistics. This description both overstates and understates the case. It is a slight overstatement because picking an axiom system can in fact amount to little more than the trial-and-error approach in a rather more sophisticated guise: if you happen to want to use a particular measurement tool anyway, it is not too difficult to write down a set of “basic” assumptions which will imply that your pet measure is in fact the only one that is available for use. Our simple description also understates the rôle of the axiomatic approach: actually it is potentially quite powerful because, by adopting this method of analysis, it is possible to set out the exact relationship between particular principles or rules of comparison, and the types of specific mathematical formulae available for summarising income distributions. In fact it aids in formulating basic ideas about the meaning and structure of inequality comparisons.

2.2 Inequality Rankings and Orderings

Inequality comparisons are the basic idea with which we need to work: from several of these comparisons we may then build up an inequality ranking or, perhaps, an inequality ordering. An inequality comparison is simply a coherent rule for comparing distributions of income (or wealth, consumption, and so on) in two situations. Has the income distribution in our country become more equal over the last five years? Is Syldavia a more unequal society than Borduria? For an inequality comparison to be meaningful, then the answer “yes, Syldavia is more unequal than Borduria” must also imply, in the other direction, “Borduria is less unequal than Syldavia”. Of course this simple pairwise rule does not say anything about whether such pairwise comparisons can always be made, or whether connecting up different pairs of comparisons (where they can be made) is also possible. We can do more if the comparison rule is transitive, which means that inequality comparisons can be chained together: the statements “Syldavia is more unequal than Borduria” and “Borduria is more unequal than Arcadia” together imply the statement that “Syldavia is more unequal than Arcadia”. Given transitivity we
can produce an inequality ranking such as that illustrated in Figure 2.1.

A transitive ranking of distributions may nevertheless leave certain gaps in the set of possible pairwise comparisons. This is also illustrated in Figure 2.1 where the inequality comparison rule implies that Syldavia is more unequal than Ruritania which in turn is more unequal than Arcadia, but that Borduria and Ruritania cannot be compared in terms of the rule. Notice that we are not saying that the inequality rule indicates that Borduria and Ruritania have the same inequality, but rather that the rule is indecisive in this case. According to the rule that generated this ranking we just do not know which of the two is more unequal.

However if the inequality comparison rule is always decisive (or
“complete” to use the standard jargon) then, combined with the property of transitivity we could obtain an inequality ordering. At one level this is just what we mean by “measuring” inequality. As we shall see in fact the meaning of inequality comparisons depends critically upon the axiomatic basis that is specified for the inequality comparison rule.

In one very special case, virtually nothing is required in terms of axiomatisation. Given a two-person world with a fixed total income there is very little to say in terms of inequality comparisons. A brief look at the four distributions in Figure 2.2 is sufficient to make the point. Because there is by assumption a fixed total of income (in this case $10) the two persons (P and R) must be equally spaced around the position of mean income ($5); it is clear that as we move from
2.2. INEQUALITY RANKINGS AND ORDERINGS

Monday

Tuesday

Figure 2.3: Inequality comparisons in a three-person world

the top of the diagram to the bottom inequality steadily increases as the rich person R and the poor person P move farther apart. So what is inequality in this case? We could measure it as the income gap between the two figures ($2 in the first line, $4 in the second, $6 in the third...), or we could measure it as the proportionate gap between the two ($2/$10 = 0.20 in the first line, and so on); or, if we wanted to, we could use the square or the cube-root of the distance between persons P and R: It matters little except in terms of the scaling of the “thermometer” by which we propose to measure inequality.

However, when there are three or more persons matters are not so simple. Examine Figure 2.3 which displays a pair of alternative distributions for three persons: Poor (P), Quite-well-off (Q) and Rich (R). To see the problem imagine that the top part of the picture represents the distribution on Monday, and the bottom part the distribution on Tuesday: then going from Monday to Tuesday we find that poor P gains at the expense of quite-well-off Q; but, along
with the gains of P, the rich person R also gains: the Q-R gap widens. It is easy to imagine two different people looking at this situation and coming to diametrically opposite conclusions as to whether the net result constitutes a rise or fall in inequality from Monday to Tuesday: depending on whether they accorded priority to the P-Q change or the Q-R change.

As we will see, further difficulties arise even if we stay with the two-person case, but attempt to compare distributions that have different totals of income. At this point the axiom system has a potentially important rôle to play.

If we want to go beyond the two-person-fixed-income situation, then putting the problem into a formal setting can assist in focusing the mind on to the essential nature of these difficulties. In order to understand the way in which these issues are usually involved it would be useful to take a brief and informal overview of the main principles that are usually applied in the problem of making inequality comparisons.¹

2.3 The Transfer Principle

Let us go a bit deeper into the little experiment that we carried out in Chapter 1. Recall that in comparing the two distributions illustrated in Figure 1.1 the “right” answer was that the top distribution was more unequal. The reason was that displayed in Figure 1.3: the reduction in the income gap between the second and third persons in the distribution. The principle which we have highlighted here can be very simply stated: for any given income distribution if you take a small amount of income from one person and give it to a richer person then income inequality must increase.² This is the transfer principle, originally introduced by Pigou (1912) and developed by Dalton (1920). In fact we have stated this principle a little too casually because we have not specified the persons to whom it is to apply (just to the poorest or the richest? just to someone below and

¹For a detailed formal exposition of the axioms that appear in this and the following chapter, please see the Appendix.

²A broader interpretation is given in Castagnoli and Muliere (1990).
someone above average income? or to any two persons in the population?) As we shall see in Chapter 4 this point is quite important in terms of understanding the applicability of the transfer principle.

The transfer principle by itself is evidently not decisive in terms of inequality comparisons. This can be seen by looking again at Figure 2.3 immediately above. In passing from Monday’s distribution to Tuesday’s we find that there is an equalising change at the bottom of the distribution (the P-Q gap has shrunk), but that there has also been a disequalising change at the top of the distribution (the Q-R gap has increased). A “top-sensitive” observer of this situation (someone who attaches particular importance to what happens in the part of the distribution concerning higher incomes) will conclude that inequality has increased from Monday to Tuesday: a “bottom-sensitive” observer would come to the opposite conclusion. By appealing to the transfer principle alone we cannot resolve all possible inequality comparisons and build them up into a complete ordering of distributions by inequality.\(^3\)

2.4 Income and Population

One of the things that is left unclear by the simple example given in Figure 2.2 above is how one might systematically compare the two-person distributions illustrated there with two-person distributions of a larger cake (with higher mean income), or with apparently similar distributions having the same mean but with more individuals receiving each of the two incomes. Furthermore the transfer principle is of no help on these issues: it applies only to the problem of slicing and re-slicing a fixed-size cake amongst a fixed number of people.

We might guess that there ought to be some reasonable ways of extending the inequality orderings that apply not to this particular problem alone, but to more general situations involving cakes of arbitrary size, and arbitrary numbers of cake-eaters. There are indeed such “reasonable” extensions. However, intuition can be an

\(^3\)For this reason some writers have appealed to additional principles such as “transfer-sensitivity” which impose an explicit view on the relative importance of transfers in different parts of the distribution (Kolm 1976a).
unreliable guide here, and we shall find more than one apparently reasonable way of extending the rules on inequality comparisons in the two-persons-fixed-cake set-up to more interesting distributional problems.

Let us begin with the issue of the size of the cake. In other words we want to take into account the effect on inequality rankings of changes in aggregate income. Perhaps the idea that first springs to mind is that of scale independence: simply stated, for a given income distribution if you double, halve, treble everyone's income, then measured inequality should remain unchanged. This has become virtually the standard assumption in the literature, but let us take a moment or two to query it. Occasionally it is argued that the scale-independence principle is somehow the only reasonable assumption to make in view of the problem of arbitrary changes in the value of the monetary unit in which income is measured: if living standards are determined by real income and there is inflation so that the buying power of the dollar is halved then of course the two distributions illustrated in Figure 2.4 must be equivalent in terms of inequality. But this argument by itself is misleading: income can be measured in any way one wants - pounds, dollars, bars of chocolate - and so we can eliminate the problem of an arbitrary monetary scale by dividing all the incomes by an appropriate price index before carrying out any inequality comparisons. To get the sense of the scale-independence principle replace the “$” sign
2.4. INCOME AND POPULATION

Figure 2.5: Translation independence

in Figure 2.4 with “chocolate bars” and suppose this chocolate to be an all-satisfying composite economic good (this trick eliminates the scale-of-measurement problem). Again we might agree that the two halves of Figure 2.4 represent equally unequal distributions of chocolate: it is just that there is twice as much chocolate to go round in the bottom picture. But would we still say the same if we were told that the “5” dollars or chocolate bars in the first distribution were just on the borderline of survival? There may be alternative distributional principles that are reasonable.

To see the point, let us consider the property of translation independence which is seen by some as a viable alternative to the standard case. Figure 2.5 illustrates the basic idea; by contrast with Figure 2.4 the “new” distribution in the bottom half of the picture has been created from the “old” distribution in the figure simply by shifting the block containing the distribution bodily to the right; this preserves the absolute differences between the incomes in the distribution (again you can interpret the diagram in terms of dollars or chocolate bars). There is nothing to say that scale independence is “right” and translation independence “wrong” in some prior sense: it all depends on how we view inequality comparisons when the size
of the cake changes.\footnote{What we can be quite clear about is that - for meaningful inequality comparisons - they cannot both be true at the same time. If you are puzzled, see the Appendix.} in our view it is an issue which deserves further investigation which we will undertake in Chapters 4 and 6.

But what should happen to inequality comparisons when we consider communities of different sizes of population rather than different amounts of income? If we restrict attention to situations that involve a “balanced” increase in the population then it is arguable that a lot can be said. If we were to create a new distribution just by scaling up the population, then it may seem that nothing essential has changed in terms of the inequality of the distribution. This is what has come to be known as the population principle. The idea is very simple: imagine that you replicate the economy by creating a set of clones for the whole population. Intuition suggests, perhaps, that the combined economy - the original and clones together - has the same inequality as the original distribution before the cloning. The argument can be extended to arbitrary numbers of replications. This is the point that is illustrated in Figure 2.6: the bottom part of the picture is a three-fold copy of the distribution in the top of the picture: for every one person with a given income in the original
distribution, there are now three persons with that income.

Nevertheless, intuition may again be an unreliable guide. In the case of extreme inequality it is arguable that population replications are not neutral in terms of inequality. Consider Figure 2.7, which shows two situations in which there is undoubtedly extreme inequality. The top half of the figure displays the case where this is one rich person, and a whole bunch of people clustered together at the bottom of the distribution: the bottom picture depicts the situation that would emerge if the population were simply “cloned” and merged in the way that we have just discussed. Notice that in the way the example has been constructed there was just one very rich person in the original distribution; the very fact that the cloning process implies that there are many enjoying a very high income, rather than
2.5 Decomposability

Along with the transfer principle, the issue of decomposability is of tremendous importance in the standard approach to the measurement of inequality. Basically it involves the logical relationship between inequality in a whole population and inequality in each of a set of constituent groups in the population (males and females, age groups, ethnic groups and so on). There is a number of different approaches to aggregation and grouping issues, most of which are very closely related. The principle that is relevant here is that, if inequality should increase in one subgroup of the population, then *ceteris paribus*, inequality would increase in the population as a whole. To explain what is involved we shall concentrate on just one of these.

To focus ideas let us extend the example of the pair of distributions that we recently considered in Figure 2.3. Now consider merging each of these three person distributions with an additional “immigrant” group: the immigrant group is identical in each case. Let us simplify the problem yet further by supposing that this immigrant group has the same mean income as the original population. The principle of decomposability implies that inequality rankings before and after the merger should be identical.

In Figure 2.8, the top pair of distributions - before the merger - represent the same situation as in Figure 2.3 above. The bottom pair of distributions represent the picture that would emerge if the immigrants were counted in with the rest of the population. The decomposability logic is as follows: the 5-person population that we have in distributions $A'$ and $B'$ consists of a 2-person group (the “immigrants”) combined with a 3-person group (the original population),
Figure 2.8: Decomposability
as shown by the shading; if overall inequality is consistently related to inequality in each constituent subgroup and inequality between the groups, then the ranking by inequality of distributions $A'$ and $B'$ must be completely determined by the original distributions $A$ and $B$ (after all, the distributions in the 2-person “immigrant” group in $A'$ and $B'$ are identical, the 2-person group and the 3-person group have the same average income so there is no between-group inequality).

Notice that the principle of decomposability is independent of whether we are top-sensitive or bottom-sensitive in terms of inequality comparisons. As we noted in our discussion of Figure 2.3, in the upper half of Figure 2.8 a “top-sensitive” observer would rank $A$ as being a more equal distribution than $B$; such a person should also rank $A$ as being more equal than $B$ in the bottom half of the picture - if the principle of decomposability is to be accepted; a “bottom-sensitive” observer would come to the opposite pair of conclusions: $B$ more equal than $A$ and $B$ more equal than $A$. According to either view the pairs of distributions will be ranked consistently.

The practical importance of decomposability is considerable. If, for example, we try to set up some kind of coherent “accounting framework” for changes in inequality of a country in the course of economic development - “of the $x\%$ inequality growth overall, $y\%$ is attributable to inequality change in the rural sector, $z\%$ to inequality change in the urban sector, and the rest to what happened to income differences between the sectors” - it is almost impossible to dispense with the decomposability principle. Similar considerations apply when one tries to break down inequality systematically in other complex heterogeneous populations. However, the principle imposes stringent limitations on the type of measurement tool that are available for constructing inequality orderings. Perhaps these restrictions are in fact too stringent: this is something which we shall look into further in Chapter 4.

### 2.6 Summary

In economic terms the question “What is inequality?” resolves into the question “how are inequality comparisons to be made”. Fancy
2.6. SUMMARY

statistical devices that might serve as inequality measures or other graphical tools for comparing distributions are given meaning by introducing a set of basic principles which embody ideas about what a “more unequal distribution” connotes. The basis for these rules need be nothing other than “that which is considered to be reasonable”. Who considers it to be reasonable is another matter.

We have had a brief look at some of the main principles that are commonly applied - explicitly or implicitly - in the standard approach to inequality comparisons. Later in the book we shall consider other principles, which have a special importance when inequality is interpreted in terms of welfare economics.\footnote{In particular we discuss the issue of “anonymity” or “symmetry” in Chapter 5.} Two of the principles that we have introduced so far stand out as being of crucial importance. The principle of decomposability is required for a lot of the applications of inequality comparisons that empirical researchers would like to undertake. The transfer principle is even more fundamental: in fact this alone is often taken to be a defining characteristic of what is actually meant by an “inequality measure” amongst all the various mathematical functions that might be defined upon the set of all possible income distributions. Nevertheless, along with the other principles reviewed above we propose to subject the principle of transfers to further scrutiny.
CHAPTER 2. WHAT IS INEQUALITY? THE ECONOMISTS' VIEW
Chapter 3

An Investigative Strategy

3.1 What are we investigating?

A glance ahead to the empirical chapters of this book will reveal that we concentrate heavily upon one particular investigative approach. Our approach may at first appear to be unconventional and so one might well ask what it could achieve that cannot be covered by more conventional methods of economic investigation. Why go to the trouble of developing a specialised strategy for one specialised branch of welfare economics? The short answer is that what conventional methods can do inevitably misses a number of important issues completely: we show that our methodology fills a gap in the body of evidence about values and preferences in economics. We shall also argue that the approach can be useful in other branches of economics.

Consider the nature of “evidence” in economics. The usual form of evidence is simply empirical corroboration - for example in studies of consumer demand or of firms’ costs. Obviously there is a variety of substantive issues to be addressed before accepting this sort of testimony in any economic debate: there are methodological issues about what constitutes a satisfactory “test” of an economic theory; behavioural models may have to be put into desperately simple forms in order to be estimated empirically; particular data sets may have defects or even be downright shoddy. But it is usually assumed that these difficulties can be overcome, or can be accommodated to a suffi-
cient degree, that other forms of evidence - such as that derived from experiments and surveys - is either superfluous or of inferior quality to data derived from real behaviour in real markets. Questionnaire or experimental methods may well suffer from the same sort of difficulties as do conventional behavioural estimation techniques with some additional problems piled on top. More than that, the conventional wisdom appears to be that these alternative approaches could actually be misleading or dangerous: market research can be misdirected, people may lie to opinion polls or refuse to participate in official surveys. In sum, the conventional wisdom in mainstream economics appears to be that it is far better to judge people by what they actually do, than by what they say that they would do.

However, an approach using behavioural evidence is simply inappropriate or irrelevant in the present case. After all we are not dealing with a situation where the relevant concepts are traded in a market where individual values or tastes are translated into choices. Many people will have strongly-defined views on inequality and welfare that will virtually never be translated into concrete actions. Even so it might be argued that a counterpart to conventional evidence used in analysing the behaviour of consumers or firms is available in the field of applied welfare analysis. Politicians and other governmental agencies make decisions about allocation that reflect value judgments on inequality, inequity and poverty and so we might be able to use the outcomes of their choices to draw inferences about the basis on which they were made in a manner similar to that used in conventional consumer theory. However this type of evidence runs into a number of special problems of its own. For a start the data base is always likely to be rather thin: there are not many agencies to observe and not many different “cake-division” actions to observe. It is also reasonable to suppose that politicians will usually make decisions on the basis of a variety of criteria in addition to any specific coherent views about inequality; and of course they may not represent anyone other than themselves. Moreover the outcome of the decision - which is all that we are likely to observe - will be influenced by a variety of factors that lie outside the government’s control. We know for example that economic inequality rose substantially during the 1980’s in a number of Western countries that had governments
3.1. WHAT ARE WE INVESTIGATING?

inclined toward the political right; how much those observed changes in income distribution are directly attributable to official policy is difficult to ascertain; still more difficult to ascertain from this evidence alone would be any specific views on the nature of economic inequality. In sum, it is unlikely that observing the outcome of distributional decisions in practice is going to address the sort of issue relevant to the subject matter of this book.

So if the problem in hand cannot make use of the conventional kind of behavioural data, what can be done? Considerable progress can be made in some branches of economics without calling on carefully documented evidence; a lot of economic models are based essentially on uncorroborated general appeal because they have an important story to tell - simple general equilibrium models and game theory. So why not just carry on with artificial models and assumptions in welfare economics? Furthermore where value judgments are involved there is a temptation to state De gustibus non est disputandum and move on to the next question. So why not just leave it at that? The “de gustibus” tag is virtually a truism, but it is perhaps an irrelevant truism. If the way that economists or other social scientists think about inequality is radically different from the way that it is perceived by others then there is good reason to think again - at least about the terms that we use. If we are concerned about the design of economic policy then it is important to consider the basis on which the objectives of the policy have been framed. For this reason we should perhaps be ready to consider alternative investigation techniques and information sources about perceptions of inequality and income distribution.

There is a practical alternative to the benign neglect of assumptions about preferences and values. It would be reasonable to consider analogous situations in related fields where behavioural data is unlikely to be available, or where the data are inadequate for the purpose of drawing conclusions about how economic agents act. There are many good examples of scientific approaches in economics which specifically address this sort of issue, including business games, income tax experiments, surveys of investment intentions and consumer attitudes.

The closest of these to our present study are those that con-
cern themselves with the analysis of individuals’ attitudes to risk. A lot of information about people’s willingness to take risks is available from observations on market behaviour - buying and selling of financial assets, insurance contracts, gambling - which will permit inferences to be drawn about the shape of people’s preference maps. But usually these inferences require the prior acceptance of a system of behavioural axioms that cannot themselves be subjected to test by the evidence. For example, assuming that people’s preferences can be adequately represented by von Neumann-Morgenstern utility functions one might be able to deduce something about the degree of risk aversion from their observed behaviour in selecting a portfolio or other actions (Levy 1994); but to investigate whether the von Neumann-Morgenstern structure is itself an appropriate way of modelling people’s preferences in the face of uncertainty requires something more than just market data (Kahneman et al. 1982).

There is another practical lesson that can be drawn from the problem of investigating behaviour under uncertainty. There are a number of instances where data is, arguably, pathologically unreliable: even if data on choices were supposedly available, we might not want to trust it. A classic example of this kind of issue is the investigation of illicit behaviour, such as is required for the empirical estimation of models of tax evasion. Although it is of considerable interest to know the size of the underground economy and the behaviour of its participants, it appears that if one were to attempt to measure incomes flowing from illegal activity one would - almost by definition - end up measuring something else because if the activity could be quantified then it could not really have been “underground”. If so, then there is little hope of using data from this source to get evidence on the patterns of preferences and the responses to incentives of those who engage in underground activities. What does the researcher do in such cases? Apart from the comparatively rare situations in which the tax authorities allow private individuals access to records of tax audits or otherwise confidential records, a common approach has been to rely on experiments, simulations and questionnaires - see Cowell (1990) Chapter 6.

However, we have to admit, economists are often suspicious of this kind of approach and wary of the evidence that it provides.
Why? Part of the reason could be that the techniques involved are perceived as principally belonging to other disciplines and that, on the whole economists are pretty self-assured about the validity of their own methods: “economists on the whole think well of what they do themselves and much less well of what their professional colleagues do” (Galbraith 1971). Nevertheless if we as economists are to be involved in making policy recommendations on taxation or other measures that affect individual incomes, or if they are to interpret trends in income distribution then we may just have to take on board methodologies that appear at first sight to be alien.

The approach that we develop in this book combines elements of these two techniques - experiments and questionnaires - which have become standard in some branches of economics and other social sciences. Let us briefly examine what is involved in each of them.

### 3.2 Experiments

It used to be conventional wisdom that - unlike the natural sciences - controlled experiments in economics are impossible. The economic history of the late 1980’s and early 1990’s may have given the lie to this - the drastic economic reforms in Eastern Europe, or the tinkering around with local taxation in the UK - seem to provide instances where economic advisers have been given a free hand to pursue the logical consequences and observe the practical implementation of a theory or doctrine. Attractive as the idea of a controlled economic experiment may be to some, to those who are unpersuaded of the doctrine or to observers who have watched some of the experiments go dramatically wrong, these developments are not strictly speaking “experiments” in the conventional usage of the term.

Although there is some latitude in the interpretation of the term “experimental method”, experiments in economics usually have a number of elements in common:

**Theoretical base.** The theoretical base for the experiment is essential in defining what its purpose is supposed to be and in interpreting the findings of the experiment. The point has been well
made by John Hey: “Consider, then what is being tested. There are two components...

- that the theory is correct given the appropriate specification (that is, under the given conditions);
- that the theory survives transition from the world of theory to the modern world

All too often the theorist ... assumes that point 1 is true - usually without discussion. Thus attention focuses on point 2.” - Hey (1991), page 10. The theoretical base need not, of course, be a conventional model of utility- or profit-maximising agents; it could encompass other types of optimising behaviour, or situations where the notion of optimisation is irrelevant.

Rules of the Game. The set of rules within which the experiment operates needs to be clearly specified and understood. This applies to all sorts of economic models that can be represented as games; it applies to the relationship between experimenter and experimental subject; and it even applies if we consider real world as the outcomes of cosmic “experiments”. It is an important step in defining what can be expected to be learned from the class of experiments of which the particular experiment in question is a part. In some instances the method of analysis delimits the sets of rules that could be considered within a particular experimental environment. We can illustrate this in the case of the board and counters used to play an ordinary game of draughts (checkers). The equipment comes with a set of rules for playing draughts, and we might imagine small variations in the rules which could make the game more interesting. We could even imagine generating a substantially new game with different rules: we could use the same counters and the same board to play a game like “fox and geese”. What we do not allow is the opportunity for players to remake the rules as they go along, or just to kick over the board. So too with economic experiments: the “rules of the game” define not just one particular experiment, but a class of experiments which could be run, and therefore a class of economic
questions which could be addressed. The possibility remains that interesting questions on a particular topic could be ruled out by virtue of the class of rules of the experiment.

Control. The element of control is usually integral to the nature of economic investigations. For example, quantitative macro-models usually require the careful specification of a “counterfactual” - a story of what would have happened otherwise - in order to appraise the worth of the model under consideration. The extensive Negative-Income Tax experiments performed in the United States (Ferber and Hirsch 1982) went to considerable trouble to provide control groups of families who were not being confronted with the negative-tax system of income support. In modern experimental economics it is common to provide the element of control through the setting in which the experiment takes place: this is conventionally described as a laboratory. The meaning of a “laboratory experiment” in economics is simply that it takes place in a controlled environment - commonly a work-room equipped with computers for use by the experimental subjects - that is manifestly different from the real world. In this way some of the problems of human nature that confront the experimenter can be dealt with systematically. For example the knowledge that you are actually part of an experiment may well affect your behaviour; so that unless the experimenter is careful, misleading interpretations could be drawn from results in the laboratory; standard techniques can be applied to mitigate this problem - such as embedding the experiment that you are really interested in within the context of some other experiment, or by providing experimental subjects with financial incentives that correspond to real-world gains and losses - but by the nature of the laboratory setting one can never be wholly free from it.

3.3 Questions

An important alternative approach to laboratory experimentation involves posing questions. This is an idea that, in this field, goes back at least to Cowell (1985). This can be done in a variety of formats, and we have to admit that questions bring their own problems. Some
of these problems are familiar to those who run opinion polls and those who use them. Here is an abbreviated summary

The “framing” problem. Sometimes the responses to a question will be significantly affected by the way in which the question is phrased or the context in which it is placed.\textsuperscript{1} One way of mitigating the problem is to ask about the same issue in a variety of forms. However, in some respects “the framing problem” may not be a problem at all but rather a part of the design of the study, in that the particular way in which the questions are to be posed is intended to be significant. An important instance of this is where the researcher wants the respondent to make reference to a particular national or social context: examples are the subjective poverty-line questionnaires used by Hagenaars (1986) and others.

Misrepresentation. People have been known to tell the questioner what they think the questioner wants to know; or they tell tales to advantage if they do not want to look foolish or boorish in the eyes of the interviewer; or they simply lie. Although people may respond to a political pollster - with good motive - in one fashion, they may well do something rather differently within the anonymous privacy of the voting booth. If they think that there is something to be gained personally from their response they may try to manipulate the system by choosing their answers appropriately.

Imprecision. Applied economists delight in precise numerical answers to precise questions: but if the questions are to be posed to individuals in questionnaires rather than being embedded in an econometric study, then a high degree of precision may be illusory or unattainable. On many important issues people may have clear and decided views but yet be unable to express them in a way that would satisfy the niceties of numerical representation that might be considered desirable in an empirical study. To try to force people’s responses into a more “precise” format might result in a spurious quantification which smacks of the “how-upset-were-you” type of question that is sometimes posed by officious reporters to the grieving widow after a traffic accident.

\textsuperscript{1}See, for example, Plous (1993) Chapter 6.
3.4. A NEW APPROACH

All of these issues are relevant to a questionnaire investigation of people’s attitudes to inequality but, as we shall see, they can be satisfactorily handled by working on a suitable design of the questions that are to be put.

3.4 A New Approach

Our approach involves presenting individuals with questionnaires in a way that uses many features of experimental methodology reviewed above - for this reason we call it the questionnaire-experimental method. To understand the basis of the approach let us consider the way in which distributional judgments may be presented to people.

Imagine a society to be made up of “identities” - labels, if you like - which can be adopted by the various people who are actually going to inhabit the society. The situation is a bit like the children’s game with cherry stones: tinker, tailor, soldier, sailor, rich man, poor man,.... The various possible states of society can then be considered as systems of rights, rewards and privileges that are associated with each of these identities. In making judgments about alternative social states it is obviously of crucial importance to be clear about the relationship between the person or group of persons making the judgment and the set of identities making up the society. There are two distinct scenarios.

In the first scenario we make the assumption of Olympian detachment: we suppose that whoever it is making judgments about the society is an outsider who is not going to be involved in the society. It is perhaps like that of a representative of an international organisation such as the World Bank or the IMF who is reviewing alternative policies for some country of which he is not a national.

The alternative scenario, of course, is to suppose that the individual will be - and knows that he will be - allocated one of the identities in the society on which he is passing judgment. Instead of being a disinterested - albeit compassionate - observer of the scene he is an insider who is going to benefit or suffer from the particular state of society that will be adopted. Rather than being a representative of
the World Bank, he is the Prime Minister, a government advisor, company executive or trade union leader. At this point a second issue arises which can be explained by the use of a couple of simple diagrams.

Suppose the tinker-tailor-soldier-sailor identities are numbered 1, 2, ..., n. What should one assume that the person (or persons) making the value judgments knows about his (their) identity? Following the work of Harsanyi (1955) and Rawls (1972)\(^2\) it is common to assume that welfare judgments are in effect made behind a “veil of ignorance”, in other words, supposing that the individual does not know which identity he or she will adopt. In its simplest form

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\(^2\)See in particular Rawls (1972) pages 137,164. See also Dahlby (1987) .
3.4. A NEW APPROACH

the position can then be represented as in panel (a) of Figure 3.1: here the assumption is that any one of the identities is equally likely, so that each person making a distributional judgment is faced with a rectangular probability distribution as to his own chances in the lottery of life (strictly speaking we should only draw a density like this if the collection \{1, 2, ..., n\} were to be replaced by a continuum: let us ignore this technicality). The obvious alternative is where the person making the judgment knows exactly which suit of clothes he is going to put on in this society: this represented by panel (b) in Figure 3.1, where all the probability mass is concentrated at identity $i$.

\footnote{In related work Beckman et al. (1994) have explicitly compared this pair of extreme alternatives in an experimental setting.}
These two extremes by no means exhaust the possibilities. In practice the situation very often lies somewhere between them. The veil of ignorance may be replaced by the net curtain of partial ignorance in that you, as the person passing judgment, have some information but not complete information about the allocation of identities. For example it could be you know that you probably belong to the rich set although you do not know exactly which member of the rich set you will be. Alternatively expressed your prior distribution over the set of labels in society is not uniform - see Figure 3.2.

This type of issue appears to be commonly regarded as important in the design of rules and procedures that have to do with distributional fairness. On the whole people regard with distaste the law-maker who profits personally from his privileged position when making laws. Recognising that you - the lawmaker or social commentator - cannot be completely neutral if you are actually a member of the society, society will devise institutions and rules that limit your power to use your inside knowledge: conventions of public life may require that your business interests be handled by trustees during the tenure of political office; the law may limit the extent to which you can use patronage in providing “jobs for the boys”. And just as the connection between self-knowledge and self-interest is perceived as important in real life we would expect it to be important in experimental situations as well.

It is clear that this second scenario of the relationship between the person making distributional judgments and the component identities of society is both more demanding in its basic assumptions (have the probabilities of individual identities been made clear to all concerned?) and perhaps sensitive to the context in which the questions are framed (the individual will be asking himself “where am I in this income distribution?”). For this reason the questionnaire-experimental method that we have adopted is designed so as to give the respondents the impression that they are making judgments about a society in which they themselves do not participate. In this way the issue of the alternative identity assumptions in Figures 3.1 and 3.2 are sidestepped.

All of the work reported in this book conforms to the same general
3.5. IMPLEMENTING THE APPROACH

pattern: questions about income distributions in an abstract setting are presented to individuals in a controlled environment that is similar to a laboratory environment. Some of the advantages of this approach are immediately apparent. For example, because the topic with which we are concerned - the structure of inequality comparisons - is not principally behavioural, we do not have to worry about behaviour in reporting the results of our experiments. Moreover, the issues themselves are not of the “what would you do if...” but rather of the “what do you think of...” variety, we may reasonably assume that strategic decisions are not going to have a significant role to play in the pattern of responses; and because no decision is consequent upon the responses to the questions - or upon other related questions as in the cases of voting-intention opinion polls - there is reason to believe that the responses are relatively uncontaminated by people’s desire to impress or mislead.

3.5 Implementing the Approach

In Chapters 4 to 8 we apply the principles of outlined above to a series of interconnected investigations on inequality, social welfare and poverty. Within the questionnaire-experimental framework the issues could be put in a variety of forms: in particular questions on comparisons of income distributions could be expressed numerically or verbally.\(^4\) Consider the sort of arguments that might be used for or against either of these approaches.

- **Numerical dazzle.** A kind of number blindness may affect people when they see a problem put on paper. Reasonable people will sometimes wilt in the face of fairly elementary arithmetic when it appears printed in front of them. This effect is exacerbated when a whole mass of these problems appear together. So if numbers are to be used they should not be used en masse.

\(^4\)The issues could be displayed graphically as well, of course. However early experiments with conventional pie-charts proved to be unsatisfactory (respondents found it difficult to distinguish the sizes of relative pie-slices). The diagrams that we use extensively in this book were not invented until we had collected most of the evidence in numerical and verbal forms.
• Careless calculation. Few of us today are as practised as our parents in the art of mental arithmetic. The mistakes that are commonly made even in elementary operations such as counting or taking differences warn us to be cautious about numerical responses and suggests that verbal responses may be more reliable.

• Tricky phrasing. However words have their own way of misleading. An inappropriate word or phrase can take respondents down the wrong track: this is particularly important for our work which takes in respondents from several countries - things can get lost or modified in translation.

• Word fatigue. One of the problems of trying to be precise and unambiguous with words is that there is a natural tendency to verbosity in explanation. Even the most willing and cooperative respondent will get fed up with a questionnaire that runs over much more than half a dozen A4 pages or that takes more than twenty to thirty minutes to complete. There is a three-way trade-off amongst painstaking detail, broad-brush simplicity and the number of issues covered in one questionnaire.

Finally let us mention a problem that can affect both numerical and verbal types of questionnaire that we must always expect to find in an investigation of this sort:

• The illusory quest for Truth. Many respondents are likely to suffer from deceptive notion that there is a “right” answer lurking just underneath the question that sufficiently energetic application of standard methods will uncover.

Our principal strategy for avoiding the problems that we have just listed is to make use of both types of approach: numerical and verbal. All of the questionnaires that we have used in the work reported here essentially makes a “three-phase” approach to the respondent as follows.
3.5. IMPLEMENTING THE APPROACH

1. A series of numerical problems are presented. Each problem involves a pairwise comparison, usually in terms of the apparent inequality of two simple distributions A and B. The respondent is asked to circle A or B or both A and B according to his own judgement.

2. There then follows a series of verbal questions that closely match the preceding numerical problems. As the respondents quickly become aware, these verbal questions cover the same issues as were illustrated by the problems, and they appear in the same order. Almost always the list of available responses to the numerical questions includes a “none of the above” option.\(^5\)

3. The final phase is merged with phase 2. After each verbal question the respondent is invited to reconsider the response that he made on the numerical problems. Now that he has had the problem explained in words, he might feel that he originally missed the point. Has he now “seen the light”?

Of course we do not claim that this methodology is problem-free, although we have found that it is remarkably robust. Let us consider some of the obvious snags that may arise.

One of the problems of representing and capturing opinions about economic policies is that they tend to be both vague and rooted in the specifics of a particular respondent’s experiences. Vagueness is essential because, if you go to a lot of trouble to specify the nature and context of the issues in painstaking detail, you run the serious risk of losing your audience before the questions are actually put. Furthermore precise judgments about distributional issues might be strongly influenced by the context in which the issues are perceived: if the question is put in dollars is the American respondent going to make some connection with the situation in the USA.

With any direct approach to individuals the problem of manipulation may arise, as we have noted. However, using the questionnaire-experimental technique enables the researcher to build in a number of checks against the possibility of deliberate distortion, and making

CHAPTER 3. AN INVESTIGATIVE STRATEGY

the approach anonymous reduces the problem of possible distortions in the responses as a result of the targeted individuals not wanting to look foolish and choosing their answers accordingly.

A major problem in implementing the technique is that there is a weight of standard practice in the subject area. Experts in inequality analysis - and even reasonably well-informed amateurs - are going to bring to the subject views that have been formed from an acquaintance with the conventional axiomatic systems. This is obviously not what we want. On the other hand if we were to use lay people as respondents it might be that we would have to throw out a lot of responses simply because the respondents did not have the basic numerical skills to deal adequately with the experiments. Our compromise was to use university students. Obviously students possess the great advantage of eminent availability for academic researchers: it is a practical method of getting a respectably-sized sample with a very good response rate. However in the present case there is a deeper reason why using students may be a particularly good idea: if one targets those who are going to study the subject matter of the experiment, but who have not yet studied the received wisdom then one has a reasonable prospect of obtaining respondents of about the right sort: they will be about half-way between the unprejudiced but innumerate and the hidebound expert.\(^6\)

Our Students. The samples for our various questionnaires are detailed on page 211 of Appendix B: in all we had about 4 000 respondents in eight countries.\(^7\) One of the main features of our sample was that we tried to get students who had not yet taken courses that involved a substantial component of welfare economics or that explicitly dealt with inequality and income distribution (in some cases the teachers presented the questionnaire at the beginning

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\(^6\)In other types of questionnaire study on distributional issues non-student opinions found to be consistent with the opinions of student samples - see Schokkaert and Capeau (1991), Schokkaert and Devooght (1995), Schokkaert and Lagrou (1983), Schokkaert and Overlaet (1989). Other questionnaire studies in the same spirit using student samples include \(^7\), Beckman, Cheng, Formby, and Smith (1994), Ballano and Ruiz-Castillo (1992), Yaari and Bar-Hillel (1984)

\(^7\)This is a subset of the sample of student respondents in our research programme. In all we have about 5 000 students in nine countries.
of such a course before revealing the “truth” in the main body of the lectures). In this way we sought to reduce the problem of received-wisdom bias amongst our respondents. However there were some exceptions to this which, as we shall see, provided us with some interesting information. The sample included both economists and non-economists.

Format of questionnaires. Questionnaires were prepared and distributed on standard size paper during class or lecture time. The “standard text” of the questionnaires is presented in Appendix B (see pages 216 to 244). However some respondents did not see the questions in exactly this format. As a control we occasionally reversed the presentation of the pairs of problems in the numerical part of the questionnaire (switching the left and right columns) and we also tried rearranging the order of the numerical questions (top and bottom switches): this rearrangement of the questionnaire had no perceptible impact on the responses.

Translation of questionnaires. In the course of the research programme which led to this book we were assisted superbly by colleagues who were willing to run our questionnaire experiments in their own universities and colleges around the world. Since we did not want to restrict our attention to the English-speaking world the issue of translation of the text of the questionnaires arose. This was treated pragmatically. In Germany and Sweden the text was left in English, but the Germans explained queries about the meaning of the questions in German where necessary. In Israel all questionnaires were translated by the first author (Yoram Amiel) into Hebrew.

3.6 A Brief Summary

The issue that concerns us in this book - the way in which inequality is to be perceived - is not something which is susceptible of analysis by the “standard” approaches of applied economics. Conventional approaches to inference about people’s preferences do not provide the right tools for the job in this case, and for this reason we have made use of the questionnaire-experiment technique.
However, we do not want the results to be a mere “trick of the light”, otherwise the conclusions that we would try to draw from our questionnaire-experiment approach might mere artefacts of the structure of the questionnaire. For this reason the multistage questionnaire seems to be the appropriate method of getting to the bottom of the way in which people conceive of inequality comparisons.

The question arises why we, or economists in general, should care about what other people’s opinions on distributional orderings. In the light of this chapter’s discussion there are two points to be made. First, economists’ care very much about other people’s orderings of entities such as commodity bundles; but in that case, of course, one has real market data to provide the information. Should one not be just as interested in situations where market data is not going to be available? Second, inequality analysis is not just for inequality experts. Judgments about inequality and income distribution affect policy issues that concern real people, and so it makes sense to know what real people “see” when they think about this subject.
Chapter 4

What is Inequality? The Students’ View

4.1 Drawing an Inequality Map

In this chapter we undertake an empirical investigation of attitudes towards the basic principles of inequality comparisons, based on our purpose-built questionnaires. We will have a first attempt at answering the question of whether the standard formalisation of inequality comparisons - such as that outlined in Chapter 2 - capture the picture of inequality rankings that may be in the heads of those who think about inequality without the benefit of studying the standard story first.

Not all of questionnaire-experiments were directly about inequality - some of them were phrased in terms of social welfare or poverty, which are to be discussed in later chapters. Right now we are going to focus on just the issues that were raised in the theoretical discussion of Chapter 2: Chapters 5 to 7 then take the approach on into three related areas of interest concerning distributional questions.

The views expressed could in principle be used to provide a type of inequality map of our student respondents’ attitudes to inequality. Although this idea is simple in principle, drawing an inequality map in practice can be quite complex. Even if we had just three persons in the society we would need to construct a diagram such as that in Figure 4.1. The income of each person is measured along one of
CHAPTER 4. WHAT IS INEQUALITY? THE STUDENTS’ VIEW

Figure 4.1: The framework for a 3-person inequality map
4.1. DRAWING AN INEQUALITY MAP

the $x_1, x_2, x_3$-axes ($x_1$ means the income of person 1, and so on), and the shaded triangular area depicts all the possible distributions out of a given fixed total income (if no income is wasted in the distribution). Some income distributions are relatively easy to see on this map - for example distributions that correspond to perfect equality must lie on the diagonal ray, and distributions where just one person gets all the income must be one of the corners of the triangle $A_1A_2A_3$, as shown - but most distributions are difficult to interpret. Moreover the iso-inequality contours that should be drawn in this diagram would themselves be three-dimensional surfaces. The problem of depicting income distributions and inequality maps is obviously augmented for larger populations.
10) 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" (if you now consider the two distributions to have the same inequality):

11) 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) Inequality remains the same.
c) Inequality has increased.

Suppose instead of adding we deduct a fixed amount from each person's income. Then inequality...

a) is the same
b) increases
c) decreases

In the light of both 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") here:

Figure 4.3: Verbal questions on scale and translation independence
As far as possible we will seek to reduce the complexity of the diagram. We do this by presenting the evidence about the basic inequality axioms in terms of one of the simplest possible formal diagrams: the two dimensional framework, set out in Figure 4.2. Here the set of income distributions corresponding to perfect equality is a ray at $45^\circ$ through the origin, and the set of all no-waste income distributions of a given sum is the line at right-angles (the set of all possible income distributions of a given total, including wasteful ones, is given by the shaded triangle bordered by this line). Figure 4.2 can be taken as a representation of the distributional possibilities in literally a two-person economy or, more interestingly, as two-dimensional plan-form view of a many-person problem - the projection of the $n$-person case. This is the appropriate interpretation of its use here, and for this reason we have labelled the axes as $x_i, x_j$ (“Irene’s income”, “Janet’s income”) to emphasise that two arbitrarily chosen individuals from the population have their incomes depicted on the axes. As we will see, some of the issues under consideration translate naturally into this simple framework, others less so. And it is usually precisely at the point in the argument where the two-person framework proves inadequate that the most interesting problems reemerge from our questionnaire-experiment results.

### 4.2 An Introduction to the Questionnaires

The order of presentation of issues to our respondents in the questionnaires is not always the best order for presenting the results of the questionnaires for discussion. In designing the questionnaire we tried to avoid putting the apparently more complex questions in too prominent a position: it seemed better to start with numerical questions where the issue was relatively obvious to reinforce the message (which we tried to get across in the rubric) that there really were no tricks; these issues were also ones that would be regarded as fairly non-contentious. The questions that touched on deeper issues were usually packed somewhere in the interior of the questionnaire.

In the standard questionnaire design we also segregated the numerical problems and the verbal questions so that respondents would
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) \( A = (5,8,10) \quad B = (10,16,20) \)

2) \( A = (5,8,10) \quad B = (10,13,15) \)

3) \( A = (5,8,10) \quad B = (5,5,8,8,10,10) \)

Figure 4.4: Numerical problems on changes in income and population
always be presented with two distinct phases of the study to allow for reconsideration of the initial responses: numbers first, then words. However in discussing the results it is more illuminating to pair up each verbal question with the corresponding numerical problems that preceded it. This rearrangement provides a good opportunity of illustrating the interaction between numerical and verbal questions that forms a feature of all of our questionnaires. Figure 4.4 shows the set of simple numerical problems that were presented in our first main questionnaire in order to see how people viewed the impact of changes in income and population totals on inequality. Although we shall present extracts from the questionnaires like this throughout most of our discussion, you may find it helpful to take a look at the questionnaire as a whole, which is reprinted in Appendix B\(^1\) in order to get a feel for the way it would have appeared to the respondents. The corresponding verbal questions are displayed in Figure 4.5.

Notice that questions 10, 11 and 12 in the two panels of verbal questions closely mimic the numerical problems 1, 2 and 3 in the numerical-problems panel. We thus get two parallel sources of information for views on scale transformations, translations of the distribution, and replications of the population.

The final sentence in each of the verbal questions provides us with a third source of information on each of the three issues. This is designed to ensure - as far as we can - that the respondents did not let themselves be tripped up by some unintended numerical illusion in the first part of the questionnaire; we wanted to make it clear to the respondents that there were to be no tricks in the design of the questionnaire-experiment, and we wanted them to be able to see the issue clearly in both main parts of the questionnaire. As it happened the instances of respondents indicating a desire to change their answers on the numerical questions were relatively few, and so we did not tabulate them separately, but rather incorporated them with the presentations of the numerical answers.

Of course it is not to be expected that an exact match of the pattern of responses to numerical problems and the responses to the verbal questions: just as we may have different mental maps of a

\(^1\)This extract is from questionnaire A1 - see page 216.
12) 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 3? If so, please write your new response ("A" or "B" or "A and B") here:

... ... ... ...

Figure 4.5: The Question on the Population Principle.

city in our heads according as whether we going around it on foot or by car, so it is reasonable to find slightly different pictures of the inequality map being revealed by the two different methods of presenting the issues. Nonetheless, it is interesting to see how often the numerical and the verbal responses do concur, and also how often responses to the same issue in different guises and separate questionnaire-experiments concur, as we shall see in Chapters 5 and 7.
4.3 Inequality and Changes in Income and Population

As the extracts in Figures 4.3, 4.4 and 4.5 indicate, we first asked students about simple across-the-board income changes in order to see whether their views corresponded to the standard view - scale independence - or to some other coherent view, such as translation independence. In terms of the inequality map these two special views on the relationship between overall income change and inequality are illustrated by the two parts of Figure 4.6. Suppose we start with some arbitrary distribution represented by point B, with total income proportional to OA; now if we double total income to an amount proportional to OA' the picture on the left-hand side depicts the distribution B' (with the new, higher total) which would be regarded as “equally unequal” in comparison with point B under scale-independence; and the picture on the right-hand side depicts the distribution B''. In each panel the line through B depicts income distributions that are just as equal as B under each of the two assumptions.

Of course the three-income distribution (5, 8, 10) used in the questionnaire-experiment (see Figure 4.4) cannot be fully represented in a diagram such as Figure 4.6, but in this case the two-dimensional projection used there adequately captures the main idea, however many income receivers there may be in the distribution.

Just about half of the respondents appeared to concur with the proposition that doubling all incomes leaves inequality unchanged in that they circled both A and B in question 1 of the questionnaire (51% did so) or selected response (a) in question 10 (47% made this selection). But more information can be extracted from the responses to questions 1, 2, 10 and 11. To see this, inspect Figure 4.7, which is an enlargement of parts of Figure 4.6. Suppose we are dealing with a true 2-person case: it is clear that if a person’s inequality map exhibits the scale-independence property, so that the line BB' forms part of an iso-inequality contour, then the points “below” BB’ should represent greater inequality (they lie further away from the inequality ray) and the points “above” BB’ should represent less inequality: in particular point B” should be regarded as less unequal
Figure 4.6: Scale-independent and translation-independent iso-inequality lines
Figure 4.7: Deviations from scale transformation
CHAPTER 4. WHAT IS INEQUALITY? THE STUDENTS’ VIEW

<table>
<thead>
<tr>
<th>Numerical Problems</th>
<th>Verbal Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double income (q1)</td>
<td>Add fixed sum (q11)</td>
</tr>
<tr>
<td>Down</td>
<td>Up</td>
</tr>
<tr>
<td>8%</td>
<td>(2%)</td>
</tr>
<tr>
<td>15%</td>
<td>3%</td>
</tr>
<tr>
<td>37%</td>
<td>(5%)</td>
</tr>
</tbody>
</table>

Table 4.1: Inequality and proportionate and absolute income differences

Taking this argument into account a person who circles both A and B in question 1 should circle just A in question 2 (see Figure 4.4). The actual breakdown of attitudes to scale and translation changes amongst our respondents are summarised in Table 4.1, which shows essentially the same pattern of responses whether the issues are put in terms of numbers or words. There is still a clear preference for scale independence (the numbers in bold) with translation-independence coming a rather distant second (the numbers that are underlined). Intermediate situations between these two cases are given by the (“Up”, “Down”) pair in row two, column 1 of each part of the table; the bracketed entries will be discussed later in this chapter.

This glimpse at the relationship between overall income levels and inequality rankings raises a number of further questions which our elementary questionnaire-experiment A1 cannot encompass by itself: is the relative support for scale-independence as against translation independence sensitive to overall income levels? Is the choice between the two largely a function of the background of particular subgroups of our panel of respondents? We deal with these in Chapters 6 and 8 below.

The counterpart to this investigation into income change is the

\footnote{Throughout this book results are given as percentages. In many tables the reported figures do not sum to 100%; the missing percentage points are attributable to cases where there was no clear answer or no answer at all and also to rounding errors.}

than B’.
4.4 Transfers and the Structure of Inequality Comparisons

<table>
<thead>
<tr>
<th>Numerical</th>
<th>Verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(q3)</td>
<td>(q12)</td>
</tr>
<tr>
<td>Down 31%</td>
<td>22%</td>
</tr>
<tr>
<td>Up 10%</td>
<td>9%</td>
</tr>
<tr>
<td>Same 58%</td>
<td>66%</td>
</tr>
</tbody>
</table>

Results are based on responses to questionnaire A1 (N=1008).

Table 4.2: The effect on inequality of cloning the distributions

examination of what happens when the population, rather than incomes, is changed. The bottom row of Table 4.2 shows that both the numerical and verbal evidence is that there is substantial support for the “population principle” - that creating one distribution from another by the simple process of replication leaves inequality comparisons unaltered. This is fairly reassuring if we consider the way that students are usually introduced to practical aspects of income distribution analysis: typically they are taught to construct relative frequency distributions and to use these as a basis for making distributional comparisons in terms of inequality; but this procedure will only be valid if the population principle holds, since it enables one to discard information about the size of the population. Nevertheless it is worth noting that one third or more of respondents feel that population size does matter when comparing distributions.

4.4 Transfers and the Structure of Inequality Comparisons

The key questions in our first questionnaire are positioned in the middle of the list of numerical problems, and just after the middle of the verbal questions. The text of the relevant numerical problems and the corresponding verbal questions are reproduced in the accompanying panels: these focus upon the transfer principle and the principle of decomposability. We have segregated these two issues from the discussion of overall income and population changes because of their tremendous importance in the whole field of eco-
nomics that makes use of distributional analysis.

First, the transfer principle. The argument for this principle in terms of the inequality map seems to be straightforward: in Figure 4.10 an income-transfer from rich Irene to poor Janet appears to move the distribution incontestably in the direction of greater equality; if B is point corresponding to the original distribution, then E is the point corresponding to equal shares with the same total and any point in the interior of the line joining B and E - such as C for instance - would correspond to a partial equalisation between Janet and Irene.

However, it is important to grasp the status of the underlying concept. The argument of the preceding paragraph is pretty well watertight if the economy consisted just of Irene and Janet alone: but the transfer principle purports to apply also in cases where Figure 4.10 refers not just to a toytown Irene-and-Janet economy, but to any two-person projection of the inequality map of an $n$-person society; we shall discuss this in more detail on page 69 below. Moreover, unlike scale independence where there is at least one very obvious alternative (and in fact an infinity of other compromise alternatives), the transfer principle is not usually treated as one of a range of possible assumptions that we might make about the structure of inequality
13) 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 had 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.

14) Suppose there are two societies A, 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 income distribution unless we know the exact distributions.

   c) Neither of the above.
Figure 4.10: The transfer principle in the two-person projection
4.4. TRANSFERS AND THE STRUCTURE OF INEQUALITY COMPARISONS

Numerical Verbal

<table>
<thead>
<tr>
<th></th>
<th>(q4)</th>
<th>(q13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>35%</td>
<td>60%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>42%</td>
<td>24%</td>
</tr>
<tr>
<td>Disagree</td>
<td>22%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Results are based on responses to questionnaire A1 (N=1008).

For interpretation of “Agree” and “Disagree”, see text and footnote 3.

Table 4.3: The transfer principle

Comparisons. As we noted in Chapter 2, for many researchers this is the defining concept for inequality analysis: explicitly or implicitly the transfer principle is invoked almost everywhere in theoretical and empirical analysis carried out in the area.

Yet it is clear from Table 4.3 that a majority of our respondents reject the transfer principle when presented to them in the form of a numerical problem. Why? Notice that the hypothetical incomes involved are exactly the same as those used to construct the series of pictograms when we discussed the point in Chapter 1 (compare the extract in Figure 4.4 with the figures on pages 5 to 7): the “Agree” response here means that people checked the “right” answer B (see Figure 1.3 on page 7). Comments provided by some of the respondents on their questionnaires reveal that rejection of the transfer principle in this type of problem was for exactly the reasons that we outlined in Chapter 1: people are concerned about the overall structure of income differences and not just about the incomes of the particular individuals who are involved in the transfer. Had the numerical example involved either the richest or the poorest individual in the transfer a different answer might well have been obtained - we pursue this further in an experiment reported on page 69 below. Moreover there are also problems with the response to the verbal part of the questionnaire on this issue - see the right-hand column of Table 4.3. Although a much higher proportion (60%) respond in support of the transfer principle, the support is not overwhelming.3

3Here, and in Table 4.4, the verbal responses “Strongly Disagree” means that students chose the response (b) that indicates that other incomes matter in the inequality comparison; “Disagree” means that people checked the response
Furthermore, why, even after some of the respondents had reacted to the invitation to change, did the verbal and numerical responses diverge? It may be that people find it difficult to translate an apparently appealing general verbal principle into concrete examples and, perhaps, into actual situations also. If so, then we should perhaps return to this issue later and take a closer look.

Now let us consider the issue of decomposability, again using the idea of the inequality map. Imagine a series of experiments with Irene’s and Janet’s incomes (keeping all the other incomes fixed) which enables us to draw an inequality map, perhaps something like that depicted in Figure 4.11. Now imagine that the experiment series were to be done all over again but with the incomes of everyone else

"Neither of the above".
4.5. DO THE ANSWERS MAKE SENSE?

The results of the basic questionnaire-experiment can be summarised in terms of a standard distributional tool, the Lorenz curve, an ex-

<table>
<thead>
<tr>
<th></th>
<th>Numerical (q5 &amp; q6)</th>
<th>Verbal (q14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>57%</td>
<td>40%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>[n.a.]</td>
<td>45%</td>
</tr>
<tr>
<td>Disagree</td>
<td>41%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Results are based on responses to questionnaire A1 (N=1008).

For interpretation of “Agree” and “Disagree”, see text and footnote 3.

Table 4.4: Decomposability.

fixed at some other arbitrary levels: will we still get the same pattern of contours as that depicted in Figure 4.11? If the principle of decomposability applies then we will indeed find this. Note, incidentally, that we are not requiring that the inequality levels associated with each contour should remain unaltered; just that the ordering of distributions should remain unaltered, irrespective of the levels at which all those other than Irene and Janet have had their incomes fixed.

There are also problems with the issue of decomposability, as we can see from the evidence displayed in Table 4.4. Here “Agree” on the numerical questions means that the ranking of distributions A and B was the same in question 5 and in question 6 (see again Figure 4.4): notice that the mean income in question 6 is 7 units (for both A and B) and that the two distributions in question 6 have been formed from those in 5 simply by merging each of them with two additional people with incomes of exactly 7 units. The decomposability principle then states that these merged incomes are irrelevant to the inequality ranking of A and B. Interestingly, in this case the respondents are less happy about the decomposability principle when it is presented to them in verbal form rather than implicitly in the numerical questions - see the right-hand column of Table 4.4.

4.5 Do the Answers Make Sense?

The results of the basic questionnaire-experiment can be summarised
ample of which is displayed in Figure 4.12. The Lorenz curve plots the proportion of total income (vertical axis) received by the bottom 1%, 2%, 5%, 50%,... against the corresponding population proportion (horizontal axis): so in Figure 4.12 the bottom 40% of the population receive only about 15% of total income, the bottom 60% of the population receive about 30% and so on. The curve must pass through the two corners and be convex as shown, and in the state of perfect equality it would lie exactly along the diagonal\footnote{For more detail on this see Cowell (1995) pages 19,20.}.

Some powerful theorems are available to interpret distributional rankings in terms of the Lorenz curve, as depicted in Figure 4.13. According to Figure 4.13 distribution $B$ appears to be more unequal than distribution $A$ (the bottom 20% get less under $B$ than under $A$;
Figure 4.13: Lorenz ranking
66CHAPTER 4. WHAT IS INEQUALITY? THE STUDENTS’ VIEW

<table>
<thead>
<tr>
<th>Add fixed sum</th>
<th>Deduct fixed sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>4%</td>
</tr>
<tr>
<td>Up</td>
<td>2%</td>
</tr>
<tr>
<td>Same</td>
<td>1%</td>
</tr>
</tbody>
</table>

Table 4.5: What happens to inequality if you add or subtract a fixed sum?

so does the bottom 80%; so too does any other “bottom x%” of the population) and, as we explain formally in Appendix A the powerful theorems we just mentioned establish that this intuitive ranking of distributions concurs with a broad class of formal tools for ranking distributions; but these results depend crucially on the acceptance of some of the specific axioms that we have been examining in this chapter.

To compare distributions in terms of the Lorenz curve we would need to invoke scale-independence, the population principle, and the transfer principle. But if we were to look at the combined response to the relevant questions on these issues (questions 10, 12 and 13) we would find that 76 per cent of the students reject the Lorenz axiom system. If we include also the principle of decomposability along those in the Lorenz system (in other words we include question 14 along with 10,12,13) then 84 per cent reject the standard axioms. Our students’ responses seem to raise a serious question of whether the standard axioms for inequality comparisons are unquestionably appropriate.

Now students, like other people, are fallible, and sometimes irrational and perverse: so of course we do not insist that our respondents display a degree of icy logic under all circumstances. Nevertheless it is obviously reasonable to enquire whether the results that we have presented are internally consistent and broadly in accord with common sense. A pattern of results that is contaminated by carelessness or perversity is not going to be much of a guide to drawing an inequality map.

We have an obvious control built into the design of the questionnaire: since we cover the same issues in the two parts of the
4.5. **DO THE ANSWERS MAKE SENSE?**

questionnaire - numerical and verbal - we can check for consistency
between responses to questions. As we have seen the numbers for
the responses to the two parts of the questionnaire are remarkably
similar in the case of scale and translation changes. Also we can ex-
amine the issue of whether respondents view upward shifts of income
and downward shifts antisymmetrically - see question 11 in the ex-
tract in Figure 4.3 - although unconventional responses here do not
necessarily imply inconsistency. As we can see from Table 4.5 on the
whole (80% of the sample) our respondents are conventional, in that
they report increases of income as having the opposite effect upon
inequality of decreases in income.

All the same, the sceptical reader might raise the question of
whether this supposed check is in fact open to manipulation by the
respondents. However, even if we disregard the numerical-verbal con-
sistency argument we have further checks that are likely to be much
less easily observable and thus less susceptible of manipulation by
respondents. For example if students were responding capriciously
to the questionnaire experiment, we would not expect them to re-
veal a coherent ordering over distributions. But the evidence of all
our questionnaire experiments reveals that they were not capricious:
for example cross-tabulations of responses to inter-related numerical
problems such as questions 7, 8 and 9 (which focus on issues exam-
ined in Chapter 6 below) reveals that only 11% of the A1 sample
violated transitivity;\(^5\) nor did any respondent indicate that it was
impossible to make the comparisons that were presented.

One might also wonder whether those who expressed minority
views - for example those who did not give the conventional view
of population replication in Table 4.2 - just fail to understand the
questions or the underlying issues? Although we cannot answer that
directly, as we have seen, it can be shown that the respondents an-
wers were, on the whole not self-contradictory. But we can say
more than that. Our questionnaire allows people to indicate whether
they want to change their responses to numerical problems once they
have thought through the answers on the related verbal questions.
On the “second thoughts best” principle we should find that where

\(^5\)This issue is discussed further in Chapter 5, see page 90.
the respondents took advantage of this they move in the direction of rationality. This is what we find: after they had been allowed to have second thoughts, just under 4% of the sample indicated both “up” on q3 and “down” on q12 or vice versa, as against the figure of just under 5% on the first pass through the numerical problems. So we seem to have an acceptably small proportion of respondents who give meaningless answers.

4.6 More on The Transfer Principle

Another way in which we might have interpreted the question “do the answers make sense?” would be to query whether the more surprising results are robust. The results on the principle of transfers demand special consideration: they suggest that there is a substantial body of opinion which rejects the principle in its pure form, although of these many were prepared to go along with the “borderline” view that a rich-to-poor transfer might leave inequality unchanged. As we discussed in Chapter 1 this is exactly the opposite to the “right” view of inequality rankings as conventionally understood in the inequality literature.

This issue is so special and so far-reaching in its implications that it warrants further investigation. It would be reasonable to investigate whether the conclusion is sensitive to alternative questions about income transfers. One way of doing this would be to try to present the question in a different format in order to control for the “framing problem” that we have referred to in Chapter 3. This could be done in two ways.

First the issue could be put in a different context from that of direct questions about income inequality. To anticipate our argument slightly we did this by incorporating the transfer principle into separate questionnaires that focused on social welfare or poverty rather than inequality, so as to dress the same issue up in a different guise. The results of these experiments are discussed in detail in Chapters 5 and 7 respectively, but the main point is that changing the context of the distributional issue does almost nothing to increase support for the principle - in the case of poverty the transfer principle was
4.6. MORE ON THE TRANSFER PRINCIPLE

“Is A more unequal than B?”

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Weakly Disagree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(q1)</td>
<td>A = (2, 5, 9, 20, 30) B = (2, 6, 8, 20, 30)</td>
<td>37%</td>
<td>23%</td>
</tr>
<tr>
<td>(q4)</td>
<td>A = (2, 5, 9, 20, 30) B = (2, 10, 9, 15, 30)</td>
<td>61%</td>
<td>31%</td>
</tr>
<tr>
<td>(q3)</td>
<td>A = (2, 5, 9, 20, 30) B = (2, 6, 9, 20, 29)</td>
<td>67%</td>
<td>17%</td>
</tr>
<tr>
<td>(q2)</td>
<td>A = (2, 5, 9, 20, 30) B = (3, 5, 9, 20, 29)</td>
<td>78%</td>
<td>11%</td>
</tr>
<tr>
<td>(q5)</td>
<td>A = (10, 10, 10, 10, 30) B = (10, 10, 10, 20, 20)</td>
<td>70%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Notes: Based on questionnaire A4 (N=358). q1,…,q5 refer to the question numbers as they appear in the questionnaire.

*Agree* means “A more unequal than B”, *Strongly Disagree* means “B more unequal than A”;

“Weakly disagree” means “A and B have the same inequality”

Table 4.6: Agreement with the Transfer Principle for Different Types of Transfer. Numerical Responses.

rejected overwhelmingly.

Second, the language of the inequality comparisons could be kept unchanged, but the details of the question could be altered to see whether there was something critical about the particular income distribution that was specified in the original questionnaire experiment. We did just this with a further questionnaire experiment run on the same rules - the results of which are reported in Table 4.6 and Table 4.7. The experiment (labelled A4) is described on page 225 of Appendix B. The idea of numerical part of the questionnaire is to present the respondents with a variety of income distributions in which, implicitly, a pure income transfer between a pair of individuals takes place; this is done at various income levels and covers both important sub-cases: those where only “middle” incomes are affected, and those where an extreme income is involved. To make interpretation easier the rows of Table 4.6 have been arranged in a different order from the corresponding questions in A4 (in the experiment we deliberately shuffled the questions around a little so as not to appear to give a strong hint at a supposedly “right” answer). Each row gives the income distributions that the students were asked to compare, and the overall proportions of responses in each category. If you follow the pairs of incomes highlighted in bold down the
first four rows of the table, the underlying structure soon becomes clear: we move the transfer progressively “outwards” towards the case of “richest poorest” (in each of rows 1 to 4 the total income is the same). In view of this it is reasonable to expect that agreement with the transfer principle would increase as we move down the table. This is precisely what we find: the proportion of “Agree” responses is initially at the level of the first experiment (A1) and then increases uniformly; however, the ratio of “Weakly Disagree”/“Strongly Disagree” responses does not change monotonically. In row 5 of Table 4.6 we give an “out-of-sequence” example which confirms the conclusion drawn of the first four rows: since one “extreme” income is involved in the transfer we would have expected the proportion of agreement with the transfer principle to be relatively high, and it is.

This remarkable conclusion about the pattern of agreement with the Transfer principle is also borne out by the pattern of verbal responses. A glance at the last-but-one row Table 4.7 show that less than one third of our respondents agreed with the transfer principle, as stated in its standard form; there are significant minorities who say either that the answer depends on the rank of everyone in the population (11%) or on the relative positions of others (10%). But we also find that when the richest and the poorest are involved then there is strong support for the transfer principle (an additional 32%). This result is not so puzzling if we look at what is happening to income differences as opposed to simple levels of income. In the case of a small (order-preserving) transfer from the richest to the poorest it is clear that some of the differences decrease and all the others remain unchanged, but of course this is not the case for other types of income transfer. So if people evaluate income inequality in terms of income differences rather than in terms of incomes directly we would expect to get the pattern of responses indicated in Table 4.7.

The “headline results” of our first sounding of opinion on the inequality axioms are summarised in Table 4.8. These make it fairly obvious that there is a substantive divergence between the views expressed by our initial batch of respondents and the standard story of how income distributions should be compared in terms of inequality. It is of course important to look behind the headlines, as we have done in this chapter, and as we shall do further in subsequent
4.6. MORE ON THE TRANSFER PRINCIPLE

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 originally had more income still has more.

a) *Income inequality in this society has fallen if the ranking of the income of all the people remains the same. If there is any change in the rank of all the incomes then it is possible that income inequality increases or remains the same.* 11%

b) *If the transfer was from the richest to the poorest, and after the transfer the richest remains the richest and the poorest remains the poorest, than income inequality has fallen. In other cases we cannot say a priori how inequality has changed.* 32%

c) *The relative position of others has also been changed by the transfer. So we cannot say a priori how inequality has changed.* 10%

d) *Inequality in this society has fallen, even if there is a change in the ranking of the income of people as a result of this transfer, and even if the transfer is not from the richest in the society to the poorest.* 31%

e) *None of the above* 4%

Based on responses to questionnaire A4, question 6 (N=358).

Table 4.7: Verbal Agreement with the transfer principle
Table 4.8: Agreement with basic axioms. Summary percentages.

<table>
<thead>
<tr>
<th>Axiom</th>
<th>Numerical</th>
<th>Verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale independence</td>
<td>51%</td>
<td>47%</td>
</tr>
<tr>
<td>Population principle</td>
<td>58%</td>
<td>66%</td>
</tr>
<tr>
<td>Transfer principle</td>
<td>35%</td>
<td>60%</td>
</tr>
<tr>
<td>Decomposability</td>
<td>57%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Based on summaries of responses to questionnaire A1.

Note: Questionnaire A1 gave only a limited set of alternative verbal responses on the question relating to the transfer principle. When the richer set of alternatives of questionnaire A4 is allowed for the verbal support for the transfer principle falls to 31% - See Table 4.7.

As we have emphasised, the status of the transfer principle is rather different from those of the others: unlike each of the other axioms there is in the literature no obvious alternate assumption to be invoked if the transfer principle were to be abandoned. As we have seen the results on the attitudes to inequality comparisons exhibited by our joint sample of students are sensitive to the type of transfer involved: it is this which gives a clue to an alternative way of looking at the logic of income-distribution comparisons in terms of inequality. Instead of basing inequality comparisons just on individual income levels it may make sense to recast the problem in terms of income differences in the community: as the discussion on page 69 showed the two approaches need not coincide in their rankings of distributions.

In tackling the question of “What is Inequality?”, from a questionnaire - experimental point of view, the analysis of this chapter has raised other questions about the basis on which people form ideas about ranking income distributions. Since there appears to be a good prima facie case for challenging the validity of some of the basic tenets of the standard approach to the subject it seems appropriate to move beyond the examination of simple static inequality comparisons set within the context of pure inequality analysis examine these issues as they emerge in three related areas: social welfare, inequality and the process of income change and poverty. We shall find that the same sort of techniques that have been introduced here
4.6. MORE ON THE TRANSFER PRINCIPLE

can also be usefully deployed in these other fields.
Chapter 5

Income and Welfare

5.1 What is Welfare?

The meaning of welfare is a bit like the meaning of life: most people are delightfully vague about it; some logical purists will question whether there is any meaning to be given to it; the zealot can interpret it in as narrow a fashion as he wishes. The welfare of an individual obviously depends on a variety of features of the social and economic environment in which he finds himself and a variety of individual characteristics and circumstances. Each of us will probably give different degrees of emphasis to these various features depending upon our backgrounds and prejudices. Each of us will probably have a pet idea on how to incorporate these features into a specific theoretical or empirical model of individual welfare.

Even if we were to narrow the issue to one of economic welfare or of utility - as it is conventionally interpreted by economists - problems would still remain. A person’s utility is usually regarded as being determined by his own income or resources and his tastes, but in principle there could be an enormous range of other possible factors that might be taken as determinants of a person’s welfare: for example it might be affected by other people’s income or utility. Apart from these factors there is a complex of market forces, institutional provisions and individual constraints which will influence his economic opportunities. However, there is a danger that in trying to adopt a very general approach one might not be able to say anything
useful at all. So we are going to simplify the situation radically and focus on the use of income as a yardstick of a person’s well-being, and take collection of people’s incomes as the basic element in our discussion.

Of course the problems do not get any easier once we try to move from the concept of individual welfare to social welfare. If we assume that social welfare depends upon individual welfare then it is going to inherit the problems of individual welfare. Furthermore, even if we were to wave these problems airily away - as we have just done - then there would still be a number of other problems associated with the specific issue of extrapolating from individual welfare analysis to social welfare analysis. These issues have deservedly been accorded entire books of their own, but it is useful to summarise them briefly here.

• The conflicting priorities problem. Because of the variety of personal preferences, as well as the variety of economic goods, there are substantial problem of aggregating views on issues which are regarded as affecting the well-being of a community. Of the extra $10mn saved by defence cuts you may consider that the proceeds ought to be used to improve public transport, your next-door neighbour might think that it ought to go on the health service, and your other next-door neighbour may think that it should instead go toward reducing taxes on the private sector.

• The “where am I?” problem. An individual’s perception of where he is personally located in the distribution may strongly affect his own ranking of social states. As we discussed in Chapter 3 (page 38) it may be possible to sidestep this issue by placing the issues within an artificial framework rather than within a specific national or historical context.

• The “there-is-no-such-thing-as-society” problem. In one sense this is a perfectly valid objection, and may even be taken to be the most difficult of the three problems that we have chosen to highlight. The essence of it is that even if all economic goods could be represented as chocolate bars (which in part
disposes of the first problem), and individuals were somehow unaware of their position in the pecking order within the candidate distributions that they are comparing (which disposes of the second problem), there could still be no coherent “social ordering” of distributions. The reason is that each member of the society could individually have different rankings of income distributions in terms of perceived welfare.

We are not going to involve ourselves further with these difficulties, but will instead sweep them away with an unsatisfactory but appealing assumption. The assumption is that although it may be impossible to draw up a coherent “social” evaluation system that is systematically linked to the views about distribution of each member of the community, it is actually possible to ascribe coherent views about social welfare to each of those members. Although people may act in a venal, self-seeking fashion in their workplace or their private life, nevertheless they are capable of disinterested judgments about distributional questions. These supposedly coherent views will be taken to form the basis for the meaning that we want to give to the concept of social welfare.

5.2 Social Welfare

Imputing to individuals this kind of coherence of view about social welfare means that it does at least make sense to talk about welfare comparisons of income distributions. Then the problem of giving meaning to the concept of social welfare can be treated in much the same way as the approach we used in Chapter 2 to focus upon the meaning of inequality. As counterparts to inequality rankings and inequality measures we can work with welfare rankings and social welfare functions.

The idea of a social welfare ranking is closely analogous to that of an inequality ranking: it is a systematic chaining of pairwise welfare comparisons (where they can be made) that satisfy the principle of transitivity. A social welfare function is just a formula which aggregates all the information about an income distribution into a single numerical welfare index. Both these concepts will again require a
system of axioms - basic assumptions - which give meaning to the concepts when they are applied to distributional questions. Some of these axioms carry over from the discussion of inequality rankings that we had in Chapter 2. In particular we shall again have occasion to make reference to the transfer principle and to the principle of decomposability, which again have an important rôle to play in standard social welfare analysis. On top of these we shall need to examine more closely the issue of anonymity, and to refer to three other important principles known as monotonicity, dominance and the Pareto Principle.

5.2.1 Anonymity

As with the discussion of inequality, the principle of anonymity means that the identities attached to a list of incomes in any given income distribution have no significance whatsoever for welfare comparisons. This might appear to be so compelling as to be blindingly obvious. For example in Figure 5.1 distribution B is based on the second of the two distributions displayed in Figure 2.3 on page 15, and distribution B' is obviously just achieved by a trivial rearrangement of the personnel in distribution B. One might be forgiven for thinking that there is little more to be said. But further thought suggests that there may well be a substantive issue to be considered here.

Examine Figure 5.2, and consider the top pair of distributions A and B; then decide which of the two has higher inequality. Now consider the bottom pair of distributions A' and B': a quick visual check confirms that positions of the incomes in these two distributions are exactly the same as in A and B - in terms of where the incomes are located on the line - but that the shading of the little persons differs. Now, if the shading of each icon is again used as a means of identifying a particular person we can see that there is important contrast between the two pairs of distributions. In the top pair of distributions a movement from distribution A to distribution B would leave each of the persons in the same rank-order within the community, whereas (the bottom part of the figure) going from distribution A' to distribution B' would involve a substantial
reordering of the individuals in the distribution. Some people might argue that if $A'$ corresponds to the distribution on Monday and $B'$ to that on Tuesday then they cannot represent situations of equal social welfare because of the personal losses and gains that seem to have occurred on Monday night. A tender-hearted observer might argue that one should give greater weight to the losses rather than the gains and so judge that social welfare in $B'$ was less than that in $A'$. Someone else with a sense of retributive fairness might claim that welfare had gone up on Monday night, along the lines of the “the-first-shall-be-last” principle. Of course others will insist that this reordering is irrelevant to an assessment of inequality or of welfare - that the anonymity principle should be applied irrespective of individual personal histories.\footnote{People in the last group could at least claim to be consistent: those arguing that social welfare falls if $A'$ is followed by $B'$ would also have to say that welfare falls if $B'$ is followed by $A'$, likewise those who argue that welfare increases under the reordering.}
Figure 5.2: Anonymity and history
5.2.2 Monotonicity, Dominance and the Pareto Principle.

The property of monotonicity implies that if the income of any one individual increases (and no-one else’s income decreases) then social welfare must have increased. The basic idea is depicted in Figure 5.3 where we take the top distribution (A) as a reference point. It is clear that if we compare distribution B with A then all the people’s incomes remain unchanged except for the bottom person whose income has moved upwards: it seems reasonable to suppose that this change is indeed one that increases social welfare. But what about comparing distribution B with distribution C? Again one and only one person is made better off but on this occasion it happens to be the richest person in the community. Some people might feel that this sort of change cannot represent an increase in social welfare: although no-one is made worse off in absolute terms by going from B to C, the worsening of the relative position of the poor as average income rises may seem so overwhelmingly unattractive that the increase in inequality outweighs the overall gain in mean income. Some people may also feel that a switch from B to D does not increase social welfare, in that there is again a rise in inequality which offsets the income gain of the single individual. However, if we are to accept the principle of monotonicity then all these changes - A→B, B→C and B→D - are to be counted as welfare increases.

Dominance refers to the comparison of two anonymous distributions rather than to what is happening to one or more selected individuals in the population. Suppose you plot distribution A as a series of uniform blobs on the income line that we have drawn as in our earlier figures. Now look at another distribution B plotted on the same line; if it looks as if distribution B could have been derived from distribution A by moving some of the blobs in A to the right, and none to the left (because the blobs are uniform there is no way of telling whether this is the way that B was actually derived), then we say that distribution B dominates distribution A. If our criterion of social welfare comparisons is such that - given that distribution B dominates distribution A - we always accord higher welfare to B than

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2In the jargon this is known as first-degree dominance.
to A then we say that the social welfare ranking has the dominance property.

The concept of monotonicity is closely related to - but not identical with - the concept of dominance in social welfare rankings.³ Figure 5.4 makes clear why this is so. First of all ignore the shading of the figures and consider the two distributions just as anonymous lists of incomes: clearly the highest income in B lies to the right of the highest income in A, the same applies to a comparison of the second-highest incomes, and to the lowest incomes in the two distributions: so distribution B is “better than” A in terms of the dominance criterion. Now let us use the shading of the little people icons as indicators of identity in the two distributions. Then we can see that in going from A to B two persons have experienced an increase in their incomes, but one person (the unshaded character) has had a huge income decrease: B would not be ranked as preferable to A in terms of monotonicity.

³See Amiel and Cowell (1994c).
Furthermore the monotonicity principle is also to be distinguished from a third well-known concept: the Pareto principle. The Pareto principle simply states that if at least one person is made better off and no-one is worse off then social welfare must increase. The essential difference between this and monotonicity lies in the distinction between a person being “better off” and a person experiencing an increase in income. This is not mere logic chopping. It is perfectly reasonable to suppose that just as a person’s state of well-being may be affected by things that he does not purchase or consume directly such as pollution, traffic congestion, crime - “externalities” in the economics jargon - so his well-being may be affected by other people’s incomes. Feelings of altruism or envy may legitimately interpose themselves in the relationship between a person’s income and the benefit that he experiences from it.

The distinction between the two criteria can be important, be-

\footnote{For examples of this approach see Arrow (1981), Boskin and Sheshinski (1978), Brennan (1973), Duesenberry (1949), Hochman and Rodgers (1969), Kapteyn and van Herwaarden (1980), Layard (1980), Morawetz (1977) and Oswald (1983).}
cause they may lead to quite different stories about the kind of changes in income distribution which make a society “better off”. For example, a social welfare function may satisfy the Pareto principle and yet violate monotonicity. To see that this is so, take the case where social welfare is just the sum of everyone’s utility, but each person’s utility is determined by his own income minus the average income of everyone richer than himself. Now give $1 to the richest person: this raises the utility of the richest person, but lowers the utility of everyone else and, if there are more than two persons in the society, social welfare will fall; monotonicity has been violated. Likewise the social welfare function could satisfy monotonicity and yet violate the Pareto principle. Again this can be seen by an example: suppose that social welfare is simply “national income” - the sum of everyone’s incomes - but that some rich people are altruistic in that their utility is increased by any income gains of the poor. Then it may be possible to take $2 off a rich person, throw away $1 and give the other $1 to the poorest person and thereby increase the utility of both rich and poor: social welfare falls even though no-one’s utility has fallen, and some people’s utility has risen. Only in the case where everyone’s utility is a (strictly increasing) function of his own income and is independent of anybody else’s income will monotonicity and the Pareto principle coincide.

As with anonymity, the issue of monotonicity of social welfare orderings is something that we could, in principle, investigate whether the assumption “more income to one person and no income loss to anyone else means higher social welfare” is a reasonable one. This could be done using the same kinds of techniques that we presented in Chapter 4. Looking back at the formulation of the problems and questions that we used for the empirical investigation it is clear that many of the same issues that we originally discussed in terms of inequality could usefully be rephrased in terms of social welfare.

### 5.2.3 Relationship to Inequality

In fact we can do more than that. Given the heroic over-simplification of the problem of social welfare that we introduced earlier, a neat analogy with Chapters 2 to 4 suggests itself. Social welfare - de-
5.2. SOCIAL WELFARE

fined on income distributions - is to be regarded as a Good Thing, and inequality - again defined in terms of income distribution - is to be regarded as a Bad Thing. If there is some consistency of view between the way alternative distributions are perceived in terms of social welfare and the way they are perceived in terms of inequality, then there ought to be a straightforward interconnection between the two concepts. We might expect that if - in going from distribution A to distribution B - inequality falls and average income remains the same, then social welfare should rise; if average income rises and inequality stays the same then we again might expect social welfare to rise. Symbolically we would then have some kind of functional relationship $f$ linking our inequality index and our welfare index, thus:

$$\text{welfare} = f(\text{inequality}, \text{mean income}) \quad (5.1)$$

Let us suppose that this is so. Then, granted some not particularly demanding mathematical conditions, we should be able to "invert" the relationship $f$ - that is turn (5.1) around - to give

$$\text{inequality} = g(\text{welfare}, \text{mean income}) \quad (5.2)$$

where $g$ is a function which has the property that if welfare increases while mean income stays constant, then inequality must fall. If this process of inversion is valid, then we can take a further step.

The significance of relationship (5.2) is that we should be able to infer inequality rankings from welfare rankings, as long as we restrict attention to distributions that all have the same mean. In other words we have two routes by which to investigate people’s attitudes to inequality and the meaning that they attach to inequality comparisons:

- The direct approach is that which we adopted in Chapter 4: the issues are presented to people explicitly in terms of inequality (whether this is done by numerical example, verbal question or by some other means).

- The indirect approach involves presenting issues to people in terms of social welfare (again by numerical example or verbal question) and then, for cases where mean income is held
constant, using relationship (5.2) to infer the attitudes about inequality comparisons.

So it would be interesting to compare evidence on social welfare rankings with the results of Chapter 4 to see whether this indirect approach to inequality orderings does in reality match up with inequality orderings obtained by the direct approach.

The analogy between the two systems of analysis of income distribution is not perfect. Although the axioms that are usually invoked for welfare comparisons correspond closely to those required for inequality comparisons for cases where only distributions with a given total income are to be compared, as we have seen, there are notable divergences elsewhere. In particular when we consider changes in the distribution that affect mean income, the standard axioms that are used for inequality analysis focus principally on changes that affect all incomes simultaneously: for example a uniform scaling-up of all incomes, or a uniform translation of all incomes; but the welfare axioms focus on what happens to individual incomes or the income of individuals - the idea of monotonicity or dominance, or the Pareto principle. For this reason the arrangement of the problems and questions had to be rather different from that used in the inequality questionnaire experiments.

5.3 Empirical Results

Despite these differences the approach and the main structure of the social-welfare questionnaire study was similar to that described in previous chapters: a set of numerical questions, followed by a set of related verbal questions, and after each verbal question an opportunity for individuals to change their minds if they so wish.

An extract from the main questionnaire used to investigate welfare issues is illustrated in the Figure 5.5 which shows the preamble used to give a setting for the numerical questions and the particular examples used to investigate the issue of the transfer principle and decomposability (these examples contain just the same numbers as used in the corresponding inequality questionnaire).

---

5This is questionnaire B1, see page 227 in Appendix B.
In Alfaland two economic programmes are proposed. It is known that both programmes will have the same effect on the population except on their incomes and all the people are identical in every respect other than income.

In each of the first ten questions there are given two alternative lists of incomes A and B (in Alfaland local currency) which result from these two programmes respectively. Please state which programme you consider would make the community of Alfaland better off by circling A or B. If you consider that each of the programmes is just as good as the other then circle both A and B.

1) \( A = (1, 4, 7, 10, 13) \) \( B = (1, 5, 6, 10, 13) \)

2) \( A = (4, 8, 9) \) \( B = (5, 6, 10) \)

3) \( A = (4, 7, 7, 8, 9) \) \( B = (5, 6, 7, 7, 10) \)

... ...

Figure 5.5: The setting for the social-welfare numerical problems
Figure 5.6: Contours of a standard social welfare function
5.3. EMPIRICAL RESULTS

Now for an overview of the findings from the social-welfare experiment. Our purpose is twofold. First we want to see whether the assumptions mentioned on pages 78 to 84 are reasonable; this step is crucial to the standard approach to applied welfare analysis: for example the transfer principle and the principle of decomposability together imply that the contours of the social-welfare function in Figure 5.6 must be convex to the origin, like indifference curves in conventional elementary economic theory. Second, we want to compare, where appropriate, the results presented here with what was found from the direct approach to inequality adopted in Chapter 4. To make this comparison easier we will also use results from an additional inequality questionnaire\(^6\) that pursued further some of the issues raised by the social-welfare investigation.

But before we get into a detailed discussion of each property of a social welfare function, it would be a good idea to see whether the empirical evidence supports the basic idea of such a function as a tool of distributional analysis. Specifically let us see whether it is reasonable to suppose that people’s views are capable of being represented by a well-defined ordering of distributions. In Chapter 4 we noted that the responses to a subset of the numerical problems in the inequality questionnaire A1 indicated that respondents’ views on income distributions were transitive (see page 67). This is borne out by the special supplementary inequality questionnaire (A2) in which we investigated this property explicitly: see the first row of Table 5.1 which shows that 79% of our respondents agreed with the principle verbally, and only 18% rejected it.\(^7\) It is interesting to note that although agreement with the transitivity principle is rather lower according to the social welfare question (70% - see the bottom row of Table 5.1), the proportion of those disagreeing with transitivity is almost the same as in the case of inequality; there is just a larger proportion of “don’t knows”. This result is one example of a rather lower agreement with the principle according to the indirect approach to inequality (bottom row in Table 5.1) than according to the direct

\(^6\)This is questionnaire A2 to be found on page 220 in the Appendix.

\(^7\)Here and elsewhere we have simplified the presentation of the verbal responses by including a paraphrase of the question in the table. Appendix B should be consulted for the exact wording and layout of the question.
CHAPTER 5. INCOME AND WELFARE

Table 5.1: Agreement with Transitivity of Inequality and Social-welfare Orderings

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>“If inequality in Alfaland is higher than inequality in Betaland and inequality in Betaland is higher than inequality in Gamaland then Inequality in Alfaland is higher than inequality in Gamaland.”</td>
<td>79%</td>
</tr>
<tr>
<td>“If society is better off under A than under B and is better off under B than under C, then it must be better off under A than under C”</td>
<td>70%</td>
</tr>
</tbody>
</table>

Inequality response to questionnaire A2, question 8 (N=181); social welfare response to questionnaire B1, question 15 (N=620)

5.3.1 Anonymity

We begin with the assumption that it seems almost obvious to make and perhaps not worth testing. Even though we have no suggestion for respecifying the anonymity axiom it or replacing it by some other principle, it seems to be a good idea to investigate whether people’s ranking of distributions do actually accord with the principle. The top row of Table 5.2 shows that in the case of inequality comparisons agreement with anonymity is very clear: 83% of the numerical responses are in accordance with it and only 12% of the responses violate it; 72% of the respondents agree with anonymity verbally. In terms of the social welfare approach the bottom row of Table 5.2) we still find two-thirds of the numerical responses in accordance with the principle, but - perhaps surprisingly - we find that the verbal agreement decreases to a level of only 54%.

Notice that for either the direct (top row) or the indirect approach (bottom row) agreement with the principle of the axiom appears to be higher when the issue is presented numerically then when it is presented verbally. There appears to be an obvious explanation of this phenomenon. As far as the numerical questions are concerned
5.3. EMPIRICAL RESULTS

The distributions (7,5,10,9) and (9,5,7,10) are seen as equivalent...

... in terms of inequality 83% 12%
... in terms of social welfare 66% 32%

If we permute the incomes of people who are identical in every respect other than income then...

...inequality remains the same 72% 19%
...social welfare remains the same 54% 33%

Table 5.2: The Anonymity Principle

Inequality response to questionnaire A2, question 7 and 10 (N=181);
social welfare response to questionnaire B1, question 10 and 16 (N=620)

respondents are faced with a simple list of incomes, and the order of appearance of the incomes (the order of the components of the income vector) should not matter either in respect of inequality or in respect of social welfare: the layout of the numerical section of the questionnaire is probably so simple that the order of appearance does not matter much in respect of people’s perceptions of the situation either. However when the issue is presented to people verbally it is natural that respondents should pause and ask themselves a few extra questions about the situations that they are being asked to compare. Although we took care to qualify the question by inserting the phrase “people who are identical in every respect other than income” it may be natural for respondents to introduce further, unstated qualifications of their own - “what about the history of these individuals?” “what about the possibility that these persons have different family circumstances?” - which do not spring to mind when just comparing lists of numbers. Whatever the reason for the phenomenon the results suggest that our respondents are uncomfortable with the anonymity or symmetry as a principle of social welfare judgment when this issue is presented to them in plain language.
Is \((1,4,7,10,13)\) more unequal than \((1,5,6,10,13)\)?

<table>
<thead>
<tr>
<th>Inequality (direct)</th>
<th>Social Welfare (indirect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree</td>
<td>35%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>42%</td>
</tr>
<tr>
<td>Disagree</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>30%</td>
</tr>
</tbody>
</table>

Table 5.3: The Transfer Principle Again: Numerical Responses

5.3.2 The transfer principle

In Chapter 4 we raised some doubts about this principle, doubts which were raised by successive numerical and verbal questionnaire results. and which were strengthened following our analysis of respondents’ comments arising from the questionnaires. As we have suggested, calling into question the transfer principle raises problems from the point of view of social-welfare analysis. If social-welfare is defined in terms of individual incomes and the contours of the social-welfare function have the standard convex-to-the-origin shape depicted in Figure 5.6 then the transfer principle is bound to hold. But, although the Irene-versus-Janet contours look reassuringly conventional, why should we accept the assumptions that conventionally-shaped contours are appropriate to welfare comparisons in practice?

Our numerical investigation of this point mimicked the approach of the first inequality questionnaire reported in Chapter 4. We asked respondents to compare exactly the same pair of income distributions as appear in the extract in Figure 4.8. Table 5.3 reports the new results from the social-welfare questionnaire alongside the earlier results for comparison purposes: to make the comparison easier.

---

8The reverse is not true: acceptance of the transfer principle does not imply that the contours have to be convex to the origin. See Rothschild and Stiglitz (1973) and Figure 5.7 below.
Irene is richer than Janet. Under programme A Irene would have $1 less than under B, and Janet would have $1 more under A than under B. So...

\[\begin{align*}
&...\text{programme A would make the community better off} & 33\% \\
&...\text{programme B would make the community better off} & 19\% \\
&...\text{we can't say, because relative positions of others are different} & 23\% \\
&...\text{none of the above} & 18\%
\end{align*}\]

Responses to questionnaire B1, question 12 (N=620)

Table 5.3 paraphrases the question that was put, but remember that the respondents saw it in the form depicted on page 227 (question 1). It appears from the first row of Table 5.3 that when the numerical problems are interpreted in terms of social welfare rather more are inclined to respond in line with the transfer principle (47%) than in the numerical responses on the original inequality questionnaire (35%). But this finding is not borne out by the results from accompanying verbal question.

The presentation of the verbal question in the social welfare questionnaire was different from the corresponding question in the inequality questionnaire. In the social welfare questionnaire we asked respondents to compare two situations which are appropriate for illustrating the transfer principle, while in the inequality questionnaire we asked them about a specific transfer of income - an income change. The reason for this difference in the formulation of the question is that there might be a status quo bias were the social-welfare issue to be presented in terms of changes: some people may reasonably take the view that every transfer decreases social welfare per se - irrespective of from whom or to whom the transfer may be. Putting the question “even-handedly” as the choice between two hypothetical programmes is a way of getting around that bias. A paraphrase of the question appears at the head of Table 5.4 (the original is on page 227 in Appendix B).

We can see from Table 5.4 that the implied verbal agreement with
the transfer principle in the responses to the social welfare questionnaire is only 33%. Such a result is remarkable in that it corresponds almost exactly with the degree of support found for the transfer principle in the detailed inequality question reported in Table 4.7 on page 71, and corroborates our finding from the numerical questions on inequality comparisons also discussed in Chapter 4. It calls into question even more strongly this fundamental axiom of welfare analysis.

Table 5.4 also reveals the sort of reservation about the transfer principle that attracted substantial minority support. The third row of the table shows that almost a quarter of our respondents took the view that the relative position of other people in the distribution is also relevant to the ranking of the two distributions. As we noted in Chapter 4 this modification of the strict interpretation of the transfer principle is actually consistent with the views originally expressed in Pigou (1912). 9

5.3.3 Principle of population

As we discussed in Chapter 4 this principle makes the inequality comparisons and the formulation of specific inequality measures much simpler; it is obviously also extremely useful in simplifying the structure of social welfare contours in a multi-person community. All the same, we ought perhaps to have some reservations about applying it uncritically *a priori*. 10 As it happens, when we investigate people’s views using questions about social welfare, the results are similar to those of the inequality questionnaire. This can be seen from the results in Table 5.5: two thirds of the numerical responses are in accordance with the principle, while over half of the sample agree verbally. Whichever way you put it - as direct or indirect inequality

---

9 On this question there was a small change of response in favour of the conventional view (B) after the students had responded to the verbal question. 16 changed their answers in this way on questionnaire B1 (3.9% of respondents), whilst 3 changed their answer in the opposite direction to A (0.7%) and 7 changed to A&B (1.7%).

10 See the discussion of this point in Chapter 4 page 57. The numerical and verbal questions in the social-welfare questionnaire (B1) were designed to be as similar as possible to those of the inequality questionnaire (A1).
5.3. EMPIRICAL RESULTS

<table>
<thead>
<tr>
<th></th>
<th>NUMERICAL</th>
<th>VERBAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(q11)</td>
<td>(q17)</td>
</tr>
<tr>
<td>Better</td>
<td>26%</td>
<td>22%</td>
</tr>
<tr>
<td>Worse</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>Same</td>
<td>66%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Results are based on responses to questionnaire B1 (N=620)

Table 5.5: The effect on social welfare of cloning the distribution

<table>
<thead>
<tr>
<th></th>
<th>NUMERICAL</th>
<th>VERBAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(q2 &amp; q3)</td>
<td>(q13)</td>
</tr>
<tr>
<td>Agree</td>
<td>58%</td>
<td>37%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>[n.a.]</td>
<td>45%</td>
</tr>
<tr>
<td>Disagree</td>
<td>39%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Results are based on responses to questions 2, 3 and 13 of questionnaire B1 (N=620 for verbal responses; N=409 for numerical questions - no data were available from the University of Bonn). For interpretation of "Agree" and "Disagree", see text and footnote 12.

Table 5.6: Decomposability of social welfare?

comparisons - there is reasonable support for the population principle but a substantial minority who view population replication as a means by which inequality is reduced.

5.3.4 Decomposability

The issue of decomposability can be tackled using exactly the same methods as we adopted in the questionnaire on inequality discussed in Chapter 4. Interestingly we get almost the same answer as before: it does not matter whether the issue is put directly in terms of inequality comparisons, or indirectly through the medium of social-welfare comparisons of income distributions.

The results for the social welfare questionnaire are given in Table 5.6: 58% gave the same ranking in each of the two numerical questions which means agreement with the axioms (57% in the inequality questionnaire). Only 37% accept the axiom when presented verbally
Figure 5.7: This SWF satisfies the transfer principle, but not decomposability

(40% in the inequality questionnaire) while 45% strongly disagree and 11% disagree which are exactly the same percentages as in the inequality questionnaire. Thus we can conclude - as in our investigation of inequality - that our students reject decomposability as a principle of distributional comparisons. One of the implications of this is illustrated in Figure 5.7: it is possible that if social welfare is not decomposable by population subgroups then the Irene-versus-Janet contours could be non-convex (to check that the contours do nevertheless satisfy the transfer principle superimpose them on Figure 4.10 and follow through the discussion on page 58).
5.3.5 Additions to incomes.

All the issues that we have examined thus far have virtually parallel axioms for the direct and indirect approaches to inequality. But the situation is rather different regarding the issue of additions to incomes. The direct approach to inequality usually addresses the very specific case of additions to all incomes simultaneously, as we discussed in Chapter 4. This may be expressed in terms either of equal absolute additions, or of equal proportional additions, or of some compromise between the two: this is something that we take up in more detail in Chapter 6 where we discuss the different ways in which this simultaneous increase can be interpreted in terms of a “direction” of income change.

By contrast the indirect approach to inequality comparisons focuses upon the impact on distributional comparisons of altering just one person’s income at a time or, by extension, of altering the incomes of any arbitrary collection of persons. This of course is exactly approach of the monotonicity axiom which states that a ceteris paribus addition to one or more person’s income will increase social welfare.

Here we will concentrate on the results for the indirect approach to inequality comparisons. As we have explained the monotonicity axiom is closely related to the Pareto superiority axiom. While the monotonicity axiom is usually put in terms of person’s incomes, the Pareto axiom is typically expressed in terms of utility. We did not postulate any explicit relationship between income and utility in our questionnaires,\footnote{The Pareto axiom has previously been investigated experimentally by McClelland and Rohrbaugh (1978) who formulated their questions in terms of utilities.} so here we focus our discussion on monotonicity as one part of the results from our comprehensive experiment.

People would very probably agree that an addition to the income of a poor person is welfare-increasing; but at the same time it is possible that they might reject the notion that an income addition to a rich person is welfare-increasing if the addition were also to increase the gap between rich and poor.\footnote{See Dagum (1990).} However we should remember that
CHAPTER 5. INCOME AND WELFARE

Based on responses to questions 4, 5 and 6 of questionnaire B1 (N=620).

Table 5.7: Agreement with Monotonicity - Numerical questions.

If programme B yields more income for someone than programme A, does it, ceteris paribus, make the community better off?

<table>
<thead>
<tr>
<th>Question</th>
<th>A=(5,5,5,5)</th>
<th>B=(5,5,5,10)</th>
<th>A&amp;B equivalent</th>
<th>B worse than A</th>
</tr>
</thead>
<tbody>
<tr>
<td>(q4)</td>
<td>64%</td>
<td>1%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>(q6)</td>
<td>59%</td>
<td>1%</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>(q5)</td>
<td>54%</td>
<td>1%</td>
<td>44%</td>
<td></td>
</tr>
</tbody>
</table>

Responses:

Programme B would make the community better off because no one is worse off and someone is better off 55%

Relative positions of others are also different as between A and B, so we can’t say which programme is better 23%

Neither of the above 14%

Results from questionnaire B1 question 14; N=523 (the sample is smaller because we have no results on this question for the Stockholm School and for one group from Koblenz.)

Table 5.8: Agreement with Monotonicity - Verbal Questions

the meaning of the monotonicity axiom is that every addition to any person’s income, including a bonus to the richest person, will increase social welfare. Once again we check support for the axiom both verbally and numerically. For the numerical investigation we present different additions to the richest person using three questions.\(^{13}\) Table 5.7 shows that the greater is the addition to the rich, the higher is the proportion of the respondents who consider that social welfare decreases as you from distribution A to the higher-income case B.

\(^{13}\) These are questions 4, 5 and 6 in questionnaire B1: notice that the questions appeared in a different order in the questionnaire from the way that they are reported in Table 5.7.
Now for the results from the verbal questions, presented in Table 5.8. Once again the heading of Table 5.8 contains a paraphrase of the issue put to the respondents, and the exact wording of questionnaire B1 should be checked in the Appendix. Just over half the respondents agreed with monotonicity, but a further quarter of the sample indicate that the relative positions of other individuals in the distribution is important in assessing the impact on social welfare of an income increase to one person. It is reasonable to conclude that, although this axiom receives more support than, say, the transfer principle or decomposability, monotonicity is indeed in dispute as a general principle of welfare analysis.\footnote{On this issue two features of the responses deserve special mention. (1) The differences here between the results for different university subsamples is very striking, and is in sharp contrast with the results for the other axioms discussed: see note 16 below and page 179 in Chapter 8. (2) There was a noticeable change of mind recorded by the students after they had tackled the verbal questions. On question 4, 8 students switched their answers to B (the conventional view), 8 students switched to A, and 2 switched to A&B. However on questions 5 and 6, where the recipient was richer, the switch in favour of the conventional view was more pronounced: 16 switched to B on question 5 and 14 switched to B on question 6. (The corresponding switches to A were 4 in the case of question 5 and 3 for question 6. The corresponding switches to A&B were 2 in the case of question 5 and 3 for question 6.)} One implication of the sort of rejection of monotonicity that we have encountered in our questionnaire responses is illustrated in Figure 5.8: the contours are consistent with the transfer principle, but where they “curl up” at the ends (by contrast to the standard case in Figure 5.6) we find that giving more income to an already-rich person would lead to lower rather than higher social welfare.

5.4 Summary: Welfare Judgments and Inequality Comparisons

In passing from the topic of inequality to the topic of social welfare much more is involved than just replacing a negative with a positive. As we mentioned in the introduction, there is the difficult problem of the lack of social consensus whether from the political right (\textquotedblright What
Figure 5.8: Contours of a non-monotonic welfare function
5.4. SUMMARY: WELFARE JUDGMENTS AND INEQUALITY COMPARISONS

<table>
<thead>
<tr>
<th></th>
<th>Numerical</th>
<th>Verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monotonicity</td>
<td>54%*</td>
<td>55%</td>
</tr>
<tr>
<td>Population principle</td>
<td>66%</td>
<td>53%</td>
</tr>
<tr>
<td>Transfer principle</td>
<td>47%</td>
<td>33%</td>
</tr>
<tr>
<td>Decomposability</td>
<td>58%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Source: based on responses to questionnaire B1 (N=620)

Note: * Based on question 5.

Table 5.9: Agreement with basic axioms on social welfare. Summary percentages

this country wants”) or from the left (“for the good of the people”). In addition to the issue of consensus there is the question of whether the views of any one person or group of persons can adequately be represented by the sort of assumptions that are commonly made in applied welfare economics.

We have not attempted to address the question of consensus, much less resolve it: that is a matter which is likely to be specific to culture and historical circumstance. But the second question is of central importance to the main theme of this book, in that economists have often appealed to social welfare concepts when thinking about inequality. In tackling this question we have been working on three things simultaneously. Firstly we have tried to replicate our earlier results on inequality rankings when set in a different context. Secondly we have attempted to get at inequality issues through the route of social welfare comparison, even where there was no direct counterpart in the direct approach to inequality discussed in Chapter 4. A summary of the outcome of these components of the chapter is presented in Table 5.9, and should be compared with the “headline

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15 An interesting example of this type of approach is found in Brittan (1973).
16 We carried out a further study (B2) on social-welfare questionnaires to check whether students’ responses were influenced by the order of presentation of the questions. This check was carried out on LSE and Israeli economics students only. In the B2 sample there was higher agreement with monotonicity (67% on numerical questions, 68% on verbal questions) and decomposability (64% numerical, 51% verbal) lower agreement with the population principle (60% numerical,
results” on inequality (page 72). Thirdly we have been able to go a small way toward addressing the question of whether it is reasonable to imagine that there could be a coherent social ordering. Our investigation of the question of transitivity of inequality comparisons and of social-welfare comparisons is fairly reassuring on this point. People may well form coherent views about the ranking of income distributions in terms of social welfare, but we should not expect those views to conform closely to “standard” patterns.

Two major implications of the social-welfare investigation stand out. The first is that there is broad consistency between the direct and indirect approaches to inequality comparisons. Support for the anonymity principle and the population principle is lower, but appears to be very close on the issues of the transfer principle and decomposability - see Table 5.10. The second is that if we take seriously the possibility that monotonicity and the transfer principle may have to be ditched, then some of the familiar basic tools of applied economics will have to be ditched along with them too.

Table 5.10: Support for basic principles of inequality comparisons.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymity</td>
<td>72%</td>
<td>54%</td>
</tr>
<tr>
<td>Population principle</td>
<td>66%</td>
<td>53%</td>
</tr>
<tr>
<td>Transfer principle</td>
<td>31%</td>
<td>33%</td>
</tr>
<tr>
<td>Decomposability</td>
<td>40%</td>
<td>37%</td>
</tr>
</tbody>
</table>

All figures based on verbal responses to questionnaires. For the direct approach anonymity responses are based on questionnaire A2, transfer principle based on questionnaire A4. All social-welfare responses are based on questionnaire B1.

50% verbal); agreement with the transfer principle was lower on numerical questions (44%) and higher on numerical questions (50%). For details of the B2 control see page 211 in Appendix B.

17Notice that in Amiel and Cowell (1994a) there is a similar table where the percentage reported for the verbal support for the transfer principle refers to questionnaire A1 (a higher value). This is also what is presented in Table 4.8. Here we report for the more extensive questionnaire A4 which was run after preparation of Amiel and Cowell (1994a) and is reported in Amiel and Cowell (1998a). See also page 184 below.
Ordinary “Benthamite” social welfare functions will not do.
Chapter 6

Income Change

6.1 Introduction: Comparing Cakes

Up to now we have given only scant attention to the size of the economic “cake” or “pie” - in other words income levels, as opposed to income distribution. The principal exceptions to this were our questions concerning scale- versus translation- independence in Chapter 4 and the case of the monotonicity principle which we considered in Chapter 5. But what has been lacking in all this is a systematic treatment of the way in which income levels and the extent of inequality are varied jointly.

There are several reasons why income levels might affect people’s views on inequality. For example it could be that people’s “taste for equality” - like their taste for butter, guns or other economic goods - depends on income in the sense that the amount of other things that they are prepared to see sacrificed for the sake of marginally greater income equality is income-dependent. This income dependence could be related to the person’s own income, or the average income in the community, or both. This point alone raises issues that can be quite important for policy-makers: because people’s views on the relative urgency of income inequality may be determined by the average living standard, or of their perceptions of it, the income-growth-versus-equality trade-off may be resolved in different ways in economies at different levels of economic development.

However there is a deeper question that is particularly relevant
Figure 6.1: Two pie distributions, before and after income growth
6.1. INTRODUCTION: COMPARING CAKES

to the things that we have discussed in earlier chapters. The size of the cake can affect the meaning of inequality rankings as well as the equality-efficiency or equality-growth trade-off. Suppose we think about the inequality comparisons illustrated in Figure 6.1. In this picture it is clear that A and A' represent the same distributional shares or proportional divisions since in each case the pie has been cut into pieces at the same angle; likewise B and B' represent identical slices, but different slices from A and A'; finally A and B represent the same smallish total income while A' and B' represent the same largish total income. If we were to respond to this picture unreflectively we might assert that “of course” A and A' are equally unequal and “of course” B and B' are equally unequal. But we know from the discussion of Chapter 4 that many people, quite reasonably, assert that inequality increases as all incomes are scaled up proportionately (see the responses to question 1 discussed in Table 6.1 on page 119).\footnote{The original distributions were A=(1,2,3,4) and B=(1.5,1.5,2.5,4.5). Notice that this means that neither can be derived from the other in terms of a sequence of richer-to-poorer transfers, so that A and B cannot be compared on the basis of the transfer principle alone, for example.}

Even if we were more cautious in replying we might yet imagine that the rankings somehow “ought to” stay the same: if A is regarded as more unequal than B then A' should be more unequal than B'. But there is no necessity for this to be so: it is perfectly logical to allow for the possibility that as income grows the ranking of a particular pair of distributional shares should change. The same individual could rank A over B at low incomes, B' over A' at higher income levels, and perhaps A'' over B'' at very high incomes.

As we shall see in this chapter there is a variety of ways in which we could approach this issue. It is important to go into some detail on this because each of these ways has an impact upon the way in which we think about inequality. We have simplified the variety of approaches down into two principal categories:

- \textit{Uniform enrichment.} In this case there is a systematic increase in everyone’s incomes. However there are several views on what constitutes an appropriate definition of a “systematic” increase. More of this in a moment.
• **Unbalanced enrichment.** By contrast to the case of uniform enrichment we assume that income growth occurs individually: income increases accrue to each of the members of a primordially equal population in turn, thus automatically creating inequality along the way. In this specific model of inequality, income inequality is a transitional state between two notional states of equality before and after income growth.

Each of these two broad types of approach has something to say regarding the meaning of inequality and its relationship to the size of the cake. We have incorporated them explicitly in our series of questionnaire experiments. We begin with a discussion of the more standard approach.

### 6.2 Uniform Enrichment

We asserted in the introduction that there is more than one meaning to be given to the concept of systematic income increases when comparing income distributions. We have already introduced two of these when we discussed scale independence and translation independence in Chapter 4 (see the pictorial representations in Figures 2.4 and 2.5 on pages 18 and 19 and also Figure 4.6 on page 54.

These basic concepts can be generalised in a number of interesting ways. For example we could replace the idea of independence as we have interpreted it so far: a standard approach is to consider scale or translation invariance. Scale invariance means that when you multiply up or down everyone’s income in any set of income distributions by a common factor the ranking of the distributions remains unaltered even though the measured inequality level may change. As a simple example of this consider the variance, as conventionally defined in statistics: if the variance of distribution A is greater than that of distribution B then, on scaling up or down all the incomes by the same factor to produce distributions A′ and B′, we will find that the variance of A′ is always greater than that of B′, so that the ordering of distributions remains invariant under transformations of scale; but it is well known that if you double everyone’s income the variance will increase fourfold, so that the level of inequality in this
6.2. **UNIFORM ENRICHMENT**

The case is not scale independent. We could have also carried out the same sort of intellectual exercise with translation independence and translation invariance: in this case if the variance of distribution A is greater than that of distribution B then adding a constant to all incomes to produce distributions $A'$ and $B'$ will mean that the variance of $A'$ will be the same as that of A, and the variances of $B'$ and of B will also be equal. Furthermore it is clear that, whether we consider scale changes or translation changes, the property of independence implies invariance but not *vice versa.*

For many results on inequality measurement invariance rather than the stronger form of independence is all that is required.

An alternative approach to the generalisation of scale and translation independence retains the idea of independence but applies it in a different “direction”. Instead of discussing just changes of income-scale on the one hand or of changes of income-origin on the other we can consider a general scale-and-origin transformation as a description of inequality-invariant income growth. It is this approach that is particularly appropriate for analysing the effect of uniform enrichment. To make the generalisation of scale- and translation-changes more precise it is useful to introduce a couple of further concepts:

- The transformation type. Type 0 will be used to denote translation independence case, and type 1 the scale-independence case. Other intermediate cases can be characterised by values of $t$ lying between 0 and 1.

- The transformation direction. This is derived from the transformation type and will usually depend upon the status quo distribution of income.

We can illustrate it in the elementary diagram depicted in Figure 6.2. Plot the incomes of Irene and Janet on a graph as in Figure 4.2: point A in Figure 2 and the enlarged Figure 6.3 (as in Chapter 4, we

---

2 Notice that, whilst a measure cannot display the properties of scale independence and translation independence at the same time (as we pointed out on page 19), the variance is a nice example of a measure that happens to satisfy scale- and translation-invariance at the same time.
Figure 6.2: Additions to Irene and Janet’s incomes
Figure 6.3: Enlargement of Figure 6.2
happen to have assumed that Irene is richer than Janet, but this is not important for the analysis). Now let us suppose that at there is an extra $10 to be given to them: it could all go to just one person - the circled points at each end of the line through B and C - or it could be split between them. The distributions that we can reach with the extra $10 are illustrated by the shaded triangle: but which of these distributions would result in the same level of inequality as the starting point A? If we insist that full scale independence is required (see page 54) then point B is just as unequal as A: points A and B lie on the ray through the origin, so Janet and Irene’s incomes under B are in exactly the same ratio as they were under A. If we go along with translation independence, then distribution C is regarded as just as unequal as distribution A: the line AC is at an angle of 45° which means that each person gets exactly $5, irrespective of her original income.

Of course there might be a variety of intermediate cases which could also represent interesting ways of dividing the $10 that - according to some people’s opinion - leaves inequality unaltered. These intermediate types can be characterised by a simple index $t$ of the transformation type. If Irene and Janet were the only two persons in the community and if $x_i$ and $x_j$ denote their incomes respectively, then a transformation of type $t$ means that inequality remains unchanged if the $10 are split $y_i$ to Irene and $y_j$ to Janet where

$$y_i = \frac{10}{2} \times \frac{x_i t + 1 - t}{x_i + x_j t + 1 - t}$$  (6.1)

$$y_j = \frac{10}{2} \times \frac{x_j t + 1 - t}{x_i + x_j t + 1 - t}$$  (6.2)

The transformation direction is the direction on the diagram from the point $(x_i, x_j)$ to the point $(x_i + y_i, x_j + y_j)$. Whether $t = 0$ or

---

3The argument generalises to the $n$-person case. Corresponding to equations (6.1) and (6.2) the critical proportions for dividing the sum $Y$ in this case would be given by

$$y_i = \frac{Y x_i t + 1 - t}{n \mu t + 1 - t}$$

where $Y = \sum_{i=1}^{n} y_i$ and $\mu = \sum_{i=1}^{n} x_i$. 
For example if $t = 1$, the case of scale independence, we would get a map that looks something like Figure 6.4. The way to read Figure 6.4 is this. The lines on the diagram represent “iso-inequality” contours - as we move along any one of these inequality remains constant. Because (in this case) the contours are rays through the origin, the “inequality map” of Figure 6.4 implies that inequality remains unchanged under uniform proportional additions to, or deductions
Alternatively, if we take the assumption of translation independence \((t = 0)\) as standard then the corresponding map will be that illustrated in Figure 6.5, where the contour lines of the map are all at \(45^\circ\). As an experiment pick a point on any one of the lines; then displace the point by the same number of millimetres in the Irene direction and the Janet direction; the new point should be on the same line. The economic meaning of this is that adding the same number of dollars to Irene’s income and Janet’s income leaves inequality unchanged; likewise for deductions of the same absolute amount.

In view of our previous discussion the contour systems of Figure 6.4 and Figure 6.5 do not exhaust the possibilities of drawing interesting inequality maps: we could also consider an intermediate case
Figure 6.6: Intermediate-type independence
where the transformation direction lies between that of translation independence and scale independence ($0 < t < 1$): this is illustrated by the inequality map in Figure 6.6.\footnote{See Bossert and Pfingsten (1990).} We could even consider cases that correspond to $t < 0$ or $t > 1$, although the applicability of these is necessarily more restricted.\footnote{The reason for this is that these cases cannot be applied to maps that have a coverage of all positive incomes without generating a logical contradiction.}

So suppose we were to apply here the same sort of techniques that we have used before on questions about inequality and welfare: we would extend the elementary map-drawing that we carried out in Chapters 4 and 5 to examine in more detail how the inequality terrain looks at different income levels. The principal issue to be investigated appears to be the question: what is the appropriate value of $t$? But this begs a more fundamental question, namely: is the transformation direction constant in practice? This second question raises an issue which deserves more detailed discussion.

### 6.3 The Dependence Hypothesis

We have already had a preview of the meaning of “dependence” in the present context. The idea is that the transformation direction depends upon the level of income at which you start. A simple example of this is illustrated in Figure 6.7. In the particular case that we have drawn consider what happens to inequality all incomes increase by a uniform absolute amount. Start at some low income point that is off the diagonal ray of perfect equality and then move outwards at $45^\circ$: at low and moderate income levels the movement increases inequality ($t < 0$), and in the limit (at indefinitely large income levels) it would leave inequality unchanged ($t = 0$).

Of course there are many other possibilities for which the transformation direction depends on the income level: Figure 6.8 illustrates the case where an across-the-board income increase would reduce inequality at low income levels ($0 < t < 1$), and would leave inequality unchanged at high income levels ($t = 0$). Figure 4.11 in Chapter 4 goes one stage further than Figure 6.7: as one progres-
Figure 6.7: Transformation direction dependent upon income (1)
successively moves outwards from the origin a uniform absolute increase in all incomes would first of all increase and then reduce inequality.

The questionnaire results that we have already presented provide empirical evidence on the relationship between distributional judgments and the reference level of overall income. As we have just explained the issue that we want to examine is whether these people’s judgments about the structure of inequality conform to a particular transformation direction. In this case it makes sense to present the results in the reverse order from our usual practice of looking first at the responses to numerical problems and then the verbal questions.

Table 6.1 provides a succinct summary of the main result.\(^6\) The

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\(^6\)Once again, although we provide a summary of the questions posed within
6.3. THE DEPENDENCE HYPOTHESIS

| The same proportionate amount added to all incomes | 32% |
| A fixed sum added to all incomes | 11% |
| Depends the income levels | 41% |
| None of the above | 9% |

Results are based on responses to questionnaire A3 (N=186)

Table 6.1: What income change will leave inequality unchanged?

first row corresponds to the map in Figure 6.4 and the second row corresponds to the map of Figure 6.5. Obviously scale independence receives more support than does translation independence (interestingly the support for these two principles when expressed in the format of questionnaire A3 is very similar to that we discovered in questionnaire A1, reported in Table 4.1 on page 56). Also obvious from Table 6.1 is that the response “depends on the income level” (third row) gets almost as much support as the first two conventional cases taken together. So the evidence suggests that the income level is crucial to an assessment of the transformation direction. But in what way?

To address this question we may look at the responses to the numerical problems included in questionnaire A1. To make the issue of the income level meaningful we have to give some sort of frame of reference to the respondents about what the units of income in the problems are supposed to be “worth”. We do this by postulating an imaginary country Alfaland, with an imaginary currency, and putting a little story in the preamble to the questionnaire - see the accompanying text box. Notice two things. First the income distributions to be compared are presented as those corresponding to different regions in Alfaland. Second that the implicit value of the Alfadollar is suggested in two ways: we mention the average income in Alfaland and the “basic-needs” income level. Further elaboration seemed to us be superfluous and probably confusing.

The relationship between the verbal and the numerical parts of the questionnaire was essentially the same as in all the others that the table, the original wording should be consulted in Appendix B, page 223.
In Alfaland there are some areas with different levels of income. All areas have the same number of people which are identical except in their incomes. In each area half of the people have one level of income and the other half have another level of income. The average income in Alfaland in local currency is 1000 Alfa-dollars and the income which ensures a supply of basic needs is 400 Alfa-dollars. In each of the following questions you are asked to compare two distributions of income - one for each area. Please state which of them you consider to be the more unequally distributed by circling A or B...

Figure 6.9: Introduction to questionnaire A3
## 6.3. The Dependence Hypothesis

Table 6.2: What happens to inequality when you increase people’s incomes?

<table>
<thead>
<tr>
<th></th>
<th>“Inequality decreases”</th>
<th>“Inequality increases”</th>
<th>“Inequality stays same”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adding a fixed absolute sum</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q1) (200,400) → (400,600)</td>
<td>78%</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>(q4) (600, 900) → (900,1200)</td>
<td>55%</td>
<td>18%</td>
<td>23%</td>
</tr>
<tr>
<td>(q7) (1200,1800) → (1800,2400)</td>
<td>51%</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td><em><em>Adding a compromise</em> sum</em>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q2) (200,400) → (400,700)</td>
<td>68%</td>
<td>28%</td>
<td>3%</td>
</tr>
<tr>
<td>(q5) (600, 900) → (900,1300)</td>
<td>40%</td>
<td>52%</td>
<td>6%</td>
</tr>
<tr>
<td>(q8) (1200,1800) → (1800,2550)</td>
<td>41%</td>
<td>52%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Adding a fixed proportionate sum</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q3) (200,400) → (400,800)</td>
<td>40%</td>
<td>29%</td>
<td>28%</td>
</tr>
<tr>
<td>(q6) (600,900) → (900,1350)</td>
<td>24%</td>
<td>53%</td>
<td>22%</td>
</tr>
<tr>
<td>(q9) (1200,1800) → (1800,2700)</td>
<td>16%</td>
<td>59%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Notes: * “Compromise” means “between absolute and proportionate”.

Results are based on numerical responses to questionnaire A3 (N=186)
we have discussed and we find, once again, that the responses to the numerical problems are in line with those made to the verbal questions.

The issue of the transformation direction was investigated using a series of questions that appear on the left-hand side of Figure 6.2. Although the questionnaire posed the question in terms of the comparison of the income distribution in two equal-sized regions of the country, named A and B, we have taken the liberty of paraphrasing and presenting each question as though it were an evaluation of a change of income distribution from case A to case B. Also for clarity we have rearranged the order of presentation of the questions so as to group them into three principal transformation types: absolute income changes (first group), proportional income changes (last group) and intermediate or compromise changes (middle group). The transformation direction can be inferred from the direction in which inequality is reported to change under each income transformation.

Figure 6.2 reveals a consistent pattern of views about the effect of income growth on inequality. As we move from relatively low incomes (the first row in each group) to relatively high incomes (the third row) there is a switch away from the view that an across-the-board addition to income (for any of the transformation types covered in Table 6.2) will reduce inequality as one looks at successively higher income levels. In fact, for proportionate or compromise additions to income, the majority view is that at low income levels an income addition will reduce inequality, whereas at moderate or high income levels the same type of income additions will increase inequality; on the other hand the "median-voter" view implicit in Figure 6.2 would be represented by the set of contours in Figure 6.8.

### 6.4 Unbalanced Enrichment

As we mentioned earlier in the chapter there is an alternative approach to inequality and income growth. This owes much to the work of the philosopher Larry Temkin. The Temkin approach is founded on the notion of an individual’s complaint inherent in his income falling below that norm to which he might reasonably be entitled.
These complaints can be aggregated up over the community - what Temkin refers to as the *additive principle* - so as to generate a measure of inequality inherent in the set of complaints. In order to see the main thrust of the Temkin approach it is useful to run through a little story which - almost - paraphrases Temkin’s exposition.

We qualify the last remark with “almost” because we are actually going to tell Temkin’s story in reverse: Temkin (1986) actually discusses the problem of defining inequality change in a depressing model of unbalanced immiserisation, but our modified tale is one with a happy ending. Imagine a population of $n$ people who are alike in virtually every respect: in this case all except one also have the same income, but the one exception enjoys a higher income. Now let the remaining $n - 1$ individuals in the population start jumping
to this higher income level, jump one by one. Go on until \( n - 1 \) are on the upper income level and one has been left behind on the original low income level. The process is illustrated in Figure 6.10. But what happens to inequality along the way?

There are several stories that could be told here, but let us focus on two opposing arguments, each of which appears to have some force:

1. As the process continues it appears to be more and more the case that just one person is being especially victimised by the situation. As we move toward the situation with \( n - 1 \) people on the upper level and one person left behind it appears

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\(^7\)These are freely adapted from Temkin (1986) page 108-110. Remember that we are retelling his story “backwards”. See also Temkin (1993).
that the entire burden of the inequality is to be borne by the one lone remaining member of the worse-off group, and it may seem both that she has a very large complaint, and that the inequality is especially offensive.

2. If we take on board the additive principle, the inequality in this tiny world is measured by summing up each of the complaints that the members have. On that view, all but one of the members start out with the same size of complaint; but fewer and fewer people will have this complaint as unbalanced enrichment continues; and according to the additive principle, the fewer people there are with a given amount to complain about, the better the situation is with respect to inequality.

We may suspect that both story 1 which sees inequality rising as total income grows through unbalanced enrichment and story 2 which gives the opposite reasoning contain elements of “the truth”. We might conjecture that an appropriate amalgam of these will come close to a consensus view of the relationship between inequality and income group. If so, then there are two principal shapes which the relationship could adopt. The first of these is illustrated in Figure 6.11: the inverted U-shape means that inequality is at a maximum when exactly \( \frac{1}{2} n \) persons are at each of the two income levels.

But what are we to make of the alternative view as illustrated in Figure 6.12? Here we find a logical problem which is readily apparent if we just modify the Temkin story a little further in one respect: begin one step further back where no-one has the higher income and carry the story on one step further so that at the end of the process all \( n \) persons will enjoy the higher income level. Then it is obvious that the extended story takes the society from a state of primordial complete equality (at a low income level) to a terminal state of complete equality (at a high income level). So for inequality statements to have any meaning it must be the case that inequality increases at some point during the process of unbalanced enrichment and must decrease at some later point during the process. This may mean that there is a discontinuity at each end of the relationship between the number of high-income individuals and the perceived degree of
Figure 6.12: Inequality and growth - second view
6.4. UNBALANCED ENRICHMENT

In each of the first nine 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.

7) A = (5, 5, 5, 10) B = (5, 5, 10, 10)
8) A = (5, 5, 10, 10) B = (5, 10, 10, 10)
9) A = (5, 5, 5, 10) B = (5, 10, 10, 10)

15) Suppose there is a society consisting of n people. There is one rich person and n-1 identical poor people. One by one, some of those who were poor acquire the same income as the rich person, so that eventually there are n-1 (identical) rich people and just one poor person. Please circle the appropriate response:
   a) Inequality increases continuously
   b) Inequality decreases continuously.
   c) Inequality at first increases and then decreases.
   d) Inequality at first decreases and then increases.
   e) Inequality remains the same throughout.
   f) None of the above.

Figure 6.13: Extract from questionnaire A1

inequality. Although it may seem less likely than the case illustrated in Figure 6.11 we should not rule it out as a logical possibility.

Once again it is interesting to check for empirical evidence on the structure of people’s inequality judgments. We included questions on these issues right from the earliest of our questionnaire experiments. Two extracts from the first of these (questionnaire A1) appear in Figure 6.13. Some of the issues raised by responses to this questionnaire were pursued further in questionnaire A2, which we will discuss further in a moment.

The main results are summarised in Table 6.3 which enables a comparison to be made of the numerical and verbal approaches, and of the results from the two separate questionnaires. First of all notice the fairly low proportion of intransitive answers (which we com-
CHAPTER 6. INCOME CHANGE

<table>
<thead>
<tr>
<th>Inequality...</th>
<th>questionnaire A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>...increases continuously</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>...decreases continuously</td>
<td>8%</td>
<td>20%</td>
</tr>
<tr>
<td>...first increases then decreases</td>
<td>26%</td>
<td>19%</td>
</tr>
<tr>
<td>...first decreases then increases</td>
<td>42%</td>
<td>35%</td>
</tr>
<tr>
<td>...remains the same</td>
<td>3%</td>
<td>11%</td>
</tr>
<tr>
<td>...does none of the above</td>
<td>1%</td>
<td>4%</td>
</tr>
<tr>
<td>No transitive answer</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Partial or no answer</td>
<td>1%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Table 6.3: Perceived Inequality Change in the Growth Process of Figure 6.13.

Based on responses to questions 7, 8, 9 and 15 of questionnaire A1 (N=1008) and question 9 of questionnaire A2 (N=181)

...remains the same

...does none of the above

No transitive answer

Partial or no answer

consider the responses in the light of the Temkin questions that we described earlier. It is clear that there is little support for the view that inequality increases monotonically as people get richer, nor (as far as the numerical questions are concerned) for the view that inequality decreases monotonically; these conclusions are also borne out by the A2 questionnaire (third column in Table 6.3). Columns 1 and 2 (the A1 questionnaire) indicate that more respondents think that inequality first decreases and then increases during the poor-to-rich migration sequence (42 percent for the numerical questions and 35 percent for the verbal question) than the opposite (26 percent and 19 percent respectively).

However the third column (questionnaire A2) seems to tell a rather different story from the other two. There is a simple reason for this. As the extract in Figure 6.14 shows, questionnaire A2’s sequence of problems starts and finishes with perfect equality, and the corresponding verbal question is worded so as to reflect this. In
6.4. UNBALANCED ENRICHMENT

1) $A = (5, 5, 5, 5)$  $B = (5, 5, 5, 10)$
2) $A = (5, 5, 5, 10)$  $B = (5, 5, 10, 10)$
3) $A = (5, 5, 10, 10)$  $B = (5, 10, 10, 10)$
4) $A = (5, 10, 10, 10)$  $B = (10, 10, 10, 10)$
5) $A = (5, 5, 5, 5)$  $B = (10, 10, 10, 10)$
6) $A = (5, 5, 5, 10)$  $B = (5, 10, 10, 10)$

9) Suppose there is a society consisting of $n$ persons. All of them are identical poor people. One by one each person receives in turn an identical large bonus and thus becomes a rich person: so eventually there are $n$ identical rich people. Please circle the appropriate response:

a) Inequality increases continuously
b) Inequality decreases continuously
c) Inequality at first increases and then decreases
d) Inequality at first decreases and then increases
e) Inequality remains the same throughout
f) None of the above

Figure 6.14: Extract from questionnaire A2
the light of this it seems natural that the support of the first and second views in Table 6.3 should be lower according to questionnaire A2 than according to A1. Moreover the fourth row of Table 6.3 is also readily explained by this fundamental difference between the two questionnaires: if someone were to support the fourth option presented in questionnaire A1 ("inequality at first decreases and then increases") then logically he should support the last option in questionnaire A2.

The same reasoning may also explain the different degree of support for the third and sixth options. But another possible explanation may be the phenomenon of “framing” (Tversky and Kahneman 1981): it is well known that the presentation of a questionnaire may elicit different answers, depending on the way in which certain pieces of information appear in the question. Now we suggested (on page 6.4) that it may be reasonable to suppose that inequality should be a continuous function of $n_1/n$ as indicated in Figure 6.11, but the format of questionnaire A1 left out the end cases $n_1 = 0$ and $n_1 = n$. So it may be that respondents failed to take account of these cases and their implications when replying “inequality at first decreases and then increases” to questionnaire A1, overlooking the possibility of a discontinuity (such as that displayed at each end of the graph in Figure 6.12), whereas the format of A2 forced the issue of the end points to the respondents’ attention.

The issue is important because, as Fields (1987) has pointed out, although there are many inequality measures which would exhibit the kind of behaviour typified by Figure 6.11, there is virtually no commonly-used inequality measure which would exhibit Figure 6.12 as the outcome of the Temkin process. The responses to the two inequality questionnaires may reveal not only the broad pattern of people’s perceptions of inequality, but also the validity of certain specific inequality measures implied by those perceptions. If we are to take the responses to the A2 questionnaire (which covers the extended sequence including the endpoints) as definitive then it appears that some sort of measure that has continuity at the endpoints would be appropriate. But we can say more.

The respondents also exhibited an interesting “symmetry” in their evaluations of the process as we can see from Table 6.4: notice
6.4. UNBALANCED ENRICHMENT

Compare the distributions A=(5,5,5,10) and B=(5,10,10,10)...

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>A1</th>
<th>A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A is more unequal</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>B is more unequal</td>
<td>23%</td>
<td>19%</td>
</tr>
<tr>
<td>Inequality in A and B is the same</td>
<td>56%</td>
<td>62%</td>
</tr>
</tbody>
</table>

Based on question 9 of questionnaire A1 (N=1008) and question 6 of questionnaire A2 (N=181)

Table 6.4: Comparing extremes in the growth process.

that more than half of the respondents consider inequality to be identical in the two cases when \( n_1 = n - 1 \) and when \( n_1 = 1 \). There are several points to be made concerning this symmetry phenomenon.\(^8\)

In the first place it rules out the Gini coefficient and most of the “standard” mean independent inequality indices that are used in the literature. This is illustrated in Figures 6.15 and Figure 6.16 which depict the outcome of two versions of the simple process depicted in Figure 6.10. In Figure 12 we have a situation similar to the experiment reported in Table 6.3.\(^9\) there are two income levels ($5 and $10) and people progressively migrate from the lower to the higher income; as this process occurs mean income rises (horizontal axis) and inequality, measured by standard indices, at first rises then falls (vertical axis). Figure 13 shows what would have happened had the income growth been greater - incomes rise from $1 to $10 in this case. In each case results are presented for the Gini coefficient and six members of the class of Atkinson indices: notice that only for the one Atkinson index where inequality aversion equals 2 do we get the symmetric pattern suggested by our questionnaire responses.\(^10\) If we were to take this finding as evidence of our respondents’ attitudes towards different types of income transfer, then

---

\(^8\)One small point on terminology should be noted. The anonymity principle that we have discussed extensively in Chapter 5, is sometimes referred to as the “symmetry assumption”, because of the mathematical property of the social welfare function that this principle implies. This of course has nothing to do with the symmetry property that we are talking about here.

\(^9\)The only difference is that to make the diagram smooth both figures have been drawn for the case where there is a much larger number of persons: \( n = 50 \).

\(^10\)In this case the inequality measure would be given by
Migration of 50 persons from $5 to $10

Figure 6.15: Mean income and inequality as incomes grow from $5 to $10

Migration of 50 persons from $1 to $10

Figure 6.16: Mean income and inequality as incomes grow from $1 to $10
it would suggest quite a high sensitivity to incomes at the bottom of the distribution: if Irene has $100, Janet has $10, and Kate has $1, then transferring just 5¢ from Janet to Kate is regarded as having the same impact as transferring $5 from Irene to Janet. However this conclusion is predicated on the assumption of scale independence, which we know to be inappropriate as a general assumption because of the earlier discussion about the transformation direction. Were we to adopt the opposite polar assumption of translation independence, we would then find that Gini’s mean difference and the variance (the translation-independent counterparts of the Gini coefficient and the coefficient respectively) also exhibit the symmetry property.

The unbalanced enrichment story - or the “reverse-Temkin” process - reveals useful supplementary information to our understanding of the inequality maps people have when they compare income distributions. Respondents to our questionnaires indicate that the general shape of the inequality path in the growth process may be regular - the classic inverted U - but that its precise form is one either that represents quite high inequality aversion or one that is inconsistent with scale-independence and decomposability.\(^{11}\)

### 6.5 Policy appraisal

As we have seen in this chapter, the structure of inequality comparisons across situations where total income differs is more complicated than the simple alternatives which we outlined in Chapter 2. We will summarise the principal points of this chapter by examining two issues that are particularly relevant to applications of inequality analysis to the making and assessment of economic policies.

\[
1 - \frac{\sum_{i=1}^{n} x_i}{n}
\]

See the Appendix for general definitions.

\(^{11}\)Notice that there are some scale-independent non-decomposable indices which exhibit the symmetry property, for example the Gastwirth index - see page 206 in the Appendix.
6.5.1 Fairness, comparability and income levels.

First, we touch on issues of fairness or comparability of income structures at different income levels. Scale and translation independence are not the only options, nor necessarily the best options, when looking for an appropriate assumption about the relationship between inequality maps at different income levels. However we can now throw some light on the relative merits, according to our respondents concerning fairness in income growth or, turning the process around, in income sacrifice. The two propositions could be crudely stated thus:

- **Fair shares.** Fair treatment requires that the gains from economic growth, or the sacrifices required by taxation, should be proportional to a person’s means.

- **The Duke and the Dustman.** Fair treatment requires equal dollar gains (or sacrifices) for all. Whether the person’s resources place him in the top 0.1 percent (the Duke) or amongst the poorest paid (the dustman) it is argued that the same absolute payment to all - or the absolute sacrifices by all - is a just way of transforming the income distribution. This has actually been argued as a principle of fair taxation in justifying the brief and inglorious system of local taxation in the UK known as the “poll tax” or “community charge”.

The questionnaire evidence reveals that neither principle is regarded as overwhelmingly appropriate in all circumstances. However the responses indicate more than a simple “don’t know” or “can’t say”. The evidence from the questionnaires shows that there is a systematic link between the view of what constitutes fair treatment in dividing the cake and the size of the cake itself (see Table 6.1). The higher is the “reference income level” that is relevant to the distributional comparison the weaker is the perceived inequality-reducing effect of an across-the-board absolute income increase; and although an across-the-board proportional increase is perceived to reduce inequality at a low income levels, it is perceived to increase inequality at high income levels.

The implications of these findings emerge more starkly if we turn them around and translate them into perceived inequality effects of
an income reduction - a tax. An equal absolute sacrifice (the poll-tax
type) would be regarded as inequitable (inequality increasing) for all
income distributions, but particularly so for cases with a small total
income. A proportional tax would be regarded as inequitable (in the
sense just explained) in low-income economy and equitable in a high
income economy.\footnote{Although in this questionnaire we did not test whether individuals regarded
the implications of an income-reduction in a way consistent with that of income
growth, this point was checked in questionnaire A1 (see chapter 4).}

### 6.5.2 Inequality and Growth.

The second area concerns a relationship that is central to a variety
of research questions that are of current concern. In the context
of economic development this relationship is commonly addressed
in the form of a trade-off epitomised by the question “how much
inequality is to be anticipated as a concomitant of economic growth?”
In this chapter we have looked at another type of trade-off: in a
sense we turn the question around so as to focus on “how much
inequality is to be tolerated as a concomitant of economic growth?”
Our questionnaires did not put the issue in that form, but this can be
inferred from questionnaire A2 which investigates the way in which
people appear to view changes in inequality as incomes grow

The stylised story that has been set out in Figures 6.10 to 6.12
can be applied directly to the inequality-tolerance. One way of de-
scribing the relationship between growth and inequality in the course
of economic development is as a “migration” process: workers and
their families move from a relatively low income sector (the country?)
to a relatively high-income sector (the city?), and so the unbalanced
enrichment story of pages 6.4 may be represented a type of unbal-
anced economic growth. Must unbalanced income growth imply a
growth in inequality too? Or could there be a fall in inequality as
one group of the population moves ahead leaving others behind? One
argument for this apparently controversial view has been neatly char-
acterised by Hirschman and Rothschild (1973) as the “traffic in the
tunnel” problem: those left behind, on witnessing the income gains
by others, experience a rise in their utility because their expectations
about a future rise in their own incomes, much as somebody stuck in traffic may be heartened by seeing the beginnings of movement in other lanes of vehicles. Whether the income inequality associated with the intermediate stages of a growth process is perceived to be rising or falling may depend upon each person’s expectations about his own incomes, and those expectations in turn will depend upon his evaluation of other people’s incomes. Once again “externalities” - the dependence of one person’s utility on another person’s economic circumstances - plays a central role in perceptions of income inequality.

One important lesson has emerged from both main parts of this chapter: the dependence of inequality rankings on the income level at which the distributional comparisons are made. The issue of a reference income level will emerge at the centre of the discussion in the next chapter.
Chapter 7

Poverty

7.1 Introduction

Thinking about inequality usually invites - at least in passing - thinking about poverty. It seems reasonable to suppose that people who are sensitive to inequality are not going to be indifferent to the existence of poverty, nor \textit{vice versa}. This suggests that there may be considerable advantage in pursuing an approach to the analysis of poverty comparisons that is similar to those of inequality or social-welfare comparisons. In this chapter we will examine how the issue of poverty may be addressed using the techniques that we applied to the subject of inequality in Chapter 4. Two steps are involved.

First we need to make precise what we mean by “poverty” in principle. As with the theoretical approach to inequality that we described in Chapter 2 this step resolves into imputing meaning to a type of distributional comparison. To do this we again introduce a system of axioms by which such comparisons may coherently be made, in this case the axioms that are sometimes used to provide a formal basis for commonly-used poverty measures. Once this system of axioms is established we examine some basic propositions about poverty comparisons using these systems of axioms.

The second step is to investigate whether the standard approach, based upon these axioms, appears to give a “reasonable” picture of poverty comparisons, one that is in accord with the way poverty judgments commonly appear to be formed. As with Chapters 4 to
6 we shall again examine the problem of framing a questionnaire investigation on this subject and report on our respondents’ views about poverty.

7.2 What Does “Poverty” Mean?

The question “what is poverty?” is virtually as large and as unwieldy as the question “what is inequality?” which underlay the discussion of so much of the previous chapters. Some of the insights of the analysis of the previous chapters on inequality and social welfare can be used to make the question less unwieldy and to provide a coherent account of the issues involved in ranking income distributions according to poverty criteria. But more is involved.

In the real world inequality and poverty are often found in the same places, have similar underlying causes, and grow or diminish together. However, in principle, inequality and poverty are two different things: the presence of the one does not logically imply the presence of the other.

Of course it is true that inequality and poverty - in some respects - will touch on issues in common. The two types of analysis draw upon similar ethical concerns and logical problems, and in many cases raise similar issues of comparison of income distributions. Furthermore in the modern literature on the analysis of income distribution similar types of statistical tools have been developed for poverty and for inequality analysis, based on similar sets of axioms. But even where there is common ground, there may be a fundamentally different basis for interpretation of income distributions in terms of poverty and in terms of inequality. For example, in a large population take two poor persons whose incomes are different. If the two poor persons were to pool their incomes and share equal misery we might argue that inequality has decreased, and perhaps that poverty has decreased too. On the other hand if the income of the “richer” of these two is just brought down to the level of the other, then it is arguable that while inequality may have fallen, poverty has increased.

Given this sort of clear difference in interpretation of the facts about income distribution it is a good idea to take a look at the
principles of poverty measurement, independent of our previous discussion of inequality analysis. The essential components of poverty measurement can be simplified down to three:

- the fundamental partition of the population into the poor and the non-poor;

- the way in which persons are to be identified individually as poor or non-poor;

- the way in which information about the income distribution of the poor and the non-poor is to be used.

Each of these steps has an influence on the way in which we modify the questionnaire approach to deal with this economic issue. Let us look at them in turn.

---

7.2.1 Partitioning the population

The first step can be illustrated schematically in Figure 7.1. Imagine that the population is arranged according to one or more observable personal attributes: these attributes could include various indicators of resources and of needs. In principle we could partition the population according to any of those attributes (males-versus-females, different regions or occupational groupings and so on), and then adopt an approach similar to the kind of “accounting” framework to the analysis of inequality that we discussed on page 2.5. However, more importantly, we could try to choose a fundamental partition of the population that - according to the resources- and needs- attributes that we have selected - will then neatly categorise every actual or hypothetical member of the population as “poor” or “non-poor”, according to his economic status and other relevant characteristics.

7.2.2 Identifying the Poor

Once the criterion for dividing up the population is determined then any one person’s poverty status can be determined. Here it is useful to use a small amount of mathematical notation to introduce a key concept of individual poverty - the income gap - which is illustrated in Figure 7.2. As in Chapter 4 let $x$ denote a person’s income, measured in whatever units of currency are appropriate, so that, for our two
7.2. WHAT DOES “POVERTY” MEAN?

arbitrarily chosen members of the population, Irene’s income is \( x_i \) and Janet’s income is \( x_j \) (in this case we have assumed that they are both poor). We shall write the poverty line income as \( z \) and average (arithmetic mean) income as \( \mu \), where both of these are measured in the same currency units as before. If Irene’s income is below the poverty line then the poverty gap for her income is just the difference between her income and the poverty line (\( g_i = z - x_i \)); and if Irene’s income is on or above the poverty line then her gap is counted as zero (\( g_i = 0 \)); the gap can never be negative. There are then three basic ways of characterising an individual’s poverty status:

- A simple “yes/no” as to whether the person’s income \( x \) falls short of \( z \).
- The person’s actual income \( x \).
- The poverty gap for the person, \( g \).

7.2.3 Using information about the distribution

In principle each of the three pieces of information about the person’s status could be incorporated into the final step of poverty measurement. This involves some type of aggregation rule covering the poverty status indicators for each member of the population.

So why does poverty analysis raise complicated questions? The answer to this can be found in the three-stage breakdown of the problem that we have just reviewed. First, the partition itself may be ambiguous: there is considerable room for debate as to what should determine the poverty line, in principle, and how it should be adjusted through time. Second, it is not always very clear what should be the appropriate choice from the information that is available in practice about each person: should we use income or expenditure, or perhaps some measure of personal wealth, for the categorisation of each individual? Third, although there seems to be an obvious “solution” as to how to aggregate information about individuals the answer is in fact not obvious at all.

Let us take this last point a little further. The main point at issue is: how should we count the poor? We might be tempted to
Figure 7.3: Counting the poor (1) - all the poor are equal

brush aside the question and in say that the way to count the poor is just to count the number of mouths to be fed or bodies to be housed. This line of thought is illustrated in Figure 7.3: on the vertical axis we have a simple scale used to evaluate poverty for each person; the evaluation is done on the simple “yes/no” basis, so that if the person’s income falls below \( z \) the evaluation is 1, otherwise it is 0. If we work out the overall poverty count in the population using this approach, then the exercise yields a well-known poverty index, the simple (normalised) head count:

\[
\text{headcount} = \frac{\text{number of the poor}}{\text{population}}
\]

But it is also a valid position to say that in counting the poor due attention should be given to the depth of poverty of individual poor people, not just to the fact of whether they are poor or not.\(^2\) This approach then counts the poor by evaluating each person’s poverty in proportion to his poverty gap (see Figure 7.4). Following this route yields the poverty deficit as a measure of overall poverty:

\[
\text{poverty deficit} = \frac{\text{average poverty gap}}{\text{poverty line}}
\]

\(^2\)See for example the recommendations in Panel on Poverty and Public Assistance (1995).
It is not difficult to see that the two different ways of counting the poor represented by Figures 7.3 and 7.4 can lead to contradictory results: if an “anti-poverty programme” lifts the incomes of a very few from just below the poverty line to just above the poverty line, while at the same time cutting the incomes of a large number of the very poor by a substantial amount, then the head-count measure will decrease (Poverty falls?) while the poverty-deficit measure will increase (Poverty rises?).

However, that is not the end of the matter. There may also be a case for a more complicated method of counting the poor: one that takes into account the dispersion of incomes amongst the poor. This can be done evaluating the poverty status of each person $i$ in a way that is dependent on either the person’s income $x_i$ or the poverty gap $g_i$, but which is not proportional to the poverty gap. One particular example of such a scheme is illustrated in Figure 7.5, but in principle there are indefinitely many ways of drawing such a “counting-the-poor” scheme.

Obviously all this is bound to introduce further complexity, so why do it? The short answer is that the two standard approaches that we have considered - the head count and the poverty deficit - suffer from what may be a conceptual flaw. Irrespective of whether they contradict each other in practice they unquestionably provide
11) Suppose there are two regions A and B which have almost identical income distribution; the only exception is that a particular person \( i \) in region B has a higher income than the corresponding person \( i \) in region A. In both regions the income of person \( i \) is less than the level that ensures a supply of basic needs.

a) Poverty in region A is higher.

b) The relative position of other people is also different in A and B; therefore we cannot say, a priori, in which region poverty is greater.

c) Neither of the above

Figure 7.6: The monotonicity question
only *ad hoc* answers to the question “what is poverty?” It has been argued that, as with inequality, a more reasonable approach to the subject would be to found the analysis explicitly upon a set of axioms that give meaning directly to poverty comparisons: then the poverty-count scheme such as that depicted in Figure 7.5, will not be something that has just been pulled out of the air, but is derived directly from the agreed set of poverty axioms.

This argument suggests two things. First, the welfare criteria that we explained and discussed in Chapter 5 will also apply here, with the proviso that the scope of their application may be affected by the fundamental partition. Second, as we have suggested earlier in this chapter, the suitability or otherwise of these axioms may be susceptible of investigation using the same methodology as that which we outlined in Chapter 3.

### 7.3 The Poverty Questionnaires

Because the modern approach to poverty measurement is founded explicitly upon an axiomatic base, it makes sense to use this base in designing a questionnaire approach to poverty comparisons. As with the studies of inequality and social welfare in Chapters 2 to 6 we sought to clarify whether the formal approach to the subject that has become received wisdom corresponds well with the way lay people perceive poverty. The next step is obviously to consider whether there are any special difficulties which have to be surmounted in trying to interpret poverty issues in a set of attitude questions.

There are two particular problems which cannot be avoided. The first is central to the questionnaire study of poverty, as opposed to inequality. It is that a frame of reference has to be given to those who are invited to make judgments or comparisons. The reason is that at the heart of the poverty comparison is the fundamental partition of Figure 7.1 which requires the specification of some level of personal or family resources in order to construct the poverty line. This could be a comparatively simple - for example a rule-of-thumb poverty line of $1 a day is sometimes used to motivate international concern for the

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3See for example \?).
poor (World Bank 1990) - or it could be based upon detailed budget studies of particular groups in the target population\(^4\) or upon an analysis of the economic and social functions that are permitted by low incomes in a variety of economic circumstances.\(^5\) Alternatively the criterion for the poverty line may be determined by reference to some statistic of the whole distribution: for example the threshold level of income\(^6\) could be tied to some proportion of mean or median income. Finally, rather than singling out one particular poverty line it may be appropriate to specify just a range within which we are confident that the poverty lies, as illustrated in Figure 7.7, where \((z, \bar{z})\) are the endpoints of an “interval” of possible values within which the unspecified, or unspecifiable poverty line \(z\) is supposed to lie.\(^7\)

The second problem is that amongst the collection of axioms that has appeared over the years as being reasonable properties for poverty measures there are a number of internal contradictions: it has been shown that it is just not possible to produce a coherent poverty ordering that simultaneously respects all of the supposedly basic criteria for poverty comparisons. In this respect the position is different from that of inequality analysis where the transfer principle

\(^{6}\)In its comparative studies of poverty in Europe, Eurostat takes 50% of mean income as the criterion for the poverty line.
\(^{7}\)See for example Atkinson (1987).
is usually taken as basic, and then the class of inequality measures is narrowed down by invoking a number of other not quite so basic criteria: decomposability, population principle, scale or translation independence, and so on. The implication of this is that either one has to work with a variety of measures that maybe mutually contradictory in their poverty diagnosis, or one has to drop one or more of the “basic” criteria and work with a specialised subclass of poverty measures.

One further issue should be mentioned. The relationship that may exist in principle between poverty and inequality raises the question of whether people perceive the common ground of the two subjects in the same sort of way. So, where practicable, it is a good idea to present the poverty and the inequality questions in a format that permits easy comparison\(^8\) of the responses.

In view of the central importance of the partitioning of the population at the poverty line, there are two fundamental types of question to be investigated. We have used a specialised questionnaire for each of them:

- Questions relating to alternative distributions relative to a given poverty line. These are dealt with in questionnaire P1 (see Appendix B, page 235).
- Questions relating to the nature of the poverty line itself. These are dealt with in questionnaire P2 (see Appendix B, page 240).

We will deal with each of these in the next two sections.

### 7.4 Income Distributions and Poverty

Once again we have a problem of how to compare income distributions. We need to look afresh at some of the principles that we have encountered before in this book, but now reinterpreted in the context of poverty. Because most of the principles will be reasonably

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\(^8\) Problems arise when the hypothetical income change implied in a comparison of two distributions would involves some person crossing the poverty line - see Kundu and Smith (1983).
In Alfaland there are two regions which have different levels of income. All the people of Alfaland are identical in every respect other than their incomes. The level of income which ensures a supply of basic needs anywhere in Alfaland is 15 Alfadollars.

In each of the ten following questions you are asked to compare two distributions of income - one for each region. Please indicate the region in which you consider poverty to be greater by circling A or B. If you consider that poverty is the same in the two regions then circle both A and B.

1) $A = (4,8,12,30,40,50,66)$  $B = (4,9,12,30,40,50,66)$
2) $A = (4,8,12,30,40,50,66)$  $B = (4,9,11,30,40,50,66)$
3) $A = (4,8,12,30,66,50,40)$  $B = (12,8,4,30,40,50,66)$
4) $A = (4,8,12,30,40,50,66)$  $B = (4,4,8,12,12,30,40,50,50,66,66)$
5) $A = (4,8,12,30,40,50,66)$  $B = (5,6,13,30,40,50,66)$
6) $A = (4,7,8,12,30,40,53,66)$  $B = (5,6,7,13,30,40,53,53,66)$
7) $A = (4,8,12,30,40,50,66)$  $B = (4,8,12,30,140,150,166)$
8) $A = (4,8,12,30,40,50,66)$  $B = (4,8,12,20,30,40,50,66)$
9) $A = (4,8,12,30,40,50,66)$  $B = (4,8,12,30,40,50,50,66,100)$
10) $A = (4,8,12,30,40,50,66)$  $B = (4,8,12,14,30,40,50,66)$
...  ...

Figure 7.8: Numerical problems in the first poverty questionnaire

familiar from the discussion of Chapter 2 and Chapter 5 it is not necessary to discuss them exhaustively. So what we shall do is introduce each one, explain the relationship (if any) to the principles of social-welfare and inequality analysis, and then examine the results from the P1 poverty questionnaire. As we have just mentioned, for the moment we set aside the problem of the poverty line itself.

The accompanying text box shows how the issue was presented to the respondents and the numerical problems that were used to draw inferences about their views on some of the basic principles of poverty analysis. Notice the preamble which specifies a “basic-needs” income level which can serve as a de facto poverty line. In this way we sidestep the issues of partitioning the population into poor and non-poor and of identifying which individuals are in poverty. More
7.4. INCOME DISTRIBUTIONS AND POVERTY

7.4.1 Monotonicity

We have already encountered this principle in Chapter 5 (see page 81), but now we have to rephrase it slightly: in the context of poverty this refers to the issue of what happens to measured poverty when the income of a poor person is increased. Income increases amongst the rich are not relevant to the specification of this axiom, but we shall have more to say about them when we come to the “Focus” axiom below. We could illustrate this schematically by modifying Figure 5.3 so as to get Figure 7.9.

In order to sharpen the analysis we have concentrated upon a particular version of the axiom - “Weak Monotonicity” - in which we restrict attention to cases where the recipient of the income increase remains poor after his income has been increased: we do not attempt to investigate the case where the income increase is so great as to lift the person’s income above the poverty line \( z \) (In Figure 7.9 none of
CHAPTER 7. POVERTY

Table 7.1: What happens if a poor person gets $1 more income?

<table>
<thead>
<tr>
<th>Numerical (q1)</th>
<th>Verbal (q11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>“poverty falls”</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>“depends on others”</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>“stays the same”</td>
</tr>
<tr>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

Note: Based on responses to questions 1 and 11 of questionnaire P1 (N=486)

The little figures crosses the heavy broken line). In this way we can get a clear view of the distinction between cases such as Figures 7.4 and 7.5 where the monotonicity axiom applies (increasing the income of any poor person will, by itself reduce poverty) and the case of Figure 7.3 where increasing a poor person’s income only reduces poverty if the person crosses the poverty line.

The numerical problem that focused on this issue is question 1 (see the extract in Figure 7.8). The verbal question is given in Figure 7.6. Notice that we posed it in the form of comparing two regions rather than as a “before-and-after” question involving time to try to avoid the problem of status-quo bias: this setting seems to be important.

The responses to the two types of question are presented in Table 7.1. In this and other tables we have used a shorthand for presenting the answers to the numerical questions; so the response “the distribution in A exhibits higher poverty than the distribution in B” is summarised as “poverty falls”. The way to read Table 7.1 is as follows: the right-hand column (in italics) gives the percentages of the three different types of response that could be made to the numerical problem; the bottom row gives the percentages of the support for the various responses to the verbal question, also as percentages. The cells in the main part of the table give the detailed breakdown by numerical and verbal responses: so, for example, 17 percent of the combined sample indicated both that poverty was higher in distribution A than in distribution B (numerical part) and that the result of an increase in the income of a poor person would depend on the
incomes of others (verbal part). As far as the numerical questions are concerned the main point that emerges is similar to the result that we found repeatedly in the case of the transfer principle in the inequality and social welfare context (Chapters 3 and 5). In comparing distribution B with distribution A the addition to incomes in the numerical example was not made to the poorest individual. So the income gap between the poorest and some other poor people would actually increase under a hypothetical change from distribution A to distribution B. So it is perhaps not surprising to find that 30 percent of the respondents indicate that this change in the distribution leaves poverty unchanged. When verbal responses are considered the picture becomes more complicated: a smaller proportion of the population concur with the monotonicity principle when stated verbally rather than numerically (44% as against 64%) but this is not surprising because of the role of the extra option provided for the verbal responses. It appears from the top centre of Table 7.1 that 17 percent of the whole sample considered that although poverty fell for the particular numerical example given in question 1 of the questionnaire the issue of whether an income increase would reduce poverty generally would depend on the income of others. As a general rule, therefore the monotonicity principle does not receive overwhelming support.

7.4.2 The transfer principle

We have, of course, encountered the transfer principle many times before; but once again the interpretation of this principle in the context of poverty analysis has to be modified somewhat from the way in which we encountered it in Chapter 2. The idea is that if there is a small income transfer from Irene to Janet then measured poverty falls as long as (a) Irene is richer than Janet and (b) Irene was poor before the transfer took place. This assumption is intimately associated with the shape of the poverty evaluation curve that we introduced in Figure 7.5. To see why, take a look at Figure 7.10 which takes Figure 7.5, one stage further. Consider the evaluation of the economic position of Irene and Janet with income $x_i$ and $x_j$ (which can be read off the vertical axis in Figure 7.10) before and
Figure 7.10: Income transfers and the poverty count

after an equalising income transfer. The average of their poverty evaluation is given by 0B before the transfer takes place, and by 0A after the transfer takes place. Obviously a convex evaluation curve such as that depicted in Figure 7.10 implies that poverty falls if there is a richer to poorer transfer amongst the poor. Spreading the misery of poverty equally reduces poverty.

Once again we focus upon a “Weak” version of the Transfer principle in that - as with our approach to the monotonicity axiom - we do not consider particular income comparisons in which the implied income transfer causes an individual to cross the poverty line; this means that both donor and recipient are poor before and after transfer.

It is clear from Table 7.2 that agreement with the transfer principle is lower - about a quarter - than in the case of inequality analysis or social welfare. There are sound theoretical reasons for expecting this to be so. Atkinson has pointed out that the case for applying the Transfer principle to poverty analysis is not clear-cut because of the possibility of alternative interpretations of the meaning of poverty.\footnote{“Do we wish to impose the Dalton transfer principle? Here views may differ. For those who see a minimum income as a basic right, the [...] transfer principle [...] may be irrelevant. On the other hand those viewing poverty as a continuous gradation may find the transfer principle quite acceptable.” (Atkinson 1987, page 759).}
7.4. INCOME DISTRIBUTIONS AND POVERTY

Figure 7.11: Transfer principle (weak version)

<table>
<thead>
<tr>
<th>Verbal (q12)</th>
<th>Numerical (q2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>11%</td>
<td>2%</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>9%</td>
<td>3%</td>
</tr>
<tr>
<td>All</td>
<td>22%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Notes: (1) “others” here means “non-poor”. (2) The “none of these” column is required because the labelling of the first three columns is simplification of the questions put: in each case a specific reason for the change in poverty was suggested. (3) Based on responses to questions 2 and 12 of questionnaire P1 (N=486)

Table 7.2: What if $1 is taken from fairly poor Irene and given to very poor Janet?
Table 7.3: If we permute the incomes does poverty stay the same?

From the right-hand column of Table 7.2 we can see that “poverty stays the same” was the clear winner amongst the responses to the case of the numerical questions (62 percent). About a quarter of the population agree with the transfer principle when stated in terms of the numerical problem and only 22% of respondents supported the principle in the verbal part of the questionnaire: these proportions are very much lower than for the comparable issue posed in the context of income inequality (see Chapter 4) or of social welfare (Chapter 5). Furthermore only 11% agree with the Principle of Transfers expressed both in its numerical and in its verbal form; and on this issue it happens that the proportion of respondents who changed their minds was very low. It seems fair to say that the transfer principle is decisively rejected as a principle for poverty measurement.

### 7.4.3 Anonymity

The interpretation of the anonymity axiom is virtually the same as that used in the discussion of social welfare and inequality - see page 5.2.1 in Chapter 5. In other words relabelling of the individuals in the population should have no effect on measured poverty. However one should note that the implications of the axiom are somewhat stronger in the poverty case than in the discussion of social welfare: acceptance of the anonymity axiom implies that “history does not matter”, so that after a permutation of incomes we should be unconcerned about the relative positions before the permutation, even if some individuals cross the poverty line during the permutation.

Remarkably the numerical support for the anonymity principle in the context of poverty is almost exactly the same as it was in the case...
7.4. INCOME DISTRIBUTIONS AND POVERTY

of inequality (82% as against 83%) - see Table 7.3. It is also clear from Table 7.3 that agreement with the principle falls off dramatically when we move from the numerical representation of the issue to stating the issue verbally: and that fewer than half of the respondents agree with the principle both numerically and verbally. This pattern of responses is understandable given the way in which we posed the questions: the numerical questions depicted a rearrangement of incomes among the poor, and among the non-poor; the verbal question placed no restriction on the possible permutations, and so allowed for the possibility that people cross the poverty line as well as being re-ranked in the distribution. So if people are concerned about poverty histories rather than just poverty snapshots, we would expect them to respond in this way.

7.4.4 Population replication

The idea of the population principle is inherited directly from the analysis of inequality and of social welfare. However, in this context the a priori basis for the principle is less clear: one could plausibly argue that if the distribution is replicated (so that there are exactly double the numbers of poor and of non-poor) then poverty is doubled. The issue is essentially whether poverty comparisons are to be made in relative or absolute terms with respect to the size of the population.

As we can see from Table 7.4 support for the population principle is rather lower when expressed in terms of poverty rather than inequality (49% agree with the principle when the issue is presented numerically in the poverty context, whereas 58% agreed with the principle when the issue is presented numerically in the context of inequality; when the issue is presented verbally we get 57% agreement in the poverty context and 66% for the inequality setting.\(^{11}\)

\(^{10}\)Cf Table 5.2. The proportion of agreement with the anonymity principle in the context of verbal questions (53%) is very similar to the corresponding figure in the social welfare study (54%), where again re-ranking seems to matter to our respondents. Notice that one group in our study is an exception; see page 181 in Chapter 8.

\(^{11}\)For social welfare (66% numerically 53% verbally) (See Tables 4.2 and 5.5 on pages 57 and 95).
CHAPTER 7. POVERTY

### Table 7.4: What happens to poverty if we clone the economy?

<table>
<thead>
<tr>
<th>Verbal (q14)</th>
<th>“poverty falls”</th>
<th>“poverty rises”</th>
<th>“stays the same”</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>4%</td>
<td>6%</td>
<td>7%</td>
<td>18%</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>3%</td>
<td>15%</td>
<td>12%</td>
<td>31%</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>2%</td>
<td>7%</td>
<td>38%</td>
<td>49%</td>
</tr>
<tr>
<td>All</td>
<td>9%</td>
<td>29%</td>
<td>57%</td>
<td></td>
</tr>
</tbody>
</table>

Based on responses to questions 4 and 14 of questionnaire P1 (N=486)

### Table 7.5: Population decomposability

<table>
<thead>
<tr>
<th>Verbal (q15)</th>
<th>“Agree”</th>
<th>“Disagree: depends on the distribution”</th>
<th>“Disagree: some other reason”</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Agree”</td>
<td>31%</td>
<td>17%</td>
<td>8%</td>
<td>62%</td>
</tr>
<tr>
<td>“Disagree”</td>
<td>15%</td>
<td>14%</td>
<td>6%</td>
<td>37%</td>
</tr>
<tr>
<td>All</td>
<td>46%</td>
<td>32%</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

Based on responses to questions 5, 6 and 15 of questionnaire P1 (N=486)

The interpretation of this seems to be that in assessing poverty - as opposed to inequality - people think much more in absolute rather than relative terms.

#### 7.4.5 Population decomposability

The interpretation of decomposability is essentially the same as that which we explained in Chapters 2 and 5 in connection with inequality and social welfare. Briefly the idea is that if we say that distribution A exhibits more poverty than another distribution B (with the same mean and the same number of persons) then we should say that distribution A' exhibits more poverty than another distribution B', where A' is formed by merging A with distribution C that has the same mean and B' is likewise formed by a merging B with C. In addition we require that A, B and C all have the same poverty line.

Remarkably, once again we find again the “60-40” pattern of
support for the decomposability axiom that we find in the case of inequality and of social welfare analysis. However in the context of poverty the level of agreement with the principle is somewhat higher.

7.4.6 The focus axiom

The issue raised by the focus axiom is this: should the concept of poverty be sensitive to information about income distribution amongst the non-poor? Assume that the distribution of income below the poverty line is fixed, and that the number of persons on or above the poverty line is fixed: if the incomes of those on or above the poverty line were to change, should this affect the level of poverty, or poverty comparisons? Supporters of the focus axiom would argue not, but there are grounds for challenging this position. Do the poor compare themselves with all others, including those who are above the poverty line? Should the size of the poverty gap be compared with total income in the economy? Is it relevant to consider the proportion of income of the non-poor that would be required to eliminate the poverty gap? If the answer to any of these questions is “yes” or “maybe”, then we are calling into question the focus axiom.

In presenting the issue in the questionnaire we took care to specify that the assumed poverty line rose along with the increase in income experienced by some of the non-poor. The views of our respondents - summarised in Table 7.6 - are clear. Support for the axiom is very weak: 28% on numerical questions alone, 38% on verbal questions alone, 18% for both numerical and verbal questions together. 31% support the view that the poor compare themselves to all others. We may conclude that information about the “rich” does matter when assessing the extent of poverty.

7.4.7 New population members

Now for an issue for which there is no clear counterpart in the conventional approach to the analysis of economic inequality and social welfare. What happens if the population grows, not through balanced replication, nor by merging with another multi-person distribution, but by the introduction of a single individual at some point in
CHAPTER 7. POVERTY

Table 7.6: What happens to poverty if the “rich” get richer?

<table>
<thead>
<tr>
<th>Verbal (q16)</th>
<th>Numerical (q7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>9% 18% 17% 4% 55%</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>2% 10% 3% 1% 16%</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>2% 3% 18% 3% 28%</td>
</tr>
<tr>
<td>All</td>
<td>13% 31% 38% 8%</td>
</tr>
</tbody>
</table>

Note: The table is based on responses to questions 7 and 16 of questionnaire P1 (N=486).

Figure 7.12: Positions for an additional population member
7.4. INCOME DISTRIBUTIONS AND POVERTY

What happens if the person’s income is...

<table>
<thead>
<tr>
<th></th>
<th>“poverty falls”</th>
<th>“poverty rises”</th>
<th>“poverty stays same”</th>
</tr>
</thead>
<tbody>
<tr>
<td>...below $z$ (q10)</td>
<td>27%</td>
<td>57%</td>
<td>14%</td>
</tr>
<tr>
<td>...above $z$, below $\mu$ (q8)</td>
<td>46%</td>
<td>19%</td>
<td>34%</td>
</tr>
<tr>
<td>...above $\mu$ (q9)</td>
<td>53%</td>
<td>17%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Note: numerical responses only. Based on questionnaire P1 questions 8, 9 and 10.

Table 7.7: The effect of introducing one new person.

The distribution? Two sub-issues immediately arise: the impact on perceived poverty of a new poor persons and the impact of additions of individuals amongst the non-poor group. We then further subdivide this second issue so as to distinguish between new individuals who have an income above the poverty line $z$ but below mean income $\mu$ (in our numerical exercise the mean equals the median which is 30 Alfadollars), and those whose incomes are greater than $\mu$ - see Figure 7.12.

It is commonly suggested that a poverty index should have the property that adding new members with incomes below the poverty line should result in an increase in measured poverty, and that adding new members with incomes above the poverty line should decrease measured poverty. However this is not self-evident: for example one could imagine a good case being made for the measured level of poverty being insensitive to additional members of the non-poor. What of the views of our student respondents?

The responses to the numerical questions are shown in Table 7.8. Notice the close match between the responses when the question was framed in terms of individuals whose incomes were above the poverty line but below the average (middle row) and in terms of individuals whose incomes were above the average (bottom row). On the basis of the numerical responses there is clearly reasonable support (about half of the sample) for the view that the “immigration” of non-poor people should reduce measured poverty. However the responses to the corresponding verbal question (Table 7.9) show considerable dispersion: respondents seem to be less confident of this principle when expressed in words rather than a numerical example.

Now let us look at the effect of introducing an additional poor
Suppose a person whose income is above the basic-needs level is allowed to immigrate to a region and that there is no change in the incomes of all others and that the basic-needs level in this region remains unchanged.

<table>
<thead>
<tr>
<th>Poverty goes up</th>
<th>14%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty goes down</td>
<td>18%</td>
</tr>
<tr>
<td>Poverty remains the same</td>
<td>38%</td>
</tr>
</tbody>
</table>

We cannot say whether poverty goes up, goes down or remains the same unless we know the exact income distributions 14%

None of the above 4%

Based on questionnaire P1, (verbal) question 17 (N=486).

Table 7.8: What happens if there is one more non-poor person?

<table>
<thead>
<tr>
<th>Verbal (q18)</th>
<th>“poverty rises”</th>
<th>“depends on distribution”</th>
<th>“neither ”</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>14%</td>
<td>6%</td>
<td>4%</td>
<td>27%</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>37%</td>
<td>8%</td>
<td>5%</td>
<td>57%</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>7%</td>
<td>4%</td>
<td>2%</td>
<td>14%</td>
</tr>
<tr>
<td>All</td>
<td>59%</td>
<td>19%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

Based on questionnaire P1 questions 10 and 18 (N=486).

Table 7.9: What happens if there is one more poor person?

person to the population. The results appear to be straightforward, either in terms of numerical responses (top row of Table 7.8) or verbal responses (bottom row of Table 7.9): almost sixty percent of the respondents agree that doing so would increase measured poverty. However the proportion of the population who express the view that adding to the numbers of the poor increases poverty both in their responses to numerical problems and in the verbal part of the questionnaire is rather modest (37%) - see the top left entry in Table 7.9.
In Alfaland there are two regions A and B. All the people of Alfaland are identical in every respect other than their incomes. The people of region A consider that the level of income which ensures a supply of basic needs in their region is 10 Alfadollars, and the people of region B consider that the basic-needs income level in their region is 20 Alfadollars. Prices in A and in B are the same.

In each of the three following questions you are asked to compare two distributions of income - one for each region. Please indicate the region in which you consider poverty to be greater by circling A or B. If you consider that poverty is the same in the two regions then circle both A and B.

1) A = (4,8,12,20,24,32,40) B = (4,8,12,20,24,32,40)
2) A = (4,8,12,20,24,32,40) B = (8,16,24,40,48,64,80)
3) A = (4,8,12,20,24,32,40) B = (14,18,22,30,34,42,50)

... ... ... ... ... ...

Figure 7.13: Numerical problems in the second poverty questionnaire

7.4.8 Poverty perceptions and the poverty line

Thus far all of the issues that we have considered - all of the problems that we have set the respondents, and all of the questions that we have posed - have been predicated on the assumption that the “basic-needs income level” (which may be interpreted as a poverty line) is fixed and that all the action in the income-distribution comparisons takes place below that income level. This has been done so as to in the discussion of poverty analysis closely with that of inequality and social welfare analysis. It is time to move on from this assumption to a more basic question of the nature of poverty.

When implementing the questionnaire approach in the context of the poverty line we face an obvious problem - how much of a hint to give to the respondents about the nature of the poverty line. After all, one of the things it would be nice to know from the respondents is the concept of poverty line that they would use if invited to make
poverty comparisons. We certainly want to know whether it is viewed as appropriate to shift the poverty line as all incomes grow.\textsuperscript{12} Ideally these views should emerge as general principles, not as particular reactions to a special set of political circumstances: it is important not put the poverty comparisons within a specific historical or social context, as we discussed in Chapter 3 (page 38).

These considerations shaped the design of our specialised poverty questionnaire that focused on poverty issues with a variable poverty line.\textsuperscript{13} Extracts from it are presented in the accompanying boxes: as can be seen the respondents were introduced to the idea of a specific “basic-needs income level” but were not prompted as to whether this income level corresponds to a poverty line $z$. Once again we examined the issues both in terms of the respondents’ assessments of simple numerical examples and of their answers to multiple-choice verbal questions, and have cross-tabulated the responses to the numerical and verbal questions on each issue. The presentation of the results follows approximately the form of the questionnaire with which the respondents were presented.

7.4.9 What happens if basic needs increase?

Perhaps the first question that ought to be asked is “how can basic needs increase”? Evidently there could be physical changes in the technology of the economy, or its environment - for example affecting the climate, or the costs of shopping - which might impinge on the resources required to achieve any given standard of living. Alternatively these changes might be in the assessment by society of the money income or resources required to meet the required living standard irrespective of any physical changes. Evidently, too, these changes could occur independently of any change in the incomes of individuals.

We did not attempt to spell this out in detail in the wording of the questionnaire, nor did we attempt to describe a process of

\textsuperscript{12}The issue of how the poverty line should change over time can be treated separately from the issue of whether poverty should be viewed as an absolute or a relative concept - see Sen (1983).

\textsuperscript{13}The results relate to poverty questionnaire P2 - see Appendix B page 240.
7.4. INCOME DISTRIBUTIONS AND POVERTY

<table>
<thead>
<tr>
<th>Numerical ($q1$)</th>
<th>Verbal ($q4$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“poverty rises”</td>
</tr>
<tr>
<td>“poverty falls”</td>
<td>44%</td>
</tr>
<tr>
<td>“poverty rises”</td>
<td>4%</td>
</tr>
<tr>
<td>“stays the same”</td>
<td>15%</td>
</tr>
<tr>
<td>All</td>
<td>64%</td>
</tr>
</tbody>
</table>

Based on responses to question 1 and question 4 of questionnaire P2 (N=340)

Table 7.10: What happens to poverty when basic-needs income level increases?

change of basic needs. In questions 1 and 4 respondents were asked to judge the two situations in which there was the same list of personal incomes ($x_1, x_2, x_3, ...$) but two different “basic-needs” income levels, as considered by people in regions A and B of the mythical country Alfaland. The right hand column of Table 7.10 reveals that whilst a majority of respondents agrees that the higher basic-needs level implies higher poverty there is a substantial dissenting minority who appear to think that changing the basic-needs level should not affect measured poverty. The responses to question 4 (bottom row of Table 7.10) throw some light on this: here respondents were asked directly whether a higher basic-needs income level implies, ceteris paribus higher poverty. Where respondents had doubts they were expressed in terms of the “neither of the above” responses which may indicate that more information would be required before an explicit judgment could be offered.\(^{14}\)

The question arises as to why people might say that increasing the poverty line does not change poverty. Presumably the answer is that respondents are looking at poverty in some kind of absolutist or existentialist terms; in other words judgements on poverty are perceived as separate from the administration that happens to measure poverty and to announce the poverty line. According to this view raising the poverty line is a mere artefact of official policy or of social convention that has little bearing upon the reality of the human con-

\(^{14}\)Elsewhere when the “Neither of the above” response was explicitly offered (question 7) it did not receive such support.
diction. On this evidence alone it may be the case that some people view poverty in statistical terms, and they do not read poverty along the lines of the “basic needs”\textsuperscript{15} view; but we have more to say on this below.

As a final point on the responses to the matched questions 1 and 4 notice that there is little difference between the cross-section numerical and the verbal responses, although if we consider the responses together only 44\% of the sample agreed both numerically and verbally with the proposition that a higher basic-needs level implies higher poverty.

7.4.10 What happens if basic needs and incomes increase?

We now consider what happens to poverty if all income-values in one distribution are scaled-up values of another distribution. In question 2 distribution B had a list of incomes \((x_1, x_2, x_3, \ldots)\) that were exactly double those that appeared in distribution A, and a basic needs value that was also double that of A; question 5 puts the issue in words (again see the extracts in the boxes). The results are reported in Table 7.11.

In the numerical version of the question (right-hand column of Table 7.11) nearly half the respondents felt that a simple doubling of all incomes and the basic-needs level left measured poverty unchanged; but there is a substantial minority view (38\%) that poverty decreases. From the verbal responses (bottom row of Table 7.11) it appears that the reported responses come more into line with what may be considered as the “conventional” view, in that the dissenting minority (those who think that doubling both incomes and basic needs will lead to a fall in poverty) becomes smaller when the issue is put in terms of words. However, note also from Table 7.11 that the view that whether poverty has gone up or not must depend on

\textsuperscript{15}We should also allow for the possibility that the “Disagree 1” on question 1 may just be numerical mistake. Note that it is the US universities and the Tel Aviv non-economists who appear to respond perversely, groups that have displayed a propensity for “unconventional” responses in previous, unrelated questionnaire studies - Cf Amiel and Cowell (1992, 1994a).
4) Suppose two regions A and B have the same income distribution. Suppose the level of income which ensures a supply of basic-needs is higher in region B.

a) It is clear that poverty in B is greater than in A.
b) The basic-needs income level does not effect the level of poverty. So poverty is the same in A and B.
c) Neither of the above.

5) Suppose the real income of each person and the basic needs income level are doubled

a) Poverty increases
b) Poverty decreases
c) Poverty remains the same
d) The direction of change of poverty depends on initial and final levels of real income.

Figure 7.14: Extract from the verbal questions in the second poverty questionnaire

<table>
<thead>
<tr>
<th>Numerical (q2)</th>
<th>Verbal (q5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“poverty falls”</td>
<td>“poverty rises”</td>
</tr>
<tr>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>7%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Based on responses to question 2 and question 5 of questionnaire P2 (N=340).

Table 7.11: When you double incomes and basic needs, what happens to poverty?
Compare \( A = (4, 8, 12, 20, 24, 32, 40) \) \( B = (14, 18, 22, 30, 34, 42, 50) \)

Poverty higher in \( A \) \( 58\% \)
Poverty higher in \( B \) \( 22\% \)
Poverty is the same \( 17\% \)

Suppose we add/deduct a fixed sum to/from all incomes and the poverty line?

<table>
<thead>
<tr>
<th></th>
<th>adding...</th>
<th>deducting...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty falls</td>
<td>9%</td>
<td>22%</td>
</tr>
<tr>
<td>Poverty rises</td>
<td>22%</td>
<td>8%</td>
</tr>
<tr>
<td>Poverty remains the same</td>
<td>62%</td>
<td>60%</td>
</tr>
<tr>
<td>Depends on initial and final income levels</td>
<td>7%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Based on question 3 and question 6 of questionnaire P2 (N=340).

Table 7.12: Shifting incomes and poverty line by a fixed sum

the income level receives almost as much support as the dissenting minority view that poverty must fall.

Again, as with the results on questions 1 and 4, it is tempting to characterise the majority view as evidence of support for the “Eurostat” view of the poverty line (see note 6 above) whereby poverty is viewed as being linked to the population mean or some other statistic of the whole distribution, but, as argued below, this conclusion may not be legitimate.

As a final numerical experiment we considered two lists of individual incomes and basic-needs levels that differ in terms of some absolute amount. Economic intuition does not provide an unambiguous suggestion as to the impact of such a shift on poverty: if $10 is added to basic needs and you give the $10 to each poor person, each poor person remains poor but has a higher percentage of total income; if the $10 were also given to each non-poor person this might be considered to be irrelevant from the point of view of the perception of poverty.

The issue addressed in question 3 and in the two parts of the related question 6 (call the second part question 6')\(^\text{16}\) are related to

\(^{16}\text{A summary of question 6 appears in Table 7.12; for full details see Appendix B, page 240.}\)
the concept of monotonicity, which we discussed earlier (see page 149). It is interesting to note that the verbal responses to questions 6 and 6’ are reassuringly consistent in that we get almost the same percentage responses for adding or deducting $x$ to both incomes and the poverty line (See the bottom half of Table 7.12). This implies that in making poverty comparisons where individuals’ relative positions and poverty status do not alter, it appears that history does not matter.\footnote{\text{Notice that the results for adding or subtracting a fixed amount here are closer than in the corresponding case of inequality - see 4.5 in Chapter 4.}}

However the results from the verbal responses do not appear to be consistent with the corresponding numerical question 3 (compare upper and lower halves of Table 7.12). In this case eleven respondents announced a change of mind about their response to the numerical question 3, so it does not seem that misperception or misunderstanding of the question accounts for the discrepancy. However it may be attributable to fundamental differences in view about the nature of the poverty line.

\subsection*{7.4.11 The definition of the poverty line}

The discrepancy between the numerical responses to question 2 and the verbal responses to the corresponding question 5, and the discrepancy between the question 3 and the corresponding questions 6 and 6’ may be explained partly by the context of the questions. The numerical questions were expressed in terms of two regions A and B with different basic needs levels, while the verbal questions spoke of income change. Other things being equal if our respondents have a “statistical” view of poverty then this should have yielded broadly similar results to the two types of question, whereas an absolutist approach need not.\footnote{\text{For further details see ?).}}

For this reason the responses to the final question on our questionnaire - reported in Table 7.13 - are particularly interesting. Here the agreement with “basic needs” rather than the “statistical” approach to the poverty line appears persuasive - 72 percent; the response “related to income distribution” (the “Eurostat” view) scores
Poverty is a situation in which incomes are...
... not enough for a supply of basic needs. 72%
... below a level which is relative to the income distribution (for example 50% of the median income). 11%
Neither of the above. 10%

Based on questionnaire P2, question 7 (N=340)

Table 7.13: What is poverty?

almost the same as the response “neither of the above”.

### 7.5 Conclusions: the Approach to Poverty Comparisons

This chapter has focused upon the analysis of one of the most pressing economic and social issues of our time. It is an issue which in the real world demands prompt attention by policy advisors and policy makers and where questions of measurement might seem to be relatively less urgent. However to dismiss issues of definition and measurement as unimportant would be a mistake, in that clear-sighted assessment of the nature of poverty helps in clarifying what needs to be done and the priorities to be attached to different manifestations of poverty in different circumstances. If economists are to offer advice on the measurement of poverty - let alone practical help in quantifying it or in attempting to combat it - then it is as well that their theoretical and empirical constructs should be informed by some understanding of the concept of poverty as it is generally perceived.

So how should we measure poverty? As we have seen there are two types of answer to this question. The first assumes that we have

---

19 Cf the remark by Aldi Hagenaars: “Poverty measurement is an important first step in a program aimed at reducing poverty; however the choice of the definition of poverty as a relative or an absolute concept may result in different measurement methods and hence different values of indices that measure the extent of poverty. A definition of poverty hence is essential for the results of poverty measurement”. - Hagenaars (1986) page ix.
### 7.5. CONCLUSIONS: THE APPROACH TO POVERTY COMPARISONS

Table 7.14: Support for standard axioms in inequality, social-welfare and poverty analysis.

<table>
<thead>
<tr>
<th>Inequality</th>
<th>Social Welfare</th>
<th>Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Num</td>
<td>Verbal</td>
<td>Num</td>
</tr>
<tr>
<td><strong>Monotonicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td>35%</td>
<td>31%</td>
</tr>
<tr>
<td>Anonymity</td>
<td>83%</td>
<td>72%</td>
</tr>
<tr>
<td>Population</td>
<td>58%</td>
<td>66%</td>
</tr>
<tr>
<td>Decomposability</td>
<td>57%</td>
<td>40%</td>
</tr>
<tr>
<td>Scale indep.</td>
<td>51%</td>
<td>47%</td>
</tr>
<tr>
<td>Translation indep.</td>
<td>31%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Note: (1) Source as for Tables 4.8, 5.2, 5.9, and 7.1. (2) For scale- and translation-independence the results for poverty are evaluated for the case where the poverty line is changed along with all other incomes. (3) For verbal questions the translation-independence result refers to what happens if an addition is made to incomes. we have lower agreement with the principle if a deduction from income is made (28% in the case of the inequality questionnaire, 60% for the poverty questionnaire).

The first type of answer to the question “how should we measure poverty?” picks up some threads of thought that have run through the last few chapters, because several of the same basic principles of distributional analysis are commonly applied to all three problems: inequality, social welfare and poverty. Conventional wisdom has it that the way we should measure poverty - the way we should make poverty comparisons - is essentially similar to the way in which we should measure inequality or social welfare. What do the responses from our questionnaires reveal in this regard? It appears that some of the standard axioms that are held in common with inequality and welfare analysis receive weaker support when presented in the context of poverty analysis: this is true of the central issues of anonymity...
and the transfer principle - see Table 7.14. However decomposability
is more widely supported in the case of poverty than for inequal-
ity: this is perhaps not surprising since there is at the heart of the
problem of poverty measurement the idea of a fundamental decom-
position between the poor and the non-poor.

The second type of answer - the type that deal explicitly with the
role of the poverty line - is by its nature rather more difficult. Where
an official or other independently specified poverty line is known and
recognised the issues involved in poverty comparisons can be made
much more approachable. But, as we mentioned above, there are
practical situations where this luxury is unavailable or ambiguous;
the problem is particularly acute when making poverty comparisons
between countries, or poverty comparisons over long periods In such
cases it might appear that the only thing to do in practice is to
take a simplified relativist approach to specifying the poverty, $x\%$
of the mean or $x\%$ of the median, for example. There are obvious
practical problems in implementing this approach - for example it
is often crucial what value $x\%$ is and whether the median or the
mean is used. However, over and above these problems our results
suggest that simple relativism may miss something essential in the
underlying concept. People appear to perceive poverty and poverty
comparisons in the abstract in a way that do not fit well into the
$x\%$-poverty-line approach.
Chapter 8

A Cross-cultural Perspective

8.1 Introduction

We have seen that the thinking about inequality practised by the economics profession may differ quite a bit from the thinking about inequality that is practised by others. But we might wonder whether there are substantial differences amongst people on this subject according to some criterion other than whether or not they are professional economists. For this reason it is appropriate to look at some aspects of the structure of the responses in the questionnaire-experiment studies that we have been discussing in Chapters 4 to 7. As the title suggests this is a more specialised chapter and can be skipped without loss of continuity of the argument of the rest of the book.

What do we mean by the grand term “cross-cultural perspective”? This is just a shorthand for a systematic approach to the interpersonal and inter-group differences underlying our questionnaire-experiment programme. Obviously views about the meaning of inequality will differ according to the type of person, as will views about most things, but in addressing the question “What determines attitudes to inequality?” it is not obvious what sort of determinants it would be reasonable to specify.

What kind of characteristics can be usefully considered in this
sort of study? We might conjecture that background - such things as income, wealth, social position - is a significant aspect of “culture” and has a role to play in determining attitudes to distributional questions. Some of these background characteristics are obviously very personal, and personalised data can be problematic. However it may well be useful to look at characteristics of groups to which individuals belong, and this is why we have focused on the concept of “culture”. Of course “culture” is a nebulous expression, but we could try to narrow its meaning down to something specific.

The reason that this is important is that there appears to be a widespread notion that culture does matter when it comes to the consideration of distributional issues. Sometimes “culture” is tacitly identified with “country”: for example Ballano and Ruiz-Castillo (1992) in running a questionnaire investigation similar to our own focused principally on the comparison of the results for Spanish students with those in Amiel and Cowell (1992); their headline result was that “contrary to the slogan of the previous [Franco] régime ‘Spain is not different’.” But of course in general “country” does not equal “culture”, nor should it be assumed that a distinctive culture would make one country dramatically different from others in terms of distributional judgments. Within our sample (see the list on pages 211ff) there are several cases illustrating these points: for example is the polyglot student body at the LSE “English”? “British”? Representative of the UK? Or is there some other aspect of British culture that is important in shaping LSE student responses? Are the differences between, say, the Universities of Bonn and Karlsruhe greater than the differences between UK (the LSE) and Germany (Bonn)? Moreover it could also be forcefully argued that to identify “Israel” with a specific culture is misleading since to do so would be to ignore important potential differences between religious and nonreligious universities.

Nevertheless it is evident that “culture” - interpreted very broadly as the universe in which a person acquires his values - may have an impact upon distributional judgments at a fundamental level. For example it might be argued that whether a person comes from a society with an “individualistic culture” (such as the United States) or a culture that accepts as part of the order of things a benevolent
interventionist State (Sweden?) may affect not only the value that a person places on inequality relative to other social issues but also on the meaning to be given to inequality rankings when comparing income distributions.

Apart from the association with country or national background there is, as we have just indicated, a second aspect of culture which should be addressed. It may be summarised in the question “Does preknowledge of economics or economic methods matter?” This question is distinct from the issue of whether a person has preknowledge of the analysis of income distributions. This latter issue has to do with the whether a person has been taught some specific technical tools, rather than with an overall approach to distributional problems and social judgments. It is the former issue that we should principally like to address, although in practice we have to accept that it may be difficult to disentangle the two.

Our questionnaires were all completed anonymously, for reasons that we set out in Chapter 3, and so we have limited information on which to base a deeper study of the pattern of responses. Although we can, and do, check internal evidence of answers to different questions by any one individual,\textsuperscript{1} we do not have information about personal indicators such as the age or gender of respondents. In view of this we interpret the cross-cultural approach by focusing principally upon two issues that are raised by the pattern of our questionnaire studies: differences between academic disciplines, and differences between countries and institutions. Let us consider how this information may be effectively deployed.

\section{A Statistical Approach}

Systematic comparisons of different subgroups of the combined sample can provide practical insights on cultural differences. It may be possible to reduce the question of cultural perspective to a series of narrowly-defined statistical hypotheses. For example it would be interesting to know if there were a significant difference between

\textsuperscript{1}See, for example, our discussion on page 66 of the use of individual responses to several questions to check agreement with Lorenz ordering.
the pattern of responses of subgroup X and that for subgroup Y on certain specific issues in the questionnaire experiments.

The appropriate formal method of checking whether or not there are significant differences of this sort between subgroups is to use a chi-squared test to compare distributions of responses to the numerical questions. Suppose the results of a particular study are available for groups of respondents \( i = 1, 2, ..., r \) and the responses can be classified into categories \( j = 1, 2, ..., c \) table where a typical element \( a_{ij} \) gives the number of observations from subgroup \( i \) in response category \( j \). We can then construct a table with \( r \) rows (one for each subgroup) and \( c \) columns (one for each response category): for example, in the case of pairwise (X,Y)-comparisons of subgroups’ responses on an issues with the three possible responses “Agree”, “Disagree” and “Strong Disagree”, we would have a \( 2 \times 3 \) table. We can address the question of whether the pattern of responses in each of the \( r \) rows is essentially the same. To do this we compute the statistic

\[
\sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(a_{ij} - e_{ij})^2}{e_{ij}}
\]

where \( e_{ij} \) is the expected number of observations in cell \((i, j)\) of the table if all the subgroup response patterns were to be the same and apply a standard test.\(^2\)

Given the range of coverage of our students respondents in terms of countries, institutions and subject specialisations there are obviously a great many pairwise (X,Y)-comparisons possible. Many of these could appear somewhat recondite to the non–specialist reader - it might not be terribly exciting to know whether, let us say, the students at Tel-Aviv think primarily in terms of scale independence, while those in Alabama give replies in line with translation independence. Nevertheless it would be interesting to concentrate upon the big questions that have emerged in the preceding chapters and to see whether there are important differences between groups in terms of their attitudes towards those questions.

\(^2\)The statistic in (8.1) is distributed \( \chi^2 \) variable with \([r - 1][c - 1]\) degrees of freedom. See also Harrison and Seidl (1994a, 1994b) for an application of this approach.
We do not expect there to be wide agreement about what are the “big questions” are. However we suggest that the following programme of action would be a reasonable way of addressing the questions of cross-cultural perspective:

- We will focus on the main principles of distributional judgments and consider the inter-group differences of support for those principles.
- We examine whether the pattern of responses differs significantly as between the direct and indirect approaches to the analysis of inequality.
- Finally we will look at the extent to which thinking about economics may influence thinking about inequality.

8.3 Principles of Distributional Judgments

Which principles? A brief glance through the technical material in Appendix A is enough to show that there is a depressingly long list of principles (axioms) in the main fields of inequality, social welfare and poverty; in principle we might run statistical tests to compare various subgroups’ responses on any of the principles in the list. Should we single out just a few of these for special treatment perhaps? The logical purist will claim - rightly - that in a true axiomatic approach no one axiom is more “basic” than any other. The horny-handed pragmatist might well reply “yes, but there some axioms which appear to embody the main idea of a subject and we should concentrate on those.” On reviewing the discussion of the three inter-related fields of distributional analysis we might reasonably claim that the most important general issues are:

- the transfer principle,
- monotonicity,
- the use of a relative rather than an absolute poverty line.
Let us then examine the possible evidence of cross-cultural diversity that may lie underneath the overall results reported earlier in Chapters 4, 5 and 7.

8.3.1 Transfer principle

As we have seen, many would consider the transfer principle to be the defining concept of inequality analysis. Remember that the principle requires that any pairwise poorer-to-richer income transfer will increase income inequality, irrespective of the rest of the income distribution.

Table 8.1 extends the discussion of page 58. It gives a breakdown of the responses to the first inequality questionnaire (A1) by subsample of student respondents just on the issue of the transfer principle. We have reported both what happened when we presented the key numerical example (which was illustrated by the three figures in Chapter 1) and when we posed the issue verbally. As we can see from the left-hand side of Table 8.1 we have students from five countries and eight university institutions; there is also a group of “non-economists” who were students whose principal subjects were philosophy and education.

One apparent cultural difference emerges strikingly from the verbal responses (right-hand half of the table): the economics students at the Hebrew University of Jerusalem appear to be way out of line with other groups in that their verbal responses are consistent with the conventional view that distributional orderings should respect the transfer principle: we shall have more to say on this point in a moment. What of other possible aspects of diversity amongst the numerical responses?

In order to investigate the possibility of divergent views we addressed the question “what is the probability that group X’s and group Y’s pattern of responses come from the same distribution?” The results of this test are reported in Table 8.2: we have highlighted in bold the cases which satisfy the standard criterion for rejecting the hypothesis that the two patterns are identical (i.e. where the probability is less than 5 percent).

On this basis it is clear that we cannot reject the hypothesis that
### 8.3. PRINCIPLES OF DISTRIBUTIONAL JUDGMENTS

Table 8.1: Breakdown of views on the transfer principle: direct approach

<table>
<thead>
<tr>
<th></th>
<th>NUMERICAL</th>
<th>VERBAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>N. Texas</td>
<td>37 22%</td>
<td>51% 27%</td>
</tr>
<tr>
<td>SMU</td>
<td>108 32%</td>
<td>51% 14%</td>
</tr>
<tr>
<td>LSE</td>
<td>106 45%</td>
<td>39% 16%</td>
</tr>
<tr>
<td>Bonn</td>
<td>356 31%</td>
<td>45% 24%</td>
</tr>
<tr>
<td>Karlsruhe</td>
<td>53 45%</td>
<td>34% 19%</td>
</tr>
<tr>
<td>Koblenz</td>
<td>50 46%</td>
<td>46% 8%</td>
</tr>
<tr>
<td>Ruppin</td>
<td>174 33%</td>
<td>38% 29%</td>
</tr>
<tr>
<td>HU Econ.</td>
<td>170 42%</td>
<td>38% 19%</td>
</tr>
<tr>
<td>HU Non-econ.</td>
<td>54 24%</td>
<td>43% 33%</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>1008 35%</td>
<td>42% 22%</td>
</tr>
</tbody>
</table>

Note: Results are based on responses to question 4 (numerical) and 13 (verbal) of questionnaire A1. “HU” means Hebrew University, Jerusalem. For interpretation of “Agree” and “Disagree”, see text and footnote 3 of Chapter 4.
Table 8.2: Do X and Y have the same pattern of responses on the transfer principle? Direct approach

<table>
<thead>
<tr>
<th>Pair</th>
<th>Probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.Texas &amp; SMU</td>
<td>15.2</td>
</tr>
<tr>
<td>Karlsruhe &amp; Bonn</td>
<td>9.4</td>
</tr>
<tr>
<td>Koblenz &amp; Bonn</td>
<td><strong>1.8</strong></td>
</tr>
<tr>
<td>Karlsruhe &amp; Koblenz</td>
<td>20.6</td>
</tr>
<tr>
<td>HU (Econ.) &amp; Ruppin</td>
<td>6.7</td>
</tr>
<tr>
<td>US &amp; Europe</td>
<td>14.7</td>
</tr>
<tr>
<td>US &amp; Germany</td>
<td>22.8</td>
</tr>
<tr>
<td>US &amp; UK</td>
<td>6.4</td>
</tr>
<tr>
<td>US &amp; Israel</td>
<td><strong>2.0</strong></td>
</tr>
<tr>
<td>Germany &amp; UK</td>
<td>9.5</td>
</tr>
<tr>
<td>Germany &amp; Israel</td>
<td>28.7</td>
</tr>
<tr>
<td>Israel &amp; UK</td>
<td>16.7</td>
</tr>
<tr>
<td>Non-econ. &amp; Econ. (HU)</td>
<td><strong>2.4</strong></td>
</tr>
<tr>
<td>Numerical &amp; Verbal</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note: Implied probabilities based on detailed breakdown of responses to numerical questions in Table 8.1. Figures in bold indicate cases where the probability that the two responses are identical is less than five percent.
8.3. PRINCIPLES OF DISTRIBUTIONAL JUDGMENTS

the views of the US and the Europe subsamples are the same; the same conclusion applies to a comparison of the US and individual European countries. By contrast we can reject the hypothesis that the pattern of responses is identical in the US and Israel; but this may be because of the special nature of the economics students at the Hebrew University, Jerusalem. Furthermore it is apparent that - with the exception of Koblenz and Bonn - we cannot reject the hypothesis that the pattern of responses is identical in pairs of individual institutions within one country.

Finally - and perhaps surprisingly - the hypothesis that the distribution of numerical responses and verbal responses amongst the 1 008 students who participated in the A1 questionnaire study is the same was rejected.

8.3.2 Monotonicity

Because monotonicity is closely related to the idea of the “Pareto principle” it is often regarded as basic to the welfare-economic comparison of income distributions. Recall its meaning: if a list of incomes B can be derived from A just by increasing one or more of the incomes in A then B is considered to have a higher level of social welfare than A.

As we noted in Chapter 5 (see note 14 on page 99) the results of questionnaire B1 seem to suggest a considerable divergence of view on monotonicity, in contrast with the views expressed on other welfare principles (the divergence of view was less pronounced in the control study B2). Does the same divergence of view emerge clearly between subsamples when we apply the same statistical approach as we have just applied in the case of responses on the transfer principle?

From Table 8.3 and Table 8.4 (below) we can see that, for example, the hypothesis that Israeli respondents and European respondents have the same views is clearly rejected: whether or not there is substantial heterogeneity of view within each country subsample, it is clear that the pattern of responses to numerical questions does differ significantly between the country groups.

Furthermore, as we can see from the summary distributions by universities in Tables 8.3 and 8.4, there appears to be a close cor-
Table 8.3: Agreement with Monotonicity - Does B exhibit higher social welfare than A?

<table>
<thead>
<tr>
<th>Location</th>
<th>$N$</th>
<th>$(q4)$ Agree (%)</th>
<th>$(q6)$ Agree (%)</th>
<th>$(q5)$ Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.S.E.</td>
<td>29</td>
<td>97</td>
<td>86</td>
<td>76</td>
</tr>
<tr>
<td>Stockholm</td>
<td>51</td>
<td>84</td>
<td>81</td>
<td>77</td>
</tr>
<tr>
<td>Bonn</td>
<td>211</td>
<td>67</td>
<td>59</td>
<td>57</td>
</tr>
<tr>
<td>Koblenz</td>
<td>84</td>
<td>79</td>
<td>73</td>
<td>62</td>
</tr>
<tr>
<td>Tel Aviv Economics</td>
<td>133</td>
<td>59</td>
<td>59</td>
<td>53</td>
</tr>
<tr>
<td>Tel Aviv Sociology</td>
<td>112</td>
<td>36</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>523</td>
<td>64</td>
<td>59</td>
<td>54</td>
</tr>
</tbody>
</table>

Note: Results are based on responses to questions 4, 5 and 6 of questionnaire B1.

Table 8.4: Breakdown of verbal responses on the monotonicity principle

<table>
<thead>
<tr>
<th>Location</th>
<th>$N$</th>
<th>Agree (%)</th>
<th>Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>29</td>
<td>93</td>
<td>7</td>
</tr>
<tr>
<td>Bonn</td>
<td>211</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>Koblenz</td>
<td>84</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>TA Econ</td>
<td>133</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>TA Soc</td>
<td>112</td>
<td>30</td>
<td>62</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>523</td>
<td>55</td>
<td>37</td>
</tr>
</tbody>
</table>

Note: responses to questionnaire B1, question 14. For interpretation of “Agree” and “Disagree”, see text and footnote 3 of Chapter 4.
respondence between the pattern of verbal and numerical responses. Detailed cross-checking of the responses by the same individuals to different questions confirms this observation. So the unconventional responses which consistently appear in certain of the subsamples do not appear to be the outcome of a fluke reaction to one particular type of question. As we noted in Chapter 5 it is reasonable to conclude that the monotonicity axiom is indeed in dispute as a general principle of welfare analysis, at least by some important subgroups within our sample.

8.3.3 The Poverty Line

Cultural differences over the approach to poverty could take many forms. For example they could just be focused on those differences that emerge on questions which are well-known from the inequality and social-welfare fields such as the transfer principle, monotonicity and sub-group decomposability. As we reported in Chapter 7 these issues can be addressed using a poverty questionnaire experiment (P1) in which respondents are asked about distributional comparisons using a given poverty line. The numerical examples in these experiments are carefully arranged so that none of the comparisons involve individuals crossing the poverty line. As we discussed on page 170 on these distributional principles the results from the poverty question generally reflect the conclusions drawn from the earlier chapters on inequality and social welfare. The principal heterogeneity within the P1 responses is that students in the two sub-groups from Bar-Ilan University generally have more markedly “conventional” views than the overall sample on the issues of anonymity, decomposability, the population principle and the transfer principle. However this no-line-crossing approach to poverty questionnaire experiments may miss the main point. It is arguable that the crucial question in this area of distributional analysis is whether the poverty line should be considered as exogenous to the distributional problem in question, or is essentially endogenous, one that is to be inferred from the data themselves. For that type of question one has to have

\footnote{However in the P2 questionnaire the students from the other subgroup of Israelis (the Ruppin Institute) did not respond in this way.}
CHAPTER 8. A CROSS-CULTURAL PERSPECTIVE

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Basic needs (%)</th>
<th>Relative (%)</th>
<th>Neither (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>80</td>
<td>85</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>SMU</td>
<td>19</td>
<td>63</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>LSE</td>
<td>34</td>
<td>71</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>Koblenz</td>
<td>31</td>
<td>87</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Warsaw</td>
<td>34</td>
<td>79</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>TA Sociology</td>
<td>43</td>
<td>56</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>Ruppin</td>
<td>64</td>
<td>61</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>ANU</td>
<td>35</td>
<td>71</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>All</td>
<td>340</td>
<td>72</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Results are based on responses to question 7 (verbal) of questionnaire P2. For interpretation of “basic needs” and “relative” poverty lines see page 161 in Chapter 7.

Table 8.5: Breakdown of views on the poverty line: verbal question.

As we saw in Chapter 7 (page 167) the context of the questions concerning poverty-line changes or comparisons appears to have an important effect upon responses on this topic, and the key point emerges in the final verbal question for which the results are reported in Table 7.13. Table 8.5, which gives the breakdown of these results by samples, shows that the general conclusion - support for the absolute rather than the relative poverty-line approach - applies to all the subgroups in the P2 poverty sample.

But is there a difference in viewpoint across countries? Applying the standard test criteria (Table 8.6) we find that the hypothesis
8.4 DIRECT AND INDIRECT APPROACHES TO INEQUALITY

<table>
<thead>
<tr>
<th>Probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US &amp; Europe</td>
</tr>
<tr>
<td>Europe &amp; Israel</td>
</tr>
<tr>
<td>US &amp; Israel</td>
</tr>
</tbody>
</table>

Note: Implied probabilities based on detailed breakdown of responses to verbal questions in Table 8.5. Figures in bold indicate cases where the probability that the two responses are identical is less than five percent.

Table 8.6: Do X and Y have the same pattern of verbal responses on the poverty line question?

that US and Europe have the same views on the poverty line question cannot be rejected. However we can reject the corresponding hypothesis in the case of the Europe and Israel comparison and for the comparison of the US and Israel.

Drawing together the results in these three subsections we may conclude that, on some key issues, there does appear to be a “cultural difference” between subgroups. This is most marked in the case of the issue of monotonicity. However this leaves open the question of whether it is attributable to something in the national outlook or is principally an aspect of the way in which students accept and apply conventional economic wisdom; we return to this in section 8.5 below.

8.4 Direct and Indirect Approaches to Inequality

Does it matter how you approach the subject of inequality? We started the book by dealing with inequality in a “free-standing” fashion, as an entity to be considered in its own right. But, as we have seen in Chapter 5, one can come to inequality via the “back-door” route of social welfare analysis, and this raises the question whether it seems to matter if a front-door or back-door route is used. We tackled this in part on pages 93ff when we examined some of the
standard inequality axioms that are commonly applied to the specification of social welfare criteria. There are two aspects of interest here: first, whether the overall pattern of responses on each of the principles is different according to the direct and indirect approaches to inequality; second whether cross-cultural issues show up in the indirect approach to inequality analysis as in section 8.3 above.

The first of these two aspects can be dealt with quite swiftly. Consider the basic principles summarised in Table 5.10: are the differences in the percentages of agreement with each principle important? The hypothesis to be considered for any one of the axioms can be stated thus: “the proportion of responses conforming to the axiom is the same for the direct and the indirect approach”. Applying the same type of test as before to the responses from the A1 and B1 questionnaires we find that for anonymity and the population principle this hypothesis is rejected both for numerical questions and for verbal questions; but the hypothesis cannot be rejected in the case of the decomposability principle. Applying the test to the verbal responses on the transfer principle from the A4 and B1 questionnaires we again find that the hypothesis cannot be rejected. This result has a bearing on the cross-cultural issue because characteristics such as educational background may affect whether people think about these inequality issues primarily via the front- or back-door route.

Now consider the second aspect of the indirect approach. Do differences between countries show up in inequality questions that are dressed up in social-welfare clothes? The detail of the B1 questionnaire enables us to deal with this point using the same technique as earlier.

Remarkably we find the same general picture as for the detail of the responses on the transfer principle using the direct approach - see Table 8.2 above. From Table 8.8 we again find that the cross-country differences in the pattern of responses on the transfer principle are insignificant but that the differences between economists and non-economists and between the pattern of verbal and non-verbal responses are significant.

4In this case we have just the comparison of respondents from Israel and from Europe (Germany, UK and Sweden).
### 8.4. DIRECT AND INDIRECT APPROACHES TO INEQUALITY

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Agree (%)</th>
<th>Strongly Disagree (%)</th>
<th>Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSE</td>
<td>29</td>
<td>52</td>
<td>41</td>
<td>7</td>
</tr>
<tr>
<td>Bonn</td>
<td>211</td>
<td>46</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>Koblenz</td>
<td>84</td>
<td>50</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>Stockholm</td>
<td>51</td>
<td>47</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>TA Econ</td>
<td>133</td>
<td>58</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>TA Soc</td>
<td>112</td>
<td>33</td>
<td>10</td>
<td>54</td>
</tr>
<tr>
<td>All</td>
<td>620</td>
<td>47</td>
<td>21</td>
<td>30</td>
</tr>
</tbody>
</table>

Note: responses to questionnaire B1, question 1. For interpretation of “Agree” and “Disagree”, see text and footnote 3 of Chapter 4.

Table 8.7: Breakdown of views on the transfer principle: indirect approach

<table>
<thead>
<tr>
<th>Probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel &amp; Europe</td>
</tr>
<tr>
<td>Tel Aviv Econ. &amp; Soc.</td>
</tr>
<tr>
<td>Numerical &amp; verbal</td>
</tr>
</tbody>
</table>

Note: Implied probabilities based on detailed breakdown of responses to numerical questions in Table 8.7. Figures in bold indicate cases where the probability that the two responses are identical is less than five percent.

Table 8.8: Do X and Y have the same pattern of responses on the transfer principle? Indirect approach.
8.5 Does Economics Matter?

The concept of culture is commonly interpreted in terms of where people live and the kind of political and social norms that they may have absorbed through their home background and education. This is essentially the way that we have treated the topic up to this point in the discussion, by focusing upon the differences within in the patterns of responses between subgroups categorised by country or educational institution. However these differences form only part of the story. It is possible that the subject matter of a person’s educational background may exert a powerful impact upon his attitudes and behaviour. In particular it is possible that the study of economics has this sort of effect: we might then speak about “the culture of economics”. So one of the most important aspects of the question “Is thinking about inequality affected by such things as cultural background?” can be roughly translated “Is thinking about inequality affected by whether you have been taught economics?”

The supposition that the culture of economics does make a difference is not original to this book. This is hardly surprising in view of the fact that the study of economics focuses upon an important slice of human activity. Because subject does not just deal with theoretical abstraction but can provide practical everyday rules and recommendations, it is reasonable to expect some of this to rub off on those who specialise in the subject. So when one compares those who have and have not studied economics, one might expect to find differences in behaviour that may be informed by individuals’ awareness of certain principles and methods in guiding their own choices and actions in everyday life. If the study of economics “matters” in this sense we would expect this to show up not only in economists’ management of their personal finances and expenditures but also in their behaviour as social creatures, their approach to the provision of public goods for example; there is indeed evidence that economists do behave differently from others in this respect.\(^5\) We should of course admit that it is difficult, and perhaps dangerous, to make more than a vague conjecture as to causation here: although it is

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8.5. DOES ECONOMICS MATTER?

Table 8.9: Do X and Y have the same pattern of responses on monotonicity?

<table>
<thead>
<tr>
<th>Probability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel &amp; Europe</td>
</tr>
<tr>
<td>Tel Aviv Econ. &amp; Soc.</td>
</tr>
</tbody>
</table>

Note: Implied probabilities based on detailed breakdown of responses to verbal questions in Table 8.4. Figures in bold indicate cases where the probability that the two responses are identical is less than five percent.

possible that exposure to economic reasoning may corrupt the innocent, converting good citizens into self-centred maximisers, it may also be that those with certain characteristics - certain social attitudes for example - select themselves by choosing to study economics rather than some other subject.

It is clear from the discussion of the material in sections 8.3 and 8.4 that there is a substantial difference in the response pattern of the economics and non-economics subgroups within a particular institution. This comes out very clearly in the cross-tabulations and formal tests on the pattern of responses concerning the transfer principle: non-economists believe in it even less than do economists; see Tables 8.1, 8.2, 8.7 and 8.8. The same picture also emerges in respect of the fundamental principle of monotonicity - Table 8.9 gives the test result for the cross-tabulations that we saw earlier in Table 8.4. It is clear that once again the sociologists really do believe in the monotonicity principle less than their economist colleagues.

Is all this evidence of a kind of “programming” - not to say brainwashing - of economics students that induces a characteristic approach to distributional questions? If so, how does it occur, and does it matter? A possible explanation for this phenomenon is the extent to which students study welfare economics - including such things as the Pareto superiority criterion - as part of their standard intellectual diet. The conventional approach to welfare economics,

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6For the corresponding numerical questions (4,5,6) one may safely reject the hypothesis that the pattern of responses of the economists and non-economists is identical; in every case the probability turns out to be less than 0.005 percent.
by focusing upon individuals in isolation may create a climate of acceptance of principles - such as the transfer principle, monotonicity and decomposability - that fit most easily within this individualistic framework. This “programming” of views matters in so far as alternative approaches to distributional comparisons deserve to be considered on their own merits rather than being casually dismissed by a general uncritical acceptance of the conventional economic wisdom.

8.6 An Appraisal

Culture interpreted as “country” matters perhaps rather less than one might have supposed: there are instances where, for example, the US responses differ from the Israelis on the transfer principle, but this sort of thing is not very common. Culture interpreted as “subject” seems to be rather important: it appears that on key issues the approach of the economists is different from others in its bias towards the conventional. Here lies a danger: uncritical acceptance of the culture of economics may serve to impede the process of thinking about inequality.
Chapter 9
Thinking Again about Inequality

9.1 Second Thoughts about Second Thoughts

Why is thinking about inequality so necessary? Why is thinking about economic inequality so necessary? The short answer is that analysing wealth and income distributions in terms of inequality, social welfare or poverty is essentially different from the idea of inequality in other contexts and other subjects. As Dalton remarked:

"An American writer has expressed the view that ‘the statistical problem before the economist in determining upon a measure of the inequality of the distribution of wealth is identical with that of the biologist in determining upon a measure of the inequality in the distribution of any physical characteristic.’ (Persons 1908). But this is clearly wrong. For the economist is primarily interested, not in the distribution of income as such, but in the effects of the distribution of income upon the distribution and total amount of economic welfare, which may be derived from that income.” - Dalton (1920), p348.

Thinking about inequality is essential because the main ideas of inequality require detailed assumptions if they are to be made workable. Even if the idea of economic equality were to be based upon an
agreed set of ethical principles or some widely accepted mathematical axioms about the meaning of distributional comparisons there remains a problem. As in other fields of study there is, of course, a question of where the agreed set of principles or the accepted axioms come from. The whole book is predicated on the advisability of rethinking the “standard” approach to inequality analysis and the related topics of social welfare and poverty. Rethinking in this way opens up the possibility of new avenues of theoretical and empirical research on the economic analysis of income distribution and related topics. In this final chapter we wish both to take stock of the empirical evidence on people’s thinking about inequality and to suggest some ways in which this type of investigation may be taken forward.

9.2 Applying Inequality Judgments

The standard approach to the treatment of inequality in the economics literature can be caricatured as the Lorenz curve method. Almost all the battery of inequality statistics that have become standard equipment for empirical researchers and policy analysts can be seen as new twists and simplifications on the basic Lorenz insight, and take as given the assumptions underlying the formal theory that has become accepted as standard in the profession. However, powerful though the Lorenz insight is, it is not the only - nor necessarily the best - way forward to the analysis of income distribution.

Right from the elementary puzzle depicted in Chapter 1 we have seen that there are problems with this approach to distributional comparisons. The basis of inequality comparison that is almost universally adopted in the theoretical and applied literature seems to be at variance with the way untrained people view interpret inequality comparisons. One might just respond to that with a dismissive shrug - the theory is what it is. But do heretical views matter? Should they? Well, of course they should matter if economists want to address the same kind of questions as are commonly addressed in other fields of study such as the analysis of preference rankings in consumer theory.

Following the analogy with the modelling of individual prefer-
ences in consumer theory we might enquire whether the responses to income-distribution questionnaires can be used to chart a coherent picture of views about income distribution. As a basis for consumer theory it is commonly assumed that the “maps” that people make of alternative baskets of goods are well-defined: the maps are complete (people know their own mind and never find two baskets of goods that they cannot compare), transitive (a basic consistency property) and continuous (there are no sudden jumps in preference). So are the views about income distribution similarly well defined? Do they exhibit the basic properties of an ordering, in the sense explained on page 14? The picture revealed by our series of questionnaire studies is encouraging.

- **Completeness.** We have indirect evidence that the completeness assumption is reasonable. We never found a case where the respondents said they were unable to compare distributions, although we did not ask our respondents directly about this issue.

- **Transitivity.** However, we do have direct evidence from the very first questionnaire study that people’s inequality orderings of distributions are transitive - see pages 67 and 90 above and Amiel and Cowell (1992).

- **Continuity.** The experiments that focused upon a number of similar comparisons in income space (for example those dealing with the iso-inequality curves and with income growth reported in Chapter 6) suggest that individual orderings are continuous, except possibly in the neighbourhood of perfect equality.

If we take as granted the basic criteria for an ordering, what are the commonly-accepted standard assumptions about orderings in distributional analysis? These are briefly summarised in Table 9.1 under the three main headings that correspond to the discussion of Chapters 4, 5 and 7. Notice that the standard criteria for social welfare comparisons do not include all of those commonly applied to inequality analysis, nor vice versa. The analysis of poverty inherits some elements from the approach to inequality and some elements
CHAPTER 9. THINKING AGAIN ABOUT INEQUALITY

<table>
<thead>
<tr>
<th></th>
<th>Inequality</th>
<th>Social Welfare</th>
<th>Poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymity</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Monotonicity</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Transfer</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Population</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Decomposability</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Scale independence</td>
<td>√</td>
<td>*</td>
<td>√</td>
</tr>
<tr>
<td>Translation independence</td>
<td>√</td>
<td>*</td>
<td>√</td>
</tr>
</tbody>
</table>

* In the case of social welfare neither form of the independence axiom makes much sense, but scale- or translation-invariance may be relevant.

Table 9.1: Standard axioms in three related fields

from that of the treatment of social welfare comparisons. As we have seen some of the axioms that would normally be considered as basic in one or more of these three fields are those which are called into question by the results of our questionnaire studies.

Can something be learned from this that would be applicable to the more general problem of comparing distributions of economic entities other than income, perhaps in areas that have little or nothing to do with economics? There are, broadly speaking, two views on this. The first is that the problem of inequality measurement is just one part of a general problem of the approach to measuring dispersion in the social sciences or in the physical sciences. The second view can be introduced by continuing the passage from Dalton’s seminal article, quoted above:

“A partial analogy would be found in the problem of measuring the inequality of rainfall in the various districts of a large agricultural area. From the point of view of the cultivator, what is important is not rainfall as such, but the effects of rainfall upon the crop which may be raised on the land. Between rainfall and crop there will be a certain relation, the discovery of which will be a matter of practical importance. The objection to great inequality of rainfall is the resulting loss of potential crop. The objection to great inequality is the resulting loss of po-
9.3. WHERE NEXT?

It is clear that, for Dalton, the difference in underlying approach between the two types of distribution problem lies in some kind of valuation process (of rainfall or of personal income): without clear principles on which to judge the loss of economic welfare it would be impossible, for his standpoint, to have a soundly-based approach to inequality measurement. Not all economists - and few from other disciplines - would be automatically persuaded that welfare loss is the right way to tackle the subject. However the general point implicit in Dalton’s remarks seems to have some force: rules for appraising income distributions should be grounded in principles that in some sense incorporate the generally accepted evaluation of individual income or of income differences.

We should then be cautious about drawing parallels between responses to questions set in the context of income distribution - inequality, social welfare and poverty - and responses to distributional questions in other contexts. Nevertheless these considerations may have a bearing upon the direction in which this type of analysis may fruitfully be taken.

9.3 Where Next?

Picking over fundamental principles like the transfer principle and monotonicity might seem a little like thinking the unthinkable. But why stop there? Once the heretical trail of inquiry has been started, we might try following it back to its source.

One of the most important intellectual sources of the modern inequality literature is the literature on ranking probability distributions. Some of the seminal pieces in inequality analysis - Atkinson (1970) foremost among them - started from the insight that the problem of ordering income distributions in terms of inequality is essentially similar to the problem of ordering distributions in other contexts. Also, as we discussed in Chapter 3, some economists and philosophers have suggested a formal basis for social attitudes to inequality using individual attitudes to uncertainty.\(^1\) So we do not

\(^1\)See the discussion of the Harsanyi and Rawls approach on pages 36ff.
only find a possible parallelism of approach between the analysis of income distribution and the analysis of risk (as there is between income distribution and, say, the distribution of firms by size or the geographical dispersion of rainfall), but we must also address the argument that the analysis of probability distributions may be a basis for the analysis of income distributions.

In view of this it may be appropriate to wonder whether useful insights can be obtained by reversing the chain of thought. We have made the case for thinking about inequality in a way that leaves open the question of whether the “basic” axioms are to be adopted or not. What would emerge if one were to adopt the same kind of approach to an examination of the problem of comparing risky prospects?

In principle the questionnaire approach could be easily adapted from either the inequality questionnaires (the A series) or the social-welfare questionnaires (the B series). The two routes lead to different concepts in the analysis of individual preference orderings in the face of uncertainty. The inequality questions can be made to correspond to the concept of risk; on the other hand questions on social welfare rankings can be shown to be parallel to the questions on individual preference rankings of prospects\(^2\) - see Table 9.2 for a brief summary comparison. Some of the more recondite points in the two subject areas can also be related: for example the issue of violations of the independence axiom in the analysis of risk,\(^3\) and the issue of externalities in the assessment of income distributions.

There is of course a substantial literature on the experimental approach to people’s behaviour in situations of choice under risk and some well-known counterparts to the unconventional results that we have found from our own questionnaire experiments.\(^4\) However to

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\(^3\)This is manifested in the phenomenon of “regrets” in choice under uncertainty.

\(^4\)Perhaps one of the best known of these is the “Allais paradox” (Allais 1953) (Allais and Hagen 1979) (Drèze 1974) (Raiffa 1968).
9.3. WHERE NEXT?

<table>
<thead>
<tr>
<th></th>
<th>Inequality</th>
<th>Risk</th>
<th>Social Welfare</th>
<th>Preferences over Prospects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anonymity</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Monotonicity</strong></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Transfer</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Population</strong></td>
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<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Decomposability</strong></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scale independence</strong></td>
<td>✓</td>
<td>✓</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Translation independence</strong></td>
<td>✓</td>
<td>✓</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

* In the case of social welfare and preference over prospects neither form of the independence axiom makes much sense, but scale- or translation-invariance may make be relevant.

Table 9.2: Standard axioms in the analysis of income and probability distributions

carry through an effective comparison of perceptions in the two fields it is more useful to mimic the approach to income distribution by constructing a questionnaire-experiment in the field of perceptions of risk and uncertainty of the same format.

Questionnaire R3 (reprinted in Appendix B, page 243) is almost identical to questionnaire A3 on inequality perceptions which was discussed in Chapter 6: when drafting it on the word processor we simply replaced all occurrences of the word “inequality” by “risk” and made a very few other changes for the sake of euphony. The experiment was run on a sample of students similar to the one used for the A3 experiment. The results are reported in Tables 9.3 and 9.4 which have been set out in the same format as those containing the results of the corresponding inequality questionnaire-experiment (A3).

We may note the apparent similarity between the results reported in Tables 9.3 and 9.4 with what we established in Chapter 6 about people’s views on inequality at different income levels (see Tables 6.1 and 6.2 on pages 119ff). In particular the evidence - from both the numerical and the verbal questions - about what happens when you add a fixed absolute amount to incomes at various income levels is particularly striking: here the pattern of responses is almost identical. It is also clear that the same sort of phenomenon emerges as one
### “Risk decreases” “Risk increases” “Risk stays same”

<table>
<thead>
<tr>
<th></th>
<th>Adding a fixed absolute sum</th>
<th>Adding a compromise* sum</th>
<th>Adding a fixed proportionate sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>q1</td>
<td>(200, 400) → (400, 600)</td>
<td>77% 9% 14%</td>
<td></td>
</tr>
<tr>
<td>q4</td>
<td>(600, 900) → (900, 1200)</td>
<td>65% 11% 24%</td>
<td></td>
</tr>
<tr>
<td>q7</td>
<td>(1200, 1800) → (1800, 2400)</td>
<td>53% 17% 29%</td>
<td></td>
</tr>
<tr>
<td>q2</td>
<td>(200, 400) → (400, 700)</td>
<td>77% 17% 5%</td>
<td></td>
</tr>
<tr>
<td>q5</td>
<td>(600, 900) → (900, 1300)</td>
<td>61% 29% 9%</td>
<td></td>
</tr>
<tr>
<td>q8</td>
<td>(1200, 1800) → (1800, 2550)</td>
<td>53% 34% 12%</td>
<td></td>
</tr>
</tbody>
</table>

Notes: * “Compromise” means “between absolute and proportionate”.

Results are based on numerical responses to questionnaire R3 (N=346).

Table 9.3: What happens to risk when you increase people’s incomes?

<table>
<thead>
<tr>
<th></th>
<th>The same proportionate amount added to all incomes</th>
<th>A fixed sum added to all incomes</th>
<th>Depends the income levels</th>
<th>None of the above</th>
</tr>
</thead>
<tbody>
<tr>
<td>q3</td>
<td>19%</td>
<td>13%</td>
<td>45%</td>
<td>14%</td>
</tr>
<tr>
<td>q6</td>
<td>55%</td>
<td>32%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>q9</td>
<td>43%</td>
<td>38%</td>
<td>18%</td>
<td></td>
</tr>
</tbody>
</table>

Results are based on responses to questionnaire R3 (N=235).

Results from the University of Osnabrück were unavailable for this question.

Table 9.4: What income change will leave risk unchanged?
increases the reference level of income - at low income levels a proportionate income addition will reduce risk or inequality, whereas at moderate or high income levels a proportionate income addition increase inequality (the dependence hypothesis again). However, there are important differences. In particular the “natural” assumption of scale independence which appears to have common currency in the inequality literature appears to be less well supported when individuals are asked the corresponding questions about risk: for example in the verbal question on inequality 32% supported the scale-independence principle (see Table 6.1) but, as Table 9.4 shows, the corresponding proportion in the context of risk is only 19%.

This has some interesting implications for the direction of future research. First, the finding that risk-attitudes conform less closely to the pattern of scale independence than do inequality-attitudes is in line with the approach commonly adopted in the related literature on risk: in the case of risk analysis the “natural” assumption appears to be that of translation independence, as is evident in the widespread use of the mean-variance approach in the analysis of risk. Second it suggests that it would be worth enquiring whether some of the other inequality axioms discussed in Chapters 2 and 4 are appropriate in the context of risk-attitudes: one could run through the first two columns of Table 9.2; a similar exercises could be done with last two columns of Table 9.2 to see whether the results on social welfare reported in Chapter 5 were matched by similar results on preferences over uncertain prospects.

However, the results raise some more basic questions for both theoretical and applied experimental work in the field:

• It may be fruitful to pursue experimentation that allows one to investigate attitudes in both fields - risk and inequality - jointly (Davidovitz 1998).

• Do perceptions of distributional orderings of risk and distributional orderings of inequality have the same basic structure? Preliminary research results suggest that they do not (Amiel 1998).

and Cowell 1998b). If so, then it may be inappropriate to base the theory of inequality comparisons exclusively on the analysis of risk.

- But if inequality comparisons are not to be based on risk analysis, then on what? Should it be based on individual perceptions of levels of income and differences? (Broome 1988), (Temkin 1986).

These issues, which go beyond the scope of the present book are the subject of current research.

9.4 A Final Word

As we admitted on page 1 income inequality is a subject that has been vulnerable to the whim of fashion within the domain of economic thought. Our idea has not been to set a new fashion but to see why a fresh look at the intellectual basis for distributional analysis can reveal some curious anomalies and arbitrary assumptions in the accepted wisdom.

Should experimentation continue? Of course we have a vested interest in the answer to this question. But the reason we feel that this approach should be pursued is not that of further experiments for experiments’ sake. Some of the lessons that to be drawn from the preceding chapters suggest that understanding of the meaning of inequality comparisons and the like can be considerably enhanced by trying to see how other people see these comparisons.

A brief list of the key points of this enhanced understanding might include the following:

- The plurality of theory. The standard approach to inequality appear to present an ever-narrower focus on the “right” way to compare one distribution with another. But this area is not a subject where statements of mathematical truth of the “2+2=4” variety predominate. Intellectual judgment is required and it would be undesirable for a monopoly on thinking about inequality to be established. Put bluntly it probably
does not matter if we “lose” some key axioms. Alternative approaches are conceivable and alternative axioms can provide a coherent basis for the comparison of income distributions.

- **The building blocks of inequality.** The “new axioms for old” idea suggests that it may be worth reconsidering the elements from which the theory is to be constructed. One of the most crucial issues is whether one should work with individual incomes or with income differences. The distinction is important because it will affect not only the specification of formal abstract principles but also the choice of practical tools which one brings to bear on empirical studies: we need to consider seriously measures defined in terms of income differences or gaps. If we follow the income-difference approach then some familiar tools such as the Lorenz curve may no longer be appropriate in all circumstances. However Gini-type indices survive because they are defined in terms of income differences.

- **The nature of distributional judgments.** Inequality judgments can have a “life of their own” distinct from welfare judgments. Of course social welfare remains as one basis for developing an approach to inequality, but it is one of several. The connections between inequality and social welfare remains one of personal value judgment. Likewise with poverty comparisons: they too may or may not have a formal root in inequality analysis or social-welfare theory. What is more, it may make good sense to work simultaneously with more than one approach to distributional comparison: the word “poverty” or the idea of poverty comparisons can simultaneously mean quite different things to different people. The same sort of idea could apply to “inequality” or “social welfare”.

Some of these avenues have been opened up a little by the research reported here. It would have been intriguing to have gone further within this book. But if it stimulates new thinking about inequality then our purpose will have been accomplished.
Appendix A

Inequality Analysis: A summary of results


A.1 The Axiomatic Approach

Assuming that the concepts “income” and “income receiver” have been defined, we index the members of the population by \(i = 1, 2, ..., n\), and assume that person \(i\)’s income is a non-negative scalar \(x_i\). The symbol \(x\) denotes a vector of such incomes \((x_1, x_2, ..., x_n)\), and \(1\) denotes an vector of ones. For convenience we write \(n(x)\) and \(\mu(x)\) respectively for the number of components and the arithmetic mean of the components of vector \(x\). Also we let \(x[m] := (x, x, ..., x)\), a \(mn\)-vector that represents a concatenation of \(m\) identical \(n\)-vectors \(x\).

Write \(N\) for the set of integers \(\{1, 2, ..., n\}\) and \(X\) for the set of all possible income vectors, which we will take to be the set of all finite-dimensioned non-negative vectors excluding the zero vector. Also write \(X'\) for the subset of \(X\) that excludes all vectors of the form \(a1\), \(a > 0\). By an inequality comparison we mean a binary relation on
the members of $X$. Since our questionnaire is phrased in terms of inequality, the statement “$x \succ x'$” is to be read as “$x$ represents an income distribution that is at least as unequal as distribution $x'$”.

It is possible, of course, that does not represent a complete ordering on $X$. We define the strict inequality comparison $\succ$ and inequality equivalence $\sim$ in the usual way.

To give economic meaning to the relation $\succ$ a number of assumptions are conventionally imposed. The principal assumptions which are commonly used as building blocks in an axiomatic approach to inequality measurement can be expressed in the following way:

- **Anonymity**: for all $x \in X$ and any permutation matrix $P$, $x \sim Px$.
- **Scale-invariance**: for all $x, y \in X$ and positive scalars $a$, $x \succ y$ implies $ax \succ ay$.
- **Translation-invariance**: for all $x, y \in X$ and any scalar $b$ (such that $x+b1 \in X$ and $y+b1 \in X$) $x \succ y$ implies $x+b1 \succ y+b1$.
- **Scale-independence**: for all $x \in X$ and positive scalars $a$, $ax \sim x$.
- **Translation-independence**: for any $x \in X$ and scalar $b$ such that $x+b1 \in X$, $x+b1 \sim x$.
- **Principle of Population**: for all $x \in X$ and positive integers $m$, $x[m] \sim x$.
- **Transfer Principle**: for any $x \in X'$, for any $i, j \in N$, and for any scalar $d > 0$ such that $x_i > x_j$ and $x_i - d > x_j + d$, $x \succ (x_1, x_2, ..., x_i - d, ..., x_j + d, ..., x_n)$.
- **Decomposability**: let $x_g \in X$, and $x'_g \in X$, $g = 1, 2, ..., G$ be income vectors such that $n(x_g) = n(x'_g)$, $\mu(x_g) = \mu(x'_g)$ and $x_g \succ x'_g$ for all $g$, then $(x_1, x_2, ..., x_G) \succ (x'_1, x'_2, ..., x'_G)$.

The anonymity axiom says that if people are identical in all relevant characteristics other than income then inequality comparisons treat them equally. This axiom is of fundamental importance in
other related fields as well as in inequality analysis, and - as long as incomes and income receivers have been appropriately defined - some form of the anonymity axiom may be taken as essential to a rational discussion of the meaning of inequality comparisons.\textsuperscript{1} The rest of the assumptions are presented in an order that is convenient for comparison with the format of our first questionnaire (A1) rather than that suggested by a logical sequence.

Except in trivial cases scale-independence and translation-independence must be treated as mutually exclusive alternatives: a simple mathematical argument is provided by Aczéľ (1987) and Amiel (1981), and the choice between the two principles was discussed by Dalton (1920) and by Kolm (1969, 1976a) However other, similar assumptions may also be reasonable: for example, it has been argued\textsuperscript{2} that some compromise position between the two scale-independence and translation-independence may be appropriate: for example one might require that inequality should remain unchanged under some transformation such as $\alpha x + b$ where $a$ and $b$ are specific constants with $a > 0$. Notice that scale (translation) independence implies scale (translation) invariance but not vice versa, and that there is no problem with an index possessing the properties of scale-invariance and translation-invariance simultaneously.

The population principle has an important implication for inequality indices that one might construct on the basis of one’s axiom system. Given this assumption such indices would be invariant under replications of the population. Note that this is considerably stronger than the requirement that inequality comparisons be invariant under replication: i.e. $x'[m] \succ x[m]$ if and only if $x' \succ x$.

The transfer principle states simply that if a small income transfer is made between two persons of unequal income, inequality rises (falls) according as the recipient is richer (poorer) than the donor. Observe that this property is required to hold independently of the other field as well as in inequality analysis, and - as long as incomes and income receivers have been appropriately defined - some form of the anonymity axiom may be taken as essential to a rational discussion of the meaning of inequality comparisons.\textsuperscript{1} The rest of the assumptions are presented in an order that is convenient for comparison with the format of our first questionnaire (A1) rather than that suggested by a logical sequence.

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\textsuperscript{1}Nygård and Sandström (1981) comment that “a rejection of SYM [the anonymity axiom] would deprive us of all means of judging inequality”. If there are subgroups in the population between which income comparisons are not possible - for example groups where income receivers have different personal characteristics such as family size - then the anonymity axiom cannot apply universally; see Cowell (1980).

\textsuperscript{2}See for example Bossert and Pfingsten (1990) and Kolm (1976b).
incomes possessed by any other members of the community.

The decomposability assumption can be viewed as a type of “independence of irrelevant alternatives” axiom. In this book we have investigated a weaker form of this property where \( G = 2 \) and \( x_2 = x'_2 \).

The transfer principle and the decomposability principle have tremendous consequences for the selection of appropriate tools with which to carry out inequality analysis. There is a simple proposition which connects the transfer principle with the ordering of distributions using the Lorenz curves.\(^3\) If \( x \) and \( y \) have the same mean then the following statements are equivalent:

- \( x \succ y \) for all inequality rankings satisfying the principle of transfers;
- the Lorenz curve of \( x \) lies somewhere below and nowhere above the Lorenz curve of \( y \);
- \( x \) can be reached from \( y \) by a sequence of poorer-to-richer pairwise income transfers.

The greater part of the received wisdom on the positive and normative approaches to economic inequality is founded upon this principle and its corollaries.

Furthermore, the acceptance of population decomposability significantly affects the structure of the class of indices that are admissible as inequality measures: for example it rules out popular indices such as the Gini coefficient, the relative mean deviation and the logarithmic variance.\(^4\) Scale invariance, the transfer principle and population decomposability require that the measure is of of a form that is ordinally equivalent to the Generalised Entropy index

\[
I_{GE}(x) = \frac{1}{\alpha^2 - \alpha} \left[ \frac{1}{n(x)} \sum_{i=1}^{n(x)} \left( \frac{x_i}{\mu(x)} \right)^\alpha - 1 \right] \tag{A.1}
\]

where \( \alpha \) is a sensitivity parameter that may be assigned any real value.\(^5\) An important related family of indices is the Atkinson class of inequality measures

\[
I_{\text{Atkinson}}(x) = 1 - \left[ \frac{1}{n(x)} \sum_{i=1}^{n(x)} \left( \frac{x_i}{\mu(x)} \right)^{1-\epsilon} \right]^{\frac{1}{1-\epsilon}} \tag{A.2}
\]

where \( \epsilon \geq 0 \) is an “inequality-aversion” parameter: an index (A.2) will rank income distributions in the same order as an index (A.1) if \( \epsilon = 1 - \alpha \) for \(-\infty < \alpha < 1\).

However, if one were to consider relaxing the core principles mentioned above, would one have sensible inequality tools available? Relaxing decomposability is not too serious: if one were to insist only on non-overlapping decomposability but not full decomposability, then the Gini coefficient\(^6\)

\[
I_{\text{Gini}}(x) = \frac{1}{2n(x)^2 \mu(x)} \sum_{i=1}^{n(x)} \sum_{j=1}^{n(x)} |x_i - x_j| \tag{A.3}
\]

is an admissible inequality index; if one were to relax even this weaker requirement, then the relative mean deviation

\[
I_{\text{RMD}}(x) = \frac{1}{n(x)} \sum_{i=1}^{n(x)} \left| \frac{x_i}{\mu(x)} - 1 \right| \tag{A.4}
\]

is admissible. What if the transfer principle were to be relaxed? One might then consider using the logarithmic variance,

\[
I_{\text{logvar}}(x) = \frac{1}{n(x)} \sum_{i=1}^{n(x)} \left[ \log \left( \frac{x_i}{\mu(x)} \right) \right]^2 \tag{A.5}
\]

\(^5\)As \( \alpha \) increases the index becomes more sensitive to the top of the income distribution; as \( \alpha \) decreases (towards \(-\infty\)) the index becomes more sensitive to the bottom of the income distribution. For the cases \( \alpha = 1 \) and \( \alpha = 0 \), respectively, this expression reduces to Theil’s first and second index (Theil 1967). See Cowell (1995, 1998) for further details.

\(^6\)If the index (A.3) were multiplied by mean income one would have the so-called absolute Gini, or Gini’s mean difference.
or the variance of logarithms. However the region in which these indices violate the transfer principle is quite different from the situations that we have been considering: the logarithmic variance has the property that the principle of transfers is violated for any pair of incomes if they exceed 2.7183 times the mean - see Cowell (1995). Our questionnaires have not involved transfers between the very rich and the super-rich. An alternative index has been suggested by Gastwirth (1974) and discussed by Nygård and Sandström (1981) p. 264.

\[
I(x) = \frac{1}{n(x)^2} \sum_{i=1}^{n(x)} \sum_{j=1}^{n(x)} \frac{|x_i - x_j|}{x_i + x_j}
\]

(A.6)

Notice that the index looks superficially similar to the Gini coefficient (A.3) but that each pairwise difference is normalised by the average that particular pair of incomes rather than by mean income \(\mu(x)\). The index (A.6) satisfies anonymity, scale independence and the principle of population but not the transfer principle.

### A.2 Inequality and Welfare Rankings

Let \(W\) denote the social-welfare function: this is assumed to be a continuous function from \(X\) to \(\mathbb{R}\). Many of the properties of the inequality ordering can be immediately restated in terms of the welfare function \(W\): this applies to the properties of anonymity, scale invariance, translation invariance, population principle and decomposition. For example one would write the first of these as:

- **Anonymity**: for all \(x \in X\) and any permutation matrix \(P\),
  \[W(x) = W(Px).\]

One principle requires a minor restatement:

- **Transfer Principle**: for any \(x \in X'\), for any \(i, j \in N\), and for any scalar \(d > 0\) such that \(x_i > x_j\) and \(x_i - d > x_j + d\),
  \[W(x) < W(x_1, x_2, ..., x_i - d, ..., x_j + d, ..., x_n).\]

---

\(^7\)This found by replacing the arithmetic mean in (A.5) by the geometric mean.
A.2. INEQUALITY AND WELFARE RANKINGS

In addition we may state

- **Monotonicity**: for any \( x \in X' \), for any \( i \in N \), and for any scalar \( d > 0 \), \( W(x) < W(x_1, x_2, ..., x_i + d, ..., x_n) \).

In many cases it is convenient to restrict the class of admissible functions to those that are in additive form:

\[
W(x) = \sum_{i=1}^{n(x)} \varphi(x_i) \tag{A.7}
\]

A number of standard results linking distributional comparisons and welfare and inequality propositions are available. For simplicity of expression let us suppose that we are comparing two distributions \( x, y \in X \) with the same population \( (n(x) = n(y)) \), although the results are valid more generally; also assume that \( x_1 \leq x_2 \leq x_3 \ldots \) and \( y_1 \leq y_2 \leq y_3 \ldots \) (given the anonymity assumption it is always valid to relabel the population so that these ordering properties are true).

Then the following two statements are equivalent (Saposnik 1981, 1983):

- "\( x_i \geq y_i, i = 1, 2, 3\ldots \)" (first-order dominance)
- "\( W(x) \geq W(y) \) for all welfare functions of the form (A.7) that satisfy monotonicity”

Furthermore the following two statements are also equivalent (Kolm 1969, Marshall and Olkin 1979, ?)

- "\( \sum_{j=1}^{i} x_j \geq \sum_{j=1}^{i} y_j, i = 1, 2, 3\ldots \)" (second-order dominance)
- "\( W(x) \geq W(y) \) for all welfare functions of the form (A.7) that satisfy monotonicity and the transfer principle.”

From this second result other important consequences flow. For example, if also we have \( \mu(x) = \mu(y) \) then these two equivalent conditions are also equivalent to the Lorenz curve of \( x \) lying everywhere on or above the Lorenz curve of \( y \) (Atkinson 1970).
A.3 Poverty Comparisons

As in the discussion of inequality and social welfare individuals are assumed to be identical in every respect other than their incomes; we suppose that there is also a given poverty line, an exogenously given number \( z \); individual \( i \) is said to be poor, or in poverty, if \( x_i < z \). The assumption that people are alike other than their incomes simplifies the analysis (otherwise we would have to consider multiple poverty lines depending on persons’ characteristics) but is not essential for stating the main principles of poverty measurement. For any \( x \in X \) we will write the set of poor persons as

\[
\Pi(x, z) := \{ i : i \in N(x), x_i < z \}.
\]

The axioms of anonymity, the population principle and decomposability are essentially the same as in the discussion of inequality orderings; the principle of transfers and monotonicity are almost the same as in the discussion above. In the following descriptions of the first five axioms it is to be understood that \( x, x' \in X \) and \( n(x) = n(x') \). A poverty index is a function \( P : X \rightarrow \mathbb{R} \) which is given meaning by a number of axioms:

- **Weak monotonicity**: If \( z > x_i > x'_i \) and \( x_j = x'_j, j \neq i \), then \( P(x) < P(x') \).

- **Strong monotonicity**: If \( x_i > x'_i \) and \( x_j = x'_j, j \neq i \), for \( i \in \Pi(x, z) \) then \( P(x) < P(x') \).

- **Weak principle of transfers**: If \( x'_i = x_i - d < x_j + d = x'_j < z \) for some \( d > 0 \), and \( x_k = x'_k, k \neq i, j \) then \( P(x) < P(x') \).

- **Strong principle of transfers**: If \( x'_i = x_i - d < x_j + d = x'_j \) for some \( d > 0 \), for \( j \in \Pi(x, z) \) and \( x_k = x'_k, k \neq i, j \) then \( P(x) < P(x') \).

- **Focus**: If \( x_j = x'_j \) for all \( x_j < z \) then \( P(x) = P(x') \).

In addition there are two axioms which are sometimes invoked concerning cases where \( n(x) \) and \( n(x') \) are different. Suppose \( x' = (x, \bar{x}) \): in other words the vector \( x' \) is formed by concatenating \( x \) with one extra component \( \bar{x} \).
A.3. POVERTY COMPARISONS

- **Growth of the Poor**: If \( \tilde{x} < z \) then \( P(x) < P(x') \).

- **Growth of the Non-Poor**: If \( \tilde{x} \geq z \) then \( P(x) > P(x') \).

Notice that the difference between the “weak” and “strong” versions of monotonicity and the transfer principle lies in whether or not we consider the possibility that one individual crosses the poverty line. This is different from the distinction between “weak” and “strong” as used in the social welfare and inequality literature.

Monotonicity and the focus axiom might at first glance seem to be self-evident properties of a sensible poverty index. However caution is required. One commonly-used poverty index - the headcount ratio - does not satisfy the requirement of monotonicity, and the focus axiom would be called into question if, for example, it was considered appropriate that the poverty line be some function of overall mean income \( \mu(x) \) or the median (a complication that we have excluded). Finally, although it seems clear that “Growth of the Poor” is reasonable and defensible, it is not clear *a priori* that “Growth of the Non-Poor” is an appropriate assumption: it could be argued that the numbers of the non-poor are irrelevant (in which case the axiom would have read “if \( \tilde{x} \geq z \) then \( P(x) = P(x') \)”); our version of the property follows Seidl (1988).
Appendix B

The Questionnaires

The first questionnaires (A1) were carried out in 1989, and studies continued over the next seven years. The procedure for conducting the questionnaires was the same in each country and educational institution. The lecturer or teacher ran the questionnaire during class time and the completed questionnaires were returned to the Ruppin Institute for collation and coding. The overall sample characteristics for the ten questionnaire-experiments reported in this book are given in the accompanying table.

The English text of the questionnaires is provided on the following pages. Notice that the rubric at the head of each questionnaire sheet is essentially the same, and that in every case the numerical question appeared on the first page of the questionnaire sheet, and the rubric for the verbal questionnaire was at the top of the second page.

In practice questionnaire B2 was rather different from the others since it was designed to check whether the ordering of numerical problems and questions would seriously affect the responses. The basic text of questionnaire B2 (page 231) was derived from B1 (page 227) and then four variants prepared as follows:
• B2a : The basic version of the questionnaire.

• B2b : Reverse the order of numerical questions and of verbal questions from B2a (i.e. top to bottom).

• B2c : Order of questions as for B2a but wherever there is “A” & “B”, reverse them (i.e. left to right).

• B2d : Both switches as in B2b & B2c.

All four sub-types were used simultaneously in each experiment on each group of student respondents. Although the questionnaires were labelled differently, students were not informed that they were tackling slightly different questionnaires.

Finally note that there is no questionnaire “R1” or “R2”. The risk questionnaire R3 is given this label because of its close similarity to the inequality questionnaire A3.
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* Hochschule für Unternehmungsführung

Table B.1: Breakdown of the combined sample
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* Hochschule für Unternehmungsführung

Table B.2: Breakdown of the combined sample (continued)
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Table B.3: Breakdown of the combined sample (continued)
INCOME INEQUALITY QUESTIONNAIRE

This questionnaire concerns people’s attitudes to income inequality. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right” answers. Some of the suggested answers correspond to assumptions commonly 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: please do not write your name on it.

In each of the first nine questions you are asked to compare two distributions of income. Please state which of them you consider to be 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 = (5, 8, 10) B = (10, 16, 20)
2) A = (5, 8, 10) B = (10, 13, 15)
3) A = (5, 8, 10) B = (5, 5, 8, 8, 10, 10)
4) A = (1, 4, 7, 10, 13) B = (1, 5, 6, 10, 13)
5) A = (4, 8, 9) B = (5, 6, 10)
6) A = (4, 7, 7, 8, 9) B = (5, 6, 7, 7, 10)
7) A = (5, 5, 5, 10) B = (5, 5, 10, 10)
8) A = (5, 5, 10, 10) B = (5, 10, 10, 10)
9) A = (5, 5, 5, 10) B = (5, 10, 10, 10)
In each of questions 10 to 14 you are presented with a hypothetical change and three possible views about that change, labelled a, b, c. Please circle the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

10) 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” (if you now consider the two distributions to have the same inequality):

11) 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) Inequality remains the same.
   c) Inequality has increased.

   Suppose instead of adding we deduct a fixed amount from each person’s income. Then inequality...

   a) is the same
   b) increases
   c) decreases
In the light of both 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”) here:

12) 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 3? If so, please write your new response (“A” or “B” or “A and B”) here:

13) 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 had 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 4? If so, please write your new response (“A” or “B” or “A and B”) here:
14) Suppose there are two societies A, 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 income distribution unless we know the exact distributions.*

c) *Neither of the above.*

In the light of the above (and your answer to question 5) would you want to change your answer to question 6? If so, please write your new response (“A” or “B” or “A and B”) here:

15) Suppose there is a society consisting of *n* people. There is one rich person and *n − 1* identical poor people. One by one, some of those who were poor acquire the same income as the rich person, so that eventually there are *n − 1* (identical) rich people and just one poor person. Please circle the appropriate response:

a) *Inequality increases continuously.*

b) *Inequality decreases continuously.*

c) *Inequality at first increases and then decreases.*

d) *Inequality at first decreases and then increases.*

e) *Inequality remains the same throughout.*

f) *None of the above.*

In the light of the above would you want to change your answer to questions 7, 8 and 9? If so please note your new responses here...

7:

8:

9:

Please write your special subject here:

Thanks once again for your help!
INCOME INEQUALITY QUESTIONNAIRE

This questionnaire concerns people’s attitude to income inequality. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right” answers. Some of the suggested answers correspond to assumptions commonly 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. Please do not write your name on it.

In each of the first seven questions you are asked to compare two distributions of income. Please state which of them you consider to be 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) $A = (5, 5, 5, 5)$  $B = (5, 5, 5, 10)$
2) $A = (5, 5, 5, 10)$  $B = (5, 5, 10, 10)$
3) $A = (5, 5, 10, 10)$  $B = (5, 10, 10, 10)$
4) $A = (5, 10, 10, 10)$  $B = (10, 10, 10, 10)$
5) $A = (5, 5, 5, 5)$  $B = (10, 10, 10, 10)$
6) $A = (5, 5, 5, 10)$  $B = (5, 10, 10, 10)$
7) $A = (7, 5, 10, 9)$  $B = (9, 5, 7, 10)$

continued/...
In each of questions 8 to 10 you are presented with possible views about inequality comparisons labelled a, b, .... Please circle the letter alongside the view that corresponds most closely to your own.

8) Suppose income inequality in Alfaland is higher than income inequality in Betaland and income inequality in Betaland is higher than income inequality in Gamaland. Then

a) Inequality in Alfaland is higher than inequality in Gamaland.

b) It is not clear that inequality in Alfaland is higher than inequality in Gamaland.

In the light of the above would you want to change your answer to questions 1, 2, 3, 4, 5 and 6? If so, please note your new responses here:
1) 4) 
2) 5) 
3) 6)

9) Suppose there is a society consisting of n persons. All of them are identical poor people. One by one each person receives in turn an identical large bonus and thus becomes a rich person: so eventually there are n identical rich people. Please circle the appropriate response:

a) Inequality increases continuously

b) Inequality decreases continuously

c) Inequality at first increases and then decreases

d) Inequality at first decreases and then increases

e) Inequality remains the same throughout

f) None of the above
In the light of the above would you want to change your answer to questions 1, 2, 3, 4, 5 and 6? If so please note your new responses here:

1) 4)  
2) 5)  
3) 6)  

10) Suppose we permute the incomes of people who are identical in every respect other than income. (So person i gets the income that j had previously, j gets the income that person k had previously, etc.). Then:

a) Inequality remains the same  

b) Inequality may change  

In the light of the above, would you want to change your answer to question 7? If so, please write your new response (“A”, “B” or “A and B”, if you now consider the two distributions to have the same inequality) here:
A3

INCOME INEQUALITY QUESTIONNAIRE

This questionnaire concerns people’s attitude to income 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. Please do not write your name on it.

In Alfaland there are some areas with different levels of income. All areas have the same number of people which are identical except in their incomes. In each area half of the people have one level of income and the other half have another level of income. The average income in Alfaland by local currency is 1000 Alfa-dollars and the income which ensures a supply of basic needs is 400 Alfa-dollars.

In each of the following questions you are asked to compare two distributions of income - one per each area. 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 = (200, 400)  B = (400, 600)
2) A = (200, 400)  B = (400, 700)
3) A = (200, 400)  B = (400, 800)
4) A = (600, 900)  B = (900, 1200)
5) A = (600, 900)  B = (900, 1300)
6) A = (600, 900)  B = (900, 1350)
7) A = (1200, 1800) B = (1800, 2400)
8) A = (1200, 1800) B = (1800, 2550)
9) A = (1200, 1800) B = (1800, 2700)

continued/...
In the next question you are presented with possible views about inequality comparisons labelled a,b,c,d. Please circle the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

10) Suppose we change the real income of each person in a society, when not all the initial incomes are equal.

a) If we add (or deduct) an amount to the income of each person that is proportional to his initial income then inequality remains unaltered.

b) If we add (or deduct) the same fixed amount to the incomes of each person inequality remains unaltered.

c) Inequality may remain unaltered: whether it does so depends not only on the change but also on initial and final levels of real income.

d) None of the above.

In the light of the above would you want to change your answers to questions 1-9? If so please note your new responses here:

1) 6)
2) 7)
3) 8)
4) 9)
5)
INCOME INEQUALITY QUESTIONNAIRE

This questionnaire concerns people’s attitude to income 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 persons who are identical in every respect other than their 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 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 the questions (1) to (5) 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 in each of five different situations in which Alfaland might find itself. 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 than 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 = (10, 10, 10, 10, 30) B = (10, 10, 10, 20, 20)

continued/...
In question 6 you are presented with a hypothetical income change and some possible views about that change. The views are labelled a),..., e). Please circle the letter alongside the view that corresponds most closely to your own. You can check more than one answer, provided that you consider they do not contradict each other. Feel free to add any comment which explains the reason for your choice.

6) 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 originally had more income still has more.

a) *Income inequality in this society has fallen if the ranking of the income of all the people remains the same. If there is any change in the rank of all the incomes then it is possible that income inequality increases or remains the same.*

b) *If the transfer was from the richest to the poorest, and after the transfer the richest remains the richest and the poorest remains the poorest, than income inequality has fallen. In other cases we cannot say a priori how inequality has changed.*

c) *The relative position of others has also been changed by the transfer. So we cannot say a priori how inequality has changed.*

d) *Inequality in this society has fallen, even if there is a change in the ranking of the income of people as a result of this transfer, and even if the transfer is not from the richest in the society to the poorest.*

e) *None of the above*

In the light of your answer to question 6, would you want to change your answer to question 1-5? If so, please state your new response here.

1) 
2) 
3) 
4) 
5)
B1

INCOME DISTRIBUTION QUESTIONNAIRE

This questionnaire concerns peoples attitude to income distribution. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right” answers. Some of the suggested answers correspond to assumptions commonly 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.

In Alfaland two economic programmes are proposed. It is known that both programmes will have the same effect on the population except on their incomes and all the people are identical in every respect other than income.

In each of the first ten questions there are given two alternative lists of incomes A and B (in Alfaland local currency) which result from these two programmes respectively. Please state which programme you consider would make the community of Alfaland better off by circling A or B. If you consider that each of the programmes is just as good as the other then circle both A and B.

1) A = (1, 4, 7, 10, 13) B = (1, 5, 6, 10, 13)
2) A = (4, 8, 9) B = (5, 6, 10)
3) A = (4, 7, 7, 8, 9) B = (5, 6, 7, 7, 10)
4) A = (5, 5, 5, 5) B = (5, 5, 5, 10)
5) A = (5, 5, 5, 5) B = (5, 5, 5, 30)
6) A = (4, 8, 9) B = (4, 8, 20)
7) A = (5, 10, 15, 20) B = (6, 8, 16, 20)
8) A = (6, 8, 16, 20) B = (6, 9, 14, 21)
9) A = (6, 9, 14, 21) B = (5, 10, 15, 20)
10) A = (7, 5, 10, 9) B = (9, 5, 7, 10)

continued/...
Now there are two other islands, Betaland and Gammaland. In Betaland there are three people and in Gammaland there are six people. All the people (on both islands) are identical in every respect other than income. Both islands have the same currency and prices.

Question 11 gives the list of income in Betaland (labelled B) and in Gammaland (labelled C). Please state which community you consider better off by circling B or C. If you think that the two communities are equally well off then circle both B and C.

\[ \text{11)} \quad B = (5, 8, 10) \quad C = (5, 5, 8, 8, 10, 10) \]

In each of questions 12 to 17 you are presented with hypothetical change and some possible views about that change, labelled a, b, c, ... Please write the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

12) Suppose there are two economic programmes A and B which have only the following difference: The income of person \( i \) in programme A is \( x \) units higher than his income in programme B while the income of person \( j \) in programme A is \( x \) units lower than his income in programme B. In both programmes the income of person \( i \) is higher than the income of person \( j \). The incomes of all other people are unaffected by the choice of programme A or programme B.

\[ \text{a)} \quad \text{Programme A would make the community better off.} \]
\[ \text{b)} \quad \text{Programme B would make the community better off.} \]
\[ \text{c)} \quad \text{The relative position of other people is also different under A and B. Therefore we cannot say which programme would make the community better off.} \]
\[ \text{d)} \quad \text{None of the above.} \]

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”) here:
13) Suppose there are two islands A, B with the same number of people and with the same total income, but with different distributions of income. Island A is now merged with island C, and island B is merged with island C', where C and C' are identical.

a) The community of the island which was better off before the merger is still better off after the merger.

b) We can’t say which community is better off unless we know the exact distributions.

c) Neither of the above.

In the light of the above, (and your answer to question 2) would you want to change your answer to question 3? If so please write your new response (“A” or “B” or “A and B”) here:

14) Suppose there are two economic programmes A and B which have only one difference: there is one person whose income under programme B is higher than under programme A. For every other person his income under programme B equals his income under programme A.

a) Programme B would make the community better off because no one is worse off and someone is better off.

b) The relative positions of others is also different as between A and B; therefore we cannot say, a priori, which programme is better off.

c) Neither of the above.

In the light of the above would you want to change your answers to questions 4, 5 and 6? If so please write your new response (“A” or “B” or “A and B”) here:

4:

5:

6:

15) Suppose the community is better off under programme A than under programme B; suppose also that it is better under programme B than under programme C.
APPENDIX B. THE QUESTIONNAIRES

a) The community is better off under programme A than under programme C.

b) It is not clear that the community is better off under programme A than under programme C.

In the light of the above would you want to change your answer to questions 7, 8 and 9? If so please write your new responses here:

7:
8:
9:

16) Suppose we permute the incomes of people who are identical in every respect other than income. (So person i gets the income that j had previously, j gets the income that person k had previously, etc.)

a) The community is equally well off in the two situations.

b) It is not clear that the community is equally well off in the two situations.

In the light of the above would you want to change your answer to question 10? If so please note your new response here:

17) Suppose two identical islands with the same income distribution are amalgamated into one state without any other change.

a) The position of the amalgamated state is as good as each island separately because the relative incomes shares remain unchanged.

b) The position of the amalgamated state is better than either island separately because there are more people who have the same income.

c) The position of the amalgamated state is worse than that of either island separately.

In the light of the above would you want to change your answer to question 11? If so please note your new response ("A" or "B" or "A and B") here:
INCOME DISTRIBUTION QUESTIONNAIRE

This questionnaire concerns people’s attitude to income distribution. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right” answers. Some of the suggested answers correspond to assumptions commonly 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 a small country for which two economic programmes have been proposed. It is known that the programmes will have an identical effect on the population - except in so far as incomes are concerned (all the people in Alfaland are identical in every respect other than income). In questions 1 to 7 you are asked about two alternative lists of incomes A and B (in Alfaland local currency) which result from each of these programmes. Please state which programme you consider would make the community of Alfaland better off by circling A or B. If you consider that each of the programmes is just as good as the other then circle both A and B.

1) A = (1, 4, 7, 10, 13) B = (1, 5, 6, 10, 13)
2) A = (1, 4, 7, 10, 13) B = (1, 4, 8, 9, 13)
3) A = (4, 8, 9) B = (5, 6, 10)
4) A = (4, 7, 7, 8, 9) B = (5, 6, 7, 7, 10)
5) A = (5, 5, 5, 5) B = (5, 5, 5, 10)
6) A = (5, 5, 5, 5) B = (5, 5, 5, 30)
7) A = (4, 8, 9) B = (4, 8, 20)

continued/...
Now suppose that there are two other islands, Betaland and Gammaland. In Betaland there are three people and in Gammaland there are six people. All the people (on both islands) are identical in every respect other than income. Both islands have the same currency and prices.

Question 8 gives the list of income in Betaland (labelled B) and in Gammaland (labelled C). Please state which community you consider better off by circling B or C. If you think that the two communities are equally well off then circle both B and C.

8) \[ B = \{5, 8, 10\} \quad C = \{5, 8, 8, 10, 10\} \]

In each of questions 9 to 12 you are presented with a hypothetical change and some possible views about that change, labelled a, b, c,... Please write the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

9) Suppose two economic programmes A and B differ only in their effect on the incomes of Irene and Janet. Irene (who is richer than Janet) gets $1 more under programme A than she would get under B; Janet would get $1 less under A than she would under B. (For everyone else income under B is the same as it would be under A.)

a) Programme A would make the community better off.

b) Programme B would make the community better off.

c) The relative positions of other people will be changed in different ways by programme A and programme B; so we can't say which is better.

d) None of the above.

In the light of the above, would you want to change your answer to questions 1 and 2? If please write your new response ("A" or "B" or "A and B") here:

question 1:

question 2:
10) Suppose there are two islands A and B with the same number of people and with the same total income, but with different distributions of income. Island A is now merged with island C, and island B is merged with island C’, where C and C’ are identical.

a) If the population of A was better off than the population of B (before the merger) then the population of A+C must be better off than the population of B+C’ (after the merger).

b) We can’t say which community is better off unless we know the exact distributions.

c) Neither of the above.

In the light of the above, (and of your answer to question 3) would you want to change your answer to question 4? If so please write your new response (“A” or “B” or “A and B”) here:

question 4:

11) Suppose two economic programmes A and B differ in only one respect: there is one person who would get a higher income under programme B than he would under A. (For everyone else income under B is the same as it would be under A.)

a) Programme B would make the community better off because no one is worse off and someone is better off.

b) The relative positions of other people will be changed in different ways by programme A and programme B; so we can’t say which is better.

c) Neither of the above.

In the light of the above would you want to change your answers to questions 5, 6 and 7? If so please write your new response (“A” or “B” or “A and B”) here:

question 5:

question 6:

question 7:
12) Suppose there are two islands that are identical in every re-
spect, including their population structure, total income and income
distribution. Now suppose the two islands are amalgamated into one
state without any other economic or social change.

a) The position of the amalgamated state is as good as each is-
land separately because the relative income shares remain un-
changed.

b) The position of the amalgamated state is better than either island
separately because there are more people who have the same
income.

c) The position of the amalgamated state is worse than that of either
island separately.

d) None of the above.

In the light of the above would you want to change your answer
to question 8? If so please note your new response ("A" or "B" or
A and B") here:

question 8:
POVERTY QUESTIONNAIRE

This questionnaire concerns people’s attitude to poverty. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right answers”. Some of the suggested answers correspond to assumptions commonly 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.

In Alfaland there are two regions which have different levels of income. All the people of Alfaland are identical in every respect other than their incomes. The level of income which ensures a supply of basic needs anywhere in Alfaland is 15 Alfadollars.

In each of the ten following questions you are asked to compare two distributions of income - one for each region. Please indicate the region in which you consider poverty to be greater by circling A or B. If you consider that poverty is the same in the two regions then circle both A and B.

1) A = (4,8,12,30,40,50,66)    B = (4,9,12,30,40,50,66)
2) A = (4,8,12,30,40,50,66)    B = (4,9,11,30,40,50,66)
3) A = (4,8,12,30,66,50,40)    B = (12,8,4,30,40,50,66)
4) A = (4,8,12,30,40,50,66)    B = (4,4,8,12,12,30,30,40,40,50,66,66)
5) A = (4,8,12,30,40,50,66)    B = (5,6,13,30,40,50,66)
6) A = (4,7,8,12,30,40,50,53,66) B = (5,6,7,13,30,40,50,53,66)
7) A = (4,8,12,30,40,50,66)    B = (4,8,12,30,140,150,166)
8) A = (4,8,12,30,40,50,66)    B = (4,8,12,20,30,40,50,66)
9) A = (4,8,12,30,40,50,66)    B = (4,8,12,30,40,50,66,100)
10) A = (4,8,12,30,40,50,66)   B = (4,8,12,14,30,40,50,66)

continued/...
In each of the following questions you are presented with a hypothetical change and several possible views about that change, labelled a, b, c,... Please circle the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which may explain the reason for your choice.

In question 11 and 12 we consider two regions A and B that have “almost identical” income distributions. By this we mean that A and B have the same numbers of inhabitants and - with just a few exceptions - we can find matching pairs of one A-resident and one B-resident who have identical incomes.

11) Suppose there are two regions A and B which have almost identical income distribution; the only exception is that a particular person \(i\) in region B has a higher income than the corresponding person \(i\) in region A. In both regions the income of person \(i\) is less than the level that ensures a supply of basic needs.

a) Poverty in region A is higher.

b) The relative position of other people is also different in A and B; therefore we cannot say, a priori, in which region poverty is greater.

c) Neither of the above

In the light of the above would you want to change your answer to question 1? If so, please note your new response (“A” or “B” or “A and B”) here:

12) Suppose there are two regions A and B which have almost identical income distributions. The only exceptions are that the income of one particular poor person \(i\) in region A is \(x\) units higher than the income of the corresponding poor person \(i\) in region B, and that the income of another, very poor person \(j\) in region A is \(x\) units lower than the income of the corresponding very poor person in region B.

a) Poverty in region A is greater than in region B.
b) Poverty in region B is greater than in region A.

c) The relative position of other people is also different in A and B. Therefore we cannot say in which region poverty is greater.

d) None of the above.

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”) here:

13) Suppose people are identical in every respect other than income, and that one income distribution is a permutation of another income distribution.

a) Poverty is the same in the two situations

b) It is not clear that poverty is the same in the two situations.

In the light of the above would you want to change your answer to question 3? If so, please note your new response (“A” or “B” or “A and B”) here:

14) Suppose two identical regions with identical income distribution and the same “basic-needs” income level were to be amalgamated into one region without any other change.

a) Poverty in the amalgamated region would be the same as in each region separately.

b) Poverty in the amalgamated region would be higher than in each region separately.

c) Poverty in the amalgamated region would be less than in each region separately.

In the light of the above would you want to change your answer to question 4? If so, please note your new response (“A” or “B” or “A and B”) here:
15) Suppose there are two regions A, B with the same number of inhabitants and with the same total income and the same basic-needs income level. Region A is now merged with region C, and region B is merged with region $C'$, where $C$ and $C'$ have identical income distribution and have the same basic-needs level as in regions $A$ and $B$.

a) If poverty in $A$ was higher (lower) than in $B$ before the merger, then it is also higher (lower) than $B$ after the merger.

b) We cannot say in which region poverty is higher unless we know the exact distributions.

c) Neither of the above.

In the light of the above, (and your answer to question 5) would you want to change your answer to question 6? If so, please write your new response (“A” or “B” or “A and B”) here:

16) Suppose we increase the income of some of the people whose incomes are higher than the basic-needs income level.

a) Poverty will increase because the poor compare their own incomes to those of other people.

b) Poverty will remain unaltered because poverty has nothing to do with the incomes of those who are not poor.

c) Poverty will decrease because in order to alleviate poverty we shall need to transfer to the poor a smaller share of the total income.

d) None of the above.

In the light of the above would you want to change your answer to question 7? If so, please note your new response (“A” or “B” or “A and B”) here:

17) Suppose a person whose income is above the basic-needs level is allowed to immigrate to a region and that there is no change in the incomes of all others and that the basic-needs level in this region remains unchanged.
a) Poverty goes up.

b) Poverty goes down.

c) Poverty remains the same.

d) We cannot say whether poverty goes up, goes down or remains the same unless we know the exact income distributions.

e) None of the above.

In the light of the above, would you want to change your answers to question 8 and 9? If so, please write your new responses ("A" or "B" or "A and B") here:

18) Suppose a person whose income is lower than the basic-needs level is allowed to move into a region. (The region’s basic-needs income level and the incomes of all other persons in the region remain unchanged.)

a) Poverty goes up because there is one more poor person.

b) We cannot say whether poverty goes up, goes down or remains the same unless we know the exact distributions.

c) Neither of the above.

In the light of the above, would you want to change your answer to question 10? If so, please note your new response ("A" or "B" or "A and B") here:
POVERTY QUESTIONNAIRE

This questionnaire concerns people’s attitude to poverty. We would be interested in your views, based on some hypothetical situations. Because it is about attitudes there are no “right answers”. Some of the suggested answers correspond to assumptions commonly 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.

In Alfaland there are two regions A and B. All the people of Alfaland are identical in every respect other than their incomes. The people of region A consider that the level of income which ensures a supply of basic needs in their region is 10 Alfa-dollars, and the people of region B consider that the basic-needs income level in their region is 20 Alfa-dollars. Prices in A and in B are the same.

In each of the three following questions you are asked to compare two distributions of income - one for each region. Please indicate the region in which you consider poverty to be greater by circling A or B. If you consider that poverty is the same in the two regions then circle both A and B.

1) A = (4,8,12,20,24,32,40) B = (4,8,12,20,24,32,40)
2) A = (4,8,12,20,24,32,40) B = (8,16,24,40,48,64,80)
3) A = (4,8,12,20,24,32,40) B = (14,18,22,30,34,42,50)

continued/...
In each of the following questions you are presented with a hypothetical change and a several possible views about that change, labelled a, b, c,... Please circle the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

4) Suppose two regions A and B have the same income distribution. Suppose the level of income which ensures a supply of basic-needs is higher in region B.

a) *It is clear that poverty in B is greater than in A.*

b) *The basic-needs income level does not effect the level of poverty.*
   *So poverty is the same in A and B.*

c) *Neither of the above.*

In the light of the above would you want to change your answer to question 1? If so, please note your new response (“A” or “B” or “A and B”) here:

5) Suppose the real income of each person and the basic needs income level are doubled

a) *Poverty increases*

b) *Poverty decreases*

c) *Poverty remains the same*

d) *The direction of change of poverty depends on initial and final levels of real income.*

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”) here:

6) Imagine a region in which some persons’ incomes are less than the basic-needs level. Suppose the real income of each person in the region is increased by the same fixed amount and that the basic-needs income level is also increased by the same fixed amount.
a) Poverty increases.

b) Poverty decreases.

c) Poverty remains the same.

d) The direction of change of poverty depends on initial and final levels of real income.

Suppose instead that the real income of each person in the same region is decreased by the same fixed amount and that the basic needs income level is also decreased by the same fixed amount.

a) Poverty increases

b) Poverty decreases

c) Poverty remains the same

d) The direction of change of poverty depends on initial and final levels of real income.

In the light of the above would you want to change your response to question 3? If so, please note your new response (“A” or “B” or “A and B”) here:

7) Poverty is a situation in which incomes are

a) not enough for a supply of basic needs.

b) below a level which is relative to the income distribution (for example 50% of the median income).

c) Neither of the above.
R3

INCOME 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. Please do not write your name on it.

In Alfaland there are some areas with different levels of income. All areas have the same number of people which are identical except in their incomes. In each area half of the people have one level of income and the other half have another level of income. The average income in Alfaland by local currency is 1000 Alfa-dollars and the income which ensures a supply of basic needs is 400 Alfa-dollars.

In each of the following questions you are asked to compare two distributions of income - one per each area. Please state which of them you consider to be the more risky to a potential migrant by circling A or B. If you consider that both of the distributions exhibit the same risk then circle both A and B.

1) \( A = (200, 400) \) \( B = (400, 600) \)
2) \( A = (200, 400) \) \( B = (400, 700) \)
3) \( A = (200, 400) \) \( B = (400, 800) \)
4) \( A = (600, 900) \) \( B = (900, 1200) \)
5) \( A = (600, 900) \) \( B = (900, 1300) \)
6) \( A = (600, 900) \) \( B = (900, 1350) \)
7) \( A = (1200, 1800) \) \( B = (1800, 2400) \)
8) \( A = (1200, 1800) \) \( B = (1800, 2550) \)
9) \( A = (1200, 1800) \) \( B = (1800, 2700) \)

continued/...
In the next question you are presented with possible views about risk comparisons labelled a,b,c,d. Please circle the letter alongside the view that corresponds most closely to your own. Feel free to add any comments which explain the reason for your choice.

10) Suppose we change all the payoffs in a lottery simultaneously:

a) If we add to (or deduct from) each payoff an amount that is proportional to the original payoff then the riskiness of the lottery remains unchanged.

b) If we add to (or deduct from) each original payoff the same fixed amount then the riskiness of the lottery remains unchanged.

c) Whether the riskiness of the lottery remains unaltered depends not only on the changes but also on initial and final levels of the payoffs.

d) None of the above.

In the light of the above would you want to change your answers to questions 1-9? If so, please note your new responses here:

1) 6)
2) 7)
3) 8)
4) 9)
5)
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Bibliography


an experimental questionnaire investigation. Distributional Analysis Discussion Paper 5, STICERD, London School of Economics, London WC2A 2AE.


