The Subjective Approach to the Measurement of Income Inequality

by

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Abstract

Inequality measurement involves explicit or implicit value judgements. The subjective approach to inequality measurement is a relatively new and fast-developing area which focueses direct attention on these judgements. It is "subjective" in the sense that it takes account of people's views on distributional comparisons. This paper surveys some of the principal contributions of recent years.

Keywords: Measurement of inequality; subjective approach; value judgements; distributional comparisons.

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1. Introduction

The research on the theory of income inequality measurement started really towards the end of the nineteenth and the beginning of the twentieth century. Most of that earlier research discussed statistical tools of measurement. One of the exceptions was the work of Dalton (1920) who discussed measurement from a social welfare point of view. The subjective approach, which is the subject of this chapter, is in fact related to this social welfare approach as is most of the more recent research on the measurement of income inequality, which started more than 25 years ago, (see Atkinson 1970, Kolm 1969, Sen 1973).

The implicit existence of a value judgement when measuring income inequality was already stressed in the early works belonging to this new generation of research on income inequality measurement. The need to choose for example a specific level of constant relative inequality aversion, or more generally the type of inequality aversion, whether it is variable, relative, or absolute was mentioned by Atkinson (1970).

But does every measurement of income inequality involve value judgements? As Dalton (1920, p. 349) pointed out "... 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 income ....", and welfare is, of course, a matter of value judgement.

Some of the measures which are used in the economic literature are borrowed from the statistical literature, but the choice of a specific index has often clear implications. For example, the use of the range means that we interpret inequality as an

issue concerning extreme incomes, so that the incomes which fall between the extremes may be ignored. This is, of course, a value judgement, and this is true, whether one considers such a measure as "objective" or "subjective". In fact, there is always a value judgement behind the use of any specific measure. Furthermore, any use of a family of inequality measures or any criterion or axiom adopted for comparing inequality or welfare levels implies an implicit if not explicit value judgement.

Some authors have tried to justify their choice of a specific measure or family of measures or axioms in terms of more fundamental principles. Of course, someone can try to check the logic of such arguments, but this still leaves unresolved the choice of more fundamental principles. These obviously remain a matter of value judgements, so that one may wonder whether it is wise to follow specialists in adopting specific measures of income inequality. Are their value judgements "better" or more important than those of others?

The investigation of people's opinions and the attempt to derive from them specific ways of measuring income inequality are the essence of what is called the subjective approach to inequality measurement. To conduct such an investigation, various methods have been used and they will be discussed in the following sections. The usual method of finding out people's opinion is by questionnaires or experiments. A distinction should be made here between two main approaches, one relying on individual welfare functions and another stressing basic axioms.

The studies emphasizing the use of individual welfare functions are in fact part of a more comprehensive research area. In his seminal work van Praag (1968) was the first to use individual welfare functions and since then tens of papers have been published on the topic. The general idea is to ask individuals to determine the level of

net income which they consider suitable and evaluate verbally their own level of income, the scale varying from bad to excellent. Techniques are then devised to estimate individual welfare functions.

An alternative approach is to use students as respondents to questionnaires or participants to experiments, which allow to check whether people agree with the basic axioms of inequality measurement. There are then two possibilities: either the individuals are asked to directly compare the levels of inequality found in various income distributions or such an evaluation is made indirectly through the device of a social welfare function. The present chapter is therefore organized as follows:

Section 2 reviews the literature stressing the individual welfare functions. Section 3 then reports on studies based on the evaluation of the axioms, adopted by the income inequality literature; Section 3.1 covers the studies based on the direct approach; Section 3.2 covers those following the indirect approach. We also present (in Section 3.3) some studies which analyzed more specifically the degree of aversion towards inequality, a topic which is evidently linked to the concept of a social welfare function. Section 4 discusses the measurement of poverty, an issue which is also related to that of income inequality measurement. Finally, Section 5 presents brief conclusions.

2. Income Inequality Measurement and the Individual Welfare Function

As mentioned in the introduction, van Praag and his followers estimated individualistic welfare functions for thousands of consumers in several countries, (see for example van Praag 1971). Written questionnaires as well as oral interviews were used (for more details see van Praag and Kapteyn 1973; van Herwaarden, Kapteyn and van Praag 1977; Hagenaars 1986, chapter 7).

The respondents were generally asked to evaluate their own level of income, the scale varying from very bad to excellent (see Figure 1). It was assumed that the verbal qualifications correspond to intervals of equal length within the range of the welfare function of income. Buyze (1982) who tested this assumption found that these intervals

Figure 1. An example for filled-in questionnaires about income levels
Extract from van Praag (1978)

Taking into account your own family and job situation, you would call your net-income (including fringe benefits and after subtracting social security contributions)

per week A
month B
year C

excellent	if it were above f45,000
good	if it were between f 35,000 and 45,000
amply sufficient	if it were between f30,000 and 35,000
sufficient	if it were between f25,000 and 30,000
barely sufficient	if it were between f22,000 and 25,000
insufficient	if it were between f20,000 and 22,000
very insufficient	if it were between f17,000 and 20,000
bad	if it were between f12,000 and 17,000
very bad	if it were below f12,000

were all within a standard error of the equal intervals.

Such an individual welfare function is in fact a cardinal utility which compares the

means and the wants of an individual. Since wants are usually not completely satisfied, there appears a welfare shortage. It becomes then natural to describe welfare

numerically on the basis of a function with a range between zero and one, the latter value corresponding to the case where there is complete satisfaction (see also the review by Kapteyn and Wänsbeek 1985a). Furthermore, van Praag argued that such a function of a steady income stream is under specific assumptions a lognormal distribution function. This hypothesis was discussed by van Herwaarden and Kapteyn (1981), Wierenga (1978) and van Praag, Kapteyn and van Herwaarden (1978). This individual welfare function was also found to depend on the current income of the respondent, the size of his family and his age. Such an approach enabled the authors, among other things, to construct family equivalence scales, an impartial tool in measuring income inequality (see Kapteyn and van Praag 1976; and van Praag 1985).

On the basis of his model van Praag also suggested a new principle for inequality measurement, the log marginal welfare variance (see van Praag 1977 and 1978). It should also be stressed that if social welfare is an additive function of the individual welfare functions of income, Kapteyn and van Herwaarden (1980) found, according to Dutch data, that under certain conditions an equal distribution of incomes is suboptimal.

Some additional aspects of the individual welfare function are discussed also by Ratchford (1985), Kapteyn and Wänsbeek (1985b), van Praag (1985) and Wänsbeek and Kapteyn (1983).

3. The Subjective Approach and the Evaluation of the Basic Axioms of Income Inequality Measurement

The studies linking the subjective approach to income inequality measurement to the choice of basic axioms, have generally used students as respondents to

questionnaires or participants to experiments. This was in fact also the approach used by researchers working in the field of risk-taking.

There are at least two main reasons for choosing students rather than a sample of the whole population. First, it is much easier to organize such an investigation with students. Second, members of the general public are generally not trained to take part in such exercises and may not often understand the type of questions which are usually asked. In this literature which evaluates the basic axioms of income inequality measurement, a distinction should be made between a direct and an indirect approach. The former relies on the direct comparison of the levels of inequality found in various income distributions, while the latter uses the device of a social welfare function (or ordering), to appraise different income distributions.

In some questionnaires respondents were therefore asked to compare pairs of income distributions and state which one of each pair is more unequally distributed (direct approach) or better (indirect approach). In other questionnaires specific income distributions were presented to respondents, and they were asked to find other distributions which have the same levels of inequality (direct approach) or social welfare (indirect approach). Responses to questions of the first type helped checking the degree of agreement or disagreement with the axioms which are usually used in the theory of income inequality measurement, while responses to questions of the second allowed to draw iso-inequality curves (direct approach) or social indifference curves (indirect approach).

Figure 2. An example for verbal questions
Extract from the questionnaire of Amiel, Cowell (1992)

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 answers to questions 7, 8 and 9? If so, please note your new responses here ...

7:
8:
9:

The limitation of such numerical questions is that even though they may be helpful for revealing disagreement with principles used in the theory, they cannot reveal complete agreement, because there cannot be too many questions that can appear in a questionnaire. This limitation led Amiel and Cowell (1992, 1994a,b and 1995, 1996, 1997a-b) to introduce a second part in their questionnaire, where respondents were also asked to give verbal answers to questions concerning the degree of agreement with the basic axioms of income inequality measurement. They were also asked whether they want to modify their earlier response to the numerical questions in the light of their answers to the verbal questions.

We can also classify the various investigations by the reference point of the respondent. In most cases the respondent is external to the society in discussion (see for example, Cowell 1985 and Amiel and Cowell, especially 1994b, 1995, 1996).

In some other investigations the respondent is considered to be a member of the society in question (see Beckman S., Cheng D. et al, 1994). In this case we can distinguish between cases where the respondent knows exactly his position in the society, and cases where he or she does not know (that is, where the responses are made behind a veil of ignorance). For investigations where the respondent is a member of the society it is very useful to plan the investigation in the form of an experiment where he/she is involved as payee.

Naturally, the characteristics of the respondent may affect his reactions to the questions even when he/she is not involved directly. Real income, cultural background, age, family status etc., may then influence his/her responses even when the questionnaires are about a mythical country (see for example the analysis by Glejser et al, 1977). On the other hand asking questions about personal characteristics may create problems, even though the questionnaire is anonymous, because respondents may think about what would be expected of someone in their position rather than giving their own views.

Figure 3. An example where the respondent is external to the society in discussion. Extract from the questionnaire of Amiel-Cowell (1994b)

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 one gives 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 programme 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)

Let us now look into more details at the differences between the direct and indirect approach.

3.1 The Direct Approach

The first experimental investigation including questions based on the direct approach appears in Cowell (1985). The paper focused mainly on inequality aversion as will be mentioned later. It should be mentioned however that the first question of the

questionnaire concerned the transformation question, since it asked what type of changes in incomes would keep inequality unchanged. Cowell reports that most of the respondents supported scale independence (proportionate additions) while a minority favored translation independence (absolute equal additions).

This question of the transformation direction (on this topic see also Kolm 1996, 1976a and 1976b) was the issue of an empirical investigation by Pfingsten (1988). He found that 60-70% of the responses took the relative view (scale independence), a small minority supported the absolute view (translation independence), while the others seemed to disagree with both assumptions. This led Pfingsten to propose the concept of intermediate inequality (see Bossert and Pfingsten 1990), an idea later extended by Amiel and Cowell (1995) when they suggested their hypothesis of independence. This dependence hypothesis means that the transformation direction depends on the level of income and on the exact distributions, so that iso-inequality curves are not necessarily straight lines.

Another aspect which was investigated separately by Amiel and Cowell (1996) was the transfer principle. They found that the level of agreement with the proposition according to which a small transfer from a richer to a poorer person decreases inequality, depends on the specific income of the individual and his location in the income distribution. It should be stressed however that most respondents tend to accept the idea that inequality decreases as a consequence of such at transfer.

These two investigations of Amiel and Cowell followed an earlier comprehensive investigation of the axioms usually mentioned in the literature on income inequality measurement. There Amiel and Cowell (1992) found low support for the principles of transfer and decomposability, while Dalton's population axiom

received higher support.

Another comprehensive investigation of these axioms was done by Harrison and Seidl (1994a). They interrogated German students and used both the direct and indirect approach. Their sample shows a weaker approval of the population axiom, and even less support for the transfer principle.

Following Amiel and Cowell's (1992) comprehensive investigation which included students from Germany, the USA, UK and Israel, Ballano and Ruiz-Castillo (1992) distributed the same type of questionnaire in their country and found that "Spain is not different". In another paper Amiel and Cowell (1994a) examined a model of income growth and inequality change formalized by Temkin (1986). They found that the perception of inequality during a "migration" process depends on the initial and terminal state of the process. They also found evidence for the symmetry hypothesis: if the numbers of rich and poor were to be interchanged (while leaving the income levels unchanged) perceived inequality would remain unaltered.

In his book (1993, chapter 3) Temkin himself reports about a poll taken at the National Humanities Center in the fall of 1984. The poll contained a series of diagrams which represented income distributions. Focusing on two diagrams at a time, respondents were asked to compare the situations represented by those diagrams and choose among possible responses concerning the change of inequality. Their possible responses were formalized in terms of "worse" and "better" rather than as "decrease" or "increase". Temkin himself suggests some serious criticism to his poll, including the very small number of responses he got (only 10 persons), so that his findings will not be discussed here.

3.2 The Indirect Approach

Several authors have tested the axioms of the social welfare approach. The monotonicity axiom was actually investigated by McClelland and Rohrbaugh (1978).

The term that they use - Pareto axiom - is appropriate in view of the different presentations of the concept of social welfare in the literature. They found that a great part of their participants violate the principle.

A comprehensive investigation of the axioms to be used in the indirect approach was done by Amiel and Cowell (1994b) and by Harrison and Seidl (1994b).

Amiel and Cowell (1994b) choose from their direct approach questionnaire those pairs of distributions which were suitable for a social welfare investigation and added questions which are suitable to check the monotonicity principle (instead of the scale and translation independence assumption mentioned in the inequality questionnaire). They found again low support for the principles of transfer and decomposability. They also found that one third or more of the respondents rejected the idea of monotonicity, even in its weak form. Harrison and Seidl (1994a,b) used the same questionnaire to test the axioms relevant for inequality and social welfare. They could therefore check monotonicity principle only for those cases where the additional incomes were given to all the persons in the population. They report a very low support for most of the axioms, except that of anonymity.[2]

Siedl and Theilen asked German and Polish students to compare the effect of two policies, one which is a result of doubling all the incomes and the other which is a result of equal absolute additions to all incomes, on equality and welfare from an economic

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2 They report about scale invariance and translation invariance but what they actually checked were scale and translation dependence, which are acceptable axioms in inequality, but not in social welfare

advisors view point. They checked also dependencies between attitudes of the respondants, their subjective income evaluations and their necessity to work.

Beckman, Cheng et al., (1994) investigated the views of participants in an experiment, both behind the veil of ignorance and when subjects know their position in the income distribution and their pay is unaffected by their response. Their results largely confirm Amiel and Cowell's findings concerning the wide disagreement with the transfer principle. For monotonicity they found overwhelming support when decisions are made behind the veil of ignorance, but substantial rejection when decision making does not affect the participants' pay.

Using three types of questionnaires Bernasconi (1994) investigated students' attitudes to social welfare, justice and risk. Once again the responses provide evidence of violations of the transfer principle and monotonicity.

We now turn to some studies which analyzed the degree of aversion towards inequality.

3.3 The Subjective Approach and Aversion Towards Inequality

An interesting way of identifying social welfare functions was proposed by Amiel, Creedy and Hurn (1996). Having groups of income distributions which lie on the same social indifference curve for each respondent, they found that a family of social welfare functions derived from the Gini index is a better fit for most of the respondents than social welfare functions based on constant relative on absolute inequality aversion.

This idea of inequality aversion was also the issue of earlier experimental investigation. Gevers *et a*l (1979) and Glejser *et al* (1977) found the equal equivalent

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comparisons.

income (a term suggested by Kolm 1969, p. 186) to given unequal distributions for each of their respondents. They found that most of their respondents were inequality averters but few were inequality lovers and few others "envious" (have positive slopes of their social indifference curves).

This concept of leaky bucket which lies behind the idea of equal equivalent income was the issue of experiments by Beckman and Smith (1994). They found that most of their participants vote for transfers when they know their own position, even when the leakage is very high, but not when they were behind the veil of ignorance. They conclude: "Altruism is thus much less popular among subjects when it comes at their own expense than when it comes at others".

Cowell (1985) made the distinction between two types of inequality aversion. For additive social welfare function the second one is what was called by Kolm (1976b) principle of diminishing transfer and later Transfer sensitivity principle. From the result he got we can find some evidence for these principles.

4. The Measurement of Poverty and the Subjective Approach

The history of the measurement of poverty is similar to that of the measurement of inequality. Until twenty years ago most of the research on the measurement of poverty discussed statistical tools. It was Sen's paper (1976) who opened the axiomatic approach which includes the social welfare aspects of poverty.

Although the measurement of poverty is similar to the measurement of inequality and social welfare, it is more complicated in the sense that an additional step is required to compare income distributions: fix the poverty line for each distribution.

A distinction is generally made between the statistical and the basic needs

approach to the poverty line. The former determines the poverty line as a function of the income distribution (for example, 50% of the median or the mean income), while the latter outlines the level of income which guarantees a supply of basic needs.

In this section we will review studies belonging either to the individualistic welfare function approach or to that which checks the basic axioms of inequality and poverty analysis.

Concerning the determination of the poverty line, van Praag and his followers were able, using his method, to derive a subjective poverty line. Thus, Goedhart, Halberstadt, Kapteyn, and van Praag (1977) asked family heads what they considered as the minimal income level for their own family, a question which enabled them to estimate the poverty line. They found that the respondents appeared to specify higher amounts, the greater their actual income and family size, and that the relation was loglinear. For each family size their is an income level at which a respondent's stated minimum income is equal to his actual income. This level was the basis for the definition of the poverty line. Empirical evidence based on various countries may be found for example in Colasanto, Kapteyn and van der Gaag (1984), van Praag, Goedhart and Kapteyn (1980), Stanovink (1992), de Vos and Garner (1991).

The question about whether poverty is an absolute or a relative concept was also examined by the individualistic welfare function school. Hagenaars and van Praag (1985) found that people viewed poverty neither as a relative nor as an absolute concept, their answers being located somehow halfway between the two views.

In another investigation Amiel and Cowell (1997a) found that 72% of the respondents supported the basic needs (absolute) approach, while only 11% were in favor of the statistical (relative) approach.

Other studies reviewed the system of axioms adopted generally in the analysis of poverty (see Foster, 1984; Hagenaars, 1986; Seidl, 1988). Amiel and Cowell (1997b) found about the same support for most of these axioms as for the corresponding axioms used in the income inequality literature. It should be noted however that there was very little support for the existence of a principle of transfer in the measurement of poverty (26% numerically and 22% verbally). Such a result was indeed expected, given the argument put forth by Atkinson (1987).

5. Conclusion

This chapter surveyed various papers which investigated people's opinions about income inequality measurement. Of course, when respondents answer, there is always the possibility that some of them misunderstood the questions or situations, made mistakes in their calculations or for some reason did not give the answers they really believe in. This may happen also in other areas of experimental economics, and researchers cannot totally avoid such a phenomenon. The solution to such problems is to do more experiments with more participants rather than give up this type of investigation. On the other hand, it is important to acknowledge the limitations of such an approach. As indicated earlier, several of the assumptions usually made in the income inequality literature did not find strong support in the experiments surveyed in this chapter. Such findings do not necessarily call for a rejection of these axioms. They do however suggest that it might be worthwhile to reconsider them.

The problem is indeed not simple. Suppose a way was found to get the correct views of all the members of a given society. Should the measurement reflect their ideas, by using for example the opinion of the majority or the views of the median voter? One

might rather prefer to have many measures, such that each individual would be able to choose the measure which best corresponds to his/her value judgement.

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