MEASURING WELL-BEING IN THE FUNCTIONING SPACE

ANDREA BRANDOLINI AND GIOVANNI D'ALESSIO

For additional information please contact:
Mr Andrea Brandolini
Banca d'Italia, Research Department
via Nazionale 91
00184 Roma
Italy

E-mail: brandolini.andrea@insedia.interbusiness.it
Fax: +39 06 47923720
Phone: +39 06 47923568

MEASURING WELL-BEING IN THE FUNCTIONING SPACE

Abstract

This paper explores the possibility of a multidimensional analysis of deprivation and inequality by adopting the specific theoretical perspective of the "capability approach" proposed by Amartya Sen. The purpose is to assess the *operational content* of the approach, i.e. the empirical methods to measure functionings and capabilities. Some critical points of the capability approach and different strategies for its empirical application are investigated in detail. In the light of the difficulties encountered in providing practical solutions, it is suggested that the analysis can be fruitfully limited to functionings, possibly appropriately "refined". The practical problems are further examined in an exploratory application to Italian data.

1. Four stories

At 39 Teresa has been unemployed for a long time; she is separated from her husband and has a dependent boy; she suffers from serious health problems. After completing secondary education, she started working as a manual worker in the manufacturing sector, alternating several job experiences with spells of unemployment. The current period out-of-work is, however, more than one-year long, and the whole year has been spent searching for a job through private job agencies and the public employment office, and by answering newspaper ads. Her life has been further complicated by poor health conditions. She recently spent 36 days in a public hospital, undergoing 3 surgical operations; many clinical tests and medical examinations, including a private one, and medicines have cost her 580,000 lire. As a result, she and her son are heavily dependent on public assistance. Since 1991 they have been assigned a small council flat of 43 sq. m. in a rough suburban area of Turin at a monthly rent of 72,000 lire (the amount was set on the basis of *equo canone*, the national measure of rent control). She also receives a subsidy from the local council, which last year amounted to 2,300,000 lire. To sustain even the low level of consumption of the family she has to rely on her relatives' help, to whom she owes 3 million lire.

When their first child was born in 1993, Salvatore and his wife were 35 and 22, respectively. Since their marriage in 1989, they have been living in a small unheated flat of around 40 sq. m. in a residential area between the centre and the outskirts of Turin; they have no regular lease and pay a monthly rent of 320,000 lire. Their average expenditure for consumer goods is around 500,000 lire per month: food accounts for two thirds of it, and almost a tenth is used to purchase mineral water because of the low quality of tap water. They have no car and spend 40,000 lire per month for public transport (which, incidentally, they rate very highly). Salvatore works as a cleaner for a monthly wage of 900,000 lire, while his wife takes care of the house. Their modest labour income is integrated with the interest earned on bank deposits amounting to just above 12 million lire. They have furniture and household equipment valued at about 5 million lire and some jewellery worth 500,000 lire. All in all, they manage to balance their family budget, though they still owe their parents 1 million lire.

Maria gave birth to her first child in 1984 at the age of 20. Her offspring was destined to increase quite rapidly, and in 1992 her sixth child was born. The 8 members of Maria's family are sharing a flat of only 75 sq. m. in a council block built in 1992 in a run-down suburb of Naples; the poor furnishings of the flat are worth roughly 2.5 million lire. Maria sees herself as a housekeeper, even though she works part-time, and

the family lives on her earnings only. Her husband, aged 30, is enrolled in the list of the local public employment agency and, still in search of his first job, is not entitled to any unemployment subsidy. As a result, the total family income, amounting in the year to 10 million lire, falls considerably short of the expenses incurred by the family. Total expenditure is in the range of 1.5 million lire per month: more than half of it is accounted for by food, but substantial amounts have been recently spent on medicines (800,000 lire), the board and tuition fees of the four children attending school (400,000 lire) and the maintenance of the old car (1 million lire). On top of that, 87,000 lire are due every month for the rent of the flat, fixed according to *equo canone*. It is no surprise then that Maria and her husband thought for a while to ask for a bank loan. They eventually gave up, as they reckoned - quite rightly, probably - that they would not have been given one.

Antonio is two years away from retirement. Since 1956 he has been working as a clerk in a small professional firm of Naples - a job he found soon after his graduation thanks to a family acquaintance. His wife, a few years younger than him, is a housekeeper, while their three children are all in search of their first employment. Unlike the older brother and sister who have obtained a university degree, the youngest son has decided to stop studying at the age of 16. Since 1968, the family has lived in a large apartment built in the late thirties in an elegant semi-central area. The apartment, rented at *equo canone*, costs 600,000 lire per month. By adding monthly purchases of consumer goods for 500,000 lire, the expenses turn out to be just below the after-tax monthly salary of Antonio, 1,250,000 lire. Recently, the family budget has come under some pressure because of the illness of Antonio's old mother-in-law, who passed away after 30 days spent in a public hospital. Unexpected expenses were incurred for medicines (200,000 lire), medical tests (250,000 lire) and the funeral (1 million lire). The death is bound to have some further permanent consequence, as the family cannot count anymore on the modest pension of the old lady (amounting to 4.5 million lire yearly).

*****

The four stories just portrayed have been constructed on the basis of the Bank of Italy's Survey of Household Income and Wealth (SHIW) for 1993. They correspond fairly closely to the information gathered in the survey, except for the names - that are fictional - and for some minor changes introduced to avoid any risk of identification of the families interviewed. The stories have been chosen at random and in no sense they can be regarded as typical, but the families of Teresa, Salvatore, Maria and Antonio

share a fundamental feature not yet spelled out: they are "poor" according to two indicators normally used by researchers and statistical offices, namely post-tax income and expenditure. More precisely, these families' expenditure and income, expressed in equivalent terms, are below the respective poverty thresholds set at 50 per cent of their medians (as a matter of fact, we have gone even further by selecting them among families with income and expenditure below 40 per cent of the medians).

Other family characteristics are recurrent, but no single feature is common to all families. Family size and composition differ, even if larger units prevail. Most families have precarious job positions, but Antonio has a lifelong attachment to his job. The large majority of people have very low degree of education, except, again, Antonio's household where three out of five members have a university degree. Dwelling in rented houses, either private or public, is very frequent, but there are many cases, not considered here, of poor homeowners. Few people are entitled to receive subsidies from local administrations, either because they are not envisaged, or because those implemented have a limited coverage; for Teresa and her son, however, the council subsidy is the only (insufficient) source of income. Most households even fail to receive the only country-wide form of family income support existing in Italy, namely *assegni per il nucleo familiare*, as its payment is conditional on the regularity of the (current or past) job position.

These cursory observations exemplify how the assessment of poverty (or inequality) on the basis of standard monetary indicators hides many underlying differences. Although the measurement already embodies variables other than income and expenditure, namely those accounted for in the equivalence scale, there are cases where we may want to draw a more comprehensive picture of deprivation, even at the expense of our capacity of synthesis.[1] The implied shift towards multidimensionality may certainly originate on purely empirical grounds as being driven by the necessity to enrich the information set and to overcome the deficiencies of monetary indicators. On the other hand, it may be motivated by a deeper foundational concern: the necessity to account for the "constitutive plurality" of human well-being, a position that has been strongly advocated by Amartya Sen with his "capability approach".

In this paper, we explore the possibility of a multidimensional analysis of deprivation and inequality by adopting the specific theoretical perspective of the capability approach. Our purpose is not to examine the logical foundations of this

---

[1] Of course, this does not amount to deny the informational content of income and expenditure, nor to play down the importance of aggregate measures of poverty and inequality. On the need to set an official poverty line and to introduce a poverty target as an explicit object of policy see Atkinson (1996).

approach, but to assess its "operational content", by which we mean the empirical methods to measure functionings and capabilities. We see this as an important preliminary step in understanding the practicability of the approach in the design of public policies. We shall review some critical points of the capability approach and we shall examine in some detail the different strategies for its empirical application. In the light of the difficulties encountered in providing practical solution to the points raised, we shall suggest to limit the analysis to functionings, possibly appropriately "refined". After an exploratory application to Italian data, some final remarks will conclude the paper.

2. About Functionings and Capabilities

2.1. A formal description of the capability approach

There are dimensions of well-being of people that are not easily captured by either the money spent for purchases, the income earned, or the resources at disposal of a family. Certainly, income and resources are necessary to buy goods, which, in turn, allow people to meet their needs and desires; but the value of expenditure may well go beyond that direct satisfaction, to encompass less material aspects like self-esteem or the pleasures of life. Moreover, there are constituents of well-being, such as the health condition, that are only weakly correlated with personal economic means. On this basis, Sen has forcibly argued that "the well-being of a person is best seen as an index of the person's functionings" (Sen, 1985: 25). *Functionings* and *capabilities* are the two basic concepts:

> "*Functionings* represent parts of the state of a person - in particular the various things that he or she manages to do or be in leading a life. The *capability* of a person reflects the alternative combinations of functionings the person can achieve, and from which he or she can choose one collection. The approach is based on a view of living as a combination of various 'doings and beings', with quality of life to be assessed in terms of the capability to achieve valuable functionings." (Sen, 1993: 31).

Valuable functionings range from elementary ones as being well-nourished and escaping avoidable disease to more complex ones like being able to take part in the life of the community.

The capability approach poses many substantive and practical problems. Taking advantage of the extensive literature developed since its first presentation, we may try to

characterise more precisely the notions of functionings and capabilities. We start with the simple formalisation given in chapter 2 of Sen (1985).[2]

Let $\boldsymbol{x}_i$ be a vector of commodities[3] possessed by person i and $f_i(\boldsymbol{x}_i)$ a function converting the commodity vector into a vector of functionings $\boldsymbol{b}_i$, so that $\boldsymbol{b}_i = f_i(\boldsymbol{x}_i)$. The function $f_i(\cdot)$ is indexed by i because the way functionings stem from a given vector of commodities depends on the person's characteristics; it is a member of the set F_i which contains all different ways open to the person to transform the given commodities. Since this vector $\boldsymbol{b}_i$ of functionings fully describes the status of a person, "well-being ... can plausibly be seen as an evaluation of this $\boldsymbol{b}_i$" (Sen, 1985: 12). Defining the valuation function by $g_{ei}(\cdot)$, where e refers to the "evaluator" and i to the person whose well-being is under examination (where it may be $e = i$), it is:

$$v_{ei} = g_{ei}(\boldsymbol{b}_i) = g_{ei}(f_i(\boldsymbol{x}_i)) \tag{1}$$

For a given commodity vector $\overline{\boldsymbol{x}}_i$, the set of feasible functionings A_i is determined by the set of converting functions F_i:

$$A_i = \left\{ \boldsymbol{b}_i \mid \boldsymbol{b}_i = f_i(\overline{\boldsymbol{x}}_i), \text{ for any } f_i(\cdot) \in F_i \right\} \tag{2}$$

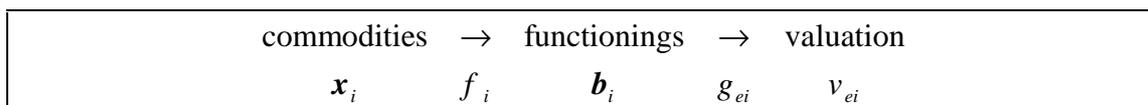By denoting person's budget set by X_i, the set of feasible functionings is then given by

$$B_i = \left\{ \boldsymbol{b}_i \mid \boldsymbol{b}_i = f_i(\boldsymbol{x}_i), \text{ for any } f_i(\cdot) \in F_i \text{ and for any } \boldsymbol{x}_i \in X_i \right\} \tag{3}$$

The set B_i reflects the capabilities of the ith person, that is "the freedom that [the] person has in terms of the choice of functionings" (Sen, 1985: 13). Capabilities depend therefore on two intertwined factors: the entitlements of the person, i.e. her command over commodities (the set X_i); the person's abilities to transform commodities into functionings (the set F_i).

We can summarise the logical structure of the capability approach into the two following sequences, where V_{ei} is the valuation set of all feasible functionings of i:

---

[2] The capability approach was first outlined by Sen in the Tanner Lecture given at Stanford University in 1979 (Sen, 1980). It had a first systematisation, including a simple formalisation, in *Commodities and Capabilities* (1985), and was then thoroughly reviewed in *The Standard of Living* (1987); a late general reassessment was given in Sen (1993). See also Sen (1984) and (1992), and Foster and Sen (1997, chapter A.7).

[3] We neglect Sen's original distinction - borrowed by Gorman and Lancaster - between "commodities" (e.g. food) and "commodity characteristics" (e.g. food capacity of yielding nutrition). Sen regarded the transformation of commodities into characteristics as being the same for all people. In our discussion, we assume that such tranformation is embedded into the function converting commodities into functionings.

commodities	→	functionings	→	valuation	
x_i		f_i	b_i	g_{ei}	v_{ei}

budget set X_i			
	$\rightarrow$ capabilities $\;B_i = X_i \times F_i\;$	$\rightarrow$ valuations $\;V_{ei}$	
converting functions F_i			

This simple framework is helpful to assess the different spaces where we may want to evaluate well-being. While analyses in terms of income or expenditure stop at the first stage of the logical chain, those based on utility favour the ultimate one (see also Muellbauer, 1987: 39-41). Sen objects to the first approach that it neglects personal differences, in the sense that the same income (or the same combination of commodities) may generate quite diverse levels of well-being according to the characteristics of the persons. On the other hand, he opposes the identification of valuation with utility because they correspond to two different exercises: a person might be fairly happy, or fulfil most of her desire while not valuing her own life very highly, simply because she adapted her own expectations to the situation she usually experiences.

These issues are discussed at length in Sen's works as well as in the related critical literature, and we are not going to review them here. We are however going to tackle five different questions, that we regard as strictly pertinent to the empirical application: (1) the notion of well-being; (2) the identification of functionings; (3) the converting function; (4) the valuation function; (5) the measurement of capabilities.

2.2. The notion of well-being

So far we have been loosely referring to "well-being", but we might have equally used the terms "standard of living" or "quality of life". At this stage it is helpful to draw a dividing line between these different terms, a point raised, among others, by Williams (1987: 95) in commenting Sen's lectures on *The Standard of Living* (1987). Williams suggested to use the term well-being for all objectives that a person "has reason to favour or promote" relating to the person herself, and the term standard of living for the narrower notion of a person's economic interest. Sen followed on this suggestion but redrew the dividing line: he identified the standard of living with all things relating to the nature of a person's life and well-being with a broader notion including also "sympathy", or the concern for other persons, since "one's misery at the sorrow of another certainly does reduce *ceteris paribus* one's well-being, but in itself

this is not a reduction in the person's living standard" (Sen, 1987: 27). In turn, as personal well-being is only one of the ends of a person, we might further widen the perspective to include also the objectives which are not directly related to the person's well-being. In so doing we would be evaluating "agency achievement" rather than well-being.[4]

We shall not stress this distinction any further, except for noticing that our focus in what follows will be on Sen's notion of "standard of living" rather than "well-being" - even if we shall keep using both terms interchangeably. Good reasons to delimit our field of investigation are the greater informational content of accounting for what people feel for others as well as the uneasiness of moving on the unfamiliar terrain of psychologists. Moreover policy-oriented analyses should probably refrain from inspecting such inner aspects of a person's well-being both for the intrinsic risk of "paternalism", and for the greater difficulty to achieve a consensus on what are pertinent functionings.

2.3. The identification of functionings

After the previous broad delimitation of the notion of living standard, we have to probe more deeply into the identification of relevant functionings. The answer to this issue depends on the breadth of our research strategy. If our objective is to enlarge the analysis by encompassing aspects of well-being other than strictly economic ones, we can simply supplement the basic evidence about the latter with information relative to some relevant functionings. If, on the other hand, our aim is to assess the overall standard of living, we need to specify a reasonably parsimonious but comprehensive vector of functionings. Understandably, the question of "what constitutes a complete list of capabilities" (Basu, 1987a: 72) has no unequivocal answer: generally speaking, the trade-off is between the risk of redundancy which stems from any attempt to give a very accurate description of people's well-being, and the possibility of neglecting some important aspects. Difficulties, though, should not be overstated, and on practical grounds we may achieve a reasonable consensus on a list of functionings.

Many researchers have explored people's standard of living in a multidimensional context and have more or less implicitly faced the issue of capturing

---

[4] The notion of agency achievement, as distinct from well-being achievement, allows us to account for "social commitments", i.e. those situations where persons pursue objectives even at the expense of their own well-being. Sen (1993: 37) suggests that the functionings space may be too narrow for the evaluation of agency achievement, as it may require assessing conditions going beyond the person's own states of being.

different aspects of well-being.[5] In Italy, for instance, a special Parliamentary Commission set up in the 1950s to investigate the extent of destitution based its main statistical evidence on three basic household characteristics: food consumption, clothing and housing. More recently, a study prepared for the Italian Poverty Commission estimated the incidence of deprivation in the 1990s on the basis of a disaggregated analysis of households' expenditure for goods and services and possession of consumer durables.[6]

Multidimensional studies of poverty share with the capability approach some of the technical problems (e.g. measurement units of elementary indicators, weighting structure) examined in the next section, but most of them are only in a very loose sense a move towards a functioning-based analysis of well-being. As a matter of fact, these studies tend to be overwhelmingly concerned with "material" living conditions, and this concern remains dominant even with indicators which might reflect less tangible aspects of life, say, the social ties of a person (this is the case, for instance, of an indicator such as "having a friend at home for a meal"). By contrast, the capability approach requires a change in the nature of the constituents of well-being (from material attributes to states of being) and an understanding of the differences across persons in achieving functionings: the identification of functionings is then a fundamental exercise which has to be done having in mind a fully-fledged characterisation of well-being. However difficult, this comprehensive viewpoint should inspire empirical applications.

Some guidance is offered by the "Scandinavian approach to welfare" - a long-established research programme centred around the first Swedish Level of Living Survey conducted in 1968 and a number of similar surveys conducted subsequently in both Sweden and other Nordic countries (Erikson and Uusitalo, 1987; Erikson, 1993). In this approach, nine components of life were identified *a priori*, ranging from material conditions to relational activities; for each of them, people's achievements were measured by means of a large number of indicators (table 1).[7]

---

[5] Well-known studies suggesting multidimensional measures of deprivation are Townsend (1979) and Mack and Lansley (1985) for Great Britain, Mayer and Jencks (1989) for Chicago, Nolan and Whelan (1996a, b) for Ireland, Federman *et al.* (1996) for the United States. All these studies examined micro data, and some information about the indicators they used is summarised in the tables in Appendix A. The conditions of families in different income quantiles or in the poor and non-poor population may be similarly evaluated also on the basis of aggregate figures. See, for instance, the papers by Mayer and Jencks (1993) and Federman *et al.* (1996) for the United States, and Mayer (1993) for Canada, the Federal Republic of Germany, Sweden and the United States.

[6] See Camera dei Deputati (1953), Cao-Pinna (1953), Istat (1953); Ruffolo (1954) gave a brief account of the main results in English. The recent study was prepared by Lemmi, Cheli and Mazzolli (1996).

[7] The alternative route of identifying functionings *a posteriori*, from a multivariate information set on the living conditions of people, was followed by Schokkaert and Van Ootegem (1990) in their analysis of the well-being of a group of Belgian unemployed. The problem with this solution is that there is little control

Table 1: Components and some typical indicators in the Swedish Level of Living Surveys

Components	Some typical indicators
1. Health and access to health care	Ability to walk 100 metres, various symptoms of illness, contacts with doctors and nurses
2. Employment and working conditions	Unemployment experience, physical demands of work, possibilities to leave the place of work during work hours
3. Economic resources	Income and wealth, property, ability to cover unforeseen expenses of up to $1,000 within a week
4. Education and skills	Years of education, level of education reached
5. Family and social integration	Marital status, contacts with friends and relatives
6. Housing	Number of persons per room, amenities
7. Security of life and property	Exposure to violence and thefts
8. Recreation and culture	Leisure-time pursuits, vacation trips
9. Political resources	Voting in election, membership of unions and political parties, ability to file complaints

Source: Erikson (1993: 68, table 1).

There is a close correspondence between the life components of the Scandinavian approach and a reasonable list of functionings, although some ambiguities might still persist. Take for instance the functioning "being well-sheltered", which is naturally associated with the life component "housing". As a matter of fact, the former is a more general concept than the latter: indeed, in the Scandinavian approach "... every person without command over a dwelling was excluded (as were people living in public institutions)" (Frykman, 1987: 182). This exclusion may be rather problematic in studies of deprivation as it means neglecting not only the institutional population but the "homeless" altogether. On the other hand, the same concept of homelessness is not without ambiguity, and it refers to a condition of deprivation much more pervasive than lacking a stable shelter (see O'Flaherty, 1996). These brief remarks suggest that the nine categories of the Scandinavian approach are a reasonable list of the main areas of interest, provided that their exact meaning is understood in relation to the available set of indicators.

2.4. The converting function

on which functionings turn out in the list, and in particular, as remarked by Schokkaert and Van Ootegem, there is no guarantee that this list is, in some reasonable sense, complete.

In the capability approach an important role is played by the converting function $f_i(\cdot)$, which makes the transformation of commodities into functionings dependent on the characteristics of person i.[8] While the intuition is fairly clear, what the converting function should exactly capture is open to some debate. Whether we can say that a person is well-sheltered living in a flat with given features depends on such factors as the number of people living there, the climate (affecting heating requirements), and the person's physical disabilities that may prevent her from easily accessing the flat. Should we consider, however, also characteristics such as "when a child she was used to live in a mansion"?

The main difficulty here is that the conversion from commodities to functionings has an intrinsic evaluative nature: the condition of "being well-sheltered" is not a mechanical transformation of the goods owned, but it reflects people's own perception *as well as* society standards. The balance between these conditioning factors impinges on the way we look at the function $f_i(\cdot)$ and, in practical terms, it affects the choice of indicators. Asking people about their own assessment would be an easy way to account for different conversion abilities, but we may want to reach a more "objective" assessment, since we know that the way people judge is conditioned by their aspirations that are in turn influenced by their experience. The issue is much debated, and positions may be quite different.[9]

As one favours an objective interpretation of the function $f_i(\cdot)$, the problem remains of accounting for the different abilities of people to transform commodities into functionings. In other words, suppose to have identified the pertinent personal characteristics (e.g. sex, age, education, job status, health condition, disabilities, but also characteristics such as the number of people living in the dwelling or the climate in the example above): can we evaluate the extent to which the same bundle of commodities generates different functionings for persons with different characteristics?[10]

---

[8] The focus is therefore on individuals rather than households: since the functioning "mobility" allowed by the commodity "bike" differs between an old disabled man and his healthy child, it is only in a very peculiar sense that we may talk of mobility as a feature attached to the whole family. Though focusing on persons would require to pay attention to the intra-family distribution of resources, we shall neglect the issue and assume that the command over commodities is equally shared *within* the family. See Sen (1985, appendix B) for a discussion of the point in terms of the sex bias within the Indian family.

[9] For instance, Erikson (1993: 76-8) argued that we should consider only "descriptive" indicators, accounting for "factual conditions" rather than "people's satisfaction with these conditions" - especially when the research is used for societal planning. On the other hand, Allardt (1993: 92) suggested that we need to look at subjective aspects as well, in order to refrain from the "dogmatism of experts". At the other extreme, the approach to obtain a cardinal measure of utility advocated by Van Praag (1993) attributes a substantial role to what persons perceive as being a "good" or "bad" situation.

[10] Note that by definition this way of approaching the problem (and the nature of available data) leads us to look at the groups of persons which are obtained by the cross-classification of the personal

A negative answer would force us to examine separately the homogeneous groups obtained by the cross-classification of the personal characteristics, refraining from comparing the achievements *across* them. Alternatively, we might agree on the ranking in terms of conversion abilities of the different groups and apply "sequential dominance analysis". Lastly, we could set *a priori* some analytical specification of the converting function, with problems similar to those posed by the specification of a utility function.

2.5. The valuation function

The last piece in the analysis of functionings is represented by the valuation function $g_{ei}(\cdot)$, that is the assessment given by e of the functionings of person i. As indicated by the subscript e, the approach imposes no constraint on the way the well-being stemming from a vector of functionings is assessed. This formulation is general enough to accommodate both subjectivist and objectivist interpretations, in that the judgement may be that of a person e (possibly, i herself), the "social planner", or any intermediate case we may think of (such as the partial ordering obtained by intersection of a plurality of assessments).[11] This indeterminacy was criticised by Nussbaum (1988: 176; quoted by Sen, 1993: 47), who advocated "a procedure of objective evaluation by which functionings can be assessed for their contribution to the good human life".[12] The point has some obvious relation to the previous discussion of the conversion function, but now a much more demanding evaluative exercise is called for. While in the case of the conversion function the issue was how to account for the different abilities of people to transform commodities into valuable states of life, here the problem is to evaluate overall combinations of functionings and compare them across people. This task implies not only to assess separate functionings somewhat in isolation, but also to select a valuation structure that specifies the relevant functionings and their mutual relationship.

---

characteristics. This means that the index i of the converting function actually refers to "groups of homogeneous persons" rather than "single persons".

[11] The double subscripts allows for the valuation function to depend on the characteristics of the person i whose well-being is valued, indipendently of the evaluator e. As stressed by Sen (1985: 57-8), this does not amount to suggest "... the possibility of using one valuation function for one person, another for the second, and then make *inter-valuation-functional* comparisons of the relative well-beings of the two persons"; such possibility is ruled out by the fact that the valuation function has no "independent descriptive content". Note also that the possibility of disagreement may extend beyond the assessment of functionings to embrace the very same choice of relevant functionings. For the sake of simplicity, we are assuming throughout that a common list of functionings can be in general agreed upon.

[12] See also Nussbaum (1990, 1993). A (moderate) case for objectivism was made by Bliss (1993: 418-9) on the basis of the "expertise" required to assess the standard of living. On the contrary, Sugden (1993) confessed his "uneasiness" with Sen's leaning towards objectivism.

2.6. *From functionings to capabilities, and* vice versa

The last step of Sen's approach would lead us to assess well-being not in terms of "achieved functioning" but of "capabilities". Conceptually, it is an important step, because it means that the well-being of a person depends not only on the combination of functionings she actually achieves, but also on the freedom she enjoys in pursuing her own well-being. On the other hand, embodying freedom into the notion of well-being is very demanding from an informational viewpoint, since the attempt to measure capabilities implies that hypothetical situations which never occurred and might never occur must be taken into account. There are several problems that arise in the attempt of developing a capability measure, and it may be useful to touch on some of them.[13]

First, the evaluation of capabilities requires some kind of enumeration of the possible alternatives to the actual achievement. As this process may have in principle no limits, a first evaluation should aim at getting rid of irrelevant alternatives, such as suicide in normal circumstances,[14] but a measure of capabilities should go beyond the mere numbering of (relevant) alternatives and reflect also their relative goodness. The *distance* between alternatives may be important, and it could be sustained that well-being is higher when the alternative to being a central-bank economist is represented by being an artist rather than an academic economist. Thus, a measure of capabilities should account for the mutual relationships among the alternative vectors of functionings, with relatively closer vectors implying a lower well-being than more faraway vectors.

A second set of issues arises with the time dimension of the capability set. The possibilities faced by a person at a certain time reflect, at least partially, the person's actual choices in the past. The fact that a person decided last year to give birth to a child (supposedly in agreement with her partner) and that she now experiences a limitation in her ability to work and to move could lead us to conclude that her capability set is in some relevant dimensions inferior to that of an otherwise equal person; of course, in the valuation of person's well-being, these limitations would be (more than) offset by the positive effect of achieving a desired motherhood. Quite apart from that, one might be tempted to argue that there was no real shrinking of her capability set because the limitations were brought about by an act of choice, and this would be evident if

---

[13] Some of the points discussed below were raised in the comments to Sen (1987) by Kanbur (1987), Muellbauer (1987) and Williams (1987).

[14] Of course, there are situations where suicide is unfortunately a relevant alternative. This is a warning that the selection process is not absolute, but it is to some extent relative to circumstances. Note also that the inclusion or exclusion of apparently irrelevant alternatives may substantially affect the choice process when preferences are menu-dependent as discussed by Sen (1997).

capabilities were assessed over a sufficiently long time.[15] We find this position at odds with the capability approach for two reasons. First, it fails to recognise that the limitations to some functionings are real, regardless of their being the product of person's choice; the multidimensionality of the approach permits us to appreciate that increases of well-being might well get along with limitations in some dimensions. Second, capabilities are an inherently prospective idea and their measure does not depend on past choices. This interpretation brings in the issue of the uncertainty of current and future alternatives. What matters for the measurement of capabilities is not only the possibility, but also the *probability* to achieve a vector of functionings. This raises, in turn, other questions such as the proper time horizon in the evaluation of capabilities and the opportunity to allow for varying time horizons for different functionings.

The third order of problems is of a more practical nature. In most cases, statistical surveys collect data on facts actually occurred rather than on facts that could happen or could have happened. Although this practice might reflect a "neoclassical" bias - if rational people choose their best, no importance must be given to alternatives not chosen -, a major technical point in its defence is that the reliability of information collected about hypothetical choices ("Can you have a job?") is typically much lower than that about actual choices ("Do you have a job?"). Statisticians involved in questionnaire design use to say that "if you ask a hypothetical question you will get a hypothetical answer". As noted by Converse and Presser (1986: 23), "asking most people to imagine what if - what might have happened in their lives if things had been otherwise, or what they might do if - confronts them with a special task that is likely to be difficult". This difficulty has mainly to do with the vagueness of the hypothetical alternatives. In asking a person whether she *has* a job, one only needs to define what is meant by "having a job", with little or no reference to other external circumstances; on the contrary, in asking whether she *can have* a job, one must qualify the "can" by fixing the boundaries of the hypothetical world she has to consider. This means, for instance,

---

[15] See also the parallel example discussed by Sugden (1993: 1952). The issue may have relevant policy implications because agreeing that there is an actual limitation of the person's capability set might provide a justification for social policies such as free nursery. In spite of the apparent similarity, the argument is not affected by the criticism levelled by Pollak and Wales (1979) against the use of "conditional" equivalence scale for welfare comparisons. Their point was not to deny the possibility of interpersonal (or interfamily) comparisons of well-being, but rather that it is "illegitimate" to use the equivalence scales estimated on the basis of observed patterns of household consumption for welfare comparisons, because "in contrast to demand analysis, welfare analysis must compare the well-being of a family in alternative situations which differ with respect to its demographic profile as well as its consumption pattern" (Pollak and Wales, 1979: 217).

specifying whether the possibility of having a job is limited to "here and now" or includes moving to another town within a certain time spell.

As an illustration of these problems, consider the abstract case of four people who are broadly similar in all respects except for the age and the labour status (table 2). Suppose also that the functioning "labour status" refers to the position that the person has in the society rather than the income he can earn. Jim is 35 and works in a private company. His capability labour-status sub-space has just two points: the current job and being on the dole. Jeff, 22, shares the same alternatives as Jim but, unlike him, he is unemployed. John is 62 and faces two alternatives: to keep working in the firm where he is employed or to retire (the option of becoming unemployed has been already eliminated as irrelevant). Last, Jason is only 8 year old and attends the primary school; understandably, he has not yet made up his mind about his future occupation.

Each adult has achieved a certain labour condition and has one relevant alternative; on the contrary, Jason has no meaningful job status, either achieved or hypothetical. (The analysis of Jason's family background and personal attitudes might give us some hints about his future job opportunities but this would lead us on a different, however related, field.) It follows that Jason cannot be compared with the others in the capability job-status sub-space. As far as the three adults are concerned, they all have the same number of (relevant) options, but it may be reasonably suggested that their respective situations are not equivalent and can be ordered in terms of well-being. As unemployment is not voluntarily chosen and is unanimously reputed to be the worse condition, we may derive that John is better positioned than Jeff or Jim: he is employed and cannot become unemployed, and he is also the only one who can reach the alternative status (retirement) at his own will. As to the other two, they share exactly the same capability sub-space, but differs in terms of achievements: the employed Jim is then better off than the unemployed Jeff, provided that greater importance is attributed to the achieved status. On the other hand, this conclusion may turn out to be too hasty, when proper account is taken of the probabilities of the alternative events. Is Jim really better off if he faces a high probability of losing his job, while Jeff has very good chances to find an occupation?

Table 2: Capability job-status sub-space

Person (age)	Jason (8)	Jeff (22)	Jim (35)	John (62)
current status	student	unemployed	employed	employed
alternative status	-	employed	unemployed	retired

The previous remarks pointed at some difficulties of arriving at a full empirical measure of capabilities. In the rest of the paper we shall follow Basu's suggestion (1987: 75) "... to go along with Sen and evaluate well-being on the basis of functionings, but be content with achievements, instead of capabilities". This is no denial of a meaningful empirical implementation of the capability notion of well-being. First, as pointed out by Sen (1985: 60-1; 1993: 38-40), focusing on the vector of achieved functionings represents an "elementary evaluation" of the capability set. Second, even if we confine our attention to achievements, the basic insight of broadening the analysis to alternative options need not be lost. The objective may become that of working in the space of "refined functionings", obtained by redefining functionings to account for "counterfactuals" opportunities: "choosing A when B is also available is a different 'refined' functioning ... from choosing A when B is not" (Sen, 1987: 37; see also 1993: 40).

2.7. Summing up

In this section we illustrated some of the problems in deriving operational measures of functionings and capabilities. The first is to identify relevant functionings: we suggested that most multidimensional studies of deprivation are conceptually distinct from the capability approach, but that some useful indications may be found in the Scandinavian approach. We then touched on two issues: how to account for the different abilities of people to achieve functionings, and how to evaluate the vector of functionings. Here, we came to no general answers: much of what one can do depends on the available data. Lastly, we discussed the practical difficulties of moving to capabilities and proposed to remain in the (refined) functionings space.

3. Strategies to Apply the Capability Approach

3.1. Approaching the multiple dimensions

In any empirical application of the capability approach, a fundamental decision concerns the way to deal with the multiple dimensions of well-being. Alternative strategies basically differ for the extent of manipulation of raw data: the greater the structure we impose on data, the closer we arrive at a complete cardinal measure of well-being. Strategies may also vary according to the purpose of the analysis, e.g. the description of the extent of inequality and poverty in a society, the comparison of two situations. A broad classification of possible strategies is given in table 3, where the main distinctions relate to whether the functionings are investigated singly or

comprehensively, and whether multidimensionality is retained or collapsed into synthetic indicators.

In Sen's *supplementation strategy* indicators of standard of living are considered in conjunction with the information on the distribution of incomes (or other indicators of monetary resources).[16] No attempt is made to reduce complexity, and functionings are examined one by one. The attention is directed not only at their univariate features, but also at the pattern of cross-correlation (the latter may be quite important in revealing whether income poverty compounds with other deprivations, or it is instead associated with better achievements in other relevant dimensions). The advantage of this strategy rests on its simplicity: it imposes little structure on the phenomena under examination and has measurement requirements less demanding. The disadvantage, especially in the presence of a rich information set about people's standard of living, is the lack of synthesis and the difficulty of drawing a well-defined unitary picture.

Table 3: Strategies for the application of the capability approach

---
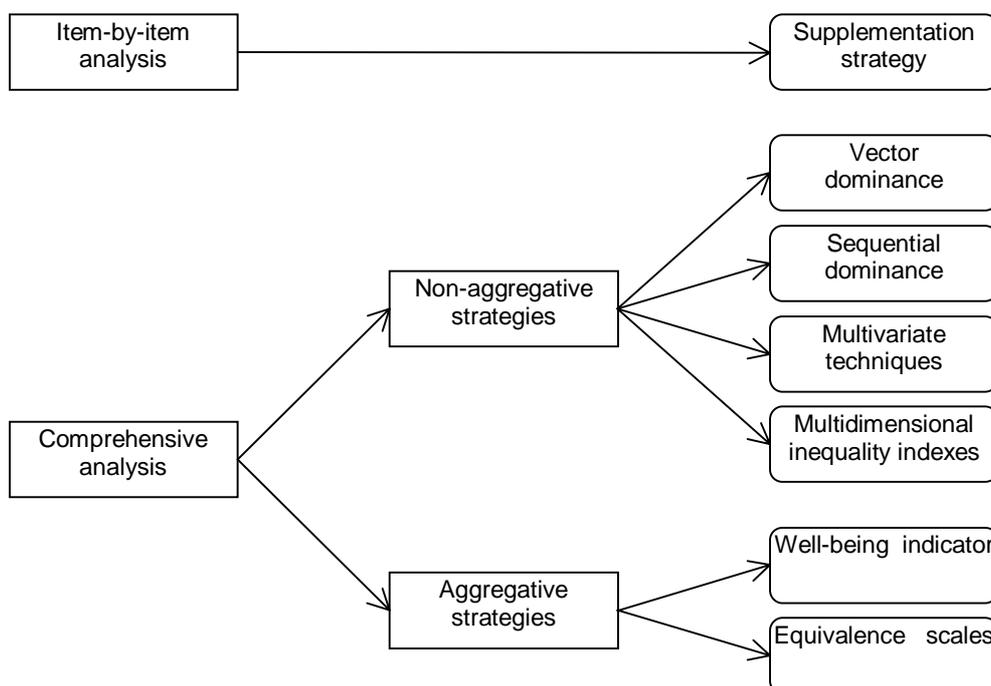
[16] See Sen's own studies of the gender discrimination in the allocation of food within Indian families (1985, Appendix B) and of the mortality figures as indicators of social inequality and racial disparity (1998).

The task of the alternative *comprehensive non-aggregative strategies* is to make comparisons on the basis of the entire vector of functionings. There are different ways of approaching the problem: (a) vector dominance; (b) sequential dominance; (c) multivariate statistical techniques; (d) multidimensional inequality indexes.

(a) Analyses based on strict *vector dominance* impose little restrictions on the data, but provide only a partial ordering; in some cases, especially when the set of indicators is large, the information extracted turns out to be fairly limited. For instance, examining some basic average functionings[17] for about 130 countries, Gaertner (1993) reported that vector dominance held in at most a quarter of the comparisons between any two countries chosen from politically or economically homogenous groups, though it held in roughly 90 per cent of the comparisons between a country in the richest group and one in the poorest group.

(b) In the context of comparisons between different situations, such as the distribution of well-being in two different countries or in the same country at two different times, interesting results can be obtained by using the *sequential dominance* analysis proposed by Atkinson and Bourguignon (1982) to extend the notion of Lorenz dominance to the two-dimensioned case.[18] The approach was further refined in the papers by Atkinson and Bourguignon (1987), Atkinson (1992) and Jenkins and Lambert (1993) to address the issue of comparing income distributions when family needs differ, while relaxing the distributional judgements implicit in the standard solution of using an equivalence scale. By transforming income by means of an equivalence scale one is specifying *how much* a family type is more needy than another; by contrast, sequential dominance only requires to *rank* family types in terms of needs, and it may easily allow for some degree of disagreement about the ranking itself. The cost of this weaker requirement is that the ordering tends to be incomplete. Although some theoretical results might extend to *n* dimensions, the mentioned empirical applications focused only on the space including income and needs.

(c) Standard *multivariate statistical techniques* (e.g. Kendall, 1975; Sharma, 1996) may help in managing the multiple dimensions of the problem. In one of the few empirical applications of the capability approach, Schokkaert and Van Ootegem (1990) employed factor analysis to identify the functionings of a group of Belgian unemployed

---

[17] In addition to GNP per capita, the indicators included infant death rate, life expectancy, number of inhabitants per medical doctor, illiteracy rate, consumption of calories.
[18] Kolm (1977) was probably the first to discuss the extension of Pigou-Dalton transfer principle to the multidimensional case; Dardanoni (1995) discussed some problems of multidimensional extensions.

from their answers to a number of qualitative questions.[19] They were very careful to stress that their application of factor analysis was "a mere data reduction technique", which did not guarantee that the list of functionings was complete, nor did it provide any indication about the relative valuation of the functionings; in particular, the estimated weights represented only the importance of each factor/functioning in explaining the pattern of responses to the 46 questions, not their importance in the valuation function (1990: 439-40).

(d) The use of *multidimensional inequality or poverty indexes* gives a complete ordering. In principle, we need not to aggregate different functionings and we can therefore bypass the issue of imposing a specific functional form on the valuation function. In fact, if the index is additively separable across persons, a valuation function is *implicitly* defined, so that this approach is observationally equivalent to a fully aggregative strategy. This is the case of the inequality indexes proposed by Tsui (1995) and the multidimensional poverty indexes developed by Bourguignon and Chakravarty (1997), to which we return at the end of this section.[20]

The last major alternative in applying the capability approach is to pursue a fully *aggregative strategy*, i.e. to construct one or more summary indicators of well-being. This strategy is the most structured and requires, more than the ones just discussed, to specify the underlying hypotheses on the measurement of functionings, the weighting structure, and the functional form of the indicators. The indicator may be expressed either in terms of some "well-being unit", or in monetary units. In the former case, multivariate techniques may be instrumental in obtaining a single aggregate measure.[21] In the latter, "functioning-equivalent incomes" are constructed by adjusting personal

---

[19] More precisely, the information contained in the answers to 46 qualitative questions was collapsed into 6 factors, which were identified with a specific functioning on the basis of the values taken by the "factor loadings". For instance, the relatively higher factor loadings on three questions concerning the difficulty to finance basic expenditure, the contraction of non-basic expenses, and the feeling of dependence on other people's incomes led to interpret the factor as the "financial functioning". The other 5 factors were similarly labelled social functioning, psychological functioning, physical functioning, microsocial contact, and activity level. To facilitate the interpretation, the 6 factors were obtained by maximising the variance of the loadings on each of them (varimax rotation). Altogether the 6 factors could explain 32 per cent of the total variance. Factor analysis was similarly used by Nolan and Whelan (1996a, b) in their study of deprivation in Ireland.
[20] Multidimensional inequality indexes were also proposed by Bradburd and Ross (1988) and Fluckiger and Silber (1994); see also the paper by Rietveld (1990).
[21] Principal components were used by Ram (1982) to derive a composite indicator of development from a set of indicators of basic needs and quality of life for world countries, and by Maasoumi and Nickelsburg (1988) and Maasoumi (1989) to construct a measure of well-being from data on annual nominal incomes, net housing equity, and average schooling of adults extracted from the Michigan Panel Survey of Income Dynamics. Cluster analysis was applied by Hirschberg *et al.* (1991) to group together attributes of quality of life and aggregate their means into two summary measures.

incomes for differences in functionings.[22] In many contexts, the estimation of functioning equivalence scales might reveal a powerful and appealing alternative, especially among economists. The monetisation of differences in achieved functionings should not, however, distract the attention from the fact that well-being is seen as a combination of valuable states of life, nor should it lead to the conclusion that every difference may be dealt with by an appropriate monetary compensation.

Regardless of the measuring rod, the outcome of an aggregative strategy is, by definition, a complete ordering - even if some ambiguity might arise as a result of sensitivity analyses of the underlying hypotheses. The main strength of this strategy rests on its being operational and rather effective in summarising complex problems in a simple and comprehensible way for a general public. The communicational advantage - Streeten's (1994) "eye-catching" property - is well represented by the popularity of the Human Development Index (HDI; e.g. UNDP, 1995),[23] or of the simple indexes regularly featuring in the Italian press to rank provinces by their living standard (e.g. Il Sole 24 Ore, 1997). On the other hand, we might be reluctant to follow this route, because too much is lost in the process of aggregation: "The passion for aggregation makes good sense in many contexts, but it can be futile or pointless in others. ... When we hear of variety, we need not invariably reach for our aggregator" (Sen, 1987: 33). On the same vein, a strong resistance to the construction of a "simple ordered indicator of level of living" was expressed in the Scandinavian approach (see Erikson, 1993: 75), and Schokkaert and Van Ootegem (1990) avoided aggregating the functionings identified with factor analysis.[24]

The choice among these different ways of dealing with the multidimensionality of the capability approach depends on both the purpose of the study and the available data, which is a good reason to postpone further comments until some exploratory applications to Italian data are discussed in the next section. In the remaining of this section, we need to examine in greater detail three questions which are of general interest for the capability approach, but are especially important for aggregative strategies: measurement units, weighting structure, and functional form of the synthetic indicator. In doing so, we shall find it useful to follow their treatment in that strand of literature focusing on multivariate measures of living conditions or deprivation.

---

[22] This solution partially overlaps with the *augmented-income strategy* explored in our companion paper (see Brandolini and D'Alessio, 1998), whereby some non-monetary elements relevant for a person's standard of living were converted into money units and added to the person's income.

[23] The acceptance of the HDI is however not uncontroversial. See Streeten (1994) for a favourable view, and Srinivasan (1994) for a critical one.

[24] Nolan and Whelan (1996a, b) aggregated, by factor analysis, elementary components into three indicators of deprivation, which they termed "basic-life style", "secondary life-style" and "housing".

3.2. Measuring the possession of an attribute

In the literature on multivariate measures of living conditions or deprivation the command over a collection of material resources is regarded as a direct measure of people's living conditions.[25] At the micro level, the information is sometimes summarised into an index of deprivation,

$$Z_i = \sum_j w_j z(x_{ij}) \tag{4}$$

or an index of living standard,

$$S_i = \sum_j w_j s(x_{ij}) \tag{5}$$

where $z(\cdot)$ and $s(\cdot)$ are non-increasing and non-decreasing functions, respectively, of the amount x_{ij} possessed by the ith family ($i = 1,...,n$) of the jth attribute ($j = 1,...,J$), and w_j is the corresponding weight (equal across families). The values taken by Z_i and S_i depend on the way possession is measured as well as the structure of the weights w_j's. Some of the measurement hypotheses discussed below are summarised in table 4.

Both Z_i and S_i share two measurement issues: first, the way in which the jth attribute is measured; second, the transformation of the x_{ij}'s by means of the functions $z(\cdot)$ and $s(\cdot)$ to indicate the degree of deprivation or possession of the attribute. The measurement unit depends on the nature of the attributes: the quantity consumed or purchased may be computed as a continuous variable for many attributes, whereas for others, like consumer durables or services, it is the number of items owned or the frequency of use to be available; on the other hand, information about attributes like self-perceived health condition is typically orderable. Whereas the measurement unit might not cause any serious problem when the indicators are considered separately, a problem of commensurability arises when they are merged into a single index. One may rely on usual procedures of variable standardisation, or on the application of ordinal criteria also to quantitative variables (e.g. by classifying units according to the quantile they belong to). Regardless of the specific procedure adopted, the transformation of the original x_{ij}'s will substantially affect the research outcome.

---

[25] As already noted, such shift to a multiple space is not by itself a move into the space of functionings because no account is taken of the ways commodities are transformed by persons into functionings.

A very popular ordering in this context is the binary classification of the type either/or.[26] A person (or family) is considered poor with respect to a certain attribute whenever the realisation of the attribute is below the "social norm" (e.g., deprivation in the housing condition is experienced by all persons living in households with less than one room per person). Formally, this means to define $z(\cdot)$ as:

$$z(x_{ij}) = \begin{cases} 1 & \text{if } x_{ij} < x'_j & \rightarrow & \text{deprivation} \\ 0 & \text{if } x_{ij} \geq x'_j & \rightarrow & \text{non - deprivation} \end{cases} \qquad (6)$$

where x'_j represents the social norm for the jth attribute.[27] An important objection to this classification is that the distinction between a "bad state" and a "good state" might be blurred and might occur by grades. One possibility would be to follow Desai and Shah (1988) and specify $z(\cdot)$ as the distance of x_{ij} from the modal value of the jth attribute, taken to represent the social norm.

The second possibility is to apply the theory of "fuzzy sets".[28] The function $z(\cdot)$ is accordingly seen as a "membership" function that may assume any value between 0 and 1: while the two extreme values indicate that a person is definitely non-deprived or deprived, respectively, any other value in the interval (0,1) means that she is "partially" a member of the set of the deprived people, that is:

$$z(x_{ij}) = \begin{cases} 1 & \text{if } x_{ij} < x'_j & \rightarrow & \text{deprivation} \\ \bar{z}(x_{ij}, ...) & \text{if } x'_j \leq x_{ij} < x''_j & \rightarrow & \text{partial deprivation} \\ 0 & \text{if } x_{ij} \geq x''_j & \rightarrow & \text{non - deprivation} \end{cases} \qquad (7)$$

---

[26] See Townsend (1979), Mack and Lansley (1985), Mayer and Jencks (1989), Nolan and Whelan (1996a, b), Federman *et al.* (1996) among others.

[27] This formalisation might be further refined to make deprivation conditional on lack of resources, in order not to count among the poor the persons who *chose* to lack the attribute. This point was raised by Piachaud (1981) in his review of Townsend (1979), while the idea of focusing on the "enforced lack" of socially perceived necessities was pursued by Mack and Lansley (1985). Desai and Shah (1988) corrected for tastes by replacing the actual values x_{ij}'s with those predicted by a regression of the x_{ij}'s against a vector of socio-economic characteristics. Note that the lack of something because of choice may be a very tricky argument, as people aspirations tend to adapt to their own current conditions.

[28] See Cerioli and Zani (1990), Cheli *et al.* (1994), Cheli and Lemmi (1995), Chiappero Martinetti (1994, 1996), Lemmi *et al.* (1996). An alternative approach to the "fuzzification" of poverty and inequality measures has been pursued by Basu (1987) and Ok (1995, 1996). In the former approach, the fuzziness relates to the condition of a person: "... poverty is certainly not an *attribute* that characterises an individual in terms of *presence* or *absence*, but is rather a *vague predicate* that manifests itself in *different shades and degrees*" (Cheli and Lemmi, 1995: 118). In the latter approach, the fuzziness has more to do with the ambiguity of the notion of inequality: "... a measure of inequality is meant to capture our inherent attitude to inequality and if the latter is imprecise, then this ought to be reflected in the measure" (Basu, 1987; quoted by Ok, 1996: 515). According to this second line of reasoning, the function $z(\cdot)$ would measure the *truth value of the statement* "the ith person is deprived of the jth attribute", rather than the fact that the ith person is *partially* deprived of the jth attribute.

where x'_j and x''_j are the two critical values to separate the definitely deprived and the definitely non-deprived, respectively; (7) coincides with (6) for $x'_j = x''_j$. Clearly, the form of the membership function comes to play a crucial role in the construction of a deprivation index (two examples, suggested by Cerioli and Zani (1990) and Cheli and Lemmi (1995), are reported in table 4). In any case, the index Z_i represents a measure of global deprivation of the ith person, and the arithmetic mean of Z_i's across the population may be interpreted as the average degree of deprivation of the population as measured by the "fuzzy proportion of poor families".

3.3. Weighting structure

Weights determine the extent to which distinct functionings contribute to well-being, and diverse weighting structures reflect different views. As suggested by Sen (1987: 30; see also Foster and Sen, 1997: 205), one way to account for this difference is to specify "ranges" of weights rather than a single set of weights, although this approach is likely to lead to a partial ordering. The practical relevance of the issue depends on the existence of a tension among different functionings: if their achievements were strongly correlated, the structure of relative weights would be less important.

The first possibility is to treat all attributes equally. *Equal weighting* may result either from an "agnostic" attitude and a wish to reduce interference at the minimum, or from the lack of information about some kind of "consensus" view. For instance, Mayer and Jencks (1989: 96) opted for equal weighting, after remarking that: "ideally, we would have liked to weight [the] ten hardships according to their relative importance in the eyes of legislators and the general public, but we have no reliable basis for doing this". (In fact, there may be disagreement between the legislator and the general public, not to say within the general public itself.) Equal weighting has the obvious drawbacks of not discriminating among constituents that are reputed to play different roles, and of double-counting whenever the informational content of two distinct attributes partly overlaps.

A second route is "to let the data speak for themselves". With a *frequency-based weighting*, the weights are computed as some function of the relative frequencies of the attributes. For instance, several authors seem to agree that the lowest the proportion of people with a certain deprivation, the highest the weight assigned to that deprivation must be; some examples are reported in table 4. As shown in the empirical application in section 4.3, this criterion may however generate rather counter-intuitive hypotheses. An alternative procedure is to use the output of *multivariate techniques*, such as factor

analysis (see Nolan and Whelan, 1996a, b), principal components (see Ram, 1982, Maasoumi and Nickelsburg, 1988, and Maasoumi, 1989), or cluster analysis (see Hirschberg *et al.*, 1991).

A third alternative is to use *market prices* as weights. When $s(x_{ij})$ denotes the (equivalent) quantity purchased by the ith family of the jth commodity and the weight w_j equals the market price p_j of the same commodity, the index S_i comes to coincide with the family's total (equivalent) expenditure. However, market prices do not exist, in general, for functionings; even if they did, it would be open to debate whether they are appropriate for well-being comparisons. [29]

3.4. Functional form of the synthetic indicator

The indexes Z_i and S_i are additively separable in the J attributes. Additivity is the reasonable hypothesis with dichotomous variables, but it prevents more complex patterns of interrelation among the indicators in other cases. If the marginal rate of substitution between two attributes is assumed to depend on the relative extent of deprivation, a straightforward generalisation of S_i (as well as of Z_i) is offered by the class of functions showing constant elasticity of substitution (CES):

$$S_{\beta i} = \begin{cases} [\sum_j w_j s(x_{ij})^\beta]^{1/\beta} & \beta \neq 0 \\ \prod_j [s(x_{ij})]^{w_j} & \beta = 0 \end{cases} \tag{8}$$

where β is a free parameter governing the degree of substitution between the attributes and the weights are normalised to add up to 1. As suggested by Maasoumi (1986), a standard univariate analysis can be performed on the attributes aggregated by (8).[30]

Tsui (1995) and Bourguignon and Chakravarty (1997) developed instead axiomatic measures of inequality and poverty based on the vectors of attributes x_i. By identifying inequality with the social welfare loss, Tsui (1995) derived two multidimensional (relative) inequality indexes:[31]

---

[29] Sugden (1993) and Srinivasan (1994) argued that the availability of an "operational metric for weighting commodities" makes traditional real-income comparison *in practice* superior to the capability approach. Foster and Sen (1997) strongly objected that the use of the metric of exchange value was not devised and is not appropriate for well-being comparisons.

[30] The use of (8) was justified from the point of view of information theory as constituting an "ideal" index, in the sense that its distribution is as close as possible to the multivariate distribution of the various attributes. The sensitivity of the results to different values of β was studied by Maasoumi and Nickelsburg (1988).

[31] Tsui (1995) restricted the class of social evaluation functions to continuous, strictly increasing, anonimous and strictly quasi-concave functions satisfying also two conditions of separability and scale invariance. He showed the ordinal equivalence between any function in this class and the additively separable welfare function $\sum U(\cdot)$, $U(\cdot)$ being an affine transformation of a Cobb-Douglas function, with

$$I_1 = 1 - \left[\frac{1}{n} \sum_i \prod_j \left(\frac{s(x_{ij})}{s_j} \right)^{w_j} \right]^{\frac{1}{\sum_j w_j}} \tag{9a}$$

$$I_2 = 1 - \prod_i \prod_j \left(\frac{s(x_{ij})}{s_j} \right)^{\frac{1}{n} \left(\frac{w_j}{\sum_j w_j} \right)} \tag{9b}$$

where s_j is the mean over all persons i's of $s(x_{ij})$. The critical assumptions underlying (9) are the separability condition, which implies that the single attributes can be aggregated into a well-behaved indicator of well-being, and the identification of inequality with the social welfare loss.[32] Notice that these indexes measure multidimensional inequality as the proportional shortfall of the mean (arithmetic in (9a), geometric in (9b)) well-being from the "representative well-being", defined by valuing each attribute at its population mean.

Bourguignon and Chakravarty (1997) derived several families of multidimensional poverty measures, which essentially differ in the way the Pigou-Dalton transfer principle is generalised to the multidimensional framework. When the validity of the transfer principle is imposed for one attribute only, the following class of indexed is a possible specification:

$$P_1 = \frac{1}{n} \sum_j \sum_{i \in Z_j} w_j \left(1 - \frac{s(x_{ij})}{z_j} \right)^{\alpha_j} \tag{10}$$

where $\alpha_j \geq 1$, z_j is the poverty threshold and Z_j is the set of persons who are poor with respect to attribute j. When the transfer principle is supposed to hold for all attributes, a possible specification, in the bi-variate case, is:

$$P_2 = \frac{1}{n} \sum_i u \left[\left\{ w_1 \left[\max \left(1 - \frac{s(x_{i1})}{z_1}, 0 \right) \right]^\alpha + w_2 \left[\max \left(1 - \frac{s(x_{i2})}{z_2}, 0 \right) \right]^\alpha \right\}^{\frac{1}{\alpha}} \right] \tag{11}$$

where $\alpha > 0$ and $u(\cdot)$ is an increasing and convex function such that $u(0) = 0$. If we redistribute an attribute from a poor person to another less poor person so to increase the

---

the attribute weights appropriately restricted to ensure an increasing and strictly concave $U(\cdot)$. These restrictions carry forward to inequality indexes; for (9b), they reduce to the weights being positive.

[32] For a general critique of ethical inequality indexes see Sen (1973, 1978, 1992).

correlation of the two attributes in the population, the index P_2 is non-decreasing for $\alpha > 1$ and non-increasing for $0 < \alpha < 1$. In other words, the higher α, the more the two attributes are complements; they are perfect substitutes when $\alpha = 1$. As remarked by Bourguignon and Chakravarty (1997: 16), the family of indexes (11) may be generalised to any number of attributes, but only at the cost of assuming the same elasticity of substitution between each pair of them.

In all previous expressions, we kept the function $s(\cdot)$ explicit to emphasise the measurement problems, arising, in particular, when some attribute is binary. In this case, (10) and (11) cannot be computed. If all the attributes are binary, for $\beta \neq 0$, (8) becomes $S_{\beta i} = S_{1i}^{1/\beta}$, where S_{1i} measures the (weighted) number of attributes possessed by the ith person: the introduction of the parameter β affects therefore only the distance between the well-being scores of the persons, higher β's corresponding to narrower distances. For $\beta = 0$, the population is divided into two groups, as S_{0i} equals 1 when all attributes are possessed, and 0 otherwise. The index I_1 simplifies to $(1 - R/S)$, where R is the proportion of persons who possess *all* attributes and S is the "representative well-being" (i.e. the weighted geometric average of the relative frequency of possession for each attribute), both raised to $1/\sum_j w_j$. When all attributes are binary, between two populations with the same average possessions of each attribute, i.e. the same S, the higher inequality is found in the population where the proportion R of those having all attributes is lower. This result may not be always convincing.[33]

---

[33] Compare society A where one half of the population has either attribute j or k, one quarter has both and the remaining quarter has neither, with society B where one half has both attributes and one half has neither. If the weights add up to 1, it is $I_1^A = 1 - 0.25/S > I_1^B = 1 - 0.5/S$, though we could argue that inequality is higher in the polarised society B than in society A where three quarters of the population have at least one attribute.

Table 4: Some measurement hypotheses in the construction of multivariate deprivation indexes

Reference	Specification of the function $z(x_{ij})$	Specification of weights
Townsend (1979) Mack and Lansley (1985) Mayer and Jencks (1989) Federman *et al.* (1996)	$\begin{cases} 1 & \text{if } x_{ij} < x'_j \\ 0 & \text{if } x_{ij} \geq x'_j \end{cases}$	$w_j = 1$
Nolan and Whelan (1996a, b)	$\begin{cases} 1 & \text{if } x_{ij} < x'_j \\ 0 & \text{if } x_{ij} \geq x'_j \end{cases}$	factor analysis
Desai and Shah (1988)	$\hat{x}_{ij} - \tilde{x}_{ij}$ where: $\hat{x}_{ij} = E[x_{ij}|Y_i]$ $\tilde{x}_{ij} = $ mode of the distribution of j	$w_j = 1 - \vartheta_j$ where: ϑ_j : proportion of deprived
Cerioli and Zani (1989)	$\begin{cases} 1 & \text{if } x_{ij} < x'_j \\ \dfrac{x''_j - x_{ij}}{x''_j - x'_j} & \text{if } x'_j \leq x_{ij} < x''_j \\ 0 & \text{if } x_{ij} \geq x''_j \end{cases}$ where: x'_j, x''_j : critical values	$w_j = -\ln \vartheta_j$ where: ϑ_j : proportion of deprived
Cheli *et al.* (1994) Cheli and Lemmi (1995) Lemmi *et al.* (1996)	$\begin{cases} 1 & \text{if } x_{ij} = x_j^1 \\ z(x_j^{k-1}) - \dfrac{\Phi(x_j^k) - \Phi(x_j^{k-1})}{\Phi(x_j^K) - \Phi(x_j^1)} & \text{if } x_{ij} = x_j^k \\ 0 & \text{if } x_{ij} = x_j^K \end{cases}$ where: x_j^k : occurrences of x_{ij} (the higher k, the lower deprivation) $\Phi(x_j^k)$: cumulative distribution function	$w_j = -\ln\left[\dfrac{1}{n}\sum_i z(x_{ij})\right]$
Hirschberg *et al.* (1991)	$\dfrac{x_{ij} - \mu_j}{\sigma_j}$	$w_j = \dfrac{1}{m_c m_j}$ where: m_c : number of clusters m_j : number of attributes in same cluster as j
UNDP (1995)	$\dfrac{x_{ij} - \min x_{ij}}{\max x_{ij} - \min x_{ij}}$	$w_j = 1$

4. Exploratory Applications to Italian data

In the previous two sections, we examined in the abstract the problems posed by the application of the capability approach and of multidimensional measures of well-being or deprivation. We shall now reconsider some of these problems in detail, by investigating data drawn from the Bank of Italy's SHIW.[34] The SHIW is a long-established survey aimed at collecting data on income sources, financial portfolios and real assets of the Italian families. In addition to this information, in what follows we shall make use of some figures on health and employment status that were specifically collected in the survey for 1995. It has to be stressed that the SHIW was not designed to gather data on the quality of life, so that our empirical analysis is an illustration of methodological questions rather than a fully developed attempt to provide a comprehensive picture of the well-being of Italian families.

4.1. A description of the basic indicators

In the SHIW database for 1995 we identified a small number of indicators and we classified them in 6 categories: health, education, employment, housing, social relationship, and economic resources. We take any one category as representing, however vaguely, a functioning. A brief illustration of the characteristics of each indicator follows; the underlying survey questions are listed in Appendix B.

The state of a person's *health* was measured straightforwardly by means of three indicators: the self-assessed[35] general health condition, on a scale from "very bad" to "very good"; the presence of chronic illnesses; the presence of any form of disabilities. Measures of self-perceived health are widely used (e.g. van Doorslaer *et al.*, 1997) but not without controversy, because "... it is often hard to know exactly what they mean" (Wilkinson, 1996: 55). One problem is that it is not clear whether respondents have in mind an absolute notion, or rather one adjusted for age or other factors. On the one hand, the proportion of people in good or very good health appears to sharply decline in the old age, suggesting that respondents only partly correct for their age; on the other hand, affection from a chronic illness or a disability does not necessarily entail a bad health status (table 5). In spite of these ambiguities, these indicators were the only feasible way of gathering information about health in the SHIW. For some exercises, we shall transform the self-perceived health condition into a binary variable by assuming

---

[34] See Banca d'Italia (1997) and Brandolini and Cannari (1994) for a general description of the survey.
[35] The assessment for those absent at the moment of the interview was made by the head of the household.

that a person is in poor health when his/her general state is assessed to be "bad" or "very bad".

Table 5: Relationship between age, health condition, chronic illnesses and disabilities. Italy, 1995 (percentage values)

Person's age	Self-assessed state of health					
	very bad	bad	nor neither bad	good, good	very good	total
Up to 5 years						
No chronic illnesses and disabilities	0.1	0.7	2.3	36.4	57.8	97.4
Chronic illness, disability or both	0.1	0.3	0.7	1.0	0.5	2.6
Total	0.2	1.0	3.0	37.4	58.3	100.0
From 6 to 18 years						
No chronic illnesses and disabilities	0.0	0.2	2.2	34.4	59.3	96.1
Chronic illness, disability or both	0.2	0.2	0.8	1.8	1.0	3.9
Total	0.2	0.4	3.0	36.2	60.3	100.0
From 19 to 30 years						
No chronic illnesses and disabilities	0.1	0.4	3.5	36.4	54.4	94.8
Chronic illness, disability or both	0.3	0.4	1.2	2.2	1.1	5.2
Total	0.4	0.8	4.7	38.6	55.5	100.0
From 31 to 40 years						
No chronic illnesses and disabilities	0.1	0.8	7.3	41.5	40.6	90.2
Chronic illness, disability or both	0.4	1.3	2.7	4.1	1.2	9.8
Total	0.5	2.1	10.0	45.6	41.8	100.0
From 41 to 50 years						
No chronic illnesses and disabilities	0.1	1.2	9.8	44.0	29.8	84.9
Chronic illness, disability or both	0.6	3.1	4.8	5.3	1.3	15.1
Total	0.7	4.3	14.6	49.3	31.1	100.0
From 51 to 65 years						
No chronic illnesses and disabilities	0.3	1.4	14.6	37.0	19.3	72.6
Chronic illness, disability or both	1.6	6.1	11.8	6.6	1.3	27.4
Total	1.9	7.5	26.4	43.6	20.6	100.0
Over 65 years						
No chronic illnesses and disabilities	0.4	3.8	17.3	19.9	5.8	47.1
Chronic illness, disability or both	5.4	18.3	20.5	7.6	1.0	52.9
Total	5.8	22.1	37.8	27.5	6.8	100.0
All ages						
No chronic illnesses and disabilities	0.2	1.2	8.7	35.5	36.3	81.9
Chronic illness, disability or both	1.3	4.6	6.7	4.4	1.1	18.1
Total	1.5	5.8	15.4	39.9	37.4	100.0

Source: authors' elaboration on SHIW data for 1995.

Education is measured by the highest qualification earned by a person, i.e. by a categorical indicator ranging from "no qualification" to "university degree".[36] The school qualification has its own place as an important determinant of social status, but we mainly regard it as an indicator of a person's educational level. It is because of the education's pervasive role in influencing the capabilities of a person to function that we chose to classify it as a separate functioning. Defining educational deprivation is a rather complex issue, mainly because school attainments vary substantially across age cohorts (table 6). On the one hand, the dramatic increase in the level of literacy needed for everyday life - from filling forms for public utilities to complying with tax reports, from understanding the working of house appliances to using the transport system - points at an important absolute dimension; on the other hand, the improvement of educational achievements led to large disparities among generations, suggesting that a person's deprivation should be mostly judged relative to his/her age cohort (see Checchi, 1997). To bring out the importance of these distinctions for measurement, in table 6 we reported three measures of deprivations: (a) the *absolute* definition counts as poor all persons who lack a secondary-school certificate; (b) the *median* criterion sets the standard at the qualification that was attained by at least half of the cohort; (c) the *legal* criterion is based on the level of compulsory education faced by each cohort.[37] There are, as expected, large variations among the three measures. The absolute index would classify as poor over a third of the population over 16, as a result of the low mean educational attainment of the older population. The median index would set deprivation at 28 per cent, by reducing the number of the deprived among the elderly and increasing it among the younger people because of the marginal shift of the median qualification from middle- to high-school. By reflecting the former but not the latter effect, the legal measure would give a much lower estimate of about 10 per cent. While aware of the evidence of table 6, in the remaining of this section we shall follow Checchi's (1997) suggestion and adopt the legal criterion.[38]

---

[36] With respect to the original format of the questionnaire, we have aggregated in a single category the three types of degrees awarded by university, namely associate's degrees or other short course (up to three years) university degrees, bachelor's degrees and post-graduate qualifications.

[37] For the people born before 1958, compulsory education ended with elementary-school; for the people born thereafter, the legal obligation was raised to secondary school. See Checchi (1997: 22-3).

[38] Incidentally, our figure is very close to that estimated by Checchi (1997: 23) by applying the same criterion to very different data on aggregate population flows and school enrolment figures (Checchi's own estimate was 11 per cent for the population aged 13 and over in 1991). This result provides an interesting external validation of the SHIW findings on educational attainment.

Table 6: Educational attainments and deprivation by birth cohort. Italy, 1995 (percentage values)

Birth cohort	Share in population	Educational qualification						Deprivation index (1)		
		None	Elementary school	Middle school	Vocational school	High school	University degree (2)	Absolute	Median	Legal
1900-04	0.2	46	40	0	0	13	1	86	46	46
1905-09	0.7	40	45	10	0	5	0	85	40	40
1910-14	2.2	43	40	8	1	7	1	83	43	43
1915-19	2.2	32	46	13	1	6	2	79	32	32
1920-24	4.6	28	51	11	1	6	3	79	28	28
1925-29	5.4	21	50	16	2	8	3	71	21	21
1930-34	5.5	16	51	18	1	11	3	68	16	16
1935-39	5.8	8	54	19	2	12	5	62	9	9
1940-44	6.6	6	45	24	2	17	6	50	5	5
1945-49	6.6	3	34	28	6	19	10	38	38	3
1950-54	6.8	2	24	33	5	26	10	26	26	2
1955-59	7.0	2	12	39	6	32	9	14	14	2
1960-64	7.7	0	7	39	6	36	12	8	46	8
1965-69	7.7	0	5	33	9	42	11	5	47	5
1970-74	8.0	0	4	30	6	58	2	4	40	4
1975-79	6.9	0	3	60	7	30	-	3	-	3
1980-84	5.6	1	49	49	1	-	-	-	-	-
1985-89	5.1	-	-	-	-	-	-	-	-	-
1990-94	4.7	-	-	-	-	-	-	-	-	-
1995-99	0.9	-	-	-	-	-	-	-	-	-
North-Centre (3)	63.6	14	26	27	5	23	5	33 (35)	24	7 (7)
South-Islands (3)	36.4	22	26	27	2	19	4	39 (43)	36	16 (16)
Italy (3)	100.0	17	26	27	4	21	5	35 (38)	28	10 (10)

Source: authors' elaboration on SHIW data for 1995.
Notes: (1) The *absolute* index counts as poor all persons lacking a middle-school certificate, the *median* index all persons with a qualification below that attained by at least half of the cohort, and the *legal* index all persons failing to have the compulsory level of education of their cohort. (2) Including associate's degrees or other short course university degrees, bachelor's degrees and post-graduate qualifications. (3) The total shares of persons deprived of education are computed only for the cohorts old enough to have completed the entire courses in 1995. Thus, the shares corresponding to the first and third definitions of deprivation include all cohorts up to the 1975-79 one, while the second definition excludes this last cohort; the figures in parentheses are computed for comparison by excluding this last cohort.

Direct information about *social relations* is virtually absent in the SHIW, nor was any question specifically inserted. We shall however use two (binary) indicators, namely the existence of close relatives (parents, brothers and sisters, sons and daughters) living on their own, and the availability of a telephone at home: the absence of either attribute is seen as signalling relational difficulties. These indicators are clearly

debatable and rather poor, but we include them to underline the need of a functioning corresponding to social relations.

A fourth set of indicators was used to assess the *labour market status*, trying to unravel the non-economic aspects. Specific qualitative questions were introduced in the questionnaire to gather information about three issues: the reasons why a person not employed, nor a pensioner was not searching for a job; the person's assessment of his/her own experience when he/she was unemployed or on wage supplementation at 0 hours for at least 6 consecutive months; the person's judgement of his/her own current work condition. An extensive analysis of these issues goes beyond the limits of this paper, and thus we only extract four elementary indicators. The first two simply separate two categories: the unemployed and first-job seekers; the discouraged workers (i.e. those who did not look for employment because of the difficulty of finding a job). The other two indicators measure, only for employed workers, the concern about losing the employment, and the overall satisfaction (apart from the economic aspects) with one's own job.

The information about the *housing condition* is based on four variables. The first two variables are subjective measures of how the family's head rates both the dwelling (on a scale from "very low-income" to "luxury"), and the location (on a scale from "run-down" to "upscale"). The other two variables are objective indicators: the availability of a heating system, and the floor area (in square meters) relative to the number of family members. We measure the first indicator as a simple binary variable, even though the large climatic variation across Italy makes the absence of a heating system a more serious problem in the northern regions of the country. With regard to the relative surface size of the home, we transformed it from a continuous to categorical variable by using the equivalence scale reported in table 7. This, admittedly arbitrary, transformation is roughly in agreement with that used in the "Scandinavian approach", which relates the number of rooms (excluding the kitchen) to the number of adults and children living in the dwelling (see Frykman, 1987: 184). Deprivation corresponds to our first two categories, "overcrowded" and "bad".

Table 7: Definition of the floor area index (square meters)

	Overcrowded	Bad	Acceptable	Good	High standard
1 person	-	30 or less	-	30-50	50 or more
2 persons	30 or less	30-50	50-70	70-90	90 or more
3-4 persons	50 or less	50-70	70-90	90-110	110 or more
5 persons or more	70 or less	70-90	90-110	110-130	130 or more

Source: authors' definition; partly based on Frykman (1987).

The last group of indicators relates to the *household's economic resources*. As the functionings of a person are "the various things that he or she manages to do or be in leading a life", we could question the inclusion of economic resources: strictly speaking, they seem to be more means to achieve functionings rather than functionings themselves.[39] On the other hand, the command over material resources has an autonomous value: first, it represents the attribute "living a comfortable life", which refers both to the availability of material objects like durable goods, and to immaterial aspects like "feeling protected from the uncertainties of life"; second, it is a measure of "social status"; third, it reflects the "easiness" with which a person may change his or her own condition. For these reasons, we have kept economic resources as a separate functioning. The underlying indicators are the most comprehensive, as their collection is the main objective of the SHIW. Among the many different possibilities, we defined four distinct variables, which we may use as continuous, categorical (as defined, for instance, in table 8), or binary variables.

There are three critical assumptions underlying these indicators. First, the intra-family distribution is totally neglected, since all members are treated equally and given the same value computed at the household level; as mentioned before, this is hardly satisfying when the analysis is carried out having persons as the reference unit.[40] Second, the adjustment of income and expenditure for non-durable goods by an equivalence scale is somewhat odd in the multidimensional frame adopted here. It

---

[39] For instance, in a case study of poverty in Pistoia, an affluent Tuscan town, Balestrino (1996) distinguished functioning-poverty from income-poverty and found that the two notions often overlaps, but are not the same. He identified the functioning-poor with the persons who participated in local social welfare programmes because of their failures to achieve satisfactory standards in health, nutrition and education.

[40] In general, the data available in the SHIW would allow us to assign each member of the family the labour and transfer incomes that he/she received, but not the property incomes, nor the expenditure variable, since they are recorded for the family as a whole. Apart from that, however, the knowledge of who was actually to earn a certain income or to incur a certain expense may be of little help in understanding the actual distribution of resources within the family.

would be more appropriate to explicitly account for differences in needs and economies of scales across households in the specification of indicators rather than relying on a preliminary correction by an exogenous equivalence scale; moreover, it is far from obvious which is the proper scale to use (see the related comments by Radner, 1997, on the use of equivalence scales when the money value of in-kind benefits is added to money incomes). Third, the transformation from continuous to categorical variables implies the specification of thresholds that are definitely arbitrary. For income and expenditure we adopted a practice common in poverty studies of setting the line at half of the median and then assessing the sensitivity around the line. For the end-of-year value of the household's durable goods and net wealth - which are proxies of the stock of resources at disposal of the family both for the everyday life and as a buffer in the case of unanticipated negative events - we chose different thresholds from those used for income and expenditure because of their more unequal distribution.

Table 8: Definitions of the indicators of household's economic resources

	Very low	Low	Lower middle	Upper middle	Top
Equivalent income	less than 40 per cent	40 to 60 per cent	60 to 100 per cent	100 to 140 per cent	more than 140 per cent
Equivalent expenditure for non-durables	less than 40 per cent	40 to 60 per cent	60 to 100 per cent	100 to 140 per cent	more than 140 per cent
End-of-year value of durables	less than 20 per cent	20 to 40 per cent	40 to 80 per cent	80 to 120 per cent	more than 120 per cent
End-of-year value of net wealth	negative	0 to 20 per cent	20 to 60 per cent	60 to 120 per cent	more than 120 per cent

Source and notes: authors' definition. Limiting values are defined relative to the respective median values for equivalent income and expenditure, and to the median computed over positive values only for the two stocks.

The set of variables we have identified - which are summarised in table 9 - is rather heterogeneous: some of the indicators are subjective or self-assessed, while others are objective measures; some are very indirect indexes of the relevant functioning, others are direct measures. However, these indicators cover many aspects of a person's well-being, and should allow us to perform meaningful exercises in the functioning space.

Table 9: Components of well-being and deprivations among persons

Component of well-being	Type of indicator	Condition of deprivation
Health		
Self-assessed general health status	categorical (1 to 5)	1 (very bad), 2 (bad)
Chronic illnesses	binary (Yes/No)	presence
Disabilities	binary (Yes/No)	presence
Education		
Highest educational qualification	categorical (1 to 6)	1 (none)
		for persons born in 1957 or before
		1 (none), 2 (elementary school)
		for persons born in 1958 or after
Social relations		
Close relatives (living on their own)	binary (Yes/No)	absence
Telephone in the home	binary (Yes/No)	absence
Labour market		
Unemployment or first-job search	binary (Yes/No)	presence
No search, because of difficulty of finding a job	binary (Yes/No)	presence
Concern about losing employment	categorical (1 to 5)	1 (very high), 2 (high)
Overall satisfaction with job (apart from economic aspect)	categorical (1 to 5)	1 (very low), 2 (low)
Housing		
Heating system	binary (Yes/No)	absence
Floor area index	categorical (1 to 5)	1 (overcrowded), 2 (bad)
Quality's rating	categorical (1 to 6)	1 (very low-income), 2 (low-income)
Location's rating	categorical (1 to 3)	1 (run-down area)
Household's economic resources		
Equivalent income	categorical (1 to 5)	1 (very low), 2 (low)
Equivalent expenditure for non-durables	categorical (1 to 5)	1 (very low), 2 (low)
End-of-year value of durables	categorical (1 to 5)	1 (very low), 2 (low)
End-of-year value of net wealth	categorical (1 to 5)	1 (very low), 2 (low)

Source: authors' definitions.

4.2. Functioning-deprivation in Italy

The first way of approaching the problem is to examine each item separately to draw a richer picture than the one allowed by the analysis of income or expenditure alone. In table 10 we reported the proportion of persons with low achievements for every selected attribute, for the whole population and separately by sex and area of residence (other breakdowns by personal characteristics are in table C1-C5). This table already presupposes two decisions. First, we proceeded to a first aggregation by considering as functioning-deprived each person with a failure in at least one of the indicators of that specific functioning. This criterion maintains the dichotomous classification of the elementary indicators, but it is clearly only one among several possibilities. Second, we had to decide how to treat the functioning indicators that are not defined for all persons. This was the case of "concern about losing the employment" and "overall satisfaction with job", which have no meaning for the non-occupied, and more generally of all labour market variables, which are not defined for the young still at school and for the retired. As we study the entire population, we assumed that no deprivation occurs in undefined cases. In practice, the percentage of, say, the persons unsatisfied with their job was computed relative to the total Italian population rather than the total number of employed.

We might start observing that deprivation occurs more frequently in economic resources, housing and health than in the other dimensions, but this ranking is not particularly insightful, owing to its dependence on the way measures are constructed. More interesting are comparisons among different population groups. With regard to gender, relatively more women than men fare badly in terms of health, social relations and, especially, education, although the outcome may be induced by an age effect. On the other hand, the fact that fewer women are unsatisfied with their job, are worried to lose it, or are unemployed (or first-job-seekers) tends to reflect their lower participation rate, which appears in the greater proportion of discouraged workers. Deficiencies in the housing condition and the family's economic resources do not differ much across sexes, consistently with the assumption of equal distribution within the family. Overall, these indicators do not point to a strong gender bias in functioning achievements, but it is quite possible that accounting for factors such as the intra-family distribution of resources, the ranking in the social scale of different occupations, etc. could lead to a different conclusion. On the contrary, the measures in table 10 consistently show a large regional divide: for virtually all indicators, deprivation in the South and in the Islands is larger than in the North, whilst central regions are in an intermediate position.

Table 10: Incidence of functioning deprivation by sex and area of residence. Italy, 1995.

Functioning	All	Female	Male	Area of residence		
				North	Centre	South-Islands
Health	*19.5*	*21.5*	*17.5*	*18.2*	*20.5*	*20.6*
Self-assessed general health condition	7.3	8.5	6.1	5.9	6.5	9.6
Chronic illnesses	16.4	18.3	14.4	15.3	16.9	17.4
Disabilities	5.8	5.8	5.7	4.8	7.4	6.1
Education	*8.6*	*11.3*	*5.7*	*5.2*	*7.0*	*13.6*
Highest educational qualification	8.6	11.3	5.7	5.2	7.0	13.6
Social relations	*7.5*	*8.3*	*6.7*	*6.8*	*5.7*	*9.3*
Close relatives (living on their own)	2.4	2.7	1.9	2.8	2.4	1.7
Telephone in the home	5.4	5.9	4.9	4.3	3.4	7.8
Labour market	*13.1*	*11.4*	*14.8*	*9.0*	*12.4*	*18.4*
Unemployment or first-job search	6.8	5.6	8.0	3.2	6.7	11.2
No job search because of difficulty	2.3	3.1	1.5	1.0	1.6	4.3
Concern about losing the employment	3.6	2.4	4.9	3.6	3.8	3.6
Overall satisfaction with job	2.1	1.7	2.6	2.2	2.3	2.0
Housing	*37.9*	*38.3*	*37.4*	*25.0*	*31.1*	*57.3*
Heating system	22.0	22.6	21.3	8.3	11.0	44.6
Floor area index	19.5	18.9	20.1	13.7	19.4	26.6
Quality's rating	9.6	10.4	8.9	6.8	7.9	14.0
Location's rating	6.7	7.0	6.4	4.8	6.1	9.4
Household's economic resources	*42.5*	*43.6*	*41.3*	*29.6*	*36.2*	*61.6*
Equivalent income	22.2	22.5	22.0	9.5	12.9	42.7
Equivalent expenditure for non-durables	15.3	15.6	15.0	4.7	6.6	32.8
End-of-year value of durables	19.4	20.8	17.9	11.0	16.3	31.3
End-of-year value of net wealth	23.3	24.1	22.6	18.6	21.0	30.3

Source: authors' elaboration on SHIW data for 1995.

Concerning other personal characteristics (see tables in appendix C), other findings are worth mentioning. First, for all functionings the largest proportion of deprived persons is among the elderly, except for the labour market indicators, which are instead worst for the young between 20 and 30 years. Second, low achievements in terms of housing and economic resources are more common among people living alone or in large households (5 or more), and among those living in metropolitan areas. Third, the relative number of functioning-poor is always declining as the unadjusted family income rises (Chart 1).[41]

---

[41] We preferred the unadjusted to the equivalent family income for the former is the standard classificatory variables in official SHIW publications. The very steep negative relationship between

Chart 1: Functioning-deprivation and unadjusted family income. Italy, 1995
(percentage values and million lire)
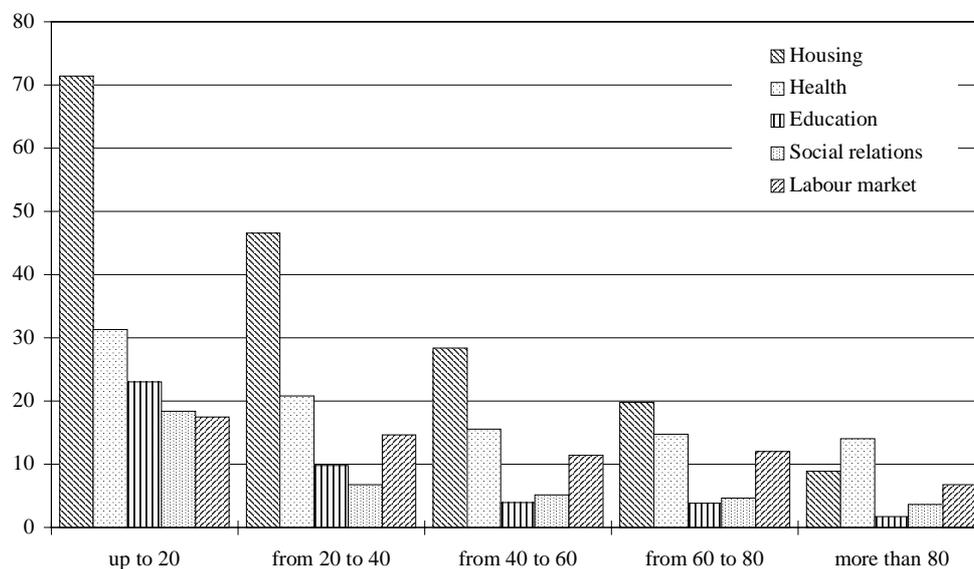
Source: authors' elaboration on SHIW data for 1995.

The correlation coefficients among the functioning indicators show low degrees of association. Most coefficients are, in absolute value, below 0.2; just a little stronger is the correlation between economic resources and housing, and between education and health, probably due to an age effect (table 11). The cross classification of the indicators shows more clearly the low redundancy of these aspects (table 12). Except for the correlated housing and economic resources, the contemporary presence of two deprivations is rare, suggesting that the indicators tend to capture complementary aspects.

Some general considerations are borne out by this simple descriptive analysis. In the first place, measures of functioning achievements have to be interpreted with the care required by their dependence on the choice of elementary indicators and the underlying measurement hypotheses; in this sense, the emphasis should be on the relative achievements of different population groups rather than on the absolute standing of each group. Second, the construction of functioning measures partly depends on the purpose at hand, as shown by the example of gender differences. Lastly, the low correlation between functioning measures confirms the usefulness of broadening the analysis to non-economic factors, though the negative relationship with

---

deprivation in terms of the economic resource indicators and unadjusted family income was not shown in chart 1.

family income indicates that the description based only on income may be partial but not necessarily distorted.

Table 11: Pearson correlation coefficients among deprivation indicators. Italy, 1995

	Health	Education	Labour market	Housing	Social relations	Economic resources
Health	1.00					
Education	0.25	1.00				
Labour market	-0.09	-0.03	1.00			
Housing	0.08	0.18	0.09	1.00		
Social relations	0.07	0.12	0.02	0.12	1.00	
Economic resources	0.10	0.18	0.09	0.40	0.08	1.00

Source: authors' elaboration on SHIW data for 1995.

Table 12: Paired relationships among deprivation indicators. Italy, 1995 (percentage values)

		Health		Education		Labour market		Housing		Social relations		Economic resources	
		ND	D	ND	D	ND	D	ND	D	ND	D	ND	D
Education	ND	76.3	15.1										
	D	4.1	4.5										
Labour market	ND	68.8	18.2	79.2	7.7								
	D	11.7	1.4	12.2	0.9								
Housing	ND	51.4	10.7	59.2	2.9	55.5	6.6						
	D	29.0	8.8	32.2	5.7	31.4	6.5						
Social relations	ND	75.2	17.3	85.4	7.1	80.6	11.9	59.0	33.6				
	D	5.3	2.2	6.0	1.5	6.4	1.1	3.1	4.3				
Economic resources	ND	48.1	9.4	55.1	2.4	51.5	6.0	45.4	12.1	54.3	3.2		
	D	32.4	10.2	36.3	6.2	35.4	7.1	16.7	25.8	38.3	4.3		
Total		80.5	19.5	91.4	8.6	86.9	13.1	62.1	37.9	92.5	7.5	57.5	42.5

Source and notes: authors' elaboration on SHIW data for 1995. Figures might not add up because of rounding. ND indicates "non deprivation", i.e. "satisfactory" functioning achievement; D indicates "deprivation".

4.3. Aggregative analysis with binary indicators

The indicators collected here can be aggregated into alternative global indexes of deprivation. First, following a suggestion by Bourguignon and Chakravarty (1997) and by analogy with the way we passed from elementary indicators to functioning measures, we identified the functioning-deprived with all persons who do not achieve the minimum level in at least one functioning: the index Z_B is the headcount poverty ratio in the space of functionings. By treating equally individuals who experience more than one hardship, this index fails, however, to capture the severity of deprivation. We therefore obtained two alternative measures by averaging across persons the sum of their scores for functionings (Z_1) and elementary indicators ($Z_{1,EI}$), respectively. Third, following Maasoumi (1986), we allowed for substitutability among functionings, by specifying an individual measure of deprivation as a CES transformation of the functionings and verifying the sensitivity of the results to changes in the free parameter β. (As the measures of the functionings are binary, the CES transformation has the only effect of raising to the power $1/\beta$ the value computed for each individual with $\beta=1$.) Finally, we derived $Z_{1,W}$ by replacing equal weighting with one in which the fewer the persons with a low achievement in a functioning, the larger the weight attributed to that functioning. Though the hypothesis may be intuitively appealing - compare the old Italian way of saying *mal comune, mezzo gaudio*, i.e. "common suffering, half happiness" - in practice it does not necessarily fare better than equal weighting or any explicit subjective judgement. Consider, for example, education and health in table 10. Since the shares of people with low achievements were 8.6 and 19.5 per cent, respectively, education insufficiency is valued more than health insufficiency. According to Desai and Shah's (1988) formula, education would be weighted over a tenth more than health (0.91 vs. 0.81); with the one by Cerioli and Zani (1990) the discrepancy would be more than one half (2.5 vs. 1.6). Whether education should be given a weight so much higher than health is certainly a matter of disagreement. In computing $Z_{1,W}$ we adopted Cerioli and Zani's (1990) formula because it amplifies the departure from equal weighting.

In table 13 we reported the absolute values of the average of each index and the standardised deviations from the national mean for the population groups defined by sex and area of residence (see tables C6-C7 for further breakdowns). All indexes consistently confirm the conclusion reached in the previous section: there is little evidence of a gender bias, while a clear ranking emerges among the three areas of the country. The relative distances among groups depend on the index: the difference between North and South is considerably increased replacing Z_B with Z_1, suggesting that not only the share of functioning-deprived is higher in the South, but also that the

occurrence of multiple deprivations is more frequent; the distance is further increased by moving to index $Z_{1,EI}$. The sensitivity to β differs among sub-groups: the relative distance between sexes goes up as β rises; it is hump-shaped, with the maximum difference for $\beta=1$, for geographical areas. Frequency weighting does not lead to substantially different results. The correlation among the indexes is rather high (table 14).

Table 13: Average functioning deprivation by sex and area of residence. Italy, 1995 (absolute values and standardised deviations from the mean)

Index	Characteristic of the index	All	Female	Male	Area of residence		
					North	Centre	South-Islands
Z_B	binary (at least one deprivation)	0.66 -	0.67 2.2	0.65 -2.3	0.55 -22.5	0.63 -5.5	0.80 30.3
$Z_{1,EI}$	sum of elementary indicators, equal weighting	1.9 -	2.0 3.3	1.9 -3.5	1.2 -33.7	1.5 -20.3	3.1 51.8
$Z_{1/3}$	sum of functionings, equal weighting, $\beta=1/3$	0.8 -	0.8 3.3	0.8 -3.5	0.7 -27.4	0.8 -8.4	1.0 37.8
$Z_{1/2}$	sum of functionings, equal weighting, $\beta=1/2$	0.9 -	0.9 3.7	0.9 -3.9	0.7 -28.7	0.8 -10.2	1.2 40.5
Z_1	sum of functionings, equal weighting, $\beta=1$	1.3 -	1.3 4.5	1.2 -4.8	0.9 -29.7	1.1 -13.7	1.8 43.5
Z_2	sum of functionings, equal weighting, $\beta=2$	3.1 -	3.3 5.1	2.9 -5.4	1.9 -26.3	2.4 -15.2	4.9 40.1
Z_3	sum of functionings, equal weighting, $\beta=3$	8.9 -	9.8 5.1	8.0 -5.4	5.0 -22.0	6.4 -14.3	15.1 34.4
$Z_{1,W}$	sum of functionings, frequency weighting	1.7 -	1.8 5.5	1.6 -5.9	1.3 -24.6	1.5 -11.4	2.4 36.1

Source: authors' elaboration on SHIW data for 1995.

Table 14: Pearson correlation coefficients among deprivation indexes. Italy, 1995

	Z_B	$Z_{1,EI}$	$Z_{1/3}$	$Z_{1/2}$	Z_1	Z_2	Z_3	$Z_{1,W}$
Z_B	1.00							
$Z_{1,EI}$	0.62	1.00						
$Z_{1/3}$	0.93	0.75	1.00					
$Z_{1/2}$	0.90	0.80	0.99	1.00				
Z_1	0.74	0.86	0.90	0.95	1.00			
Z_2	0.49	0.82	0.69	0.77	0.93	1.00		
Z_3	0.35	0.73	0.54	0.63	0.82	0.97	1.00	
$Z_{1,W}$	0.67	0.79	0.82	0.87	0.95	0.92	0.85	1.00

Source: authors' elaboration on SHIW data for 1995.

4.4. Further results on the North-South divide: the case of non-binary variables[42]

While in the previous sections we focused exclusively on binary indicators, we shall now examine the standard of living in the northern and central regions of Italy (*NC*) and in *Mezzogiorno* (*SI*) by means of two non-binary indicators: self-assessed health *h*, a categorical variable taking integer values from 1 to 5; and family's equivalent income *y*, aggregated into 31 classes. We shall use this example to investigate two techniques: sequential dominance analysis and multidimensional poverty indexes.

The main purpose of sequential dominance is to extend to the multidimensional case the possibility "... to make a partial ranking of distributions without knowledge of the precise form of the social welfare function" (Atkinson and Bourguignon, 1982: 183). Let us define the social welfare function *W* as the average standard of living of the population, as valued by the function $g(\boldsymbol{b})$, where $\boldsymbol{b} = (h, y)$.[43] Because of the discrete nature of *h*, we can write the social welfare function as

$$W = \sum_h p^h \int_y g^h(y)\varphi^h(y)dy$$

where p^h is the share in the population of people having health status *h*, $g^h(y)$ is the continuous valuation function of income when health is *h*, and $\varphi^h(y)$ is the probability

---

[42] In writing this section we greatly benefitted from an enlightening discussion with François Bourguignon.
[43] For notational simplicity, we dropped both sub-indexes *e* and *i* (dropping *i* means assuming that the valuation function is independent of personal characteristics). Notice that we are retaining the assumption that the social welfare function is additively separable and symmetric with respect to individuals. As in the one-dimension case (about which see Sen, 1973), additive separability might be relaxed.

distribution function of y conditional to h, $\Phi^h(y)$ being the corresponding cumulative distribution function.

The comparison of the conditional cumulative distribution functions gives a simple case of first-degree dominance, that is $\Phi^h_{NC}(y) < \Phi^h_{SI}(y)$ for each level of health and income (chart 2; Φ^1_{NC} and Φ^1_{SI} not shown). If the marginal distributions of the health condition were the same in the two areas (i.e. $p^h_{NC} = p^h_{SI}$ for all h), using the results by Atkinson and Bourguignon (1987) we could conclude that the living standard is higher in the Centre-North than in *Mezzogiorno*, provided that, for given health, well-being is non-decreasing with income, i.e. $g^h_y(y) \geq 0$ (the subscript y denotes derivative with respect to y). However, since the health marginal distributions differ, to rank the two geographical areas we need to take into account the population shares and to make an assumption about the interrelation between health and income.

Following Jenkins and Lambert (1993), the dominance condition when population shares differ is verified by comparing $\Psi^h_{NC} = \sum_{i \leq h} p^i_{NC} \Phi^i_{NC}$ with $\Psi^h_{SI} = \sum_{i \leq h} p^i_{SI} \Phi^i_{SI}$ for all $h=1,...,5$. If $\Psi^h_{NC} < \Psi^h_{SI}$ for all h and y, the living standard is assessed to be higher in the Centre-North by all conditional valuation functions $g^h(y)$ that are increasing and concave, and satisfy the following conditions:

(a) $g^1_y(y) \geq g^2_y(y) \geq ... g^5_y(y) \geq 0$, for all y;

(b) $g^1_{yy}(y) \leq g^2_{yy}(y) \leq ... g^5_{yy}(y) \leq 0$, for all y;

(c) $g^h(Y) = g^{h+1}(Y)$, for all h, where Y is the "maximum conceivable income level".

By condition (a), the worst the health status, the higher the marginal valuation of income, i.e. poor health implies greater needs. The dominance condition is not satisfied in our example, since the two functions Ψ^4_{NC} and Ψ^4_{SI} cross at an income level between 66 and 69 million lire (chart 3; Ψ^1_{NC} and Ψ^1_{SI} not shown), as a consequence of a share of persons in very good health slightly greater in *Mezzogiorno* than in the Centre-North (37.7 vs. 37.1).

To sum up, a standard univariate analysis of the distribution of equivalent incomes would lead us to rank the Centre-North ahead of *Mezzogiorno* in terms of well-being for a wide class of valuation functions (the first-degree dominance is evident from the bottom-right panel of chart 3). In the bi-variate case, we cannot find an unambiguous ranking of the two geographical areas, under the assumptions indicated above. Few comments are in order.

Chart 2: First-degree dominance comparison of Italian geographical areas, 1995
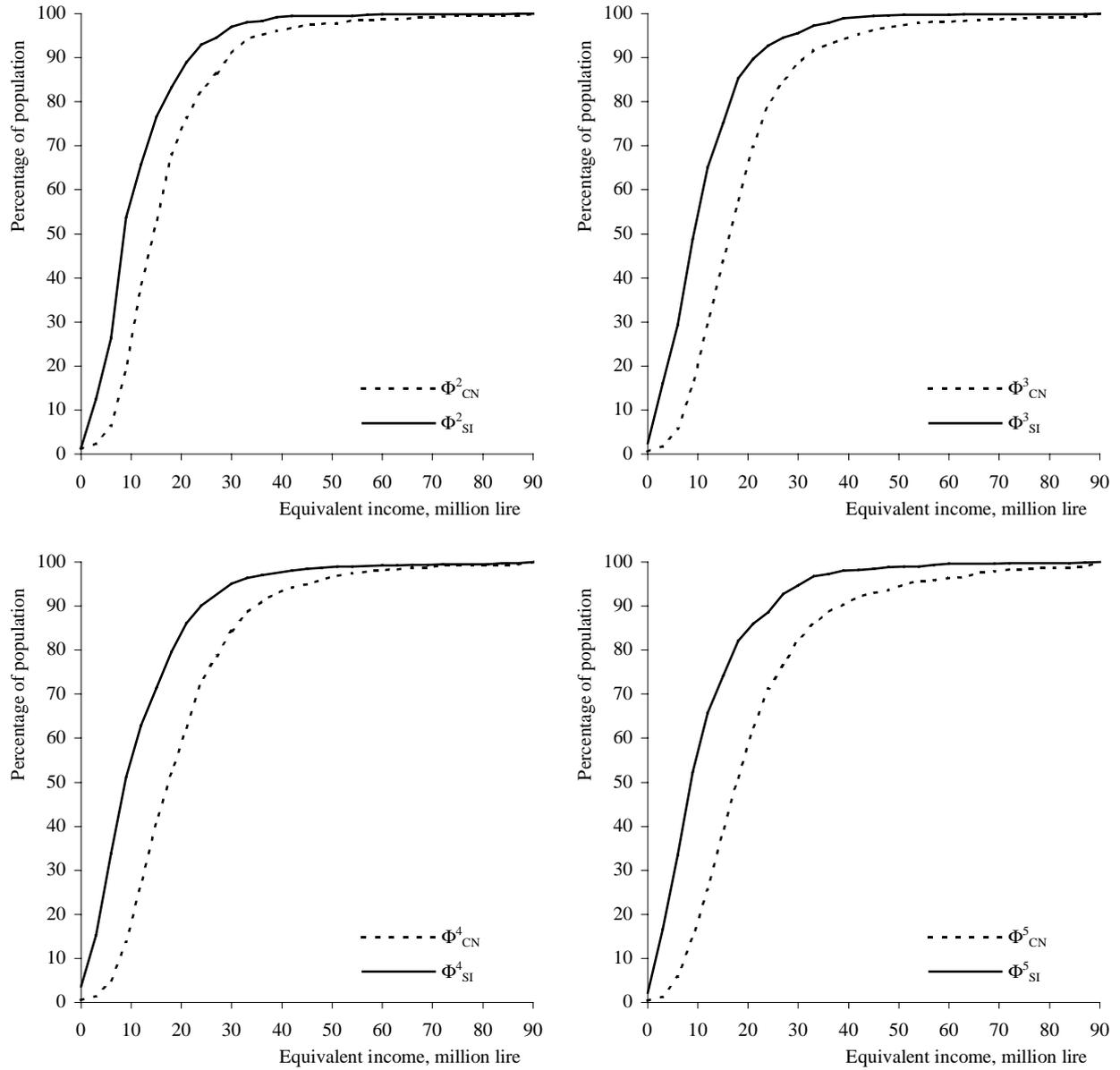
Source: authors' elaboration on SHIW data for 1995.

Chart 3: Jenkins and Lambert's dominance comparison of Italian geographical areas, 1995
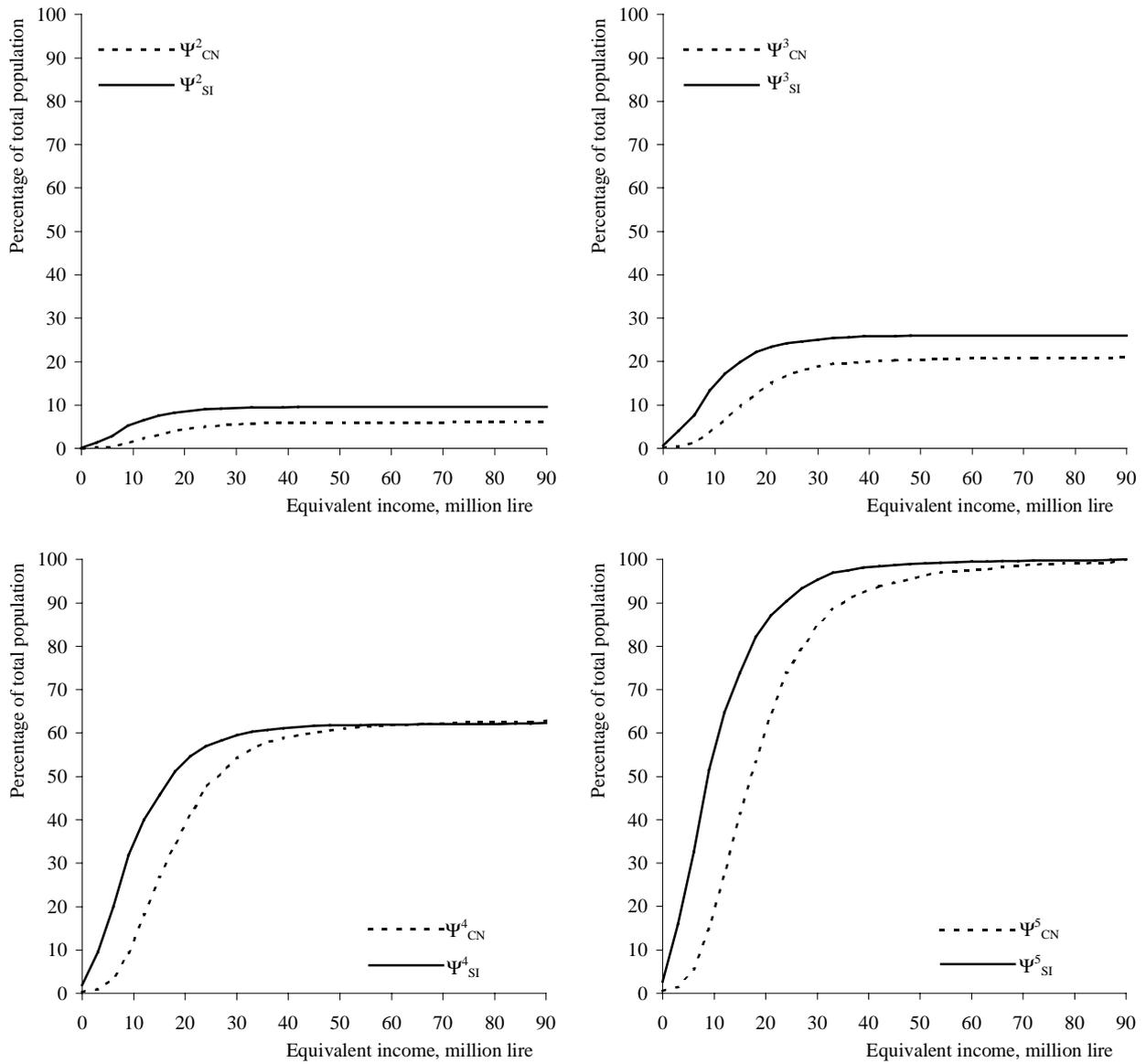
Source: authors' elaboration on SHIW data for 1995.

First, we should not put excessive emphasis on the substantive result both for the health indicator is rather crude, and because the difference between the two curves is small and likely to be within the bounds of sampling error, a point stressed also by Jenkins and Lambert (1993: 353). Second, the ranking of two situations with different marginal distributions of health requires that the valuation of the "maximum conceivable level of income" is the same for any health status (condition (c)). That there is an income so large that differences in needs become irrelevant may be reasonable in the original Jenkins and Lambert's framework, where needs essentially depend on family size, but it is rather debatable in our context. We are certainly not ready to argue that a billionaire in good shape has the same level of well-being of a billionaire affected by cancer, just because they are enormously rich. The point is that while the notion of needs refers to something that can be compensated by money, this is not true for health, because the possibility to alleviate or even eliminate health disadvantage by monetary transfers is not unlimited. This brings us to the third issue: the correspondence between "poor health" and "needs" depends on the external environment. In a society where ill and disabled people are universally and freely provided with the most sophisticated facilities and medical treatments, one could argue that an additional sum of money is less valuable to them than to a healthy person, since the latter has access to uses of the money that are precluded to them. In other words, in this society, condition (a) might be questioned on the grounds that income and health are complements rather than substitutes, or, taking h as continuous, $g_{yh}(y,h) \geq 0$ rather than $g_{yh}(y,h) \leq 0$. Notice that, in our example, with this alternative assumption Atkinson and Bourguignon's (1982) condition (5b) would be satisfied and the well-being in the Centre-North would be valued greater than in *Mezzogiorno*.

The picture is different if we look at poverty. Since the crossing between the two curves in chart 3 occurs at a level of income which is much higher than any reasonable poverty threshold, the data would support the conclusion that deprivation is higher in the southern regions, provided that the various assumptions are accepted. The same result is obtained by applying the multidimensional poverty indexes proposed by Bourguignon and Chakravarty (1997):[44] both the headcount measure - which equates poverty with the occurrence of at least one disadvantage - and all indexes confirm that poverty is higher in the South and the Islands than in the other regions (tables 15-16).

---

[44] For computational reasons, the income-poverty threshold was set differently from the previous sections, and results are not comparable.

Table 15: Functioning-deprivation in Italian geographical areas, 1995 (percentage values)

	Centre-North				South-Islands			
	Health-poor	Income-poor	Health/income-poor	Total	Health-poor	Income-poor	Health/income-poor	Total
Headcount	5.6	5.1	0.4	11.1	6.8	29.7	2.8	39.3

Source: authors' elaboration on SHIW data for 1995.

Table 16: Multidimensional poverty indexes P_1 and P_2 in Italian geographical areas, 1995 (percentage values)

		Centre-North		South-Islands		Percentage difference	
		$w_y=w_h=1$	$w_y=1, w_h=4$	$w_y=w_h=1$	$w_y=1, w_h=4$	$w_y=w_h=1$	$w_y=1, w_h=4$
α_y	α_h	P_1					
1	1	8.2	29.7	20.8	56.2	152.2	89.0
1	2	10.5	38.6	25.2	73.9	141.2	91.5
1	3	14.9	56.3	34.1	109.3	128.9	94.2
2	1	7.7	29.2	16.2	51.6	110.4	76.8
2	2	9.9	38.0	20.6	69.3	108.1	82.2
2	3	14.3	55.7	29.4	104.7	105.5	87.8
3	1	7.5	29.0	14.4	49.8	91.4	85.2
3	2	9.7	37.8	18.8	67.5	93.4	78.3
3	3	14.1	55.6	27.6	102.9	95.4	85.2
10	10	1,138	4,554	2,274	9,094	99.7	99.7
α		P_2, with $u(t)=u^2$					
0.25		43.19	706,649	322.18	1,844,964	646.0	161.1
0.50		11.78	2,473	37.60	4,809	219.1	94.5
0.75		10.43	383	25.52	700	144.6	82.9
1.00		10.12	151	22.66	272	124.0	79.8
1.50		9.95	60	21.05	108	111.6	80.0
2.00		9.90	38	20.60	69	108.1	82.2
3.00		9.87	24	20.34	45	106.1	86.5
10		9.85	13	20.24	25	105.5	98.0
100		9.85	10	20.24	21	105.5	104.7
1000		9.85	10	20.24	20	105.5	105.4
∞		9.85	10	20.24	20	105.5	105.5

Source: authors' elaboration on SHIW data for 1995.

References

Allardt, E., (1993). "Having, Loving, Being: An Alternative to the Swedish Model of Welfare Research". In Nussbaum and Sen (eds.) (1993), 88-94.

Atkinson, A. B., (1992). "Measuring Poverty and Differences in Family Composition". *Economica*, 59, 1-16.

Atkinson, A. B., (1996). "Promise and Performance: Why We Need and Official Poverty Report". In P. Barker, *Living as Equal*. Oxford: Oxford University Press.

Atkinson, A. B., and F. Bourguignon (1982). "The Comparison of Multi-Dimensioned Distributions of Economic Status". *Review of Economic Studies*, 49, 183-201.

Atkinson, A. B., and F. Bourguignon (1987). "Income Distribution and Differences in Needs". In G. R. Feiwel (ed.), *Arrow and the Foundations of the Theory of Economic Policy*. Basingstoke: Macmillan.

Balestrino, A., (1996). "A Note on Functioning-Poverty in Affluent Societies". *Notizie di Politeia*, 12, No. 43/44, 97-105.

Banca d'Italia (1997). "I bilanci delle famiglie italiane nell'anno 1995". *Supplementi al Bollettino Statistico*, 7 (n. s.), 14.

Basu, K., (1987a). "Achievements, Capabilities and the Concept of Well-Being. A Review of *Commodities and Capabilities* by Amartya Sen". *Social Choice and Welfare*, 4, 69-76.

Basu, K., (1987b). "Axioms for a Fuzzy Measure of Inequality". *Mathematical Social Sciences*, 14, 275-288.

Bliss, C., (1993). "Life-Style and the Standard of Living". In Nussbaum and Sen (eds.) (1993), 417-436.

Bourguignon, F., and S. R. Chakravarty (1997). "The Measurement of Multidimensional Poverty". Mimeo.

Bradburd, R. M., and D. R. Ross (1988). "A General Measure of Multidimensional Inequality". *Oxford Bulletin of Economics and Statistics*, 50, 429-433.

Brandolini, A., and L. Cannari (1994). "Methodological Appendix: The Bank of Italy's Survey of Household Income and Wealth". In A. Ando, L. Guiso and I. Visco (eds.), *Saving and the Accumulation of Wealth. Essays on Italian Households and Government Saving Behaviour*. Cambridge: Cambridge University Press.

Brandolini, A., and G. D'Alessio (1998). "Money-Metric Indicators of the Standard of Living". Mimeo.

Camera dei Deputati (1953). *Atti della Commissione parlamentare di inchiesta sulla miseria in Italia e sui mezzi per combatterla*. Roma: Camera dei Deputati.

Cao-Pinna, M., (1953). "Le classi povere". In Camera dei Deputati, *Atti della Commissione parlamentare di inchiesta sulla miseria in Italia e sui mezzi per combatterla. Vol. II: Indagini tecniche. Condizioni di vita delle classi misere*. Roma: Camera dei Deputati.

Cerioli, A., and S. Zani (1990). "A Fuzzy Approach to the Measurement of Poverty". In C. Dagum and M. Zenga (eds.), *Income and Wealth Distribution, Inequality and Poverty*. Berlin: Springer-Verlag.

Checchi, D., (1997). *Povertà ed istruzione: alcune riflessioni ed una proposta di indicatori*. Quaderno della Commissione di indagine sulla povertà e sull'emarginazione. Roma: Istituto Poligrafico e Zecca dello Stato.

Cheli, B., and A. Lemmi (1995). "A 'Totally' Fuzzy and Relative Approach to the Multidimensional Analysis of Poverty". *Economic Notes*, 24, 115-134.

Cheli, B., G. Ghellini, A. Lemmi and N. Pannuzi (1994). "Measuring Poverty in the Countries in Transition via TFR Method: The case of Poland in 1990-1991". *Statistics in Transition*, 1, 585-636.

Chiappero Martinetti, E., (1994). "A New Approach to Evaluation of Well-Being and Poverty by Fuzzy Set Theory". *Giornale degli economisti e Annali di economia*, 53 (n.s.), 367-388.

Chiappero Martinetti, E., (1996). "Standard of Living Evaluation Based on Sen's Approach: Some Methodological Suggestions". *Notizie di Politeia*, 12, No. 43/44, 37-53.

Converse, Jean M., and Stanley Presser (1986). *Survey Questions. Handcrafting the Standardized Questionnaire*. Newbury Park, CA: Sage Publications.

Dardanoni, V., (1995). "On Multidimensional Inequality Measurement". *Research on Economic Inequality*, 6, 201-207.

Desai, M., and A. Shah (1988). "An Econometric Approach to the Measurement of Poverty". *Oxford Economic Papers*, 40, 505-522.

Erikson, R., (1993). "Description of Inequality: The Swedish Approach to Welfare Research". In Nussbaum and Sen (eds.) (1993), 66-83.

Erikson, R., and H. Uusitalo (1987). "The Scandinavian Approach to Welfare Research". In R. Erikson, E. J. Hansen, S. Ringen and H. Uusitalo (eds.), *The Scandinavian Model. Welfare States and Welfare Research*. Armonk, NY: Sharpe.

Federman, M., and T. I. Garner, K. Short, W. B. Cutter IV, J. Kiely, D. Levine, D. McGough and M. McMillen (1996). "What Does It Mean to Be Poor in America?". *Monthly Labor Review*, 119, 5, 3-17.

Fluckiger, Y., and J. Silber (1994). "The Gini Index and the Measurement of Multidimensional Inequality". *Oxford Bulletin of Economics and Statistics*, 56, 225-228.

Foster, J. E., and A. K. Sen (1997). "*On Economic Inequality* after a Quarter Century". In A. K. Sen, *On Economic Inequality*. Expanded edition with a substantial annexe by J. E. Foster and A. K. Sen, 107-219. Oxford: Clarendon Press.

Frykman, T., (1987). "Housing Conditions". In R. Erikson and R. Åberg Erikson (eds.), *Welfare in Transition*, 180-192. Oxford: Clarendon Press.

Gaertner, W., (1993). "Commentary to: 'Amartya Sen: Capability and Well-Being'". In Nussbaum and Sen (eds.) (1993), 62-66.

Hirschberg, J. G., Maasoumi E., and D. J. Slottje (1991). "Cluster Analysis for Measuring Welfare and Quality of Life Across Countries", *Journal of Econometrics*, 50, 131-150.

Il Sole-24 Ore (1997). "Dossier. Il check-up delle province". *Il Sole-24 Ore*, 29/12/1997, 9-20.

Istat (1953). "Rilevazione speciale sulle condizioni di vita della popolazione e indagine sui bilanci di famiglie povere". In Camera dei Deputati, *Atti della Commissione parlamentare di inchiesta sulla miseria in Italia e sui mezzi per combatterla. Vol. II: Indagini tecniche. Condizioni di vita delle classi misere*. Roma: Camera dei Deputati.

Jenkins, S. P., and P. J. Lambert (1993). "Ranking Income Distributions When Needs Differ". *Review of Income and Wealth*, 39, 337-356.

Kanbur, R., (1987). "The Standard of Living: Uncertainty, Inequality and Opportunity". In Sen (1987), 59-69.

Kendall, M., (1975). *Multivariate Analysis*. London: Griffin.

Kolm, S.-C., (1977). "Multidimensional Egalitarianisms". Quarterly Journal of Economics, 91, 1-13.

Lemmi, A., B. Cheli and B. Mazzolli (1996). "La misura multidimensionale della povertà in Italia nella prima metà degli anni 90". Mimeo. Siena: Centro di Ricerca Interdipartimentale sulla Distribuzione del Reddito.

Livi Bacci, M., (1993). *Popolazione e alimentazione. Saggio sulla storia demografica europea*. 2nd edition. Bologna: Il Mulino.

Maasoumi, E., (1986). "The Measurement and Decomposition of Multi-Dimensional Inequality". *Econometrica*, 54, 991-997.

Maasoumi, E., (1989). "Continuously Distributed Attributes and Measures of Multivariate Inequality". *Journal of Econometrics*, 42 (Annals 1989-1993), 131-144.

Maasoumi, E., and G. Nickelsburg (1988). "Multivariate Measures of Well-Being and an Analysis of Inequality in the Michigan Data". *Journal of Business & Economic Statistics*, 6, 327-334.

Mack, J., and S. Lansley (1985). *Poor Britain*. London: Allen and Unwin.

Marshall, A., (18..). *Principles of Economics*.

Mayer, S. E., (1993). "Living Conditions among the Poor in Four Rich Countries". *Journal of Population Economics*, 6, 261-286.

Mayer, S. E., and C. Jencks (1989). "Poverty and the Distribution of Material Hardship". *Journal of Human Resources*, 21, 88-113.

Mayer, S. E., and C. Jencks (1993). "Recent Trends in Economic Inequality in the United States: Income versus Expenditures versus Material Well-being". In D. B. Papadimitriou and E. N. Wolff (eds.), *Poverty and Prosperity in the USA in the late Twentieth Century*. Basingstoke: Macmillan.

Muellbauer, J., (1987). "Professor Sen on the Standard of Living". In Sen (1987), 39-58.

Nolan, B., and C. T. Whelan (1996a). *Resources, Deprivation, and Poverty*. Oxford: Clarendon Press.

Nolan, B., and C. T. Whelan (1996b). "The Relationship Between Income and Deprivation: A Dynamic Perspective". *Revue économique*, 3, 709-717.

Nussbaum, M. C., (1988). "Nature, Function, and Capability: Aristotle on Political Distribution". *Oxford Studies in Ancient Philosophy*, suppl. vol., 145-184.

Nussbaum, M. C., (1990). "Aristotelian Social Democracy". In R. B. Douglass, G. Mara and H. Richardson (eds.), *Liberalism and the Good*, 203-252. New York: Routledge.

Nussbaum, M. C., (1993). "Non-Relative Virtues: An Aristotelian Approach". In Nussbaum and Sen (eds.) (1993), 242-269.

Nussbaum, M. C., and A. K. Sen (eds.) (1993). *The Quality of Life*. Oxford: Clarendon Press.

O'Flaherty, B., (1996). *Making Room: The Economics of Homelessness*. Cambridge, Mass.: Harvard University Press.

Ok, E., (1995). "Fuzzy Measurement of Income Inequality: A Class of Fuzzy Inequality Measures". *Social Choice and Welfare*, 12, 111-136.

Ok, E., (1996). "Fuzzy Measurement of Income Inequality: Some Possibility Results on the Fuzzification of the Lorenz ordering". *Economic Theory*, 7, 513-530.

Piachaud, D., (1981). "Peter Townsend and the Holy Grail". *New Society*, 57, No. 982, 419-21.

Pollak, R. A., and T. J. Wales (1979). "Welfare Comparisons and Equivalence Scales". *American Economic Review Papers and Proceedings*, 69, 216-21.

Radner, D. B., (1997). "Noncash Income, Equivalence Scales, and the Measurement of Economic Well-Being". *Review of Income and Wealth*, 43, 71-88.

Ram, R., (1982). "Composite Indices of Physical Quality of Life, Basic Needs Fulfilment, and Income. A 'Principal Component' Representation". *Journal of Development Economics*, 11, 227-247.

Rietveld, P., (1990). "Multidimensional Inequality Comparisons: On Aggravation and Mitigation of Inequalities". *Economics Letters*, 32, 187-192.

Ruffolo, G., (1954). "The Italian Parliamentary Enquiry into Poverty". *Banca Nazionale del Lavoro Quarterly Review*, 7, 52-57.

Schokkaert, E., and L. Van Ootegem (1990). "Sen's Concept of the Living Standard applied to the Belgian Unemployed". *Recherches Economiques de Louvain*, 56, 429-450.

Sen, A. K., (1973). *On Economic Inequality*. Oxford: Clarendon Press.

Sen, A. K., (1978). "Ethical Measurement of Inequality: Some Difficulties". In W. Krelle and A. F. Shorrocks (eds.), *Personal Income Distribution*. Amsterdam: North-Holland.

Sen, A. K., (1980). "Equality of What?". In S. M. McMurrin (ed.), *Tanner Lectures on Human Values*, i. Salt Lake City: University of Utah Press. Reprinted in A. K. Sen, *Choice, Welfare and Measurement*. Oxford: 1982, Blackwell.

Sen, A. K., (1984). "The Living Standard". *Oxford Economic Papers*, 36 (n.s.), Supplement, 74-90.

Sen, A. K., (1985). *Commodities and Capabilities*. Amsterdam: North Holland.

Sen, A. K., (1987). *The Standard of Living*. With contributions by J. Muellbauer, R. Kanbur, K. Hart and B. Williams. Edited by G. Hawthorn. Cambridge: Cambridge University Press.

Sen, A. K., (1992). *Inequality Reexamined*. Oxford: Clarendon Press.

Sen, A. K., (1993). "Capability and Well-Being". In Nussbaum and Sen (eds.) (1993), 30-53.

Sen, A. K., (1997). "Maximization and the Act of Choice". *Econometrica*, 65, 745-779.

Sen, A. K., (1998). "Mortality as an Indicator of Economic Success and Failure". *Economic Journal*, 108, 1-25.

Sharma, S., (1996). *Applied Multivariate Techniques*. New York: Wiley.

Srinivasan, T. N., (1994). "Human Development: A New Paradigm or Reinvention of the Wheel?". *American Economic Review Papers and Proceedings*, 84, 238-243.

Streeten, P., (1994). "Human Development: Means and Ends". *American Economic Review Papers and Proceedings*, 84, 232-237.

Sugden, R., (1993). "Welfare, Resources, and Capabilities: A Review of *Inequality Reexamined* by Amartya Sen". *Journal of Economic Literature*, 31, 1947-1962.

Townsend, P., (1979). *Poverty in the United Kingdom: A Survey of Household Resources and Standards of Living*. Harmondsworth: Penguin.

Tsui, K.-Y., (1995). "Multidimensional Generalizations of the Relative and Absolute Inequality Indices: The Atkinson-Kolm-Sen Approach". *Journal of Economic Theory*, 67, 251-265.

UNDP (1995). *Human Development Report*. New York and Oxford: United Nations Development Programme and Oxford University Press.

van Doorslaer, E., A. Wagstaff, H. Bleichrodt, S. Calonge, U.-G. Gerdtham, M. Gerfin, J. Geurts, L. Gross, U. Hakkinen, R. E. Leu, O. O'Donnell, C. Propper, F. Puffer, M. Rodriguez, G. Sundberg and O. Winkelhake (1997). "Income-Related Inequalities in Health: Some International Comparisons". *Journal of Health Economics*, 16, 93-112.

van Praag, B. M. S., (1993). "The Relativity of the Welfare Concept". In Nussbaum and Sen (eds.) (1993), 362-85.

Wilkinson, R. G., (1996). *Unhealthy Societies. The Afflictions of Inequality*. London: Routledge.

Williams, B., (1987). "The Standard of Living: Interests and Capabilities". In Sen (1987), 94-102.

Appendix A: Multidimensional Studies of Deprivation

The identification of functionings parallels the problem of identifying "necessities" in studies of multidimensional deprivation. That necessities are contingent upon social, historical and geographical factors is widely agreed. In his *Principles of Economics*, Alfred Marshall stated that "every estimate of necessaries must be relative to a given place and time" and then continued by listing the necessities of a worker in the England of his time: "a well-drained dwelling with several rooms, warm clothing, with some changes of underclothing, pure water, a plentiful supply of cereal food, with a moderate allowance of meat and milk, and a little tea, etc., some education and some recreation, and lastly, sufficient freedom for his wife from other work to enable her to perform her maternal and her household duties" (Marshall, 18..). As this quotation makes it clear, even for food, whose necessity is hardly disputable, there is substantial leeway in defining which specific items are to be included. Tea has little nutrient value, but it was nonetheless seen by Marshall as a necessity because deep-rooted in the habits of the English people. On the other hand, there is a true difficulty in finding more objective criteria, in the light of the large interpersonal variations of needs as well as of nutritionists' discordant views about minimum dietary requirements (Livi Bacci, 1993, chapter 2).

The identification of necessities requires therefore an explicit evaluation exercise, in the light of the availability of data. Possible criteria are to regard as necessities those commodities which are reputed to be necessary by the observer (*objective criterion*) or by some significant proportion of the people (*consensus criterion*), or that are actually possessed by some significant proportion of the people (*frequentistic criterion*). For instance, Mayer and Jencks' (1993: 153) remarked that "societies seldom define an item as a 'necessity' until most middle-income households have it".

Federman *et al.* (1996: 12) focused on nine hardships on the grounds that each of them "... is relatively rare in the overall U.S. population and represents an element of material well-being important in day-to-day life in this country that has been forgone". Mayer and Jencks (1989) had information about ten hardship indicators and examined the eight that turned out to be significant in the regression of people's satisfaction with their own living standard against the ten indicators. Mack and Lansley (1985) and Nolan and Whelan (1996a, b) collected information on whether a number of separate items were regarded as necessities by people interviewed, and whether the lack of any one of them was due to their not being able to afford it rather than to their own choice. Whilst Mack and Lansley used both pieces of information, Nolan and Whelan focused on "enforced lack" only.

Despite methods of selection may differ, the items examined in the literature are largely overlapping and tend to include food and clothes availability, ownership of house and consumer durable goods, housing conditions, recreational and relational activities, health status and use of health care services. Some examples are given in the following tables A1-A4.

Table A1: Townsend's deprivation index. Great Britain, 1968-69

Characteristic	Percentage of population not having the characteristic
Has not had a week's holiday away from home in last 12 months	53.6
Has not had a relative or friend to home for a meal or snack in last 4 weeks (adults only)	33.4
Has not been out in last 4 weeks to a relative or friend for a meal or snack (adults only)	45.1
Has not had a friend to play or to tea in the last 4 weeks (children only)	36.3
Did not have party on last birthday (children only)	56.6
Has not had an afternoon or evening out for entertainment in the last 2 weeks	47.0
Does not have fresh meat (including meals out) as many as 4 days a week	19.3
Has gone through one or more days in the past fortnight without a cooked meal	7.0
Has not had a cooked breakfast most days of the week	67.3
Household does not have a refrigerator	45.1
Household does not usually have a Sunday joint (3 in 4 times)	25.9
Household does not have sole use of 4 amenities indoors (flush WC; sink or washbasin and cold-water tap; fixed bath or shower; gas or electric cooker)	21.4

Source: Townsend (1979: 250).

Table A2: The lack of socially perceived necessities. Great Britain, 1983

Standard-of-living items	Percentage of respondents classing item as necessity	Percentage of population having the item (1)	Percentage of population unable to afford item (1)	Percentage of population not wanting item (1)
Necessities (2)				
Heating to warm living areas of the home	97	92	6	0
Indoor toilet (not shared)	96	98	1	0
Damp-free home	96	85	8	2
Bath (not shared)	94	97	2	0
Beds for everyone in the household	94	97	1	1
Public transport for one's needs	88	87	3	6
A warm water-proof coat	87	88	7	3
Three meals a day for children (3)	82	90	4	3
Self-contained accommodation	79	93	3	3
Two pairs of all-weather shoes	78	84	11	4
Bedroom for each child over 10 of different sex (3)	77	76	10	7
Refrigerator	77	96	1	1
Toys for children (3)	71	92	3	2
Carpets in living rooms and bedrooms	70	97	2	1
Celebrations on special occasions such as Christmas	69	93	4	2
A roast meat joint or its equivalent once a week	67	87	7	5
A washing machine	67	89	5	4
New, not second-hand, clothes	64	85	8	5
A hobby or leisure activity	64	77	9	12
Two hot meals a day (for adults)	64	81	4	14
Meat or fish every other day	63	81	9	8
Presents for friends or family once a year	63	90	5	3
A holiday away from home for one week a year	63	68	23	7
Leisure equipment for children (3)	57	79	13	4
A garden	55	88	5	5
A television	51	98	0	1
Other items				
A 'best outfit' for special occasions	48	78		
A telephone	43	82		
An outing for children once a week (3)	40	58		
A dressing gown	38	84		
Children's friends round for tea once a fortnight (3)	37	60		
A night out once a fortnight (adults)	36	57		
Friends/family round for a meal once a month	32	64		
A car	22	61		
A packet of cigarettes every other day	14	39		

Source: Mack and Lansley (1985: 54, table 3.1; 66, table 3.3; 89, table 4.1).
Notes: (1) The responses are weighted by the number of household members. The three columns are from 2 distinct tables: no reason is given why the sums by row do not add up to 100. (2) Necessities are the items so classified by the majority of the respondents. (3) For families with children under 16 only.

Table A3: Questions and Coding for Ten Hardships. Chicago, 1983 and 1985

Variable	Question	Code
Couldn't afford food	Has there been a time in the last year when you needed food but couldn't afford to buy it or couldn't get out to get it?	1 → yes, couldn't afford it 0 → otherwise
Less than thrifty food budget of the US Dept. of Agriculture	A) Counting both cash and any food stamps that you might get, about how much do you and your family spend each week on groceries? B) Thinking about yourself and the other people that you buy groceries for, could you guess about how much all of you spend in an average week on eating out, including breakfasts, lunches, dinners and snacks?	1 → if A+B/3 < thrifty food budget 0 → otherwise
Rent unpaid	In the last two years has there been a time when you couldn't afford a place to stay or when you couldn't pay the rent?	1 → yes 0 → no, incl. homeowners
Crowded	How many rooms are there in your home, not counting bathrooms?	1 → rooms < members 0 → otherwise
Evicted	Have been evicted from your home in the past two years for not being able to pay your rent?	1 → yes 0 → no
Utilities off	Has your gas or electricity been turned off for not paying the bill any time during the last two years?	1 → yes 0 → no
Housing problems	Now I'm going to name some problems with housing that sometimes cause people difficulty. Do any of these things cause you difficulty now? 1) A leaky roof or ceilings? 2) A toilet, hot water heater or other plumbing that doesn't work right? 3) Rats, mice, roaches or other insects? 4) Broken windows? 5) A heating system that doesn't work properly? 6) Exposed wires or other electrical problems? 7) A stove or refrigerator that doesn't work properly? For each "yes": Would you say that this hasn't been taken care of due to the high cost involved, lack of time, a problem with the landlord, or some other reason?	1 → if two or more problems due to cost or landlord 0 → otherwise
No insurance	Is everyone in your household covered by health insurance such as Medicare, Medicaid, Veteran's benefits, Blue Cross, Prudential, an HMO, or any other program?	1 → no 0 → yes
Unmet medical needs	Has there been any time in the last year when you or anyone else in your family needed to see a doctor or go to the hospital but didn't go? If "yes": Was that because of lack of money, lack of time, because you didn't know who to see or what?	1 → yes, because of lack of money 0 → otherwise
Unmet dental needs	Has there been any time in the last year when you or anyone else in your family needed to see a dentist but didn't go? If "yes": Was that because of lack of money, lack of time, because you didn't know who to see, because you are afraid of the dentist or some other reason?	1 → yes, because of lack of money 0 → otherwise

Source: Mayer and Jencks (1989: 92-94, table 1).

Table A4: Life-Style Deprivation Indicators. Ireland, 1987

Socially defined necessities	Basic life-style deprivation	Secondary life-style deprivation	Housing deprivation
Basic items			
No days without a substantial meal in previous week	0.89	0.09	0.20
Never been without heating in last year for lack of money	0.81	0.33	0.11
No arrears on rent or utilities bills, no debt or pawning to meet ordinary living expenses, no assistance from a charity	0.76	0.25	0.04
Warm waterproof overcoat	0.76	0.16	0.42
Two pairs of strong shoes	0.75	0.25	0.38
Meal with meat, chicken or fish every second day	0.74	0.30	0.40
New not second-hand clothes	0.74	0.30	0.29
A roast meat joint or equivalent once a week	0.73	0.33	0.25
Secondary items			
A week's annual holiday away from home	0.39	0.69	0.01
Telephone	0.25	0.65	0.28
Car	0.26	0.60	0.20
Central heating in the house	0.19	0.59	0.40
Able to save regularly	0.49	0.54	0.18
A daily newspaper	0.48	0.50	0.11
A hobby or leisure activity	0.59	0.44	0.08
Presents for friends or family once a year	0.58	0.44	0.20
Afford afternoon or evening out in last fortnight	0.43	0.38	0.08
Housing items			
Bath or shower	0.17	-0.01	0.99
An indoor toilet in the dwelling	0.16	-0.01	0.98
Washing machine	0.02	0.46	0.63
Refrigerator	0.26	0.23	0.62
Colour television	0.21	0.30	0.53
A dry damp-free dwelling	0.27	0.30	0.47
Heating for the living room when it is cold	0.48	0.25	0.30

Source: Nolan and Whelan (1996a: 88, table 4.8) or (1996b: 712, table 2).

Appendix B: Questions About Quality of Life[45]

Health

I would now like to discuss the health of the members of the household.

A14. In general terms, would you describe the <u>health</u> of ..... *(name)* at the end of 1995 as very good (5), good (4), neither good nor bad (3), bad (2), very bad (1)?

A15. At the end of 1995 did ..... *(name)* suffer from any <u>chronic illnesses</u>? (*Show card*)

A16. At the end of 1995 did .... *(name)* suffer from any form of <u>disability</u>? (*Show card*)

Education

A11. Educational <u>qualification</u>: *(Give highest qualification earned)*
- none
- elementary school
- middle school
- professional secondary school diploma (3 years of study)
- high school
- associate's degree or other short course university degree
- bachelor's degree
- post-graduate qualification

Employment

B13. Has. ... *(name)* <u>ever lost a job</u> at any time in his/her life and remained unemployed for at least 6 consecutive months? *(N.B. not when a first-job seeker)*

B14. Has ... *(name)* ever been on <u>wage supplementation</u> at 0 hours[46] for at least 6 consecutive months?

For members who at some time in their lives have been unemployed or on wage supplementation at 0 hours for at least 6 consecutive months.

B15. I shall now ask some questions that you should answer with a score of from 1 to 5, where 1 is a low rating and 5 a high one (2,3,4 are intermediate ratings). When you were unemployed or on wage supplementation, as compared with when you were working, ... (*)
- your role in the family is/was
- your health is/was
- your ability to have relationships with other people is/was
- your confidence in yourself is/was
- your ability to exploit your free time is/was
- overall, apart from the economic aspect, you feel/felt yourself to be

For all employed members.

B20. I shall now ask some questions that you should answer with a score of from 1 to 5, where 1 is a low rating and 5 a high one (2,3,4 correspond to intermediate ratings). How do you judge your work as regards ... (*)
- environmental conditions (physical and social)
- dangerousness for life or health

---

[45] The original questionnaire number is reported before each question.
[46] The wage supplementation is a form of paid temporary layoff.

- demandingness
- interestingness
- consideration by others
- concern about losing your employment
- overall satisfaction, apart from the economic aspect

(*) Question directed to the individual members of the household. In the event of a member being absent, contact him/her by phone.

B04. In 1995 did ..... *(name)* do anything to find employment (temporary or otherwise) or to change his/her employment?

(If not employed or a pensioner)

B05. Can you tell me why you did not look for employment? (*Do not prompt*)
- for family reasons:
  - to look after members of the household (children, old people)
  - to have more time to spend with the family
  - other family reasons
- because the household's income was sufficient
- because it would not have been worthwhile economically
- because of the difficulty of finding work
- for health/disability reasons
- because I was waiting for public competitive exams
- because I was studying
- because I was doing/waiting to do military service
- other *(specify)*

Housing

D23. How do you rate the area in which this dwelling is located? Is it ...?*(One answer only)*
- upscale	1
- run-down	2
- neither upscale nor run-down	3
- other *(specify)*	4

D24. How do you rate this dwelling? Luxury, etc. *(One answer only)*
- luxury	1
- upscale	2
- mid-range	3
- modest	4
- low-income	5
- very low-income	6

D25. What is the <u>surface area</u> (in m^2) of this house/apartment (consider usable area)?

D29. Does the dwelling have a <u>heating system</u> (either independent or centralised)?

Social relationships

A23. Were your <u>parents</u> still alive at 31.12.1995?

A24. Did you have <u>brothers</u> or <u>sisters</u> who *were not* residing with you at 31.12.1995?

A25. *(If "Yes")*: How many brothers? How many sisters?

A26. Did you have <u>children</u> who did not reside with you at 31.12.1995?

A27. *(If "Yes")*: How many children?

Economic resources

We shall now talk about the <u>spending</u> of your household in 1995 on both food and non-food consumption.

E01. What was the <u>monthly average spending</u> of your household in 1995 on all consumer goods? Include spending in cash, by means of credit cards, cheques, Bancomat cards, etc. Consider all spending, on both food and non-food consumption, and *exclude* only that on: extraordinary maintenance of your dwelling, mortgage payments, purchases of precious objects, purchases of cars, household appliances and furniture, rent for the dwelling, life insurance premiums and contributions to private pension funds.

E02. What instead is the <u>monthly average figure</u> for <u>just food consumption</u>? Consider spending on food products in supermarkets and the like and the spending on meals eaten <u>regularly</u> outside the home.

(Warning! Control consistency with the income declared by the interviewee!)

E07. Can you give an estimate, even if only rough, of all the goods possessed by the household at the end of 1995 in the following categories: precious objects, means of transport, furniture/furnishings/ household appliances?

(If necessary, suggest: Think of what you would have received if you had sold them in 1995.)

- <u>precious objects</u> (jewellery, old and gold coins, works of art, antiques, including antique furniture)
- <u>means of transport</u> (cars, motorbikes, caravans, motorboats, boats, bicycles)
- <u>furniture, furnishings, household appliances and sundry articles</u> (furniture, furnishings, carpets, lamps, small household appliances, washing machines, dishwashers, vacuum cleaners, floor polishers, televisions, PCs, refrigerators, cookers, heaters, air conditioners, HI-FI equipment, radios, tape recorders, CD players, mobile phones, fax machines, cameras, camcorders, etc.)

Appendix C: Functioning Deprivation in Italy, 1995

Table C1: Health deprivation. Italy, 1995 (percentage of individuals)

Person's characteristic	Self-assessed general health condition	Chronic illnesses	Disabilities	At least one
Sex				
male	6.1	14.4	5.7	17.5
female	8.5	18.3	5.8	21.5
Age				
up to 10 years	0.8	2.8	0.4	3.5
from 10 to 20 years	0.9	4.2	0.9	5.0
from 20 to 30 years	1.1	4.5	1.4	5.6
from 31 to 40 years	2.6	8.6	2.6	10.7
from 41 to 50 years	5.0	13.2	3.7	16.4
from 51 to 65 years	9.4	25.1	7.4	29.1
more than 65 years	27.9	48.1	21.0	57.1
Education				
none	15.6	22.8	10.5	27.5
elementary school	11.9	25.1	9.9	30.1
middle school	3.5	11.8	3.4	13.8
high school	2.0	8.7	1.3	10.1
bachelor's degree	2.4	11.5	2.1	13.3
Branch of activity				
agriculture	2.6	12.5	2.7	14.7
industry	2.6	7.4	2.2	9.7
public administration	2.1	9.6	1.9	11.9
other sectors	1.7	10.4	2.2	11.9
none	10.1	20.2	7.7	23.9
Work status				
blue-collar workers	3.0	8.7	2.7	11.0
office workers, school teachers	1.6	8.4	1.4	10.2
cadres, managers, professors	1.0	10.3	0.8	11.7
total employee	2.2	8.8	2.0	10.8
employers, professionals	0.9	9.9	2.7	12.2
other self-employed	2.4	11.2	2.8	13.3
total self employed	2.0	10.8	2.7	13.0
retired	23.7	42.5	19.5	50.8
other unoccupied	2.6	7.9	1.2	9.1
total unoccupied	10.1	20.2	7.7	23.9
Household size				
1 member	25.0	40.7	17.4	50.0
2 members	15.9	31.3	11.1	36.7
3 members	5.9	14.6	5.2	17.0
4 members	2.6	9.2	2.5	11.1
5 members or more	4.2	10.1	3.7	12.4
Number of earners				
1 earner	8.0	16.8	5.0	20.0
2 earners	7.0	15.8	5.5	18.8
3 earners	6.8	17.3	6.8	20.3
4 earners or more	7.7	16.6	9.5	20.8
Unadjusted family income				
up to 20 millions	17.5	24.7	10.0	31.3
from 20 to 40 millions	8.0	17.8	6.5	20.8
from 40 to 60 millions	4.1	13.2	4.4	15.6
from 60 to 80 millions	4.1	12.6	4.7	14.8
more than 80 millions	2.6	12.4	2.4	14.1
Town size				
up to 20,000 inhabitants	8.1	14.7	6.7	18.3
from 20,000 to 40,000 inhabitants	6.5	15.8	4.3	18.2
from 40,000 to 500,000 inhabitants	7.1	19.1	5.2	22.3
more than 500,000 inhabitants	5.8	17.7	4.9	19.7
Geographical area				
North	5.9	15.3	4.8	18.2
Centre	6.5	16.9	7.4	20.5
South and Islands	9.6	17.4	6.1	20.6
Total	*7.3*	*16.4*	*5.8*	*19.5*

Source: authors' elaboration on SHIW data for 1995.

Table C2: Education and social relations deprivation. Italy, 1995 (percentage of individuals)

Person's characteristic	Education	Social relations		
		Close relatives	Telephone in home	At least one
Sex				
male	5.7	1.9	4.9	6.7
female	11.3	2.7	5.9	8.3
Age				
up to 10 years	0.0	0.5	5.4	5.9
from 10 to 20 years	2.1	1.5	3.6	5.1
from 20 to 30 years	4.8	1.9	5.3	7.0
from 31 to 40 years	7.1	1.3	5.3	6.6
from 41 to 50 years	2.5	1.8	3.9	5.6
from 51 to 65 years	9.9	2.4	4.1	6.4
more than 65 years	29.2	6.3	9.8	14.9
Education				
none	41.0	1.8	9.8	10.9
elementary school	6.8	2.5	6.3	8.5
middle school	0.0	2.2	4.4	6.5
high school	0.0	2.5	3.2	5.6
bachelor's degree	0.0	3.8	1.6	5.4
Branch of activity				
agriculture	10.7	0.3	6.2	6.5
industry	3.3	1.4	4.2	5.5
public administration	0.2	2.3	2.7	5.0
other sectors	3.0	2.5	3.8	6.3
none	11.7	2.6	6.3	8.4
Work status				
blue-collar workers	5.3	1.8	5.0	6.6
office workers, school teachers	0.0	2.1	2.7	4.8
cadres, managers, professors	0.5	1.5	2.5	4.0
total employee	2.6	1.9	3.8	5.6
employers, professionals	0.5	2.2	1.5	3.8
other self-employed	4.1	2.2	4.6	6.9
total self employed	3.1	2.2	3.8	6.0
retired	24.1	4.9	8.1	12.2
other unoccupied	4.9	1.2	5.2	6.4
total unoccupied	11.7	2.6	6.3	8.4
Household size				
1 member	25.3	8.0	17.3	22.8
2 members	15.5	3.2	8.1	10.8
3 members	6.2	2.4	3.1	5.5
4 members	4.1	1.1	4.2	5.2
5 members or more	8.2	2.0	4.3	6.2
Number of earners				
1 earner	9.6	1.9	7.8	9.2
2 earners	7.5	2.0	4.6	6.4
3 earners	9.4	3.2	3.6	6.7
4 earners or more	9.9	5.8	2.8	8.6
Unadjusted family income				
up to 20 millions	23.1	3.7	15.9	18.4
from 20 to 40 millions	9.8	1.8	5.1	6.8
from 40 to 60 millions	4.0	2.2	3.0	5.2
from 60 to 80 millions	3.9	2.4	2.3	4.7
more than 80 millions	1.7	2.4	1.3	3.7
Town size				
up to 20,000 inhabitants	10.6	2.3	6.6	8.5
from 20,000 to 40,000 inhabitants	7.4	1.5	3.5	4.9
from 40,000 to 500,000 inhabitants	7.4	2.5	4.3	6.6
more than 500,000 inhabitants	5.0	3.2	5.4	8.2
Geographical area				
North	5.2	2.8	4.3	6.8
Centre	7.0	2.4	3.4	5.7
South and Islands	13.6	1.7	7.8	9.3
Total	*8.6*	*2.4*	*5.4*	*7.5*

Source: authors' elaboration on SHIW data for 1995.

Table C3: Labour market deprivation. Italy, 1995 (percentage of individuals)

Person's characteristic	Unemployment or first-job search	No search, because of difficulty of finding a job	Concern about losing the employment	Overall satisfaction with job	At least one
Sex					
male	8.0	1.5	4.9	2.6	14.8
female	5.6	3.1	2.4	1.7	11.4
Age					
up to 10 years	0.0	0.0	0.0	0.0	0.0
from 10 to 20 years	11.0	2.4	0.5	0.2	12.3
from 20 to 30 years	20.3	4.6	5.2	2.8	29.3
from 31 to 40 years	7.6	2.9	7.3	4.3	19.8
from 41 to 50 years	4.6	3.2	8.1	5.2	18.4
from 51 to 65 years	2.8	2.5	3.3	1.9	8.7
more than 65 years	0.0	0.0	0.0	0.0	0.0
Education					
none	0.5	0.4	0.3	0.3	1.2
elementary school	3.9	2.4	2.6	1.1	8.7
middle school	9.8	3.4	5.1	2.7	18.3
high school	10.0	2.0	4.8	3.4	18.2
bachelor's degree	10.6	2.3	5.6	5.1	20.9
Branch of activity					
agriculture	0.0	0.0	10.9	7.8	15.1
industry	0.0	0.0	13.3	6.1	17.5
public administration	0.0	0.0	7.4	6.4	13.0
other sectors	0.0	0.0	10.0	5.9	14.1
none	10.4	3.5	0.0	0.0	12.0
Work status					
blue-collar workers	0.0	0.0	12.6	7.3	17.4
office workers, school teachers	0.0	0.0	7.6	6.5	13.1
cadres, managers, professors	0.0	0.0	6.5	5.7	11.6
total employee	0.0	0.0	9.9	6.8	15.0
employers, professionals	0.0	0.0	10.4	2.0	12.0
other self-employed	0.0	0.0	12.7	5.2	16.0
total self employed	0.0	0.0	12.1	4.3	14.9
retired	0.0	0.0	0.0	0.0	0.0
other unoccupied	16.1	5.5	0.0	0.0	18.6
total unoccupied	10.4	3.5	0.0	0.0	12.0
Household size					
1 member	1.3	0.4	2.4	2.0	5.4
2 members	3.5	1.8	2.7	1.6	8.2
3 members	6.2	2.1	4.3	2.6	13.6
4 members	7.3	2.5	4.0	2.5	14.2
5 members or more	11.4	3.5	3.3	1.4	17.1
Number of earners					
1 earner	8.1	3.5	2.9	1.4	14.1
2 earners	6.3	1.6	3.5	2.3	11.9
3 earners	6.2	2.4	5.7	2.7	14.7
4 earners or more	4.8	1.3	3.6	3.2	11.8
Unadjusted family income					
up to 20 millions	13.1	2.8	2.3	1.1	17.5
from 20 to 40 millions	8.2	3.8	3.7	1.6	14.7
from 40 to 60 millions	4.4	1.3	4.3	2.7	11.4
from 60 to 80 millions	4.2	1.0	4.5	3.9	12.0
more than 80 millions	2.3	0.6	2.6	1.8	6.8
Town size					
up to 20,000 inhabitants	5.8	2.6	3.8	2.0	12.2
from 20,000 to 40,000 inhabitants	7.7	2.2	3.7	2.3	14.2
from 40,000 to 500,000 inhabitants	7.5	1.9	3.2	2.2	13.3
more than 500,000 inhabitants	8.1	2.2	3.8	2.5	14.4
Geographical area					
North	3.2	1.0	3.6	2.2	9.0
Centre	6.7	1.6	3.8	2.3	12.4
South and Islands	11.2	4.3	3.6	2.0	18.4
Total	*6.8*	*2.3*	*3.6*	*2.1*	*13.1*

Source: authors' elaboration on SHIW data for 1995.

Table C4: Housing deprivations. Italy, 1995 (percentage of individuals)

Person's characteristic	Heating system	Floor area index	Quality's rating	Location's rating	At least one
Sex					
male	21.3	20.1	8.9	6.4	37.4
female	22.6	18.9	10.4	7.0	38.3
Age					
up to 10 years	22.1	28.5	8.6	5.6	41.3
from 10 to 20 years	22.2	24.0	8.9	6.5	39.7
from 20 to 30 years	21.7	22.1	8.9	6.5	39.0
from 31 to 40 years	20.7	22.5	8.5	5.1	37.7
from 41 to 50 years	17.0	16.5	7.2	5.7	32.3
from 51 to 65 years	19.8	15.0	9.1	6.3	33.7
more than 65 years	30.2	11.8	15.7	10.8	42.8
Education					
none	33.0	26.8	15.4	9.6	50.0
elementary school	27.7	19.7	12.7	9.1	44.0
middle school	20.7	21.4	9.2	6.7	39.0
high school	11.8	13.8	3.8	3.0	24.8
bachelor's degree	7.2	6.1	1.9	1.0	14.2
Branch of activity					
agriculture	42.3	19.6	6.5	6.7	50.8
industry	14.5	19.0	7.5	5.3	32.0
public administration	11.4	12.1	4.3	3.1	24.0
other sectors	14.8	18.5	6.7	5.3	31.7
none	25.6	20.8	11.4	7.7	41.7
Work status					
blue-collar workers	22.2	26.5	11.3	7.7	44.5
office workers, school teachers	9.5	12.3	3.2	2.3	22.5
cadres, managers, professors	3.9	9.9	1.0	2.1	15.2
total employee	15.1	18.9	6.9	4.9	32.4
employers, professionals	6.0	6.2	3.1	0.7	14.0
other self-employed	19.1	13.2	5.1	5.9	30.0
total self employed	15.5	11.3	4.5	4.5	25.6
retired	27.5	12.6	13.5	9.2	40.3
other unoccupied	24.5	25.4	10.3	7.0	42.5
total unoccupied	25.6	20.8	11.4	7.7	41.7
Household size					
1 member	34.4	3.6	20.0	11.8	45.2
2 members	22.4	10.0	11.8	7.8	34.7
3 members	16.6	20.5	7.7	4.8	34.0
4 members	19.3	15.0	6.3	5.7	31.8
5 members or more	29.4	39.6	12.6	8.5	54.0
Number of earners					
1 earner	29.7	22.3	13.3	8.6	46.8
2 earners	18.3	17.3	8.0	5.6	32.8
3 earners	18.8	19.8	6.8	6.4	35.5
4 earners or more	16.9	21.0	9.3	6.4	35.1
Unadjusted family income					
up to 20 millions	56.0	33.5	27.5	17.9	71.4
from 20 to 40 millions	25.9	24.1	9.9	7.7	46.6
from 40 to 60 millions	12.5	15.6	6.4	3.7	28.4
from 60 to 80 millions	6.4	12.1	2.1	2.1	19.8
more than 80 millions	4.5	3.9	1.2	0.9	8.9
Town size					
up to 20,000 inhabitants	24.0	15.7	8.2	5.3	36.1
from 20,000 to 40,000 inhabitants	20.2	19.1	8.2	3.3	35.2
from 40,000 to 500,000 inhabitants	20.5	20.8	12.0	7.5	37.7
more than 500,000 inhabitants	19.8	31.4	11.8	14.2	47.8
Geographical area					
North	8.3	13.7	6.8	4.8	25.0
Centre	11.0	19.4	7.9	6.1	31.1
South and Islands	44.6	26.6	14.0	9.4	57.3
Total	*22.0*	*19.5*	*9.6*	*6.7*	*37.9*

Source: authors' elaboration on SHIW data for 1995.

Table C5: Household's economic resources deprivation. Italy, 1995 (percentage of individuals)

Person's characteristic	Equivalent income	Equivalent expenditure for non-durables	Stock of durables	Stock of net wealth	At least one
Sex					
male	22.0	15.0	17.9	22.6	41.3
female	22.5	15.6	20.8	24.1	43.6
Age					
up to 10 years	34.1	24.3	17.6	31.3	50.3
from 10 to 20 years	31.1	21.0	20.2	25.8	46.8
from 20 to 30 years	21.1	16.3	16.2	23.9	41.3
from 31 to 40 years	25.2	16.8	14.0	27.3	42.4
from 41 to 50 years	19.7	12.4	13.8	18.1	36.5
from 51 to 65 years	15.7	10.2	18.7	16.3	34.7
more than 65 years	14.8	10.4	34.5	24.3	49.5
Education					
none	32.9	23.7	30.3	32.9	58.1
elementary school	24.5	17.7	26.5	24.9	47.9
middle school	24.4	16.5	16.5	25.9	44.6
high school	12.1	7.0	9.6	14.1	27.4
bachelor's degree	4.1	2.8	6.0	6.5	14.0
Branch of activity					
agriculture	33.9	22.6	20.8	15.1	53.4
industry	12.0	8.3	9.4	21.4	32.1
public administration	7.7	5.9	8.3	15.4	25.2
other sectors	15.9	9.2	12.4	20.2	34.8
none	26.9	18.8	24.0	25.6	48.0
Work status					
blue-collar workers	18.1	13.7	15.9	31.6	45.6
office workers, school teachers	5.2	3.6	6.7	14.6	22.1
cadres, managers, professors	1.5	2.7	4.4	7.2	13.1
total employee	11.0	8.3	10.9	22.1	32.6
employers, professionals	8.8	4.2	6.1	4.0	18.0
other self-employed	24.5	11.9	11.9	12.1	36.5
total self employed	20.2	9.8	10.3	9.9	31.5
retired	14.5	10.5	28.9	22.2	44.3
other unoccupied	33.8	23.4	21.3	27.5	50.0
total unoccupied	26.9	18.8	24.0	25.6	48.0
Household size					
1 member	17.0	7.1	37.4	36.8	57.5
2 members	13.0	7.2	23.1	22.1	41.8
3 members	16.3	10.9	13.1	19.3	34.6
4 members	23.3	15.1	14.2	20.6	38.7
5 members or more	38.0	31.3	27.7	30.1	55.6
Number of earners					
1 earner	40.0	23.5	27.2	33.2	59.8
2 earners	15.8	11.7	16.8	19.4	36.2
3 earners	11.0	12.3	15.2	18.4	33.0
4 earners or more	2.5	6.2	7.0	12.7	20.6
Unadjusted family income					
up to 20 millions	78.3	52.7	50.0	57.1	93.5
from 20 to 40 millions	29.5	17.5	23.6	29.4	58.3
from 40 to 60 millions	0.2	3.7	10.2	14.2	23.8
from 60 to 80 millions	0.0	1.7	4.5	5.8	10.9
more than 80 millions	0.0	0.5	3.8	0.7	4.6
Town size					
up to 20,000 inhabitants	22.9	15.0	16.9	19.7	41.0
from 20,000 to 40,000 inhabitants	25.1	17.5	20.4	22.5	45.0
from 40,000 to 500,000 inhabitants	20.8	16.0	20.9	25.7	42.4
more than 500,000 inhabitants	19.6	12.5	24.6	32.9	45.9
Geographical area					
North	9.5	4.7	11.0	18.6	29.6
Centre	12.9	6.6	16.3	21.0	36.2
South and Islands	42.7	32.8	31.3	30.3	61.6
Total	*22.2*	*15.3*	*19.4*	*23.3*	*42.5*

Source: authors' elaboration on SHIW data for 1995.

Table C6: Average functioning deprivation. Italy, 1995 (absolute values)

Person's characteristic	Z_B	$Z_{1,EI}$	$Z_{1/3}$	$Z_{1/2}$	Z_1	Z_2	Z_3	$Z_{1,W}$
Sex								
male	0.65	1.9	0.8	0.9	1.2	2.9	8.0	1.6
female	0.67	2.0	0.8	0.9	1.3	3.3	9.8	1.8
Age								
up to 10 years	0.62	1.9	0.7	0.8	1.0	1.9	3.9	1.0
from 10 to 20 years	0.60	1.9	0.7	0.8	1.1	2.4	6.1	1.3
from 20 to 30 years	0.66	1.9	0.8	0.9	1.3	3.0	8.5	1.7
from 31 to 40 years	0.65	1.9	0.8	0.9	1.2	2.9	8.4	1.7
from 41 to 50 years	0.61	1.6	0.7	0.8	1.1	2.5	6.6	1.5
from 51 to 65 years	0.63	1.7	0.8	0.9	1.2	2.9	8.5	1.7
more than 65 years	0.82	2.7	1.1	1.2	1.9	5.5	18.3	2.9
Education								
none	0.77	3.0	1.0	1.2	1.9	5.6	19.5	2.7
elementary school	0.72	2.3	0.9	1.0	1.5	3.5	10.1	1.9
middle school	0.66	1.9	0.8	0.9	1.2	2.7	6.9	1.5
high school	0.53	1.1	0.6	0.7	0.9	1.6	3.7	1.2
bachelor's degree	0.46	0.8	0.5	0.6	0.7	1.2	2.5	1.0
Branch of activity								
agriculture	0.72	2.2	0.9	1.0	1.5	3.5	9.4	1.9
industry	0.58	1.4	0.7	0.7	1.0	2.1	5.2	1.3
public administration	0.51	1.0	0.6	0.6	0.8	1.5	3.3	1.0
other sectors	0.60	1.4	0.7	0.8	1.0	2.1	5.1	1.3
none	0.70	2.3	0.9	1.0	1.5	3.7	11.1	2.0
Work status								
blue-collar workers	0.69	1.9	0.8	0.9	1.3	2.9	7.7	1.7
office workers, school teachers	0.49	0.8	0.6	0.6	0.7	1.3	2.6	1.0
cadres, managers, professors	0.39	0.6	0.4	0.5	0.6	0.9	2.0	0.8
total employee	0.58	1.3	0.7	0.7	1.0	2.0	5.0	1.3
employers, professionals	0.42	0.7	0.5	0.5	0.6	1.0	2.0	0.8
other self-employed	0.62	1.5	0.7	0.8	1.1	2.2	5.4	1.4
total self employed	0.56	1.3	0.7	0.7	0.9	1.9	4.5	1.3
retired	0.76	2.4	1.0	1.1	1.7	4.8	15.4	2.5
other unoccupied	0.67	2.2	0.8	0.9	1.3	3.1	8.7	1.7
total unoccupied	0.70	2.3	0.9	1.0	1.5	3.7	11.1	2.0
Household size								
1 member	0.82	2.8	1.1	1.3	2.1	6.3	22.5	3.1
2 members	0.71	2.0	0.9	1.0	1.5	3.8	11.7	2.1
3 members	0.61	1.6	0.7	0.8	1.1	2.5	6.6	1.5
4 members	0.59	1.6	0.7	0.8	1.1	2.3	5.9	1.3
5 members or more	0.74	2.7	0.9	1.1	1.5	3.7	10.4	1.9
Number of earners								
1 earner	0.77	2.6	1.0	1.1	1.6	4.0	12.1	2.1
2 earners	0.60	1.6	0.7	0.8	1.1	2.6	7.4	1.5
3 earners	0.61	1.7	0.8	0.8	1.2	2.8	8.0	1.7
4 earners or more	0.60	1.5	0.7	0.8	1.1	2.3	6.0	1.6
Unadjusted family income								
up to 20 millions	0.98	4.9	1.3	1.6	2.6	7.7	26.1	3.4
from 20 to 40 millions	0.80	2.3	1.0	1.1	1.6	3.7	10.1	2.0
from 40 to 60 millions	0.54	1.0	0.6	0.7	0.9	1.7	4.1	1.2
from 60 to 80 millions	0.46	0.8	0.5	0.6	0.7	1.1	2.3	1.0
more than 80 millions	0.30	0.4	0.3	0.4	0.4	0.6	1.0	0.6
Town size								
up to 20,000 inhabitants	0.64	1.9	0.8	0.9	1.3	3.1	9.2	1.7
from 20,000 to 40,000 inhabitants	0.66	1.9	0.8	0.9	1.2	2.9	7.9	1.6
from 40,000 to 500,000 inhabitants	0.66	2.0	0.8	0.9	1.3	3.1	8.7	1.7
more than 500,000 inhabitants	0.70	2.1	0.9	1.0	1.4	3.4	9.6	1.8
Geographical area								
North	0.55	1.2	0.7	0.7	0.9	1.9	5.0	1.3
Centre	0.63	1.5	0.8	0.8	1.1	2.4	6.4	1.5
South and Islands	0.80	3.1	1.0	1.2	1.8	4.9	15.1	2.4
Total	*0.66*	*1.9*	*0.8*	*0.9*	*1.3*	*3.1*	*8.9*	*1.7*

Source: authors' elaboration on SHIW data for 1995.

Table C7: Average functioning deprivation. Italy, 1995 (standardised deviations from the mean)

Person's characteristic	Z_B	$Z_{1,EI}$	$Z_{1/3}$	$Z_{1/2}$	Z_1	Z_2	Z_3	$Z_{1,W}$
Sex								
male	-2.3	-3.5	-3.5	-3.9	-4.8	-5.4	-5.4	-5.9
female	2.2	3.3	3.3	3.7	4.5	5.1	5.1	5.5
Age								
up to 10 years	-9.0	-2.6	-15.9	-18.4	-23.7	-27.9	-27.8	-38.1
from 10 to 20 years	-12.7	-3.1	-13.5	-14.2	-15.3	-15.9	-15.5	-23.5
from 20 to 30 years	-0.6	-2.7	-0.9	-1.2	-1.7	-2.2	-2.6	-0.1
from 31 to 40 years	-1.8	-1.0	-4.4	-4.4	-4.1	-3.5	-3.0	-3.9
from 41 to 50 years	-9.3	-15.4	-11.7	-12.9	-14.7	-14.4	-12.9	-13.8
from 51 to 65 years	-5.5	-10.4	-5.7	-5.9	-5.5	-3.9	-2.6	-2.0
more than 65 years	33.8	34.1	44.5	48.2	54.3	55.5	52.3	64.4
Education								
none	24.6	47.5	34.7	39.9	50.3	58.0	58.9	57.2
elementary school	14.0	14.1	16.1	15.9	14.2	9.8	6.4	9.5
middle school	0.4	-3.1	-2.3	-3.3	-5.8	-9.4	-11.4	-10.9
high school	-27.2	-37.7	-32.0	-34.0	-36.3	-33.4	-29.0	-31.7
bachelor's degree	-41.9	-52.5	-49.5	-51.4	-51.7	-43.8	-35.8	-38.1
Branch of activity								
agriculture	14.1	12.7	20.7	21.0	18.7	9.8	2.4	11.6
industry	-17.0	-25.8	-22.2	-23.3	-24.5	-23.0	-20.7	-22.3
public administration	-32.3	-43.2	-38.6	-40.6	-42.0	-37.2	-31.4	-38.0
other sectors	-12.1	-24.8	-17.3	-19.5	-23.0	-23.5	-21.3	-22.3
none	9.5	14.9	12.1	12.9	14.0	13.4	12.0	13.1
Work status								
blue-collar workers	7.5	-1.5	5.3	4.3	1.2	-3.9	-6.8	-3.6
office workers, school teachers	-36.3	-49.3	-43.7	-45.9	-47.5	-41.8	-34.9	-42.2
cadres, managers, professors	-56.6	-60.3	-63.5	-64.5	-61.6	-49.2	-38.6	-51.4
total employee	-17.2	-27.4	-22.0	-23.5	-25.5	-24.3	-21.8	-24.5
employers, professionals	-50.8	-57.0	-56.3	-58.2	-58.0	-48.2	-38.7	-49.2
other self-employed	-8.2	-20.5	-13.0	-15.0	-18.8	-20.7	-19.7	-16.6
total self employed	-19.9	-30.5	-24.8	-26.8	-29.5	-28.2	-24.9	-25.5
retired	21.7	21.7	28.6	31.2	35.9	37.6	36.0	43.9
other unoccupied	2.7	11.2	3.0	2.9	2.0	0.1	-1.2	-3.8
total unoccupied	9.5	14.9	12.1	12.9	14.0	13.4	12.0	13.1
Household size								
1 member	34.9	37.1	49.1	54.3	65.0	73.7	75.8	75.3
2 members	10.9	0.6	13.5	14.3	15.7	16.1	15.2	22.3
3 members	-10.3	-15.8	-14.2	-14.8	-15.3	-14.2	-12.7	-13.7
4 members	-14.2	-15.3	-17.8	-18.9	-20.3	-19.1	-16.9	-21.1
5 members or more	17.1	34.8	21.7	22.1	20.5	13.8	8.4	10.6
Number of earners								
1 earner	23.3	28.8	26.1	26.5	25.6	21.2	17.7	18.5
2 earners	-11.8	-13.9	-13.1	-13.4	-13.0	-10.7	-8.7	-10.7
3 earners	-9.4	-11.0	-9.6	-9.3	-8.0	-6.0	-5.1	-3.4
4 earners or more	-11.9	-21.6	-16.4	-17.5	-18.9	-18.0	-16.1	-8.9
Unadjusted family income								
up to 20 millions	68.7	132.0	87.3	94.9	106.3	104.9	95.6	94.0
from 20 to 40 millions	29.5	14.8	29.5	28.5	23.5	13.3	6.6	15.9
from 40 to 60 millions	-25.4	-40.7	-29.9	-32.0	-34.4	-31.6	-27.0	-29.3
from 60 to 80 millions	-42.4	-53.5	-50.3	-52.4	-53.1	-45.3	-36.9	-41.0
more than 80 millions	-76.5	-68.1	-82.2	-82.0	-75.3	-57.3	-44.0	-60.9
Town size								
up to 20,000 inhabitants	-3.2	-2.6	-3.9	-3.4	-2.0	0.2	1.4	0.5
from 20,000 to 40,000 inhabitants	0.1	-3.0	-0.6	-1.5	-3.5	-5.4	-5.7	-5.6
from 40,000 to 500,000 inhabitants	1.0	2.2	1.5	1.2	0.5	-0.7	-1.3	-0.3
more than 500,000 inhabitants	9.8	8.3	12.0	11.7	10.0	6.4	3.9	4.7
Geographical area								
North	-22.5	-33.7	-27.4	-28.7	-29.7	-26.3	-22.0	-24.6
Centre	-5.5	-20.3	-8.4	-10.2	-13.7	-15.2	-14.3	-11.4
South and Islands	30.3	51.8	37.8	40.5	43.5	40.1	34.4	36.1
Total	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*

Source: authors' elaboration on SHIW data for 1995.