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USING FUNCTIONINGS TO ESTIMATE EQUIVALENCE SCALES

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Equivalence scales are used to enable welfare comparisons across heterogeneous households. In this paper, we propose to use the achievement of a certain level of functioning as the identifying assumption for the derivation of equivalence scales. This will allow us not only to deal with welfare comparisons between households of different size and composition, but will also enable us to incorporate other characteristics (such as location and employment status) in the creation of equivalence scales for welfare comparisons. The paper applies this approach to create equivalence scales for the functioning "shelter" using Belgian and Italian data. The analysis shows that the income differences associated with different characteristics only play a small role in explaining differences in functionings. An important policy message is therefore that compensating people for functioning shortfalls in monetary terms may not be sensible.

1. Introduction

Hardly anyone would deny the enormous influence that income has on what people can or cannot do. But what is the real relative power of monetary factors in accomplishing people's ambitions and generating at least minimum acceptable levels of well-being?

Income implicitly—and sometimes explicitly—acts as a proxy for well-being in standard poverty and inequality analyses, since it is not money itself but what it can generate which is of intrinsic interest. As a rule, higher incomes translate into higher well-being, so income appears to be a good proxy. Yet, a variety of theoretical frameworks put forward during recent decades make a case for a more extensive characterization than strict monetary measures. A number of factors exhibiting a non-monetary nature are believed to come into play (e.g. non-market commodities or access to public goods).

The role played by such factors either in generating well-being or increasing the poverty risk of some population groups hardly ever translates into mainstream empirical analyses or official poverty and inequality measures.[1] It is not evident, in fact, how the non-income dimensions of one's living standard should be taken into account when making distributional assessments and carrying out welfare

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[1]A notable exception is the pioneering report by Atkinson *et al*. (2002), emphasizing the multidimensionality of social disadvantage. According to the authors, poverty also depends on specific social circumstances (poor housing, low education, difficult access to health care).

comparisons. Within the traditional literature, the common method for deriving monetary measures of well-being relates to the use of equivalence scales.

In this paper, we propose to use the achievement of a certain level of *functioning* (defined according to Amartya Sen's capability approach) as the identifying assumption for the derivation of equivalence scales. This will allow us not only to deal with welfare comparisons between households of different size and composition, but will also enable us to incorporate other characteristics (such as location, employment status) in the creation of equivalence scales for welfare comparisons.

We thus begin in Sections 2 and 3 with an account of Sen's approach, as well as of the notion of equivalence scale. We then proceed in Section 4 to set out the reference framework for the subsequent analysis. An exploratory comparative application to Italian and Belgian data will illustrate the model and make it possible to identify the apparent relative contributions of monetary and non-monetary factors to changes in the functioning level associated with several specific socioeconomic characteristics, as is argued in Sections 5 and 6. The computed scale factors will make it possible to examine how the relative economic position of population sub-groups changes when we account for differences in one specific dimension of their lives. We will explore this issue in Section 7. Finally, in Section 8 some conclusions are drawn.

2. The Core Concepts of the Capability Approach

The capability approach is a broad normative framework that can be used for the evaluation of individual well-being and social arrangements. The core characteristic of the approach is its focus on what people are effectively able to do and to be, on the quality of their life, and on removing obstacles in their lives so that they have more freedom to live the kind of life which, upon reflection, they find valuable. This contrasts with philosophical approaches that concentrate on people's happiness or desire-fulfillment, or on theoretical and practical approaches that concentrate on income, expenditures, or consumption.

In Sen's view, the capacity of profiting from the available resources is greatly influenced by their utilization, which in turn depends upon the specific circumstances experienced by an individual. Hence, goods are not valued as a consequence of their being possessed; rather, they are evaluated on the basis of the effects that they may engender on the individual, effects that are likely to differ rather seriously according to the various circumstances under which those goods are consumed. Well-being should be discussed in terms of people's *capabilities to function*, that is, on their effective opportunities to undertake the actions and activities that they want to engage in, and be whom they want to be. These beings and doings, which Sen calls *functionings*, together constitute what makes a life valuable. Functionings are what a person succeeds to do or to be in life given personal and environmental characteristics. They include working, resting, being healthy, being literate, being respected, etc. The distinction between functionings and capabilities is, thus, between the realized and the effectively possible. In other words, between achievements and freedoms.

Formally, following Sen (1985), letting x_h be a vector of commodities possessed by person h and selected from the consumption set X_h, c be the function converting the commodity vector into a vector of characteristics of those commodities[2] (thus, the vector of characteristics consumed by person h will be given by $c(x_h)$) and u_h a utilization function chosen by person h in the set U_h reflecting the specific use of the commodities that the person can make in generating a functioning vector out of the characteristics of the given commodities and in association with his actual abilities, person's h functioning f_h will be expressed as

$$f_h = u_h(c(x_h)) \tag{1}$$

Depending on two main factors—namely, the consumption set of the person (i.e. the set X_h) and the ability to convert commodities into achievements (i.e. the set U_h)—capabilities can instead be described as

$$Q_h = \{f_h | f_h = u_h(c(x_h)),\ for\ some\ u_h(\cdot) \in U_h\ and\ some\ x_h \in X_h\} \tag{2}$$

In spite of its intuitive appeal, defining the value of the set Q_h has fairly significant and disturbing implications in that the notion of capability implies that opportunities, hence hypothetical situations, have to be taken into account when evaluating one's living standard. This makes, of course, the measurement of one's capabilities far more difficult than the measurement of one's actual functionings. As a consequence, in what follows, Basu's (1987) suggestion will be taken up and the analysis will exclusively focus on functionings as indicators of one's living standard.

3. Well-Being and Equivalence Scales: Concept, Usage and Measurement Methods

Providing an answer to the question: "which is the ideal equivalence scale from Sen's point of view?" clearly lies outside the purpose of this work. By the way, the answer is obvious: if we believe in the capability approach and have perfect information on the individuals' standards of living, then we implicitly have the scale. In fact, concentrating on functionings allows one to circumvent issues related to equivalization because the hypotheses on the scale economies or adult equivalence are made redundant by the direct monitoring of an individual's actions and circumstances. Yet, in what follows we wish to elaborate on an evaluative device that could help to throw some light on the effectiveness of income redistribution in compensating achievements' heterogeneity among individuals.[3]

The practice of resorting to equivalence scales typically aims at making comparisons possible between essentially heterogeneous entities, typically

[2]Sen adopts, in fact, the Gorman-Lancaster's perspective, which enables him to see every commodity in terms of the vector of its characteristics.

[3]Note that equivalence scales are, in this case, individual-specific. This is not to suggest, of course, that individuals should be considered in isolation. We recognize that the circumstances of the households are major determinants of the level of well-being experienced by the household members, but we also believe that in measuring well-being the fundamental concern should be with the position of each single person.

households.[4] Household size and composition, *in primis*, but also other socio-demographic characteristics are likely to affect both the capacity to generate income and the extent of needs, hence the possibility of achieving a given level of well-being.

An equivalence scale is an exchange rate between money and well-being based on how high the income of a given type of household/individual should be relative to that of a reference household/individual, so that both are equally well off. The specification of an equivalence scale entails a number of choices (e.g. the significant characteristics of individuals and households). The fundamental question of the analysis is the meaning to be attached to well-being. One needs observable proxies for it. Unanimity does not seem to exist on how such proxies should be characterized. The mainstream interpretation of the expression "equally well off" usually implies the same level of material well-being. A few solutions have been received more or less favorably by the literature and have resulted in corresponding widespread types of scales.

"Objective scales," i.e. scales based on objective data revealed by households, represent an established tradition. The oldest paradigms are derived from Engel (1895) and Rothbarth (1943). Both start from the idea that the welfare level of a household can be assessed as a function of its actual consumption of given commodities and that equivalent incomes are consequently the incomes resulting from the same quantity of consumption of these commodities. They do differ, however, in the choice of the specific welfare proxy. The Engel method identifies the welfare of a household with its expenditure share of food, whereas the Rothbarth method equates welfare with expenditure on adults' goods (i.e. tobacco, alcohol, adult clothing).[5]

Equivalence scales estimated from household expenditure data experience two major problems: (1) identification, and (2) whether such scales are suitable for welfare comparison. A basic assumption underlying these issues is that the well-being of households at a given level of income is a negative function of family size. This implies that children are treated purely as an economic cost or burden to their parents. Such basic assumption has been criticized by Pollak and Wales (1979).[6] In response, the majority of the contemporary literature on equivalence scales advocates the use of an approach based on a utility maximization model, where well-being is interpreted as utility (see, e.g. Deaton and Muellbauer, 1980).[7]

[4]Following Slesnick (1998, p. 2130) it is self-evident that "measuring the welfare effects of demographic changes introduces a normative element to the analysis . . . and this requires assumptions of interpersonal comparisons of well-being that are not empirically refutable." However, it should be noted that various types of comparability can be postulated according to assumptions concerning the specific type of transformations, while leaving social orderings unchanged (cf. e.g. Blackorby and Donaldson, 1991).

[5]For further discussion on the Engel and Rothbarth models see, e.g. Watts (1967), Coulter *et al.* (1992), Deaton *et al.* (1989).

[6]For a defense of equivalence scales as a measure of welfare we refer to Deaton and Muellbauer (1980).

[7]Postulating that two households with the same level of well-being enjoy the same utility level, the cost of achieving a given level of utility is obtained from a specific indirect utility function after estimating the model's parameters under the assumption that households face equal prices. Examples of utility-based methods can be found in Prais and Houthakker (1955), Barten (1964), Gorman (1976), Ray (1986), and in the vast literature arisen from their works.

This framework can capture the effect of demographic changes on household preferences.

"Subjective approaches" offer another way to derive equivalence scales. A given sample of people is questioned on the income levels they believe to correspond to different levels of well-being. Equivalence factors are derived from the relationship between income, family composition and a subjective evaluation of one's well-being (see, e.g. Van Praag, 1971; Van Praag and Kapteyn, 1973, 1976; Van Praag *et al*., 1982; Kapteyn *et al*., 1987). It follows that well-being is understood here as a function of the extent to which income meets one's needs. Doubts about the reliability of subjective information, together with a number of debatable assumptions used in the estimation process, account for the limited popularity of this procedure for deriving equivalence scales.

The "standard of living method" is situated in between the subjective (it focuses on the relationship between income and living standards) and the objective (it uses objective data on incomes and consumption) approaches to equivalization. The underlying idea is that resources (typically income) determine standards of living. The standard of living is assumed to rise with income for all households, but for a household with greater needs—for instance, owing to the presence of a disabled member—the same income results in lower living standard.[8] This methodology is closely related to the one adopted in this paper.

Given the wide variety of possible welfare concepts, a consensus on a unique and objective way of generating equivalence scales for welfare comparisons is impossible. No single method can be regarded as superior over others. This is not surprising. Nevertheless, such an observation is crucially important for our analysis: one might as well try out other methods.

In truth, the welfare concept implicitly underlying nearly all equivalence scale models is, in our opinion, one that conveys a much too narrow definition of human well-being into the estimated equivalence scales. Hence, why couldn't one possibly combine the growing belief that alternative spaces for evaluating people's living standards should be explored with a definition of welfare that could more clearly reveal its normative component?

4. Developing Equivalization Factors for Functionings

4.1. *The Model*

We propose to identify equivalence scales by Amartya Sen's notion of *functionings*.

In addition to the fact that welfare effects not revealed in the consumption behavior of households are totally ignored by the conventional objective approach (but not by the subjective one),[9] we consider functionings to be theoretically

[8]Zaidi and Burchardt (2005) have a short review on this method. The method was originally proposed by Berthoud *et al*. (1993).

[9]It is fair to stress, however, that both objective and subjective scales could easily be extended to a multidimensional context, which would allow for regional disparities or other socioeconomic discrepancies as well. Indeed, De Vos and Garner (1991) offer an example of subjective scales. Moreover, traditional equivalence scales could well be estimated to account for factors other than family size, as proven by the recent studies by Jones and O' Donnell (1995) or Zaidi and Burchardt (2005) on the costs of disability.

superior to food share or income satisfaction, because they avoid the one-sidedness of both the goods space and of subjective indicators for measuring welfare. Though not denying the informational content of income or expenditure *per se*, it has been extensively demonstrated that certain dimensions of well-being exist that cannot be easily captured by standard indicators.[10] Furthermore, a number of relevant aspects, which common wisdom regards as the standard of living, appear to be only weakly correlated with one's economic resources.[11] Objective scales, on the contrary, are deeply rooted in the general strategy of defining well-being only in terms of "what money can buy" or, better, in terms of an essentially materialistic condition, which neglects moral motivations and sentiments, and relies on the simple assumption of a direct link between the quantity of goods possessed and the level of well-being (in the form of utility) achieved. On the other hand, subjective scales conform to the notion of welfare being a subjective phenomenon or a mental status. As such, they link welfare to the distortions typically brought about by the psychological adjustment to persistent deprivation, for instance.

Regardless of the major theoretical objections raised over the years against this kind of welfare concept, it is quite hard to defend an income transfer granted exclusively on the basis of personal dissatisfaction that totally disregards other aspects. One could, of course, question why subjective scales are being discarded so decisively since they could perhaps be seen as a closer representation of what Sen advocates: the variation in the estimates of the income that respondents assume to need in order to achieve a given functioning could be regarded as a consequence, as well as a proof, of the heterogeneity of needs among people. However, the information on which subjective scales rely appears to be far more subjective than Sen's proposal. In the light of the influence exerted by one's opinions by experience and ambition, one may want to achieve a slightly more objective measurement of well-being. When this is possible, satisfaction levels, at best, enter as indicators in the welfare index instead of being the sole welfare criterion, at least at a theoretical level.[12]

In view of these considerations, one should explore the possibility of embracing an alternative perspective of the welfare notion. A perspective that would attempt to reflect the welfare conception of public policies, the aim of which is to make sure that through social support, people are able to do certain things,

[10]Self-esteem, self-confidence, social status, social integration, psychological distress or health conditions all play a considerable role in determining whether an individual can be said to be leading a satisfactory life. Sweeney (1998), for instance, offers an in-depth analysis of the relevance of mental distress as well as of its relationship on the individual's occupational status. Further interesting contributions on multidimensionality can be found in Dasgupta (1990), Dasgupta and Weale (1990) or in the Scandinavian approach developed by Erikson (1996), Erikson *et al.* (1987) and Allardt (1996), among others.

[11]Schokkaert and Van Ootegem (1990), for instance, clearly prove that compensating the unemployed for their income loss still leaves them worse off on a variety of other facets which exhibit no relationship at all to economic resources. Balestrino (1996), who compares income poverty and functioning poverty in the Italian town of Pistoia, suggests that educational and social functionings seem to be only indirectly influenced by access to market goods and services. Hence, one would not expect them to be associated with income.

[12]Data availability constraints can often force the analyst to resort to the exclusive use of subjective information.

participate in given activities, etc. The perspective would need to allow accounting for "what money cannot buy" as well.

Therefore, on account of Sen's (1992, p. 111) assertion that "income adequacy to escape poverty varies parametrically with personal characteristics and circumstances," we propose to define individual well-being as an evaluation of the functionings a person achieves on a number of dimensions of his life, so that well-being levels are compared on the basis of some specific functionings achievements f_h^m in the various m dimensions ($m = 1, \ldots, M$). Hence,

$$W_h = W_h(f_h^1, \ldots, f_h^M) \tag{3}$$

Assuming that each f_h^m depends upon some given individual endowment (which we generally interpret as income Y_h) as well as upon some demographic factors π_h results in

$$f_h^m = f_h^m(Y_h, \pi_h) = f_h^m(Y_h, fs_h, z_h) \tag{4}$$

where, out of convenience in view of the application of this framework to the equivalence scales' estimation, the set of demographic variables $\pi_h = \{fs_h, z_h\}$ is partitioned into a subset fs_h providing information on the size and composition of the household where individual h lives, and a subset z_h comprising any other socioeconomic attributes.

Given the lack of consensus regarding the criteria on the basis of which the whole set of functionings could/should be aggregated in order to obtain an overall picture of an individual standard of living, we opt for a distinct analysis of each single component of well-being. We thus abstain from merging them into a common index. We feel that the functionings vectors as such already provide sufficiently illuminating information and to subsume them into aggregates could imply "hiding" some important aspects.[13]

Accepting these hypotheses for the time being, equivalence scales can then be computed as the compensating amounts of income that, compared to a reference individual r, are necessary for individual h to be equally well off, namely guaranteeing him an identical fulfillment as r on a given dimension of well-being. Formally, therefore, for each functionings vector one determines the income level Y_h^* so that $\{Y_h^* \mid f_r^m(Y_r, \pi_r) = f_h^m(Y_h^*, \pi_h)\}$ and computes an equivalence coefficient as $m_h = Y_h^*/Y_r$.

The underlying intuition is that one's functioning level is positively affected by income availability, but the presence of greater needs (disadvantaged location or low educational level, for instance) may alter one's efficiency of converting income into well-being and thus may result in a lower standard of living.

It has to be stressed, however, that the attempt to make the income levels of people with individual characteristics comparable in terms of achieved functionings does not imply support for the idea that an appropriate amount of money can always compensate for any dissimilarity (in the specific case, for any disparity in functionings). To use Sen's terminology, we then clearly "distinguish between income as a *unit* in which to measure inequality and

[13]Aggregating across dimensions could imply that a loss in one dimension (health, for instance) could be compensated for by a gain in another (e.g. education).

income as the *vehicle* of inequality reduction" (Sen, 1999, p. 84; emphasis in the original).

4.2. *Deriving the Scales*

The formal application of the suggested methodology is carried out by postulating that the following functional form can satisfactorily depict the relationship linking individual functionings, resources and personal characteristics[14]

$$f_h^m = \alpha + \beta \ln(Y_h) + \eta \ln(fs_h) + \sum_d \gamma fs_{hd} + \delta z_h + \varepsilon_h \tag{5}$$

where fs_{hd} represents the number of members in the household of individual h belonging to age class d and the γ coefficients, associated to the latter variable, allow the effects of changing composition to be investigated while holding household size constant. The equation can also be extended to provide a non-linear (thus, possibly more accurate) representation of the relationship between resources and achievements by including a quadratic term in the logarithm of income

$$f_h^m = \alpha + \beta \ln(Y_h) + \lambda[\ln(Y_h)]^2 + \eta \ln(fs_h) + \sum_d \gamma fs_{hd} + \delta z_h + \varepsilon_h \tag{6}$$

In both cases, demographics enter into the equation in a pragmatic but convenient way following the Deaton and Paxson (1998) specification and thus separating the effects of household composition from household size. On the basis of the estimates, scales can easily be derived to provide the compensating level of income needed by agents living in households of different composition and/or exhibiting different personal socioeconomic characteristics in order to reach the same position with respect to a specific functioning. Equivalence scales can be computed from equation (5) after selecting a reference individual, equating the latter's functioning level on the given dimension with the one for the h-th considered person and solving for Y_h/Y_r. In what follows, the arbitrarily selected reference individual will be a single childless adult.[15] Let fs_r and $\sum_d fs_{rd}$ refer to the household size and family composition of the reference agent. Then, to calculate the equivalence scale relative to the h-th agent with household size fs_h and composition $\sum_d fs_{hd}$ and assuming all other things to be equal, we will have for each given individual:

$$f_h^m = \alpha + \beta \ln(Y_h) + \eta \ln(fs_h) + \sum_d \gamma(fs_{hd}) + \delta z_h + \varepsilon_h \tag{7}$$

$$f_r^m = \alpha + \beta \ln(Y_r) + \eta \ln(fs_r) + \sum_d \gamma(fs_{rd}) + \delta z_r + \varepsilon_r \tag{8}$$

Assuming $f_h^m = f_r^m$

[14]We name equation (5) *linear case*, and equation (6) *quadratic case*.

[15]Consequently, the equivalence scale can also be interpreted as the number of adult equivalents comprising the household.

(9) $$0 = \beta \ln\left(\frac{Y_h}{Y_r}\right) + \eta \ln\left(\frac{fs_h}{fs_r}\right) + \gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right) + \delta(z_h - z_r) + \varepsilon_h - \varepsilon_r$$

from which

(10) $$\ln\left(\frac{Y_h}{Y_r}\right) = -\frac{\eta}{\beta}\ln\left(\frac{fs_h}{fs_r}\right) - \frac{\gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right)}{\beta}$$

and

(11) $$m_h = \frac{Y_h}{Y_r} = \exp\left[-\frac{\eta}{\beta}\ln\left(\frac{fs_h}{fs_r}\right) - \frac{\gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right)}{\beta}\right]$$

The derived equivalence scales exhibit the beneficial property of being independent of the base level of income (the so-called "equivalence scale exactness" in Blackorby and Donaldson's (1991) terminology), meaning that they remain constant regardless of the income level at which they are estimated. Consequently, the cost of any additional household member does not vary with income.[16]

Yet, an interesting spin-off of the suggested methodology is the possibility of appraising the indications stemming from the equivalization of incomes for differences in attributes other than family size. Along the same lines as before, in fact, indices can be derived that adjust income levels upward or downward according to such determinants of well-being as occupational status, educational level, age or gender. We can interpret these estimates as measures of cost differences related to different conditions. Hence, neglecting disturbances, for instance, and hypothesizing that two single individuals differ only in their occupational status z_1 (thus assuming household size, household composition and any z-variable other than one's occupational status to coincide), at equal functioning levels $f_h^m = f_r^m$ we obtain the identity (for the *linear case*)

$$\beta \ln(Y_h) + \eta \ln(fs_h) + \sum_d \gamma fs_{hd} + \delta z_{1h} = \beta \ln(Y_r) + \eta \ln(fs_r) + \sum_d \gamma fs_{rd} + \delta z_{1r}$$

from which an equivalence scale can simply be derived as

(12) $$m_h = \frac{Y_h}{Y_r} = \exp\left(\frac{\delta(z_{1r} - z_{1h})}{\beta}\right)$$

[16]This, however, no longer holds when scales are computed, instead, on the basis of equation (6). Owing to the presence of a quadratic term, one will typically get a set of scales that depend on a chosen level of reference income. Moreover, it will generally not be possible to obtain an explicit solution for the scales unless one resorts to an iterative procedure. Nevertheless, Maltagliati (2000) claims that an analytical solution is possible as well (basically corresponding to the solution of a quadratic equation). The procedure he suggests, whenever applied to our setting, will provide the following equivalence scale:

$$m_h = \frac{Y_h}{Y_r} = \exp\left(\frac{-(2\lambda \ln(Y_r) + \beta) - \sqrt{(2\lambda \ln(Y_r) + \beta)^2 - 4\lambda\left(\eta \ln\left(\frac{fs_h}{fs_r}\right) - \gamma(fs_{hd} - fs_{rd})\right)}}{2\lambda}\right)$$

Clearly, promoting a new approach to equivalence scales lies outside the scope of this paper. Less ambitiously, we would like to explore how far a familiar concept like income can take us in the actual evaluation of Sen's functionings: inadequate levels of income can explain, with other factors, why a give functioning is not fully achieved by a person.[17] Of course, if there is a general theoretical concern that monetary compensation may not make sense because of the variety of dimensions of well-being, then one needs no further empirical analysis to make points about compensation. One could well wonder that this is exactly what this paper does. Still, our idea is that *even if* it made sense to compensate, this would not necessarily be the best way to proceed and we will empirically test this belief in what follows.

5. The Data

The data on which our exploratory analysis is based have been drawn from two different sources.

The first one is the Bank of Italy's "Survey of Household Income and Wealth" (SHIW) for the year 1995. This long-established questionnaire mainly aims at collecting information on the economic behavior of a sample of 8,135 Italian households (corresponding to some 24,000 individuals). The survey is composed of two main sections. In the first (repeated every year), information on demographics, income sources, working conditions, financial portfolios and real assets is collected. In the second part, a monographic section, which varies from year to year and strives for an investigation of non-monetary dimensions which may influence households' living conditions, is presented.

The main focus of the SHIW is on people's real income and financial activities, thus its suitability for a comprehensive well-being evaluation in the spirit of Sen is fairly limited.[18] Hence, in what follows we try to make the best possible use of the available SHIW information.

The second source of our data is the Panel Study of Belgian Households (PSBH), i.e. the survey whose questions make up the Belgian section of the European Community Household Panel. The specific questionnaire was submitted in 1998 to a sample of about 3,800 households (corresponding to 7,021

[17]A somewhat similar approach has been explored by Smeeding *et al*. (1993) and Brandolini and D'Alessio (1998a), who try to widen the income definition to include certain non-monetary factors (health care subsidies, education benefits, public support to housing, housework). A money value is attributed to these factors and subsequently they are imputed to households and added to their disposable income to arrive at a measure of "full income." Though being an extremely interesting exercise, it results in some ethically bizarre implications for well-being comparisons: unless incomes are corrected not just for subsidies but also for needs, it is possible that some households may result in being less poor than others simply because their health status is worse and thus avail themselves of health care services more frequently. Furthermore, in-kind transfers cannot be considered as fully equivalent to income or any other available resources, because of their own specificity: one cannot use imputed education transfers to buy food, for instance. Thus in our opinion, it would perhaps be better to keep the various types of information separate.

[18]The wealth of qualitative information from an alternative dataset collected by the Italian National Institute of Statistics (namely, the "Indagine Multiscopo sulle Famiglie") would have been of more use for our analyses. Nonetheless, this alternative dataset includes no information at all on household income or wealth, thus rendering it unsuited to the purpose of this study.

individuals). It represents the richest available body of data for the purpose of assessing multidimensional well-being in Belgium.

5.1. *In Search of Suitable Well-Being Indicators*

The Italian questionnaire enables us to measure only one distinct valuable dimension: shelter.[19] Not too wide a choice, indeed, even minimal, but still providing an approximate picture of one basic element of one's well-being.

As a general rule, we try to reconcile data availability consistent with Sen's approach, hence we attempt to choose a combination of available indicators which, when aggregated, can truly depict a functioning. We basically make use of the information from four questions. Two of them are rating scales pertaining to the respondent's perceptions about his own dwelling (ranging from "very low-income" to "luxury") and its location (on a scale from "run-down" to "up-scale"). These essentially constitute subjective measures. Yet, they represent extremely valuable information in that they can be said to account for some of the socioenvironmental factors over which a person may have very limited control but which may acutely affect the relationship between income and functionings. The remaining two indicators are more objective. They consist of the floor area of the house and availability of heating.[20]

Given the availability from a previous work (i.e. Lelli, 2001) of a perfect match of observable indicators for Belgium which had subsequently been aggregated into a functioning, utilizing these to compare and contrast evidence related to different (affluent) countries on the role of the same dimension could provide instructive comparative findings. As a general rule, the fact that our Belgian data provide a slightly larger range of socioeconomic information than the Italian data, should lead—at least in principle—to a more precise conceptualization of individual achievements. This further motivates their inclusion.

The Belgian sheltering conditions are to be interpreted as the result of three main types of indicators: a crowding index, taking note of the household size as well as of possible economies of scale, and a heating availability variable;[21] a subjective ranking depicting the level of satisfaction about one's housing situation; two summated rating scales corresponding to the occurrence of problems related to the dwelling and/or to its specific location.[22]

[19]Appendix A reports a systematic description of our indicators.

[20]As accurately noted by Brandolini and D'Alessio (1998b), heating availability within a Mediterranean country like Italy could be said to assume the character of necessity only in the northern regions. The use of a binary indicator introduces the possibility of underestimating shelter conditions in the southern area because of the irrelevance of heating availability in this part of the country. Unfortunately, the available data do not allow such a distinction to be made.

[21]The crowding index has been computed as the ratio between the total number of rooms and an equivalence coefficient determined on the basis of the OECD scale. Accordingly, the following weights have been used: 1.0 for the first adult; 0.7 for any other adult (18 and over); 0.5 for children (under 18). Only heating has been considered as a result of the extremely poor variation exhibited by other indicators of basic utilities, which made them not appropriate for factor analysis.

[22]Both the dwelling's and the area's scale bring together seven dichotomous variables. The reliability coefficients for these scales are 0.60 and 0.67, respectively. The values are slightly low when compared to the widely used rule of thumb of 0.70; however, I consider them still acceptable.

5.2. *Aggregation Procedures*

Since our objective consists of summarizing the largest possible part of the information at our disposal in one artificial variable to be subsequently entered in a regression model, we believe that a principal component analysis is an efficient choice. Specifically, we propose to extract the first principal component of the set of elementary indicators, i.e. the linear function of the set of variables which fits these same variables in the best possible way in a least squares sense. The main benefits of this procedure, as emphasized by Klasen (2000), lie in its detection, on an empirical basis, of the associations among the variables and deriving a weighing system for the various elementary indicators from the intensity of the relationship linking each to the well-being measure being examined.

A principal component analysis is a statistical procedure and, as such, is often not intuitively straightforward from an economic point of view.[23] Still, we believe it is fairly informative and exhibits an obvious merit for our purpose (it allows the data to determine the optimal weights). Accordingly, we use it on our dataset after carrying out the necessary recordings for ensuring that the resulting indices are positively measured.

The results are given in Table 1 for both countries. For Italy, they reveal a not so satisfactory outcome for the shelter dimension, with the first component capturing 46 percent of the total variance of the constituent variables. Even though a careful inspection of the loadings clearly reveals that the derived composite indicator accurately depicts the hypothesized well-being aspect, it does not appear to be an ideal substitute for the original variables. However, an examination of alternative aggregative procedures (such as simple adding up or frequency-based weighing) ultimately confirms these results. It is quite possible that the various *modi operandi* for translating Sen's philosophical framework of thought into practice look as if they perform equally well.[24] Hence, lacking a better account, we take the obtained principal component as the acceptable representation of the functioning "being well sheltered."

Replicating the application of the principal component model on the Panel Study of Belgian Households for the variables listed under the heading "shelter" in Table A2 of Appendix A results in the identification of the optimal weights reported in the second panel of Table 1. Unfortunately, in this case also, the first principal component captures only a modest proportion of the various elementary indicators considered. Still, a closer look at the weights enables us to appraise the presumed reliability of the derived index that looks fairly close to what intuition would suggest.[25]

[23]A distinction has to be drawn between the principal component analysis and its companion technique, factor analysis. Because factor analysis is a model similar to regression, we expect that some of the divergence for each observed variable will be explained by the model, while some will not. In contrast, in the principal components analysis, all variability in the original variables will be explained by the components. In our case, factor analysis could have been used equally well. It was, in fact, conducted on the same set of data, with substantially comparable results.

[24]Each elementary indicator is almost equally represented in the first principal component: this makes each linear composite substantially correspond to an equal weighing scheme (cf. Lelli (2001) for an empirical analysis).

[25]Note that high scores on the shelter functioning imply "bad shelter," owing to the coding of the involved variables. Such a dimension, however, will be positively measured in the remainder of the paper.

TABLE 1

First Principal Component Analysis

Original Variables	First Eigenvector	Proportion of Variance Accounted for by 1st Component
Italy		
Shelter		46%
Rating for dwelling	0.59063	
Rating for location	0.47425	
Heating	0.46840	
Floor area	0.45480	
Belgium		
Shelter		36%
Problems with the dwelling	0.58015	
Problems with the area	0.52005	
Housing satisfaction	–0.52745	
Heating	–0.30135	
Crowding index	–0.15477	

Data source: Bank of Italy, Survey of Household Income and Wealth (1995); Panel Study of Belgian Households (1998).

6. Moving Towards the Operationalization of Functioning-Equivalent Incomes

6.1. *Estimating Functionings' Curves*

Accomplishing our objective requires a preliminary estimation of equations (5) and (6) linking the composite indicator to represent a functioning with some variables indicating the needs of the household, i.e. household income and a bundle of socio-demographic variables. We specifically control for the effect of household size and composition, age, gender, area of residence, type of occupation, occupational sector, educational level, marital status, location of the dwelling and tenure.[26]

How is the functioning related to one's income and the other indicators? In the case of shelter the relationship looks rather obvious: higher income makes better living conditions possible.

In Tables 2 and 3, we report the parameter estimates for shelter for the Italian and Belgian datasets, respectively. In all cases, the fit of the models to the data does not improve substantially with the inclusion of the quadratic term in income. Still, shelter conditions (for both countries) vary in a statistically significant and non-linear way with one's financial possibilities. For practical reasons, however, information on the linear case only is conveyed here, and we refer the reader to Appendix C for a full account of the non-linear results. The explanatory power of the regressions ranges between 0.36 and 0.18: not an unusual interval of values for this stream of literature. Moreover, the sample on which the Italian regressions are conducted exhibits nearly double the size in comparison with the one available for Belgium. It is then reasonable to conclude that this partially contributes to the greater estimation accuracy of the Italian functioning equation. The following

[26]For the interpretation of the following tables, it is helpful to inspect the sample means for income and demographic variables that have been used in the exercise. These are given in Appendix B.

TABLE 2

PARAMETER ESTIMATES OF THE FUNCTIONING EQUATION; ITALY

	Shelter	
Variables	Coeff.	Std. Err.
Intercept	–3.092***	(0.101)
Ln (Y)	0.747***	(0.027)
Ln (fs)	–0.207***	(0.068)
Age 10–14	–0.719**	(0.341)
Age 15–20	0.083	(0.082)
Age 21–50	–0.033	(0.032)
Age over 70	–0.094*	(0.049)
No of children aged 0–4	0.068**	(0.033)
No. of children aged 5–9	0.088***	(0.032)
No. of children aged 10–14	0.112***	(0.030)
No. of children aged 15–20	0.041	(0.027)
No. adults under 70	–0.001	(0.023)
Female	0.026	(0.019)
Married	0.307***	(0.030)
Divorced	0.249***	(0.070)
Widowed	0.275***	(0.053)
North West	–0.126***	(0.026)
North East	0.174***	(0.028)
South	–0.207***	(0.031)
Islands	–0.414***	(0.042)
Compulsory education	0.437***	(0.047)
Secondary school	0.800***	(0.052)
University	0.988***	(0.062)
Self-employed	0.331***	(0.029)
Students	0.804	(0.604)
Unemployed	0.082	(0.050)
Retired	0.088**	(0.034)
Home duties	–0.065	(0.081)
Manufacturing	0.158***	(0.040)
Services	0.207***	(0.040)
Ownership	0.194***	(0.036)
Rental	–0.369***	(0.040)
Urban	0.030	(0.034)
Adj. R-squared	0.356	
Sample size	12,797	

Notes: Heteroskedasticity-consistent standard errors have been computed according to White's covariance matrix.

*, ** and ***denote significance at 10, 5 and 1 percent, respectively.

statements are made with respect to the baseline individual taken to be male, aged between 51 and 70, from the North East in the case of Italy and from Wallonia in the case of Belgium, single, an employee in the agricultural sector, illiterate, resident in a rural area where he enjoys the usufruct of the house he inhabits. Unfortunately, information on the level of urbanization in the area of residence or the sector of activity is not available for the Belgian cross-section. It was not possible to control for the effect of these characteristics in the Belgian part of the exercise. Similarly, the minimum age of the PSBH respondents is 16 years old and this accounts for the modification in the age categorization.

A good number of coefficients are found to be highly significant at the 5 percent level and their signs, for the most part, are as expected. A snapshot com-

TABLE 3

PARAMETER ESTIMATES OF THE FUNCTIONING EQUATION; BELGIUM

	Shelter	
Variables	Coeff.	Std. Err.
Intercept	–0.076**	(0.152)
Ln (Y)	0.598***	(0.019)
Ln (fs)	–0.355***	(0.078)
Age 16–20	–0.203*	(0.112)
Age 21–50	–0.295***	(0.053)
Age over 70	0.233***	(0.072)
No. of children aged 0–4	0.018**	(0.044)
No. of children aged 5–9	0.017**	(0.037)
No. of children aged 10–14	0.037*	(0.040)
No. of children aged 15–20	–0.028	(0.021)
No. adults under 70	–0.009***	(0.032)
Female	0.052	(0.032)
Married	0.239***	(0.053)
Divorced	–0.121	(0.082)
Widowed	0.234***	(0.084)
Brussels	–0.221***	(0.068)
Flanders	0.054	(0.033)
Compulsory education	–0.108	(0.093)
Secondary school	0.054	(0.084)
University	0.148*	(0.085)
Self-employed	0.109*	(0.059)
Students	0.160**	(0.080)
Unemployed	–0.196**	(0.080)
Retired	–0.094	(0.062)
Home duties	–0.129*	(0.069)
Ownership	0.522***	(0.108)
Rental	–0.553***	(0.114)
Adj. R-squared	0.179	
Sample size	6,509	

parison of the living conditions in the countries considered can be informative. Basic similarities include high scores on the selected functioning in both countries which show a robust positive correlation with reasonably high levels of educational attainment, the self-employed labor condition and the income variable.

People, who are either voluntarily or involuntarily without an occupation (a condition experienced by 6 percent of the Belgian sample versus 8 percent of the Italian sample), appear to be robustly associated with unsatisfactory achievements in terms of shelter in Belgium but not Italy.[27]

Quite the opposite, there is no evidence in the Belgian sample to support the fact that housing conditions are better for the retired than the conditions of those being employed, whereas such evidence does exist for Italy. It is also noteworthy that the housing circumstances of the elderly differ substantially between the two samples. Elderly Italians endure poorer housing than the baseline individual while

[27]The significance of the differences between the coefficients on the various socioeconomic traits considered here has been tested for all the regressions. In the case of Italy, no apparent statistically significant differences exist for the marital status. When considering the Belgian results, on top of marital status, statistical equality of coefficients characterizes the age groups 16–20 and 21–50 as well as the occupational states of "unemployed" and "home duties."

TABLE 4

ESTIMATED SCALES FOR SHELTER BY HOUSEHOLD SIZE; ITALY AND BELGIUM

	Italy				Belgium			
	Fs = 1	Fs = 2	Fs = 3	Fs = 4	Fs = 1	Fs = 2	Fs = 3	Fs = 4
Household size								
0–4 years	–	1.11	1.14	1.13	–	1.46	1.80	2.07
		0.08	*0.18*	*0.45*		*0.03*	*0.14*	*0.14*
5–9 years	–	1.08	1.08	1.04	–	1.46	1.80	2.07
		0.05	*0.11*	*0.29*		*0.02*	*0.08*	*0.15*
10–14 years	–	1.04	1.01	0.94	–	1.42	1.70	1.90
		0.06	*0.12*	*0.23*		*0.18*	*0.24*	*0.47*
Adult	1.00	1.21	1.37	1.49	1.00	1.53	1.97	2.37
		0.13	*0.15*	*0.24*		*0.06*	*0.10*	*0.25*

Note: Standard errors in italics.

their Belgian counterparts enjoy the most comfortable housing conditions relative to other age groups.

In general, one can say that education and occupation seem relevant, including regional factors as well, emphasizing the pre-eminence of the North East (in Italy) and Flanders (in Belgium). Sizeable gaps between the north and south in shelter attainments further characterize the Italian sample in as much as the rest of Belgium seems to be doing better than the area around Brussels in terms of housing well-being. From a qualitative point of view and as far as Italy is concerned, the findings coincide with the Brandolini and D'Alessio analysis.[28]

6.2. *Computing Functioning-Equivalent Incomes*

On the basis of the previous parameter estimates (which, we believe, provide a meaningful picture of people's living standards in the dimension considered) and after selecting a reference household, we can then proceed to the actual derivation of our synthetic well-being indicators in the form of a set of equivalence scales for the shelter functioning. Our baseline family is composed of a single childless adult, male, aged between 21 and 50, residing in an urban area of either the North East or Flanders, self-employed in the service sector, with college education, and is the owner of the house where he resides.

Tables 4 and 5 present the scales computed for both countries along the lines of equations (7) to (11) for statistically significant variables. This conveys a substantial implication: no scales have been computed for those variables where standard econometric test procedures established the absence of any significant difference between the coefficients.

Table 4 reports equivalence scales for the shelter dimension. They show the estimated cost of a one-person family plus one or more additional members of varying ages, calculated relatively to the costs of a single adult household. Shelter scales for other socio-demographic traits are displayed in Table 5 and illustrate the

[28]Still, one should always keep in mind the insightful remark by Brandolini and D'Alessio (1998a, p. 38) stressing how "measures of functioning achievements have to be interpreted with the care required by their dependence on the choice of the elementary indicators and the underlying measurement hypotheses."

estimated cost of the stated characteristics for an adult agent (i.e. aged between 21 and 50).

The most important observation is that these scales look rather flat, i.e. the income needs of families do not increase much with the growing size of the household.[29] A review of other equivalence scales for other countries, regardless of whether derived from customary data on consumption behavior or proposed by experts (e.g. Perali (1999) or the official scale by Carbonaro (1985) in the case of Italy, for instance), clearly reveals a steeper pattern.

Of course, an understanding of the reasons why our equivalence factors are so much flatter than the traditional ones is essential in order to make sure that they accurately indicate the income levels at which various-sized families enjoy the same level of living standard. Despite the fact that no other methodology can be said to constitute a fully fail-proof benchmark against which to assess such validity (cf. *infra*), a few observations are possible.

Why are additional household members substantially cheaper in terms of functionings?[30] First of all, we believe one needs to put the question into perspective by considering that we are basically contrasting an issue related to quality with one related to quantity. To be exact, the welfare yardstick being used in the construction of functionings equivalence scales has, by its empirical definition, an essentially qualitative nature, which is in total contrast to the quantitative nature of a measure such as, for instance, the food share. Obviously, when speaking in terms of quality, income needs become less stringent. Specifically, when welfare is an index reflecting how well one is sheltered in terms of location or the dwelling's amenities, the relatively low cost of any extra resident can be regarded as an expected outcome. An obvious and more economically plausible hypothesis for the cheapness of additional household members relates to possible returns to scale, which are likely to affect shelter and may, thus, motivate the almost negligible marginal cost of any extra family member. An obvious suggestion of the existence of returns to scale comes from the observation that while the marginal cost of extra family members (in terms of relative food requirements) increases at a diminishing rate for traditional Engel scales (as several analyses suggest), this holds only partially for the corresponding Italian housing scales. In fact, as far as children are concerned, their marginal cost (in terms of shelter quality) seems to decrease once an "optimal" household size has been attained.

Our shelter equivalence factors also persistently point to a relative "cheapness" of older children vis-à-vis babies for both countries. It is possible that they convey the idea of certain standards of the society that pressure families to make sure that a child, for instance, be provided a room of their own, or that a relocation towards a better neighborhood takes place. Accommodating a new-born baby into a family could, then, entail some sort of fixed initial investment in shelter conditions that are no longer required for older children. Although justifiable to some

[29]Note that some scales exhibit large standard errors. This is not a surprise, given the low significance of the corresponding parameters in the model.

[30]Flatness typically characterizes subjective equivalence scales as well. At least three possible explanations for this have been put forward in the literature: substitution effects, dampening of parents' aspirations about their material well-being and reference group effects. For a comprehensive analysis of the subject we refer the reader to Van den Bosch (1996), among others.

TABLE 5

Estimated Scales for Shelter by Other Demographic Characteristics; Italy and Belgium

Italy		Belgium	
	Fs = 1		Fs = 1
Geographical location		Geographical location	
North West	1.49 *0.02*	Brussels	1.58 *0.08*
North East	1.00 –	Wallonia	1.09 *0.10*
Centre	1.26 *0.09*	Flanders	1.00 –
South	1.66 *0.04*		
Islands	2.19 *0.11*		
Occupation		Occupation	
Employee	1.56 *0.08*	Employee	1.20 *0.09*
Self-employed	1.00 –	Self-employed	1.00 –
Retired	1.38 *0.15*	Unemployed	1.66 *0.15*
		Student	0.92 *0.11*
		Home duties	1.49 *0.39*
Housing tenure		Housing tenure	
Ownership	1.00 –	Ownership	1.00 –
Rental	2.12 *0.03*	Rental	6.03 *0.03*
Usufruct	1.30 *0.07*	Usufruct	2.39 *0.05*
Education			
Illiterate	3.74 *0.10*		
Compulsory	2.09 *0.07*		
Secondary	1.28 *0.02*		
College	1.00 –		
Sector			
Manufacturing	1.07 *0.11*		
Services	1.00 –		
Agriculture	1.32 *0.04*		

Note: Standard errors in italics.

extent, this phenomenon is most likely a reflection of a weakness of our functioning equations' estimates.

Turning to Table 5, the similar definition of the shelter functioning adopted for both countries enables us to make some informative direct comparisons concerning the cost of given characteristics for a single adult of either sample. The scale factors for our housing conditions functioning basically re-express the considerations already made in the previous subsection. Yet, the use of monetary units in terms of the ratio of needed purchasing power allows us to convey the same message in a more powerful and direct way. For instance, our respective parameters estimates allow us to pinpoint the relatively better housing conditions, *ceteris paribus*, of Belgian employees versus their Italian counterparts. The former's endowment needs to be raised only by 20 percent (as against 56 percent for the latter) in order to make their shelter well-being comparable to that of the self-employed individual. Conversely, despite tenancy status in both countries being robustly associated with lower shelter achievements in comparison with the ownership condition, the computed equivalence factors indicate that the Belgian respondents are penalized significantly more with regard to rental tenure than the Italians. Perhaps this is a consequence of the relatively larger prevalence of ownership within this sample. Therefore, to enjoy similar housing conditions, a tenant residing in Belgium would need five times the income of his landlord compatriot,

whereas an Italian colleague would achieve the same standard with an addition in income of just 22 percent. The fairly large absolute value of the Belgian scale may be interpreted to suggest that the shelter quality of a tenant cannot efficiently be improved simply through extra household income. Several other factors of a non-monetary nature may reasonably play a role, subsequently weakening the relative importance of one's endowment.

With reference to the illustrative empirical exercise performed by Winkelmann and Winkelmann (1995) in their analysis of the psychological costs of unemployment, we can draw on the parameter estimates from equation (5) to explicitly inquire into the apparent relative contributions of these non-monetary factors to one's welfare level, in order to uncover the actual role of income on our selected well-being measures. In addition to gaining some insights into the effectiveness of income redistribution for functionings' levels, if the non-monetary component turns out to have considerable impact, then it is reasonable to question the traditional assumption which postulates that the totality of the well-being concept can be sufficiently and robustly captured by its monetary counterparts.

Specifically, we attempt to determine what percentage of the total increase (or decrease) in functionings' achievements associated with given individual characteristics appears to be due to the growth (or decline) of income and what percentage to non-monetary factors. To answer this question, we assume that the average yearly household incomes of individuals in a chosen category of the sample represent the realistic "before" and "after" circumstances of people sharing a particular environment. Because of the semilog functional form adopted in the estimation, the change in the dependent variable f associated to a modification in one's monetary resources Y may be computed as $\Delta f = \beta(\Delta Y/Y)$, i.e. by multiplying the estimated coefficient on the logarithm of income by the relative change in income.[31]

Considering the previously mentioned housing tenure variables in the Belgian sample, for instance, the average yearly disposable household income of an usufructuary totals 22,318 Euro, but increases to 30,254 Euro for the average homeowner, suggesting a difference of 7,936 Euro in the latter's favor. Assuming that household income rises by this entire amount, the shift from usufruct towards ownership will be associated with a rise in the dependent variable of our shelter regression in Table 3 of 0.02 (i.e. $\{0.598 \times [\ln(30{,}254/22{,}318)/\ln(22{,}318)]\}$, which represents only 3.7 percent $\{0.02/(0.522 + 0.02)\}$ of the total increase associated with the move from one contingency to the other.[32] This suggests that, *ceteris paribus*, some 96 percent of the improvement in housing conditions related to ownership is non-monetary.

Similarly, moving from usufruct to tenancy (average income of 22,066 Euro) when all other socio-demographic traits remain unchanged produces a diminished quality in shelter of 0.0007, corresponding only to some 0.13 percent of the total. A comparison with the Italian sample reveals an essentially analogous pattern, although the orders of magnitude appear to be larger. Namely, just 9.3 and 2.6 percent of the change in shelter achievements associated with ownership and tenancy, respectively, are due to monetary factors. However, in light of the rela-

[31]In the light of the adopted specification, Y stands, of course, for $\ln(Y)$.

[32]For sake of accuracy, we specify that 0.522 corresponds to the estimated coefficient for ownership in the Belgian shelter regression, while 0.598 represents the income coefficient.

tively large inaccuracy characterizing the Belgian tenure coefficients, this close alignment of results should be looked at with care. The same exercise can, of course, be repeated for other variables such as occupational status or residence area, which exhibit smaller standard errors. We find that, other things being equal, 98 percent of the deteriorating housing circumstances for an individual residing in Wallonia compared to an individual in Brussels appear to be related to non-monetary determinants. This occurs in exactly the same way as the drop in the income level of the average resident of Rome to the one enjoyed by the average Neapolitan implies a related decline in housing conditions, 91 percent of which is non-monetary.

When confronted with the orders of magnitude of the previously derived equivalence scales, this exercise can be said to convey essentially the same information. Still, its own specific value-added lies in the fact that it allows us, when income and other variables are controlled for, to posit that a significant contribution of a given individual condition to either a high or low level of functioning achievement can be attributed to a large extent to the non-monetary aspects of the condition itself. In other words, the impressive predominance exhibited by the non-monetary factors of well-being highlights the inadequacy of income as a comprehensive proxy for it, at least for the shelter dimension. This is, by no means, astonishing news. A variety of empirical applications of Sen's approach exists which provide evidence on the issue.[33] However, confining ourselves to the samples under consideration, at the conclusion of the above exercise it seems reasonable to recall the earlier conjecture (cf. *supra*) that income transfers need not necessarily be the best way to offset the disparities observed among individuals. There is no doubt that income's effectiveness in redressing functioning disparities needs to be investigated further, as does the role played by incentives and the like. Precisely for these reasons, we acknowledge for the time being that income—when appropriately adjusted on the basis of information on functioning constituents—has the merit of being a useful and immediate inequality indicator. Yet, we have reasons to proceed with great care when interpreting it as an appropriate instrument for redressing those same disparities.

7. Comparing the Poor: A Closer Look at the Distribution of Welfare

In an attempt to foster the understanding of the results presented in Tables 4 and 5, traditional income scales (namely, Engel scales) have been computed on the SHIW dataset.[34] The equivalence scales estimated in this study (namely, scales for shelter by household size) have then been applied to the incomes of a set of individuals singled out from the whole sample. The selection process of the sub-sample was not completely random, however. Owing to the fact that only equivalence scales (by household type) for children up to nine years old and adults could be

[33]See, among others, Ruggeri Laderchi (1997), Phipps (1999), and Balestrino (1996).

[34]Appendix D reports the complete parameter estimates of the Engel curve for the Italian sample. Unfortunately, no information on food consumption habits is gathered by the PSBH. This prevented us from performing a similar analysis on Belgian data.

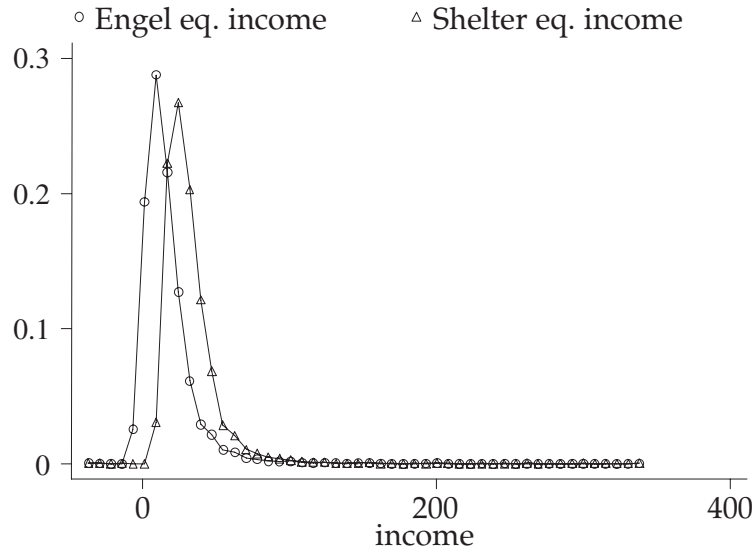

Figure 1. Non-Parametric Density of Equivalent Incomes for Italy

derived from both Engel and shelter estimates, any individual living in households including kids older than nine has been excluded *a priori* from the sub-sample. This selection process resulted, therefore, in 14,000 sampled individuals out of 23,900 for Italy and 4,839 out of 7,021 for Belgium.[35] This procedure allows an interesting comparison, i.e. the identification of differences in the distribution of welfare. To accomplish such a goal we have been adjusting incomes using the scales computed at each individual's specific household composition.

The resulting series of deflated monetary resources have been used to compute the non-parametric density function of welfare for the sample (Figure 1). As it immediately appears, the density functions yield similar distributions of welfare. Yet, the Engel one displays a slightly higher concentration of low levels of welfare while the distribution of functioning-equivalent incomes derived from the shelter scale factors looks slightly more concentrated (it exhibits a smaller variance). Moreover, the latter also undergoes a slight translation to the right, entailing a modification in the overall poverty rate.

To further scrutinize this shift and assess whether or not some specific demographic groups are hurt more by the alternative shelter scales, we count the number of individuals whose deflated (i.e. equivalized) income falls below the poverty line, arbitrarily set at 60 percent of the median equivalent income and report the results in Table 6. The choice of the scale indeed seems to affect the overall poverty estimates, although not to an extremely large extent. Resorting to equivalization factors computed on the basis of individual achievements in functionings results in a higher percentage of individuals regarded as living in poverty (about 2 percent,

[35]For the purpose of drawing such direct comparisons, the availability of a nutritional functioning would have unquestionably represented a more effective device. Unfortunately, the lack of any information concerning body size or metabolic rates in the dataset made such idea absolutely unworkable.

TABLE 6

IDENTIFYING THE POOR: ENGEL-POOR VS. FUNCTIONING-POOR

	Italian Sample	Below the Poverty Line		
		Engel	Functioning	% Variation
Sample size	14,143	–	–	–
No. households	5,765	965	1,448	+8.4%
No. children (0–9)	1,401	388	255	–9.5%
No. adults	12,742	2,195	2,599	+3.2%
North West	3,254	305	412	+3.3%
North East	3,113	194	312	+3.8%
Centre	3,011	357	373	+5.3%
South/Islands	4,765	1,727	1,757	+0.6%
Self-employed	1,294	226	209	–1.3%
Employee	3,526	278	238	–1.1%
Unemployed	851	391	357	–4.0%
Retired	4,789	709	1,250	+11.3%
Student	1,014	235	161	–7.3%
Home duties	1,762	513	479	–1.9%
Married	7,751	1,341	1,385	+0.6%
Divorced	302	57	87	+9.9%
Widowed	1,471	226	545	+21.7%
Single	4,619	959	837	–2.6%
Women	7,339	1,349	1,642	+4.0%
Man	6,804	1,234	1,212	–0.3%
Illiterate	2,752	812	899	+3.2%
Compulsory educ.	6,793	1,319	1,572	+3.7%
Secondary educ.	3,649	403	339	–1.7%
College educ.	949	49	44	–0.5%
Percentage of people in poverty	–	18.3	20.2	1.9%

according to our definitions). Sensible discrepancies, however, are to be remarked when focusing on given population sub-groups.

Considerable differences occur, for instance, at the geographical level. In particular, a relative increase in the incidence of deprivation among Northern and Central Italy inhabitants seems to be suggested by the distribution of functioning-equivalent incomes, revealing the complexity underlying regional gaps. Exposure to a significantly increased poverty risk also seems to characterize the feminine gender as well as divorced and/or widowed individuals, witnessing the existence of possible welfare effects for these categories that are not captured by one's consumption behavior. Similarly, discrepancies are to be noticed for the not employed. While measures of destitution based on the quality of one's life in the form of shelter achievements hint at a reduced presence of both students, unemployed and housewives, poverty among the retired looks remarkably understated when assessed on the basis of the traditional income scales.

Does the functioning perspective yield a more accurate picture of well-being (or, at least, additional information on it), so to counterbalance its extra costs in terms of data requirements? As already stressed, one cannot fail to notice from Table 6 that some social categories perform in a notably different way when a functioning-based rather than a consumption-based approach is adopted. The incidence of deprivation among retired, widowed, students or divorced individuals,

just to mention a few, significantly vary. Hence, we are led to a very similar conclusion to the one reached by Balestrino and Sciclone (2001) in the context of their investigation of the correlation linking income and functionings. Specifically, that despite the *prima facie* resemblance of the welfare distributions resulting from the application of the two considered scales to our sample's incomes, focusing on different notions does have a bearing on the identification of particular deprived categories, and this is likely to seriously affect any subsequent assessment in well-being analysis.[36]

8. Conclusions

In this paper, we have explored the potential of equivalence scale estimation for the computation of welfare measures that meet with what Sen has defined as the third line of approach "in giving practical shape to the foundational concern . . . as to how individual advantages are best judged and interpersonal comparisons most sensibly made" (Sen, 1999, p. 81). Thus, we have been extending the usual type of equivalence scale estimation by adjusting individual income levels for differences in valuable states of life, so as to make them equivalent in terms of functioning achievement. The derived scales should in principle reflect the individual's needs in a more precise way, enabling us to incorporate other characteristics (such as location, employment status) in the creation of equivalence scales for welfare comparisons.

This new way of identifying equivalence scales has been applied using Italian and Belgian data. We came to the conclusion that the income differences associated with different characteristics only play a small role in explaining differences in functioning achievements (hence, in well-being), mainly because of the relative magnitude of the effects of certain non-monetary factors as compared to household economic resources on the living standard enjoyed by different persons.

An important policy message is therefore that compensating people for functioning shortfalls in monetary terms may not be sensible. The size of the computed scale factors as well as the relevance of non-pecuniary elements seem to clearly hint at the inappropriateness of the assumption that disparities across individuals may be efficiently redressed by means of additional income. Hence, even if it made sense from a theoretical point of view to compensate, the empirical exercise in this paper suggests that this is not the best way to proceed. Of course, this is not meant to be the final judgment on the issue. Nevertheless, it is fully in line with certain existing studies on the subject, emphasizing that cash transfers are unlikely to represent a useful vehicle of inequality reduction in a capability context (Balestrino, 1996, for instance).

The pursued alternative has potentially useful policy implications: it may be quite effective in condensing information and conveying it in an easy-to-

[36]Note, however, that Buhmann *et al*. (1988) in their in-depth review of the available equivalence scales already came to a similar conclusion, proving that the choice of the scale (whether objective or subjective, for instance) can systematically affect absolute and relative levels of poverty and inequality, and therefore comparative rankings of population sub-groups within countries.

understand form to the general public. This unfortunately does not ease its implementation. Practical compromises induce analogous needs as directly examining and comparing vectors of functionings, as do the various judgments that are required in order to obtain suitable measures of achievements. Moreover, without higher precision in the estimates, this remains an illustrative rather than a conclusive analysis.

Yet, it is hoped that we were able to prove that the experience of equivalence scales acquired in other economics areas could be fruitfully and sensibly utilized within a quality of life-oriented context.

Appendix A: The Indicators of Functionings

TABLE A1

Italy

Functioning's Components	Type of Indicator	Description of the Indicator
Shelter		
Rating of dwelling	Categorical (6 mod.)	Quality of the dwelling itself
Rating of location	Categorical (4 mod.)	Quality of the neighborhood
Heating	Dichotomous	Availability of heating
Floor area	Continuous	Total floor area in square meters

TABLE A2

Belgium

Functioning's Components	Type of Indicator	Description of the Indicator
Shelter		
Crowding index	Continuous	No. of rooms
Heating	Dichotomous	Availability of heating
Housing satisfaction	Categorical (6 mod.)	Degree of satisfaction with one's housing
Problems to the dwelling	Summated scale	Presence of structural problems in the house[a]
Problems to the location	Summated scale	Presence of problems due to the location[b]

Notes:

[a]The indicators whose summated rating has been considered are: insufficient space; lack of light; heating problems; mould or humidity; damaged roof; cracks in the walls; damaged coatings.

[b]The indicators whose summated rating has been considered are: insufficient space; lack of light; heating problems; mould or humidity; damaged roof; cracks in the walls; damaged coatings.

Appendix B: Variable Means

TABLE B1

Variable Means for the Italian Sample

Variables	Sample Means (n = 23,900)	Variables	Sample Means (n = 23,900)
Male	0.49	Illiterate	0.16
Female	0.51	Compulsory education	0.53
Age 0–10	0.10	Secondary school	0.25
Age 11–20	0.13	University and over	0.06
Age 21–30	0.16		
Age 31–40	0.14	Employee	0.28
Age 41–50	0.14	Self-employed	0.09
Age 51–60	0.13	Unemployed	0.08
Age 61–70	0.11	Retired	0.23
Age 71–80	0.06	Students	0.19
Age 80+	0.03	Home duties	0.13
Married	0.51	Agriculture	0.09
Divorced	0.02	Manufacturing	0.35
Widowed	0.07	Services	0.56
Single	0.40		
North West	0.21	Ownership	0.65
North East	0.20	Usufruct	0.09
Centre	0.20	Rental	0.26
South	0.28	Household size	3
Islands	0.11		
		Mean household income	24,710 Euro
Urban location	0.89	1st decile (% mean)	0.12
Rural location	0.11	9th decile (% mean)	1.75

Note: Household income equals unadjusted household disposable income in Euros.

TABLE B2

Variable Means for the Belgian Sample

Variables	Sample Means (n = 7,021)	Variables	Sample Means (n = 7,021)
Male	0.47	Illiterate	0.01
Female	0.53	Compulsory education	0.39
		Secondary school	0.51
Age 16–25	0.14	University and over	0.09
Age 26–35	0.18		
Age 36–45	0.23	Employee	0.45
Age 46–55	0.16	Self-employed	0.07
Age 56–65	0.11	Unemployed	0.06
Age 66–70	0.06	Retired	0.21
Age 71–75	0.05	Students	0.09
Age 75+	0.07	Home duties	0.12
Married	0.60	Ownership	0.74
Divorced	0.08	Usufruct	0.03
Widowed	0.08	Rental	0.23
Single	0.24		
		Household size	3
Flanders	0.56	Mean household income	28,148 Euro
Brussels	0.09	1st decile (% mean)	0.32
Wallonia	0.35	9th decile (% mean)	1.75

Appendix C: Parameter Estimates from the Quadratic Model

TABLE C1

Belgium

	Shelter	
Variables	Coeff.	Std. Err.
Intercept	–0.018**	(0.151)
Ln (Y)	0.218***	(0.038)
[Ln(Y)]^2	0.041***	(0.009)
Ln (fs)	–0.316***	(0.078)
Age 16–20	–0.214*	(0.112)
Age 21–50	–0.290***	(0.053)
Age over 70	0.228***	(0.072)
No. of children aged 0–4	–0.014	(0.044)
No. of children aged 5–9	0.018	(0.037)
No. of children aged 10–14	0.039	(0.040)
No. of children aged 15–20	–0.029	(0.021)
No. adults	0.077**	(0.032)
Female	0.051	(0.032)
Married	0.227***	(0.053)
Divorced	–0.128	(0.082)
Widowed	0.229***	(0.084)
Brussels	–0.241***	(0.068)
Flanders	0.058*	(0.033)
Compulsory education	–0.090	(0.093)
Secondary school	0.049	(0.084)
University	0.124	(0.085)
Self-employed	0.075	(0.059)
Student	0.166**	(0.080)
Unemployed	–0.170**	(0.080)
Retired	–0.064	(0.062)
Home duties	–0.110	(0.069)
Ownership	0.528***	(0.107)
Rental	–0.536***	(0.114)
Adj. R-squared	0.181	
Sample size	6,509	

TABLE C2

ITALY

Variables	Shelter	
	Coeff.	Std. Err.
Intercept	–2.427***	(0.168)
Ln (Y)	0.278***	(0.096)
$[\text{Ln}(Y)]^2$	0.081***	(0.015)
Ln (fs)	–0.184***	(0.068)
Age 10–14	–0.835**	(0.329)
Age 15–20	0.092	(0.082)
Age 21–50	–0.026	(0.031)
Age over 70	–0.112**	(0.049)
No. of children aged 0–4	0.066**	(0.033)
No. of children aged 5–9	0.079**	(0.032)
No. of children aged 10–14	0.100***	(0.030)
No. of children aged 15–20	0.034	(0.027)
No. adults	–0.017	(0.023)
Female	0.024	(0.019)
Married	0.306***	(0.030)
Divorced	0.240***	(0.069)
Widowed	0.266***	(0.053)
North West	–0.132***	(0.026)
North East	0.165***	(0.028)
South	–0.208***	(0.031)
Islands	–0.418***	(0.041)
Compulsory education	0.441***	(0.047)
Secondary school	0.791***	(0.052)
University	0.944***	(0.061)
Self-employed	0.310***	(0.029)
Student	0.813	(0.611)
Unemployed	0.045	(0.050)
Retired	0.088**	(0.034)
Home duties	–0.079	(0.081)
Manufacturing	0.165***	(0.040)
Services	0.212***	(0.040)
Ownership	0.191***	(0.036)
Rental	–0.372***	(0.040)
Urban	0.029	(0.034)
Adj. R-squared	0.359	
Sample size	12,797	

Note: Tests of equality of coefficients revealed a lack of statistical significance for marital differences among the Belgians, age groups 16–20 and 21–50 as well as the labor market states of "unemployed" and "home duties." As for the Italian sample, no apparent statistically significant differences exist on the marital status.

Appendix D: Parameter Estimates of the Engel Curve

TABLE D1

Italy

Variables	Coeff.	Std. Err.
Intercept	0.643***	0.013
Ln (per capita expenditure)	–0.132***	0.004
Ln (fs)	–0.023***	0.005
Ratio children aged 0–4	–0.093***	0.017
Ratio children aged 5–9	–0.046***	0.018
Ratio children aged 10–14	–0.017	0.016
Ratio children aged 15–20	0.015	0.014
Ratio adults under 70	–0.012**	0.006
Female	–0.005	0.004
Married	–0.001	0.004
Divorced	–0.019**	0.008
Widowed	0.013	0.006
North West	0.003	0.005
North East	–0.001	0.005
South	0.004	0.005
Islands	0.004	0.006
Compulsory educ.	–0.001	0.005
Secondary school	0.002	0.006
University	0.015	0.008
Self-employed	0.002	0.005
Unemployed	–0.003	0.009
Retired	0.026***	0.004
Student	0.003	0.032
Home duties	0.030***	0.007
Manufacturing	0.009	0.006
Services	0.007	0.006
Ownership	0.001	0.005
Rental	0.001	0.006
Urban	0.025***	0.005
Adj. R-squared	0.178	
Sample size	8,098	

Notes: The estimation has been performed at the household level, thus demographics refer to the family head. An extension of the Working–Leser equation that incorporates a vector of characteristics was adopted. Standard tests of equality of coefficients were employed, rejecting the statistical equality of coefficients. The variables "Ratio children" and "Ratio adults" denote the ratio of the number of children or adults belonging to the indicated age class to total household size.

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