United Nations University
WIDER
World Institute for Development Economics Research

Research Paper No. 2004/41

# What Money Can't Buy

## The Relevance of Income Redistribution for Functioning Levels

Sara Lelli *

July 2004

**Abstract**

This paper relates Amartya Sen's capability approach to the literature on equivalence scales. Synthetic indicators of well-being are constructed by adjusting individual incomes for differences in functionings. An exploratory comparative application to Italian and Belgian data illustrates the model while disclosing the apparent relative contributions of monetary and non-monetary factors to changes in the functionings' level. The results suggest that income as such cannot take us very far in evaluating achievements, on account of the effect of some non-monetary factors. Further, they hint at the inappropriateness of the assumption that any dissimilarity among individuals may be efficiently dealt with by a suitable monetary compensation.

Keywords: well-being, functionings, equivalence scale, equivalent income

JEL classification: I31, I32



* Center for Economic Studies, Katholieke Universiteit Leuven and Università Cattolica del Sacro Cuore, Piacenza

This is a revised version of the paper originally prepared for the UNU-WIDER Conference on Inequality, Poverty and Human Well-Being, 30-31 May 2003, Helsinki.

UNU-WIDER acknowledges the financial contributions to the research programme by the governments of Denmark (Royal Ministry of Foreign Affairs), Finland (Ministry for Foreign Affairs), Norway (Royal Ministry of Foreign Affairs), Sweden (Swedish International Development Cooperation Agency—Sida) and the United Kingdom (Department for International Development).

ISSN 1810-2611 ISBN 92-9190-630-1 (internet version)

**Acknowledgements**

This paper greatly benefited from the crucial comments of Erik Schokkaert, who generously gave his time to read previous versions of it. I would also like to express my gratitude to my financial supporter, the Fondazione di Piacenza e Vigevano. I remain, of course, responsible for all the views expressed in the paper.



UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Liisa Roponen at UNU-WIDER
Printed at UNU-WIDER, Helsinki

> Some capabilities are harder to measure than others, and attempts at putting them on a 'metric' may sometimes hide more than they reveal. Quite often income levels—with possible corrections for price differences and variations of individual or group circumstances—can be a very useful way of getting started in practical appraisal.
>
> Amartya K. Sen (1999: 81)

## 1 Introduction

Hardly anyone would deny the enormous influence income has on what people can or cannot do. By the same token, it would probably be irrational not to acknowledge the advantages that additional monetary resources could bring to one's life. Even so, a more fundamental issue seems to lie beneath common wisdom, namely what is the real relative power of such monetary factors in accomplishing people's ambitions and generating at least minimum acceptable levels of well-being?

Economics has traditionally distinguished itself from other social sciences by keeping as close as possible to the well-known 'measuring rod of money' (Pigou 1920) Nevertheless, this no longer seems to be the case, as the variety of wider theoretical frameworks put forward during the last decades indicates. More often than not, these make a case for a more extensive characterization than strict monetary measures. Specifically, a number of factors exhibiting a non-monetary nature are believed to come into play, the most obvious being the existence of various 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 is, thus, by and large acknowledged at the theoretical level but 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—and, consequently, the non-income differences among individuals—should be taken into account when making distributional assessments and, more specifically, when carrying out welfare comparisons. Within the traditional literature, the common method of deriving at monetary measures of well-being relates to the use of equivalence scales.

This paper draws precisely on one recent multidimensional framework modelling the notion of well-being (namely, Amartya Sen's capability approach) and brings it together with the literature on equivalence scales, in order to explore the former's implications for the use of the latter. Sen's approach allows, in fact, to investigate a further solution (other than expenditure information) to the fundamental problem of welfare analysis, i.e., determining the basis on which to compare the welfare levels of different individuals. Given that his so-called *functionings* relate to the outcomes achieved by a person on various dimensions of his life through the consumption of goods and services and that these are supposed to fully describe one's status, these could plausibly be taken

---

[1] A recent notable exception is the pioneering report on poverty and social exclusion in Europe coordinated by Atkinson *et al.* (2002) in which the authors emphasize the multidimensionality of social disadvantage. According to Atkinson *et al.*, poverty also depends on specific social circumstances such as poor housing, low education, and difficult access to health care.

as a proxy for welfare levels. In the light of this and as Sen himself (1999) sets forth, a synthetic indicator of well-being could be constructed by adjusting individual incomes for differences in functionings, in order to get some sort of 'functioning-equivalent incomes'.

It is not our intention, however, to provide an answer to the question: 'which is the ideal equivalence scale from Sen's point of view?' Clearly, 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. Concentrating on functionings (or, even better, capabilities) 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. We wish, instead, to take a more pragmatic stance and elaborate on an evaluative device that could help to throw some light on the effectiveness of income redistribution in compensating achievements' heterogeneity among individuals.[2]

We thus begin in section 2 with an account of the notion of equivalence scales and its uses as well as some cursory remarks on the main derivation methods. We then proceed in section 3 to set out the reference framework for the subsequent analysis. While scrutinizing an interesting, albeit not fully appreciated option for the operationalization of the capability approach, the proposed procedure will incidentally allow us to draw some comparisons to the traditional methodology. 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 functionings' level associated with several specific socioeconomic characteristics, as is argued in sections 4 and 5. Furthermore, 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 alternative dimensions of their lives. We explore this issue in section 6. Finally, in section 7 some conclusions are drawn.

## 2 Well-being and equivalence scales: concept, usage and measurement methods

As already mentioned, the practice of resorting to equivalence scales to assess inequalities, poverty and living standards typically aims at making comparisons possible between different households, i.e., between essentially heterogeneous entities. Household size and composition, *in primis*, but also socio-demographic characteristics (such as occupational status, living location, age and health of members, etc.) are likely to affect both the capacity to generate income and the extent of needs, or more generally, the possibility of achieving a given level of well-being. The idea is, therefore, to reduce heterogeneous households to equivalent units that are comparable with respect to their standard of living.[3]

---

2 Note that equivalence scales are, in this case, individual-specific. Each household member is regarded as a separate agent. 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 individuals composing the household, but we also believe that in measuring well-being, the fundamental concern should be with the position of each single person.

3 Following Slesnick (1998: 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

Specifically, as Ringen (1996) points out, a couple of commonplace observations have to be carefully reviewed whenever moving from the individual to the household dimension. First, there is an efficiency effect related to the fact that larger groups of individuals can exploit economies of scale in consumption, especially on typical 'family goods' like housing costs, durables or home production activities (transportation by car, preparation of meals, etc.). Next, a needs-effect, stemming from the personal characteristics of household members, means that even families of identical size and similar income may experience different levels of well-being depending on their circumstances. Obviously, age, gender, health status tend to govern one's needs and, in turn, one's accomplishments in terms of living standard through the acquirement of the needed resources.

Such factors, in conjunction with several others not subjected to the choice of the family, deeply affect the household's ability to extract well-being through income. Hence, an equivalence scale basically represents a sort of an exchange rate between money and well-being based on how much larger the income of a given type of household should be relative to that of a reference household, so that both are equally well off. The specification of an equivalence scale entails a number of choices. The characteristics of individuals and households, which are regarded as significant or the relevant price vector, represent only a few of these. But, essentially, the fundamental question of the whole analysis is the meaning to be attached to well-being or, to state it differently, the basis on which to compare various welfare levels. One needs observable proxies, and this causes the major difficulty. 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 number of ideas have, *de facto*, been proposed and assessed in the literature.

Despite the intrinsic arbitrariness of any such well-being indicator, two solutions—both relying on the idea that the household itself is the best judge of its living standard—seem to have been received more or less favourably and have resulted in corresponding widespread types of scales. A closer look at each of these will be helpful for the forthcoming analysis.

### 2.1 Consumption scales

An extensive literature has accumulated regarding consumption equivalence scale models, but the oldest paradigms remain most popular, namely those attributable to Engel (1895) and Rothbarth (1943). Both methods encompass the same beneficial feature: the scales are produced with econometric methods applied to household budget data, a feature which makes them fairly undemanding from a computational point of view. Furthermore, both models start from the idea that the welfare level of a household can be assessed as a function of its actual consumption of certain given commodities and that equivalent incomes are consequently the incomes resulting from the same quantity of consumption of these commodities.

---

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).

They do differ, however, in the choice of the specific welfare proxy. The Engel method is based on the observation (Engel's law) that, *ceteris paribus,* richer households spend proportionally less on food than poorer households. This observation, coupled with the empirical fact that food share seems to increase with the number of children (when resources are held constant), led Engel to assert that the proportion of income spent on food could be taken as an indirect measure of well-being.[4] The Engel scale, thus, measures the additional cost required by any household to achieve the same food share as the reference household. Clearly, this method implicitly assumes that the presence of children has similar impacts on the consumption of all household commodities.[5] In reality, this seems rather implausible, as Rothbarth forcefully argues: an additional child is unlikely to affect energy expenditures as much as it affects milk consumption. Consequently, the Rothbarth method proposes to ascribe the same welfare level to households exhibiting an equal consumption of some spending category attributable exclusively to adult members (i.e., tobacco, alcohol, adult clothing, etc.). The most prominent complications in this case stem, on the one side, from difficulties in finding persuasive examples of commodities exclusively consumed by adults as well as their plausibility as welfare measures and, on the other side, from the fact that the Rothbarth scales appear to be extremely sensitive to the choice of the specific bundle of adult goods.[6]

Consequently, then, neither the Engel nor the Rothbarth scales seems to constitute the ideal method. In spite of their straightforwardness, they allow neither covering the complete range of preferences, nor capturing the impact of demographic characteristics on the preferences or modelling their possible interactions with prices.[7] For these reasons, the majority of the contemporary literature on equivalence scales advocates the use of a statistical-economic approach based on a utility maximization model, in which well-being is interpreted as utility. 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) and in the vast literature arising from their works. However, basically, these procedures take for granted the existence of a household utility function which rationalizes the household's observable choices, the feasibility of comparison of

---

4 Clearly, a negative relationship exists between the food share and the level of well-being: the higher the food share, the lower the household's well-being level.

5 Furthermore, a major difficulty with Engel's approach lies in the arbitrary assertion that food share indicates well-being. This does not follow directly from Engel's observations and may yield biased outcomes (for example, take the case of a food loving family versus a car loving family).

6 A solution to this problem has been suggested by Deaton, Ruiz-Castillo and Thomas (1989), who introduce the concept of demographic separability, which allows to test the hypothesis that the demand for a certain bundle of goods is monotonically related to the adults' utility level. Nevertheless, the ethical issue of equating one's well-being with the consumption of goods such as tobacco or alcohol still remains.

7 It should also be noted that a modification in household composition might affect one's relative willingness to pay. The need for a larger car as a consequence of the birth of a child might, for instance, alter the price of the commodity 'holiday trip' for a couple, causing the implicit price of a holiday would be higher than its actual monetary cost.

utility levels across households and, finally, the appropriateness of utility as a welfare concept. Indeed, some involve controversial issues, entailing, among others, major technical difficulties related to the identification of the scales.[8] One possible solution to the latter problem consists of making plausible identification assumptions, based on prior beliefs, about the properties of equivalence scales (such as the scale's independence of the reference utility level). Alternatively, one could combine demand data with essentially two types of additional information: either observations on revealed preferences for household composition, or direct questions on household cost functions. The latter option relies very much on the methodology pursued by the so-called 'Leyden school'.

### 2.2 Subjective scales

Research using subjective information first made its appearance in the early 1970s thanks to the work of Van Praag (1971), followed immediately by (with Van Praag) Kapteyn (1973, 1976) and many others. Based on the assumption that households themselves can best evaluate their needs, the methodology recommends establishing utility values by questioning a given sample of people on the income levels they would assume to produce alternative levels of welfare. These are specified on a verbal scale ranging from 'very bad' to 'very good', and are subsequently converted into numerical scores. The equivalization factors are finally computed on the basis of the observed effect of a change in family composition and, consequently, on household welfare.

It follows then that well-being is understood here as a function of the extent to which income meets one's needs. From a theoretical point of view, in its original formulation the whole model was basically founded on a pre-specified form of utility function as well as on the assumption that individual welfare/utility is cardinally measurable on a 0-1 scale, where identical distances mean identical welfare differences.[9] Specifically, a bounded log-normal welfare function is postulated whose parameters, for a given respondent, are the log-mean $\mu$ and variance $\sigma^2$ of the answers. Of course, these parameters can be measured only after the verbal labels have been transformed into numerical indices, say $e_j$. For the conversion, the verbal labels need to convey the same meaning to each and every respondent and the so-called 'equal interval assumption' is required.[10] If it holds, respondents will associate the $j$-th verbal label out of $J$ with the welfare level $e_j = (2j-1)/2J$. Denoting the standard normal distribution function by $N$ and the respondent's answers by $a_j$, then by the log-normality assumption the latter will approximately satisfy

---

8 Demographic characteristics may not only affect the equivalence scales through their impact on household consumption. Instead, they may exert direct influence on the household utility function as well, and this direct influence cannot be estimated with demand data. This observation corresponds to the well-known distinction between conditional and unconditional preferences made by Pollak and Wales (1979).

9 This no longer holds for recent applications, where assumptions about the form of the utility functions, the distributions of the error terms, etc., are avoided as much as possible and only ordinal measurability of utility is usually postulated. See, e.g., Van Praag and Plug (1994-5).

10 The assumption is motivated by the information maximization argument. Cf. Van Praag (1991).

$$N(\ln(a_j);\mu,\sigma) = N\left(\frac{\ln(a_j)-\mu}{\sigma};0,1\right) = e_j \qquad \text{j} = 1,...J \tag{1}$$

implying that

$$\frac{\ln(a_j)-\mu}{\sigma} = N^{-1}(e_j;0,1) \qquad j = 1,...J \tag{2}$$

from which, by adding an error term, the parameters $\mu$ and $\sigma$ can be estimated

$$\ln a_j = \mu + \sigma N^{-1}(e_j;0,1) + \varepsilon_j \tag{3}$$

The parameters $\mu$ and $\sigma$ fully describe the shape of the so-called 'welfare function of income'. The parameter $\mu$ is found to vary over individuals and it has been shown to be well-explained by household characteristics

$$\mu_h = \beta_0 + \beta_1 \log(fs_h) + \beta_2 \log(Y_h) + \varepsilon_h \tag{4}$$

where $\mu_h$ is the value of $\mu$ for the *h*-th respondent, $Y_h$ denotes the respondent's household income and $fs_h$ the respondent's family size. Conversely, attempts to explain $\sigma$ have met with only limited success. Hence, in most analyses $\sigma$ is taken to be randomly varying over individuals. In view of the calculation of equivalence scales, specifying utility levels is rather problematic in this setting, given that people partially adapt to their income and use it as their reference position to evaluate other incomes. This causes one's evaluation of income in terms of welfare to depend strictly on one's current economic prosperity.[11] Hence, equivalence scales have to be calculated so as to take this factor into account. The problem is solved by the Leyden school; equivalence scales are derived under the assumption that households would enjoy equal welfare if their actual incomes coincide with the equivalent income. In other words, assume that the welfare derived from income is a function of the ratio of the respondent's household income and exp($\mu$)

$$N(Y_r) = N(\log(Y_r) - \mu_r) \tag{5}$$

This implies that welfare depends both on income and on household size (through $\mu$). The new income level $Y_h$ that will restore the welfare level to its value prior to the change of the family size to $fs_h$ will be defined as

$$\log(Y_r) - [\beta_0 + \beta_1 \log(fs_r) + \beta_2 \log(Y_r)] = \log(Y_h) - [\beta_0 + \beta_1 \log(fs_h) + \beta_2 \log(Y_h)]$$

which solves to

$$m_h = Y_h / Y_r = (fs_h / fs_r)^{\beta_1/(1-\beta_2)} \tag{6}$$

---

[11] Van Praag names this phenomenon 'preference drift', corresponding to $\beta_2 \neq 0$.

Despite the stability exhibited by the results originating from empirical estimations performed with the subjective approach (the tests on log-normality and equal intervals are generally favourable to the theory), one cannot deny that some deep-rooted difficulties still exist. The various technical problems with estimation probably attribute to the extremely moderate appreciation of this procedure.[12] Furthermore, conceptual difficulties persist. These are related to the question of what the welfare function of income actually measures. Evidence shows that depending on the phrasing of the question, different underlying concepts are apparently measured (see, e.g., Van Praag and Plug 1994-5). This fact, of course, causes some uneasiness and raises a number of doubts. Is the question itself well-understood by the respondents? And, more specifically, do the verbal labels have the same meaning for all individuals in the sample? Further investigations are thus needed, at least to determine which welfare concept people use in answering survey questionnaires.

As is obvious by now, the above summary has shown that, in spite of their remarkable reputation and scientific pedigree, no unique and objective way of generating equivalence scales for welfare comparisons exists. A variety of welfare concepts can be adopted, each of which inevitably entails some value judgements (implicit, in most cases). Consequently, given the wide variety of possible views, a consensus is impossible. No single method can be regarded as superior over others. This is not staggering news. Nevertheless, such an observation is crucially important for our analysis. Indeed, the welfare concept implicitly underlying nearly all equivalence scale models is, in our opinion, one that is not the most appealing ethically. As such, it conveys a definition of human well-being into the estimated equivalence scales that is much too narrow. Hence, why couldn't one possibly combine the growing belief that alternative spaces for evaluating people's living standards should be explored with the search for unconventional proxies for welfare levels, proxies which perhaps could more clearly reveal their normative component?

## 3 Developing equivalization factors for functionings

### 3.1 The model

A particularly unconventional proxy for welfare levels can be found, for instance, in Amartya Sen's notion of 'functionings'. In addition to the fact that welfare effects not revealed in the consumption behaviour of households are totally ignored by the conventional consumption approach (but not by the subjective one),[13] the functionings'

---

12 The assumption of cardinal utility—criticized by many—is not essential for the estimation of equivalence scales. Van Praag and Van der Sar (1988) offer a derivation of subjective scales in an ordinal framework, providing very similar results to the ones presented above except that these depend on the reference welfare level, i.e. on *j*. Further criticism relates to the flatness of the subjective scales, i.e. increasing family size does not seem to increase the incomes needed by comparable households much. Cf., e.g., Van Praag (1991), Van den Bosch *et al*. (1993).

13 It is fair to stress, however, that both consumption 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 (2002) on the costs of disability.

methodology may possibly address the already-mentioned ethically narrow characterization of welfare which is beyond both the consumption and subjective scales. 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. Such non-material aspects as 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.[14] 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.[15] Contrary with these observations, consumption scales 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, the Leyden 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 respondents assume to need in order to achieve a given basic functioning could be regarded as a consequence, as well as a proof, of the heterogeneity of need among people. However, the information on which Leyden scales rely appears to be far more subjective than Sen's proposal. One may want, especially in the light of the influence exerted on one's opinions by experience and ambition, 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 (data availability constraints can often force the analyst to resort to the exclusive use of subjective information).

In view of these considerations, one should explore the possibility of embracing an alternative perspective of the welfare notion, one which would avoid both the paucity of comparison in the goods space and the subjectivity inherent in the level of satisfaction experienced—a perspective that would attempt to reflect the welfare conception of

---

14 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 by Erikson (1987), Erikson *et al*. (1996) and Allardt (1996), among others.

15 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. An extensive literature also exists on the relationship between income and life expectancy, but Anand and Ravallion (1993) suggest that this positive association diminishes when the effect of affluence on public spending (particularly on health care) and the decrease in income poverty that typically accompanies higher incomes are taken into account. 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.

public policies, the aim of which is to make sure that through social support, people are able to do certain things, 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: 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 $f_h^m$ on the various $m$ dimensions ($m = 1,...,M$). Hence,

$$W_h = W_h(f_h^1,...,f_h^M) \tag{7}$$

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 $\pi_h$ results in

$$f_h^m = f_h^m(Y_h,\pi_h) = f_h^m(Y_h, fs_h, z_h) \tag{8}$$

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. We posit evidently that functionings are straightforward to measure, which is by no means a weak assumption, as the subsequent empirical application indicates. Moreover, 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. 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 fulfilment as *r* on a given dimension of well-being. Formally, therefore, for each functionings' vector one determines the income level $Y_h^*$ so that $\left\{Y_h^* \middle| f_r^m(Y_r,\pi_r) = f_h^m(Y_h^*,\pi_h)\right\}$ 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 achieved functionings). To use Sen's terminology, we then clearly 'distinguish between income as a *unit* in which to measure inequality and income as the *vehicle* of inequality reduction' (Sen 1999: 84,

emphasis in the original). Hence, suggesting that an income transfer will compensate for being seriously disabled is completely outside the purpose of this analysis. Instead, we believe that equivalence scales may represent an effective instrument for summarizing inequality information and, consequently, we confine ourselves to measuring disparities in functionings in terms of equivalent incomes.

### 3.2 The actual derivation of 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

$$f_h^m = \alpha + \beta \ln(Y_h) + \eta \ln(fs_h) + \sum_d \gamma fs_{hd} + \delta z_h + \varepsilon_h \tag{9}$$

where $fs_{hd}$ represents the number of members in the household of individual $h$ belonging to age class $d$ and the $\gamma$ coefficients, associated to the latter variable, allow to investigate the effects of changing composition while holding household size constant. The equation can also be extended to provide a more flexible and realistic representation by including a quadratic term in the logarithm of income

$$f_h^m = \alpha + \beta \ln(Y_h) + \lambda[\ln(Y_h)]^2 + \eta \ln(fs_h) + \sum_d \gamma fs_{hd} + \delta z_h + \varepsilon_h \tag{10}$$

In both cases, demographics are entered in 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 (9) 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.[16] 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

$$f_h^m = \alpha + \beta \ln(Y_h) + \eta \ln(fs_h) + \sum_d \gamma(fs_{hd}) + \delta z_h + \varepsilon_h \tag{11}$$

$$f_r^m = \alpha + \beta \ln(Y_r) + \eta \ln(fs_r) + \sum_d \gamma(fs_{rd}) + \delta z_r + \varepsilon_r \tag{12}$$

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

Assuming $f_h^m = f_r^m$

$$0 = 0 + \beta \ln\left(\frac{Y_h}{Y_r}\right) + \eta \ln\left(\frac{fs_h}{fs_r}\right) + \gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right) + \delta\left(z_h - z_r\right) + \varepsilon_h - \varepsilon_r \tag{13}$$

from which

$$\ln\left(\frac{Y_h}{Y_r}\right) = -\frac{\eta}{\beta}\ln\left(\frac{fs_h}{fs_r}\right) - \frac{\gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right)}{\beta} \tag{14}$$

and

$$m_h = \frac{Y_h}{Y_r} = \exp\left[-\frac{\eta}{\beta}\ln\left(\frac{fs_h}{fs_r}\right) - \frac{\gamma\left(\sum_d fs_{hd} - \sum_d fs_{rd}\right)}{\beta}\right] \tag{15}$$

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. This, however, no longer holds when scales are computed instead on the basis of equation (10). 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

$$m_h = \frac{Y_h}{Y_r} = \exp\left(\frac{-\left(2\lambda \ln(Y_r) + \beta\right) - \sqrt{\left(2\lambda \ln(Y_r) + \beta\right)^2 - 4\lambda\left(\eta \ln\left(\frac{fs_h}{fs_r}\right) - \gamma(fs_{hd} - fs_{rd})\right)}}{2\lambda}\right) \tag{16}$$

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 a measure of the 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's levels $f_h^m = f_r^m$ we obtain the identity (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

$$m_h = \frac{Y_h}{Y_r} = \exp\left( \frac{\delta(z_{1r} - z_{1h})}{\beta} \right) \tag{17}$$

Clearly, promoting a new approach to equivalence scales lies outside the purpose of this work, but 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, how efficient it is in compensating achievements' heterogeneity among individuals.[17] Furthermore, the interest to work further on Brandolini and D'Alessio (1998a), who explored the distribution of functionings' achievements and deprivation among the Italian population, motivates the present study and accounts for our choice of the specific dataset, described next.

## 4 The data

The data on which the subsequent exploratory analysis is based have been drawn from 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 behaviour of a sample of 8,135 Italian households (corresponding to some 24,000 individuals). Continuing with an established tradition, 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.

It is fair to emphasize that the main focus of the SHIW is on people's real 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

---

17 A somewhat similar approach has been explored by Smeeding *et al*. (1993) and Brandolini and D'Alessio (1998b), 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 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, in view of our interest in carrying on with the Brandolini and D'Alessio investigations, this alternative dataset includes no information at all on household income or wealth, thus rendering it incompatible to this study.

the available SHIW information to derive at a number of elementary indicators which could reasonably be aggregated to measure a few valuable elements of life for computing 'functioning-equivalent incomes'. At the same time, the consumption information provided by the SHIW allows us to estimate a set of standard Engel scales; a comparison of these with the previous ones produces interesting indications about the agents' living standard.

### 4.1 In search of suitable well-being indicators

A limited number of indicators have been selected from the overall database in order to make possible, albeit rather tentatively, the identification of a few functionings. As previously stressed, our hypothesis on the undemanding identification of functionings is a very optimistic one. In defining functionings' vectors, we follow Brandolini and D'Alessio only to a certain extent, mainly because of both the debatability of some of their functionings and the statistical requirements of the analysis.[19] Specifically, the questionnaire enables us to measure three distinct valuable dimensions in a relatively accurate and reliable way: health, shelter and job satisfaction.[20] Not too wide a choice, indeed, almost even minimal, but still reasonable for obtaining an approximate picture of the basic and elementary elements 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. With regard to health, respondents of the SHIW were asked to evaluate their overall self-assessed health status on a scale ranging from 'very bad' to 'very good', as well as record any disabilities and/or chronic diseases. We then assume these variables to be a reasonable description of one's physical health. A slightly wider set of indicators is available for appraising living accommodations. Here, 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. Nevertheless, 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.[21] Finally, labour conditions deal

---

19 On the one hand, 'social relationships' were appraised, for instance, on the basis of such information as the existence of close relatives or the availability of a telephone at home. Hence, the derived functioning looked conceptually quite weak, as the authors themselves acknowledge. On the other hand, the Brandolini and D'Alessio characterization of the functioning 'labour market status' did not satisfy the statistical requirements imposed by the particular aggregation technique chosen for our application (namely, an extremely high proportion of missing values as well as deeply heterogeneous sample sizes characterized the information according to which employment conditions were assessed). Finally, in the absence of additional variables, educational achievements were evaluated on the basis of a single indicator (i.e. educational qualification), resulting in a fairly restrictive interpretation of such a functioning.

20 Appendix A reports a systematic description of the indicators.

21 As accurately noted by Brandolini and D'Alessio (1998a), 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

exclusively with perceived levels of well-being. They are, in fact, evaluated in terms of the satisfaction one derives from a job. The answers given by a restricted sample of employed individuals to questions investigating the extent of their contentment with respect to various aspects characterizing their current activity (from physical and social conditions to social status or job security, etc.) are exploited. Of course, the major drawback of such a measure is its deeply subjective nature. Yet, in the light of the fact that the largest part of one's life is spent at work, we feel that job satisfaction is an important aspect in the lives of most people, and that it is a relevant factor in improving our well-being, and thus deserves consideration despite its entirely self-assessed character.

### 4.2 Aggregation procedures

An explicit aggregation procedure has to be selected to combine the elementary indicators and obtain an overall measure for each functioning. Since our objective simply consists of summarizing the largest possible part of the information at our disposal in a relatively small number of artificial variables (three, to be precise) 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 each separate 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. At a general level, given $v$ variables, the goal of the first principal components analysis is to find a new variable $S$ to account for as much of the variance in the original $v$ variables as possible. Since the component is a linear combination of the original variables, it is usually possible to easily ascribe a meaning to what it represents. Algebraically, scores for the first component $S_1$ are created by merely adding up the answers of each respondent $h$ on the $v$ items $a_v$ under consideration, weighted in such a way that the resulting component accounts for the largest share of the variance in the dataset, i.e.

$$S_{1h} = b_{11}(a_{1h}) + b_{12}(a_{2h}) + ... + b_{1V}(a_{Vh}) = \sum_{v=1}^{V} b_{1v} a_{vh} \qquad (18)$$

so that the variance of $S_1$ is maximized, given the constraint that the sum of the squared weights equals one.[22] If the variance of $S_1$ is maximized, so then is the sum of the squared correlations $c$ of $S_1$ with the items. First principal component analysis, then, recovers the optimal weights vector and the associated variance of $S_1$.

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

---

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.

22 The size of the elements in the weights vector has to be constrained. Otherwise one could arbitrarily make the variance of the principal component large simply by selecting large weights.

straightforward from an economic point of view.[23] Still, we believe it is fairly informative and exhibits obvious merits 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 1a and reveal a fairly satisfactory outcome for the health dimension, with the first component capturing 61 per cent of the total variance of the constituent variables. The same enthusiastic ranting cannot be tagged onto the remaining two dimensions. Even though a careful inspection of the loadings clearly reveals that the derived composite indicators accurately depict the hypothesized well-being aspects, none of them 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. As the empirical analysis carried out in Lelli (2001) basically emphasizes, it is possible that the various *modi operandi* for translating Sen's philosophical framework of thought into practice would be equally adequate.[24] Hence, failing to have better accounts, we take the three obtained principal components as the acceptable representation of the functionings 'being in good physical shape', 'being well sheltered' and 'being satisfied with one's job'.

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 functionings, utilizing these to compare and contrast evidence related to different (affluent) countries on the role of the same set of dimensions could provide instructive comparative findings. As a general rule, the fact that our Belgian data provide a 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. Replicating the application of the principal component model on the Panel Study of Belgian Households for the variables listed under the headings 'health', 'shelter' and 'working conditions' in Table A2 of Appendix A results in the identification of the optimal weights reported in Table 1b. Unfortunately also in this case, the first principal components capture 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 indices, and to look fairly close to what intuition would suggest, especially for the health index, which undoubtedly is more articulated than the Italian counterpart.[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] Consider, for instance, the case of health and shelter. It can easily be observed that each elementary indicator is almost equally represented in the first principal component, which thus makes each linear composite substantially correspond to an equal weighing scheme.

[25] Given its characterization and despite the label that was chosen, the working condition functioning basically relates to the individual's 'job satisfaction' rather than his 'job situation'. Note, moreover, that high scores on the shelter or health functionings imply 'bad shelter' and 'bad health', owing to the coding of the involved variables. Such dimensions, however, will be positively measured in the remainder of the paper.

Table 1a
First principal component analysis—Italy

| Original variables | First eigenvector | Proportion of variance accounted for by 1st component |
|---|---|---|
| Health | | 61 % |
| Health status | 0.61071 | |
| Chronic illness | 0.59480 | |
| Disability | 0.52273 | |
| Shelter | | 46 % |
| Rating for dwelling | 0.59063 | |
| Rating for location | 0.47425 | |
| Heating | 0.46840 | |
| Floor area | 0.45480 | |
| Job satisfaction | | 33 % |
| Work environment | 0.46642 | |
| Level of danger involved with the job | -0.19685 | |
| Demand of the job | -0.39809 | |
| Level of interest of the job | 0.54722 | |
| Social status | 0.50840 | |
| Job insecurity | -0.16526 | |

Table 1b
First principal component analysis—Belgium

| Original variables | First eigenvector | Proportion of variance accounted for by 1st component |
|---|---|---|
| Health | | 37 % |
| Health status | -0.46090 | |
| Chronic illness | 0.42474 | |
| Recent illness | 0.36927 | |
| Hospital | 0.34965 | |
| General physician | 0.43824 | |
| Specialist | 0.38425 | |
| Alternative medicine | 0.09408 | |
| 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 | |
| Working conditions | | 35 % |
| Work certitude | 0.33554 | |
| Work type | 0.62335 | |
| No. of hours | 0.41191 | |
| Work schedule | 0.43920 | |
| Work environment | 0.44670 | |
| Work distance | 0.28136 | |
| Job search | -0.18722 | |
| Overqualified | -0.10621 | |

## 5 Moving towards the operationalization of functioning-equivalent incomes

### 5.1 Estimating functionings' curves

Accomplishing our objective requires a preliminary estimation of equations (9) and (10) linking each included composite indicator to represent a functioning with household income and a bundle of socio-demographic variables. With regard to the latter, 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] In Tables 2a and 2b, we report the parameter estimates for health, shelter and job satisfaction 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) and job satisfaction (for Italy) statistically vary significantly, in a non-linear way, with one's financial possibilities. For practical reasons, however, information only on the linear case 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 0.04: 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 (except for job satisfaction) 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 functionings' equations. The following 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.[27] A good number of coefficients are found to be highly significant at the 5 per cent level and their signs, for the most part, are as expected.

A snapshot comparison of the living conditions in the countries considered can be informative. Basic similarities include high scores on the three selected functionings in both countries which show a robust positive correlation with reasonably high levels of educational attainment and the self-employed labour condition. Basic dissimilarities relate to the income variable which is more relevant in the Italian regressions. Specifically, monetary resources do not seem to matter in Belgium either in determining the health scores or in shaping their work contentment (even under the non-linear specification) whereas in the Italian sample they play a rather prominent role, at least for job satisfaction.

---

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.

27 Unfortunately, as information on the level of urbanization in the area of residence or the sector of activity is not available for the PSBH 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.

Table 2a
Parameter estimates of the functionings' equation—Italy

| | Health | | Shelter | | Job satisfaction | |
|---|---|---|---|---|---|---|
| Variables | Coeff. | Std err. | Coeff. | Std err. | Coeff. | Std err. |
| Intercept | -1.200*** | (0.111) | -3.092 *** | (0.101) | -1.861 *** | (0.254) |
| Ln (Y) | 0.130 *** | (0.024) | 0.747 *** | (0.027) | 0.265 *** | (0.047) |
| Ln (fs) | 0.017 | (0.073) | -0.207 *** | (0.068) | -0.138 | (0.158) |
| Age 10-14 | 0.840 *** | (0.133) | -0.719 ** | (0.341) | - | - |
| Age 15-20 | 0.639 *** | (0.064) | 0.083 | (0.082) | -0.007 | (0.169) |
| Age 21-50 | 0.411 *** | (0.034) | -0.033 | (0.032) | -0.097 | (0.063) |
| Age over 70 | -0.604 *** | (0.064) | -0.094 * | (0.049) | 0.314 | (0.348) |
| No of children aged 0-4 | 0.126 *** | (0.030) | 0.068 ** | (0.033) | 0.015 | (0.072) |
| No. of children aged 5-9 | 0.062 ** | (0.031) | 0.088 *** | (0.032) | 0.089 | (0.067) |
| No. of children aged 10-14 | -0.012 | (0.029) | 0.112 *** | (0.030) | 0.039 | (0.066) |
| No. of children aged 15-20 | -0.001 | (0.027) | 0.041 | (0.027) | 0.062 | (0.057) |
| No. adults under 70 | 0.036 | (0.024) | -0.001 | (0.023) | 0.020 | (0.054) |
| Female | -0.005 | (0.021) | 0.026 | (0.019) | -0.117 ** | (0.047) |
| Married | -0.134 *** | (0.028) | 0.307 *** | (0.030) | 0.071 | (0.064) |
| Divorced | -0.230 *** | (0.069) | 0.249 *** | (0.070) | 0.004 | (0.124) |
| Widowed | -0.179 *** | (0.068) | 0.275 *** | (0.053) | 0.233 ** | (0.111) |
| North West | 0.216 *** | (0.031) | -0.126 *** | (0.026) | -0.073 | (0.065) |
| North East | 0.085 *** | (0.032) | 0.174 *** | (0.028) | 0.209 *** | (0.065) |
| South | 0.007 | (0.034) | -0.207 *** | (0.031) | -0.112 | (0.069) |
| Islands | 0.057 | (0.044) | -0.414 *** | (0.042) | 0.280 *** | (0.087) |
| Compulsory education | 0.455 *** | (0.064) | 0.437 *** | (0.047) | 0.326 * | (0.177) |
| Secondary school | 0.601 *** | (0.067) | 0.800 *** | (0.052) | 0.571 *** | (0.181) |
| University | 0.584 *** | (0.074) | 0.988 *** | (0.062) | 0.866 *** | (0.191) |
| Self-employed | 0.055 ** | (0.024) | 0.331 *** | (0.029) | 0.386 *** | (0.052) |
| Students | 0.151 | (0.244) | 0.804 | (0.604) | – | – |
| Unemployed | -0.089 * | (0.048) | 0.082 | (0.050) | – | – |
| Retired | -0.463 *** | (0.042) | 0.088 ** | (0.034) | – | – |
| Home duties | -0.158 * | (0.087) | -0.065 | (0.081) | – | – |
| Manufacturing | 0.119 ** | (0.051) | 0.158 *** | (0.040) | 0.110 | (0.110) |
| Services | 0.111 ** | (0.050) | 0.207 *** | (0.040) | 0.416 *** | (0.107) |
| Ownership | -0.005 | (0.040) | 0.194 *** | (0.036) | 0.195 ** | (0.078) |
| Rental | -0.018 | (0.043) | -0.369 *** | (0.040) | 0.211 ** | (0.086) |
| Urban | 0.001 | (0.035) | 0.030 | (0.034) | 0.042 | (0.072) |
| Adj. R-squared | 0.264 | | 0.356 | | 0.082 | |
| Sample size [a] | 12,838 | | 12,797 | | 3,895 | |

Notes: Standard errors corrected for heteroskedasticity. *, ** and *** denote significance at 10, 5 and 1 per cent, respectively

[a] The difference in sample size is a direct consequence of data availability. All functionings are measured at the individual level, but information concerning job satisfaction was available only for a restricted sample of employed people. The same observation applies to the Belgian data.

Monetary resources would also seem to make a difference in the health status of the Italian respondents. Nevertheless, the impossibility of establishing a robust finding prevents us from emphasizing this trend. This leads to a particularly important inference for both countries, viz. that extra household income does not have any clear potential for

alleviating one's unsatisfactory physical condition. In the light of this and leaving aside the impact of the specific set of elementary indicators which have been used to compute individual functioning achievements for the two countries, perhaps the greater relevance and robustness of the income variable in the Italian regressions are partly caused by the fact that income inequality may be more severe in Italy than in Belgium. Table 3 summarizes this aspect for our two samples, reporting equivalent household income (corrected via standard OECD scales) at the $10^{th}$ and $90^{th}$ percentile expressed as a percentage of the median and of each other, as well as the proportion of individuals falling below 40, 50 and 60 per cent of the median in each country. From the upper part of the table, one can easily observe, for instance, that the income of the household at the $90^{th}$ percentile in the Italian sample is nearly 5 times that of the household at the $10^{th}$ percentile. Similarly, from the second part of the table, it can be noted that 14 per cent of Italians live in households whose income is 40 per cent below the median, falling by 2 percentage points in the Belgian case.

Table 2b
Parameter estimates of the functionings' equations—Belgium

| | Health | | Shelter | | Working conditions | |
|---|---|---|---|---|---|---|
| Variables | Coeff. | Std err. | Coeff. | Std err. | Coeff. | Std err. |
| Intercept | -0.045 ** | (0.156) | -0.076 ** | (0.152) | -0.104 ** | (0.271) |
| Ln (Y) | -0.004 | (0.027) | 0.598 *** | (0.019) | -0.021 | (0.038) |
| Ln (fs) | 0.142 | (0.087) | -0.355 *** | (0.078) | 0.281 ** | (0.142) |
| Age 16-20 | 0.273 ** | (0.128) | -0.203 * | (0.112) | -0.465 | (0.316) |
| Age 21-50 | 0.153 ** | (0.064) | -0.295 *** | (0.053) | -0.535 *** | (0.096) |
| Age over 70 | -0.529 *** | (0.113) | 0.233 *** | (0.072) | 1.377 ** | (0.656) |
| No. of children aged 0-4 | -0.015 | (0.047) | 0.018 ** | (0.044) | -0.088 | (0.070) |
| No. of children aged 5-9 | 0.111 *** | (0.036) | 0.017 ** | (0.037) | -0.118 ** | (0.060) |
| No. of children aged 10-14 | -0.019 | (0.042) | 0.037 * | (0.040) | -0.029 | (0.065) |
| No. of children aged 15-20 | -0.024 | (0.022) | -0.028 | (0.021) | -0.027 | (0.035) |
| No. adults under 70 | 0.058 | (0.036) | -0.009 *** | (0.032) | -0.108 * | (0.060) |
| Female | -0.143 *** | (0.038) | 0.052 | (0.032) | 0.149 *** | (0.057) |
| Married | -0.194 *** | (0.057) | 0.239 *** | (0.053) | -0.021 | (0.083) |
| Divorced | -0.175 ** | (0.082) | -0.121 | (0.082) | 0.049 | (0.119) |
| Widowed | -0.271 ** | (0.114) | 0.234 *** | (0.084) | 0.338 | (0.318) |
| Brussels | 0.078 | (0.062) | -0.221 *** | (0.068) | 0.065 | (0.105) |
| Flanders | 0.118 *** | (0.040) | 0.054 | (0.033) | 0.448 *** | (0.066) |
| Compulsory education | -0.295 *** | (0.104) | -0.108 | (0.093) | 0.288 | (0.213) |
| Secondary school | 0.036 | (0.086) | 0.054 | (0.084) | 0.204 | (0.156) |
| University | 0.233 *** | (0.087) | 0.148 * | (0.085) | 0.225 | (0.155) |
| Self-employed | 0.263 *** | (0.050) | 0.109 * | (0.059) | 0.289 *** | (0.083) |
| Students | 0.041 | (0.091) | 0.160 ** | (0.080) | – | – |
| Unemployed | -0.316 *** | (0.078) | -0.196 ** | (0.080) | – | – |
| Retired | -0.444 *** | (0.083) | -0.094 | (0.062) | – | – |
| Home duties | -0.213 *** | (0.078) | -0.129 * | (0.069) | – | – |
| Ownership | 0.047 | (0.107) | 0.522 *** | (0.108) | -0.027 | (0.191) |
| Rental | -0.106 | (0.112) | -0.553 *** | (0.114) | -0.086 | (0.194) |
| Adj. R-squared | 0.180 | | 0.179 | | 0.040 | |
| Sample size | 6,555 | | 6,509 | | 3,386 | |

Table 3
Income inequality and income-poverty—Italy and Belgium

| Ratios of percentiles | Italy | Belgium |
|---|---|---|
| P10/P50 | 0.42 | 0.44 |
| P90/P50 | 2.10 | 1.79 |
| P90/P10 | 4.97 | 4.04 |
| Percentage of individuals below stated percentage of median | | |
| below 40 per cent | 9.1 | 8.8 |
| below 50 per cent | 14.0 | 11.9 |
| below 60 per cent | 20.9 | 17.4 |

It is clear, therefore, that evidence of a higher incidence of income-poverty and of greater income inequality exists for our Mediterranean reference country. This makes it reasonable to presume that a part of the greater relevance of the income variable in the Italian regressions can to be attributed to this fact. Clearly, this does not represent an exhaustive argument. It is possible that the Belgian results appear to suggest that in a country where an individual's dissatisfaction with work is not associated with poor salary (or, more generally, with limited financial resources), the non-monetary aspects represent apparently salient factors, the discernible impact of which should not be neglected (e.g. available leisure time, pleasant workplace, interesting tasks, etc.).

Furthermore, the working dimension regressions identify a striking discrepancy concerning Belgian women's satisfaction versus the dissatisfaction of Italian women. Without wishing to resort to conventional stereotypes, we feel that at least a few possible explanations exist. To start with, one could claim that the answer is perhaps in the lower propensity of Italian female workers versus men to adjust their preferences and expectations in order to come to terms with the inferior quality of their jobs. Alternatively, a justification could relate to the institutional and social framework still characterizing salaried work in Italy. Employment, in our view, is far less favourable to women in Italy than in Belgium. In Italy, a substantial gender inequality persists in all activities relating to bringing-up children and caring for other members of the household.

With regard to health, one can further comment that the negative effect of both unemployment and unpaid work at home becomes magnified (both in size and significance) in the case of Belgium because of these social groups' more frequent recourse on average to medical consultation, a factor not accounted for in the characterization of the Italian health functioning. Yet, caution is required in the interpretation of such high correlations with the state of the labour market, as reverse causation phenomena may also take place. A person may be unemployed or devoted to home duties because he or she experiences health problems, not *vice versa*. Reverse causation could, then, weaken the interpretation of whether the factors studied are true intermediaries between socioeconomic status and health.

The harmful impact of divorce on one's physical condition is also evident. The disruptive influence of separation in both countries, however, is invalidated by an F-test

for the equality of the marital status coefficients.[28] We are on somewhat firmer ground, however, with regard to housing. People, who are either voluntarily or involuntarily without an occupation (a condition experienced by 6 per cent of the Belgian sample versus 8 per cent of the Italian sample), appear to be robustly associated with unsatisfactory achievements in terms of shelter in Belgium but not Italy. 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 the housing circumstances of the elderly conflict substantially between the two samples. Elderly Latins endure poorer housing than the baseline individual while their Belgians counterparts enjoy the most comfortable housing conditions relative to other age groups.

In general, one can say that education and occupation seem relevant for all the functionings considered, 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 health and shelter attainments further characterize the Mediterranean sample in as much the same way as the rest of Belgium seems to be doing better than the area around Brussels in terms of housing well-being. An indication of a clear improvement in an individual's contentment level through a career in the services sector also emerges, together with the complete irrelevance of whether one's dwelling is in an urban or rural location. From a qualitative point of view and as far as Italy is concerned, the findings coincide with the Brandolini and D'Alessio analysis, except for the gender bias in work contentment. This may be a reflection of the different definition of our measure of functioning's achievement.[29]

### 5.2 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 dimensions considered) and after selecting a reference household, we can then proceed to the actual derivation of our well-being indicators in the form of a set of equivalence scales for the three functionings being examined. Our baseline family is composed of a single childless adult, male, aged between 21 and 50, residing in a 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, 5 and 6 present the scales computed for both countries along the lines of equations (11) to (15) for statistically significant variables. This conveys a substantial implication: since household size does not seem to represent any influential explanatory

---

[28] 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, in addition to marital status (for both shelter and health), no apparent statistically significant differences exist for the occupational sector (for health), housing tenure and geographical location (for job satisfaction). When considering the Belgian results, on top of marital status, statistical equality of coefficients characterizes the age groups 16-20 and 21-50 (for both health and shelter) as well as the occupational states of 'unemployed' and 'home duties' (for shelter).

[29] This corroborates, however, the insightful remark by Brandolini and D'Alessio (1998a: 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'.

factor for health (in both countries) or for job satisfaction (in Italy), no attention is paid to this variable in the derivation of scales for these dimensions, or to state it differently, scales are derived for the single adult household only. Similarly, no scales have been computed for those variables where standard econometric test procedures established the absence of any significant difference between the coefficients. Finally and in line with what we have already mentioned, given the lack of a significance of the coefficients on the level of disposable household income in the Belgian regressions for health and working conditions, it would be meaningless to derive monetary measures of well-being and carry out income comparisons for such dimensions. We thus refrain from calculating scales from the corresponding equations.

The scale factors for our physical conditions functioning, thus, focus only on the Italian sample and 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. We can now remark, for instance, that *ceteris paribus* an Italian teenager only needs one-thirtieth of the income of an adult under 50 years in order to achieve similar well-being in terms of health.

Table 4
Estimated scales for health—Italy

| | Fs=1 | | Fs=1 |
|---|---|---|---|
| Age | | Occupation | |
| 10-14 | 0.04 | Employee | 1.53 |
| 15-20 | 0.17 | Self-employed | 1.00 |
| 21-50 | 1.00 | Unemployed | 3.03 |
| 51-70 | 23.61 | Retired | 53.76 |
| 70+ | 2459.45 | Home duties | 5.15 |
| Geographical location | | Education | |
| North West | 0.36 | Illiterate | 89.33 |
| North East | 1.00 | Compulsory | 2.70 |
| Centre | 1.92 | Secondary | 0.88 |
| | | College | 1.00 |

Table 5
Estimated scales for job satisfaction—Italy

| | Fs=1 | | Fs=1 |
|---|---|---|---|
| Occupation | | Sector | |
| Employee | 4.29 | Services | 1.00 |
| Self-employed | 1.00 | Agriculture | 4.80 |
| Gender | | Marital status | |
| Male | 1.00 | Single | 1.00 |
| Female | 1.55 | Widowed | 0.41 |
| Education | | | |
| Illiterate | 26.20 | | |
| Compulsory | 7.67 | | |
| Secondary | 3.04 | | |
| College | 1.00 | | |

Similarly, other factors being equal, a resident in the central regions of the country needs nearly double the revenue of his northern compatriots to enjoy an equivalent level of health. Likewise, the indicators in Table 5 on job satisfaction suggest that in order to bridge the gender gap would mean that women should be entitled to 55 per cent additional monetary resources relative to their male fellow workers. Interestingly enough, large discrepancies among the specific types of occupations are emphasized by the equivalence factors characterizing, *ceteris paribus,* the social group of employees under both welfare measures. In fact, these call for an increase of one's endowment ranging from 53 per cent (in the case of health) to more than 300 per cent (in terms of work contentment) in comparison to the self-employed baseline agent. The latter result, however, is not realistic and most probably reflects a weakness in our estimates.

Nevertheless, an immediate observation is obvious when examining Tables 4 and 5, and one cannot fail to notice the extremely large values exhibited by a considerable number of scale factors, as well as the notable peaks for attributes such as illiteracy, retirement or old age. This phenomenon, in our view, magnifies the implications of assessing well-being in the space of achievements (specifically if identified with a functioning vector) rather than in the space of the means to well-being. In particular, we consider it as a preliminary but clear indication of the already mentioned inappropriateness—within the current framework of analysis—of the assumption that any dissimilarity among individuals can efficiently be dealt with by means of a suitable monetary compensation. This is not surprising and we will return on this issue in more detail later.

In the meantime, another feature of the computed scales is worthy of comment. This becomes apparent from Table 6a, where equivalence scales for the shelter dimension are presented. Given the statistically significant influence played by household size in the country regressions for both Belgium and Italy, shelter equivalization scales have been derived also with reference to the latter attribute. In particular, 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 6b and illustrate the 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. A review of other equivalence scales for other countries, regardless of whether derived from customary data on consumption behaviour 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. The same observation arises when inspecting Table 7, where Engel scales estimated on the SHIW dataset are given.[30]

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.

---

30 Appendix D reports the complete parameter estimates of the Engel curve for the Italian sample. Unfortunately, no information on food consumption habits is collected by the Panel Survey of Belgian Households, which prevented us from performing a similar analysis on Belgian data.

Why are additional household members substantially cheaper in terms of functionings?[31] 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 orientation characterizing a measure such as 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 more than food consumption 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 the Engel scales, 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 neighbourhood 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 extent, this phenomenon is once again most likely a reflection of a weakness of our functioning equations' estimates, and thus should not be credited with too much emphasis.

Table 6a
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 |
| 5-9 years | – | 1.08 | 1.08 | 1.04 | – | 1.46 | 1.80 | 2.07 |
| 10-14 years | – | 1.04 | 1.01 | 0.94 | – | 1.42 | 1.70 | 1.90 |
| Adult | 1.00 | 1.21 | 1.37 | 1.49 | 1.00 | 1.53 | 1.97 | 2.37 |

[31] 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.

Turning to Table 6b, 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.

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 per cent (as against 56 per cent for the latter) in order to make their shelter well-being comparable to that of the self-employed individual. Conversely, despite the 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 Central Europe would need five times the income of his landlord compatriot, whereas a Southern European colleague would achieve the same standard with an addition in income of just 22 per cent. Again, 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 (9) 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 on the effectiveness of income redistribution for functionings' levels, if the non-monetary component turns out to have considerable impact, then it is reasonably 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.[32]

[32] In the light of the adopted specification, *Y* stands, of course, for *Ln(Y)*.

Table 6b
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 | Brussels | 1.58 |
| North East | 1.00 | Wallonia | 1.09 |
| Centre | 1.26 | Flanders | 1.00 |
| South | 1.66 | | |
| Islands | 2.19 | | |
| Occupation | | Occupation | |
| Employee | 1.56 | Employee | 1.20 |
| Self-employed | 1.00 | Self-employed | 1.00 |
| Retired | 1.38 | Unemployed | 1.66 |
| | | Student | 0.92 |
| | | Home duties | 1.49 |
| Housing tenure | | Housing tenure | |
| Ownership | 1.00 | Ownership | 1.00 |
| Rental | 2.12 | Rental | 6.03 |
| Usufruct | 1.30 | Usufruct | 2.39 |
| Education | | | |
| Illiterate | 3.74 | | |
| Compulsory | 2.09 | | |
| Secondary | 1.28 | | |
| College | 1.00 | | |
| Sector | | | |
| Manufacturing | 1.07 | | |
| Services | 1.00 | | |
| Agriculture | 1.32 | | |

Table 7
Estimated Engel scales—Italy

| | Fs=1 | Fs=2 | Fs=3 | Fs=4 |
|---|---|---|---|---|
| Household size | | | | |
| 0–4 years | – | 1.30 | 1.65 | 1.99 |
| 5–9 years | – | 1.55 | 2.09 | 2.61 |
| Adult | 1.00 | 1.77 | 2.49 | 3.16 |

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 houseowner, suggesting a difference of 7,936 Euro in the latter's favour. 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 4.2b of 0.02 (i.e., {0.598*[Ln(30254/22318)/Ln(22318)]}, which represents only 3.7 per cent

{0.02/(0.522+0.02)} of the total increase associated with the move from one contingency to the other.[33] This suggests that *ceteris paribus* some 96 per cent 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 per cent 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 per cent of the change in shelter achievements associated with ownership and tenancy, respectively, are due to monetary factors. However, in light of the relatively large inaccuracy characterizing the Belgian tenure coefficients, this close alignment of results should probably not be taken too seriously. 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 per cent 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 per cent of which is non-monetary.

An even lower contribution of pecuniary factors emerges if we turn to occupational status. Given average incomes of 29,060 and 30,660 Euro for employees and self-employed respectively, the Italian estimates suggest that when a worker moves to an autonomous job, 98-99 per cent experienced higher well-being (*ceteris paribus* and no matter the specific dimension) do not stem from the increase in income. The estimate drops to 97 per cent when examining the Belgian sample.[34] An equally sizeable proportion of non-monetary elements is noted, when an exit from the job market is considered. Focusing on Italy, only 2.5 per cent of the overall decline in the health of housewives, 0.8 per cent of the decline in the physical state of the retired and 6.8 per cent of the physical deterioration of the unemployed (9.2 per cent of the sharpening of this same social group's housing conditions in the Belgian sample) can be ascribed to financial factors. This emphasizes the non-material side-effects of voluntarily or involuntarily unemployment. Likewise, slightly more than 1 per cent of Italian women's dissatisfaction with their occupation is of a pecuniary nature, with the remaining 98.7 per cent being probably imputable to social or cultural determinants.

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

---

[33] 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.

[34] Specifically, in the Italian sample monetary factors account for 1.2 per cent of both health and shelter improvements, and 0.2 per cent of the additional felt satisfaction. For Belgium, only shelter can be considered, owing to the statistical irrelevance of the income variable for the remaining functionings. In the examined case, *ceteris paribus* pecuniary elements describe 2.7 per cent of the total enhancement of housing circumstances.

impressive predominance exhibited by the non-monetary factors of well-being highlights the inadequacy of income as a comprehensive proxy for it. This is, by no means, astonishing news. A variety of empirical applications of Sen's approach exists which provide evidence on the issue.[35] 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 functionings' 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 a fitted instrument for redressing those same disparities.

## 6 Comparing the poor: a closer look at the relative economic position of population sub-groups

In an attempt to foster an understanding of the results presented in Tables 4 to 7, the two types of equivalence scales estimated in this study (namely, Engel scales and scales for shelter by household size) have been applied to the incomes of a group of individuals singled out from the whole sample. The selection process of the sub-sample is not completely random, however. Owing to the fact that equivalization scales (by household type) for children up to nine years old only as well as adults could be derived from both the Engel and shelter estimates (cf. Tables 6a and 7), any individual living in a household which includes children over nine years of age 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.[36] This procedure allows us to conduct an interesting comparison, i.e., the identification of differences in the distribution of welfare. To accomplish this goal, we have adjusted incomes using the scales computed for each individual's specific household composition.

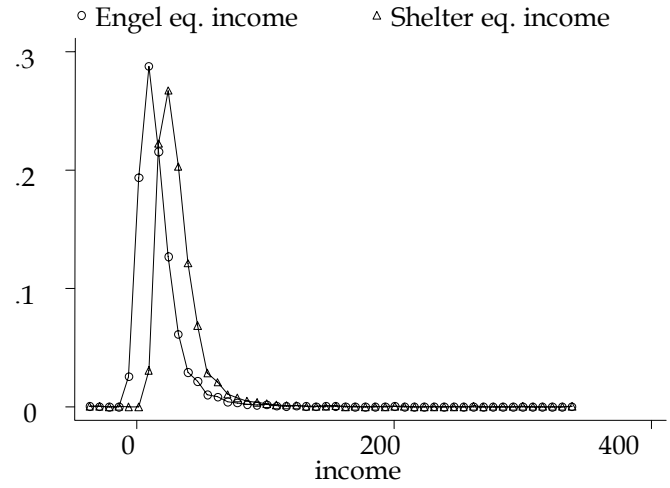
The resulting series of deflated monetary resources have been used to compute the non-parametric density function of welfare for the sample (Figure 1). For now, owing to the unavailability of analogous food scales that would have enabled a comparison of the Belgian dataset, we refer to the Italian sample only. As is immediately apparent, 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 seems to be slightly more concentrated (exhibiting a smaller variance). Moreover, the latter also undergoes a slight translation to the right, entailing a modification in the overall poverty rate.

---

35 See, among others, Ruggeri Laderchi (1997), Phipps (1999), Balestrino (1996).

36 For the purpose of drawing direct comparisons, the availability of a nutritional functioning would have unquestionably represented a more effective device. Unfortunately, the lack of information on body size or metabolic rates in the dataset rendered such an idea unworkable.

Figure 1
Non-parametric density of equivalent incomes for Italy




To examine this shift further and to 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. This was arbitrarily set at 60 per cent of the median equivalent income. The results are reported in Table 8. Indeed, the choice of the scale does seem to affect the overall poverty estimates, although not to any great extent. If one resorts to equivalization factors computed on the basis of individual achievements in functionings, it results in a higher percentage of individuals being regarded to be living in poverty (about 2 per cent, according to our definitions). Sensible discrepancies, however, are to be noted when focussing 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 the inhabitants of Northern and Central Italy seems to be suggested by the distribution of functioning-equivalent incomes, revealing the complexity of regional gaps. Exposure to a significantly increased poverty risk also seems to characterize the feminine gender as well as divorced and/or widowed individuals, pointing the existence of possible welfare effects for these categories not captured by one's consumption behaviour. Similarly, discrepancies are to be noticed for the unemployed. While measures of impoverishment based on the quality of life with regard to shelter standards hint at its reduced presence among students, unemployed and housewives, poverty among the retired, when assessed on the basis of the standard Engel scales, looks remarkably understated.

In addition to comparing evidence for Italy on the role of different equivalence scales for the distribution of welfare, our data allow us to focus on functioning-poverty only and to contrast its extent in the two countries under review. Table 9 facilitates such an exercise. Also in this case, several comments can be inferred, starting from the observation of the relatively higher rate of occurrence of impoverishment among certain Mediterranean population sub-groups (i.e., unemployed, students, divorced or widowed individuals), a fact which highlights significant failures in terms of life quality within

Table 8
Identifying the poor: Engel-poor versus functioning-poor

| | | Below the poverty line | | |
|---|---|---|---|---|
| | Italian sample | Engel | Functioning | % variation |
| Sample size | 14,143 | – | – | – |
| No. of households | 5,765 | 965 | 1,448 | +8.4 |
| No. of children (0-9) | 1,401 | 388 | 255 | -9.5 |
| No. of 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 |
| Men | 6,804 | 1,234 | 1,212 | -0.3 |
| Illiterate | 2,752 | 812 | 899 | +3.2 |
| Compulsory education | 6,793 | 1,319 | 1,572 | +3.7 |
| Secondary education | 3,649 | 403 | 339 | -1.7 |
| College education | 949 | 49 | 44 | -0.5 |
| Percentage of people in poverty | – | 18.3 | 20.2 | 1.9 |

Table 9
Functioning-poverty: Belgium versus Italy

| | Below the poverty line, % | | |
|---|---|---|---|
| Proportion of functioning-poor in stated categories | Belgium | Italy | Difference |
| No. of households | 20.7 | 25.1 | +4.4 |
| Children (0-9) | 16.1 | 18.2 | +2.1 |
| Adults | 24.3 | 20.4 | -3.9 |
| Self-employed | 11.3 | 16.1 | +4.8 |
| Employee | 9.0 | 6.7 | -2.3 |
| Unemployed | 28.4 | 41.9 | +13.5 |
| Retired | 24.1 | 26.1 | +2.0 |
| Students | 0.2 | 15.9 | +15.7 |
| Home duties | 33.1 | 27.2 | -5.9 |
| Married | 19.2 | 17.9 | -1.3 |
| Divorced | 20.9 | 28.8 | +7.9 |
| Widowed | 23.6 | 37.0 | +13.4 |
| Single | 15.8 | 18.1 | +2.3 |
| Women | 20.9 | 22.4 | +1.5 |
| Men | 17.3 | 17.8 | +0.5 |
| Illiterate | 20.2 | 32.7 | +12.5 |
| Compulsory education | 32.9 | 23.1 | -9.8 |
| Secondary education | 19.2 | 9.3 | -9.9 |
| College education | 10.8 | 4.6 | -6.2 |
| Percentage of people in poverty | 19.3 | 20.2 | +0.9 |

a country traditionally considered to be among the world's most developed nations. Furthermore, the table shows substantial shiftings in the configuration of the share of the deprived with regard to educational levels. While a significant increase occurs in the extent of functioning-deprivation among the Italians with no educational qualifications in comparison to Belgium (probably as a result of the lower prevalence of illiteracy in Belgium), a sizeable improvement is obvious in the proportion of educated individuals estimated to be in poverty in the south. Also note the relatively less favourable conditions endured by the Central European housewives.

Despite the dissimilarities in the extent to which some national sub-groups are affected by functioning-deprivation, the overall pattern does not look too disparate. In fact, given our discretionary poverty line, the share of the population expected to experience deprivation raises by less than 1 per cent (from 19.3 to 20.2) in a comparison of the Belgian to the Italian sample. These results do not come as a surprise because our choice of the two Euro regions inevitably have similar economies, and because of our initial claims. No doubt that, if our claims were to be held true, having chosen achievement as our notion of well-being—and considering the fact that the mainstream approach (i.e., our contender measure) is based on a definition of welfare which takes no account of the qualitative aspects of life, the corresponding group of the poor does not accurately identify the set of functioning-poor agents. Clearly, this observation implies no tacit judgement. The objective of this section is neither to measure poverty nor to claim shelter quality as the supreme yardstick for its assessment. This would take us away from the scope of the present work.

Rather, the real task is to determine whether the functioning perspective yields a more accurate picture of well-being (or, at least, provides additional information on it), so as to counterbalance its extra costs in terms of data requirements. As already mentioned, one cannot fail to notice from Table 8 how certain social categories deviate when a functioning-based rather than a consumption-based approach is adopted. The incidence of deprivation among the retired, widowed, students or divorced individuals, just to mention a few, varies significantly. Hence, our conclusion is a very similar to that reached by Balestrino and Sciclone (2001) in the context of their investigation of the correlation linking income and functionings. Specifically, despite the *prima facie* resemblance of the welfare distributions that resulted from the two scales applied to the incomes in our sample, the emphasis on different concepts has a bearing on the identification of the particular categories of impoverishment, and this is likely to affect any subsequent assessment in the analysis of well-being.

## 7 Conclusions

Growing awareness of the complex variety of factors likely to contribute to the determination of well-being in more advanced societies threatens to diminish both the ethical appeal and the explanatory power of the traditional approaches. But we would probably be only deceiving ourselves to think that one day all elements that may directly or indirectly affect an individual's attainment of the state of well-being will be elucidated. Indeed, the attempt to consider just the insufficiency of income or expenditures at the individual or household level means subscribing to an extremely limited account.

In this paper we have tried to assess, with Belgian and Italian household survey data, whether the well-being profile rooted in Sen's capability approach provides us with different insights than an approach based on economic welfare. To accomplish this objective, we performed welfare comparisons across individuals with different demographic profiles. Because their efficacy in summarizing the welfare information extracted from the econometric regressions, we used instruments typically suggested by standard economic theory, i.e., equivalence scales. In the absence of a consensus in the literature on the specific proxy on which welfare levels are to be compared and as equivalization can be applied, in principle, to any kind of need that can be quantified in terms of an income gap, we explored what Sen himself 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: 81). Believing that there is a strong ethical case for not resorting to the utility concept in measurements of well-being, we adjusted individual income levels for differences in valuable states of life, so as to make them equivalent in terms of functioning achievement.

The empirical implementation of the proposed procedure—relying on a comparison of the living standards of people exhibiting disparate needs at a given income level—allowed us to ascertain the feasibility of deriving such 'functioning-equivalent incomes'. It also enabled us to appraise the quantitative importance of the parametric variations affecting individuals' ability to convert available resources into action. At the same time, we highlight the fact that both the demographic structure of people in poverty and the overall extent of deprivation appear to be quite dissimilar, depending on whether equivalence factors which account for differences in functioning achievements across individuals or traditional consumption scales are used. This suggests, in turn, that to capture deprivation in basic functionings, an expenditure indicator will not be sufficient or appropriate. It is important to be aware of this. Examining the various results presented in this paper leads to the conclusion that income as such is not very effective for evaluating achievements, mainly because of the relative magnitude of the effects of certain non-monetary factors as compared to household economic resources on the advantages enjoyed by different persons. Furthermore, within the current framework of analysis, doubts were raised about the effectiveness of income in redressing disparities across individuals. 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 any dissimilarity among individuals may be efficiently dealt with by means of a suitable monetary compensation. Of course, this is not meant to be the final judgement 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).

Meanwhile, a final remark suffices. Our attempt to explore an underexploited strategy for the practical use of the capability approach has suggested that resorting to the metric of income (appropriately adjusted) essentially may provide better comparable information than the more commonly used 'direct strategy' (namely, directly examining and comparing vectors of functionings). In addition, the pursued alternative may reveal to be quite effective in condensing information and conveying it in an easy-to-understand form to the general public. Furthermore, in addition to the danger of interpreting income as a functioning-inequality reduction instrument, this unfortunately does not ease its implementation. Practical compromises induce analogous needs, as do the various judgements that are required in order to obtain suitable measures of

functionings (from the data issues or the underlying measurement hypotheses to the assumptions concerning the weighing structure, in case one aims at a joint analysis of the various dimensions of well-being).

Of course, the adopted approach is far from comprehensive and further refinements are certainly to be hoped for. However, 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, while prompting a reassessment of results on policy matters such as the incidence of poverty or the distribution of welfare.

**References**


Allardt, E. (1996). 'Having, Loving, Being: an Alternative to the Swedish Model of Welfare Research', in M. Nussbaum and A. Sen (eds), *The Quality of Life*. Oxford: Clarendon Press.

Anand, S., and M. Ravallion (1993). 'Human Development in Poor Countries: On the Role of Private Incomes and Public Services'. *Journal of Economic Perspectives*, 7 (1): 133-50.

Atkinson, T., B. Cantillon, E. Marlier, and B. Nolan (2002). *Social Indicators: the EU and Social Inclusion*. Oxford: Oxford University Press.

Balestrino, A. (1996). 'A Note on Functioning-Poverty in Affluent Societies'. *Notizie di Politeia*, 12: 97-105.

Balestrino, A., and N. Sciclone (2001). 'Should we use Functionings Instead of Income to Measure Well-being? Theory, and Some Evidence from Italy', *Rivista Internazionale di Scienze Sociali*, 109 (1): 3-22.

Barten, A. (1964). 'Family Composition, Prices and Expenditure Patterns', in P. E. Hart, G. Mills and J. K. Whitaker (eds), *Economic Analysis for National Economic Planning*. London: Butterworth, 277-92.

Blackorby, C., and D. Donaldson (1991). 'Adult-equivalence Scales, Interpersonal Comparisons of Well-being, and Applied Welfare Economics', in J. Elster and J. E. Roemer (eds), *Interpersonal Comparisons of Well-Being*. Cambridge: Cambridge University Press, 164-99.

Brandolini, A., and G. D'Alessio (1998a). 'Measuring Well-being in the Functioning Space'. Rome: Banca d'Italia. Mimeo.

Brandolini, A., and G. D'Alessio (1998b). 'Money-metric Indicators of the Standard of Living'. Rome: Banca d'Italia. Mimeo.

Carbonaro, G. (1985). 'Nota Sulla Scale di Equivalenza', in *La Povertà in Italia*. Rome: Presidenza del Consiglio dei Ministri, Istituto Poligrafico dello Stato.

Dasgupta, P. (1990). 'Well-being and the Extent of its Realization in Poor Countries'. *The Economic Journal*, 100: 1-32 (Conference 1990).

Dasgupta, P., and M. Weale (1990). 'On the Measurement of Well-Being'. DAE Working Paper No. 9018. Cambridge: Dept. of Applied Economics, University of Cambridge.

Deaton, A., and C. Paxson (1998). 'Economies of Scale, Household Size, and the Demand for Food'. *Journal of Political Economy*, 106: 897-930.

Deaton, A., J. Ruiz-Castillo, and D. Thomas (1989). 'The Influence of Household Composition on Household Expenditure: Theory and Spanish Evidence'. *Journal of Political Economy*, 97: 179-200.

De Vos, K., and T. Garner (1991). 'An Evaluation of Subjective Poverty Definitions: Comparing Results from the US and The Netherlands'. *The Review of Income and Wealth*, 37: 267-85.

Engel, E. (1895). 'Die Lebenskosten Belgischer Arbeiter-Familien Früher und Jetzt'. *International Statistical Institute Bulletin*, 9: 1-74.

Erikson, R. (1996). 'Descriptions of Inequality: The Swedish Approach to Welfare Research', in M. Nussbaum and A. Sen (eds), *The Quality of Life*. Oxford: Clarendon Press.

Erikson, R. *et al*. (1987). *The Scandinavian Model. Welfare States and Welfare Research*. London: M. E. Sharpe.

Gorman, W. M. (1976), 'Tricks with Utility Functions', in M. Artis and M. Nobay (eds), *Essays in Economic Analysis*. Cambridge: Cambridge University Press, 211-43.

Klasen, S. (2000). 'Measuring Poverty and Deprivation in South Africa'. *Review of Income and Wealth*, 46: 33-58.

Jones, A., and O. O'Donnell (1995). 'Equivalence Scales and the Costs of Disability'. *Journal of Public Economics*, 56: 273-89.

Maltagliati, M. (2000). 'Scale di Equivalenza su Dati LIS: un Confronto Internazionale'. Milano: Università degli Studi. Mimeo.

Perali, F. (1999). 'Stima Delle Scale di Equivalenza Utilizzando i Bilanci Familiari ISTAT 1985-1994'. *Rivista Internazionale di Scienze Sociali*, 107: 481-541.

Phipps, S. (1999). 'The Well-Being of Young Canadian Children in International Perspective'. LIS Working Paper 197. Luxembourg: Luxembourg Income Study.

Pigou, A. C. (1920). *The Economics of Welfare*, London: Macmillan.

Pollak, R. A., and T. J. Wales (1979). 'Welfare Comparisons and Equivalence Scales'. *American Economic Review, Papers and Proceedings*, 69: 216-21.

Prais, S. J., and H. S. Houthakker (1955). *The Analysis of Family Budgets*. Cambridge: Cambridge University Press.

Ringen, S. (1996). 'Households, Goods, and Well-Being'. *Review of Income and Wealth*, 42 (4): 421-31.

Rothbarth, E. (1943). 'Note on a Method of Determining Equivalent Income for Households of Different Composition', in C. Madge (ed.), *War-Time Pattern of Savings and Expenditure*. Cambridge: Cambridge University Press, 123-30.

Ruggeri Laderchi, C. (1997). 'Poverty and its Many Dimensions: The Role of Income as an Indicator'. *Oxford Development Studies*, 25: 345-60.

Schokkaert, E., and L. Van Ootegem (1990). 'Sen's Concept of the Living Standard Applied to the Belgian Unemployed'. *Recherches Economiques de Louvain*, 56: 429-50.

Sen, A. K. (1992). *Inequality Reexamined*. Cambridge, MA: Harvard University Press.

Sen, A. K. (1999). *Development as Freedom.* Oxford: Oxford University Press.

Slesnick, D. T. (1998). 'Empirical Approaches to the Measurement of Welfare'. *Journal of Economic Literature*, 36: 2108-65.

Smeeding, T., P. Saunders, J. Coder, S. Jenkins, J. Fritzell, A. Hagenaars, R. Hauser, and M. Wolfson (1993). 'Poverty, Inequality, and Family Living Standards Impact across Seven Nations: The Effect of Non-Cash Subsidies for Health, Education and Housing'. *Review of Income and Wealth*, 39: 229-56.

Sweeney, J. (1998). 'Why Hold a Job? The Labour Market Choice of the Low-Skilled'. Leuven: Katholieke Universiteit Leuven. Ph.D. Dissertation.

Van den Bosch, K. (1996). 'Equivalence Scales based on Subjective Income Evaluations: Are Children Really Cheap?'. *Recherches Economiques de Louvain*, 62, 203-27.

Van den Bosch, K., T. Callan, J. Estivill, P. Hausman, B. Jeandidier, R. Muffels, and J. Yfantopoulos (1993). 'A Comparison of Poverty in Seven European Countries and Regions, Using Subjective and Relative Measures'. *Journal of Population Economics*, 6 (3): 235-59.

Van Praag, B. (1971). 'The Welfare Function of Income in Belgium: An Empirical Investigation'. *European Economic Review*, 2: 337-69.

Van Praag, B. (1991). 'Ordinal and Cardinal Utility. An Integration of the Two Dimensions of the Welfare Concept. *Journal of Econometrics*, 50 (1): 69-89.

Van Praag, B. M. S., and A. Kapteyn (1973). 'Further Evidence on the Individual Welfare Function of Income: An Empirical Investigation in the Netherlands', *European Economic Review*, 4: 32-62.

Van Praag, B. M. S., and A. Kapteyn (1976). 'A New Approach to the Construction of Family Equivalence Scales', *European Economic Review*, 7: 313-35.

Van Praag, B., and J. S. Plug (1994-5). 'Family Equivalence Scales within a Narrow and Broad Welfare Context'. *Journal of Income Distribution*, 4 (2): 171-86.

Van Praag, B., and N. L. Van der Sar (1988). 'Household Cost Functions and Equivalence Scales'. *Journal of Human Resources*, 23: 193-210.

Winkelmann, L,. and R. Winkelmann (1995). 'Unemployment: Where Does It Hurt?'. CEPR Discussion Paper No 1093. London: Centre for Economic Policy Research.

Zaidi, A., and T. Burchardt (2002). 'equivalization for the Extra Costs of Disability: Comparing Incomes When Needs Differ'. London: London School of Economics. Mimeo.

## Appendix A—The indicators of basic functionings

In a comparison with the Brandolini and D'Alessio characterization of functionings, one can easily note that in the absence of additional (and less subjective) information, we adopt their portrayal of the health functioning and also emulate their study in appraising shelter conditions. Conversely to Brandolini and D'Alessio, who also examine the reasons underlying the choice not to work and the feelings associated to one's possible unemployment experience, labour conditions in this study are instead portrayed exclusively in terms of job satisfaction.

Appendix Table A1—Italy

| Functioning's components | Type of indicator | Description of the indicator |
|---|---|---|
| Health | | |
| Health status | Categorical (5 modalities) | Self-assessed health status |
| Chronic illness | Dichotomous | Presence of chronic illness |
| Disability | Dichotomous | Presence of disabilities |
| Shelter | | |
| Rating of dwelling | Categorical (6 modalities) | Quality of the dwelling itself |
| Rating of location | Categorical (4 modalities) | Quality of the neighbourhood |
| Heating | Dichotomous | Availability of heating |
| Floor area | Continuous | Total floor area in square meters |
| Job satisfaction | | |
| Work environment | Categorical (5 modalities) | Assessment of physical and social environment |
| Job-related danger | Categorical (5 modalities) | Assessment of the danger related to life and health |
| Demand related to job | Categorical (5 modalities) | Assessment of the effort required |
| Interest related to job | Categorical (5 modalities) | Assessment of the job-related interest |
| Social status | Categorical (5 modalities) | Assessment of consideration by others |
| Job insecurity | Categorical (5 modalities) | Assessment of the probability of losing one's job |

Appendix Table A2—Belgium

| Functioning's components | Type of indicator | Description of the indicator |
|---|---|---|
| Health | | |
| Health status | Categorical (5 mod.) | Self-assessed health status |
| Chronic illness | Dichotomous | Presence of chronic illness or disability |
| Recent illness | Dichotomous | Interruption of activities due to recent illness or accident |
| Hospital | Dichotomous | Hospitalization during last year |
| Generalist | Continuous | No. of visits to a general physician in the last year |
| Specialist | Continuous | No. of visits to a specialist in the last year |
| Alternative medicine | Continuous | No. of visits to an homeopath, an osteologist, etc. in the last year |
| 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 related 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] |
| Working conditions | | |
| Work certitude | Categorical (6 mod.) | Degree of satisfaction with the certitude of one's work |
| Work type | Categorical (6 mod.) | Degree of satisfaction with one's type of activity |
| Number of hours | Categorical (6 mod.) | Degree of satisfaction with the number of hours spent at work |
| Work schedule | Categorical (6 mod.) | Degree of satisfaction with one's schedule |
| Work environment | Categorical (6 mod.) | Degree of satisfaction with one's work conditions and environment |
| Work distance | Categorical (6 mod.) | Degree of satisfaction about the distance of one's workplace from home |
| Job search | Dichotomous | Currently looking for an alternative job |
| Overqualified | Dichotomous | Feeling overqualified for the current job |

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

Appendix Table B1
Variable means for the Italian sample

| Variables | Sample means (n=23900) | Variables | Sample means (n=23900) |
|---|---|---|---|
| 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 | $1^{st}$ decile (% mean) | 0.12 |
| Rural location | 0.11 | $9^{th}$ decile (% mean) | 1.75 |

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

Appendix Table B2
Variable means for the Belgian sample

| Variables | Sample means (n=7021) | Variables | Sample means (n=7021) |
|---|---|---|---|
| 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 | $1^{st}$ decile (% mean) | 0.32 |
| Wallonia | 0.35 | $9^{th}$ decile (% mean) | 1.75 |

## Appendix C—Parameter estimates from the quadratic model

Appendix Table C1—Belgium

| Variables | Health | | Shelter | | Job satisfaction | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. err. | Coeff. | Std. err. | Coeff. | Std. err. |
| Intercept | -0.049 ** | (0.156) | -0.018 ** | (0.151) | -0.091 ** | (0.269) |
| Ln (Y) | -0.013 | (0.042) | 0.218 *** | (0.038) | 0.091 | (0.074) |
| [Ln(Y)]² | -0.002 | (0.011) | 0.041 *** | (0.009) | 0.028 * | (0.015) |
| Ln (fs) | 0.140 | (0.088) | -0.316 *** | (0.078) | 0.323 ** | (0.144) |
| Age 16-20 | 0.273 ** | (0.129) | -0.214 * | (0.112) | -0.465 | (0.316) |
| Age 21-50 | 0.153 ** | (0.064) | -0.290 *** | (0.053) | -0.526 *** | (0.095) |
| Age over 70 | -0.529 *** | (0.113) | 0.228 *** | (0.072) | 1.409 ** | (0.065) |
| No. of children aged 0-4 | -0.015 | (0.047) | -0.014 | (0.044) | -0.086 | (0.070) |
| No. of children aged 5-9 | 0.111 *** | (0.036) | 0.018 | (0.037) | -0.119 ** | (0.060) |
| No. of children aged 10-14 | -0.018 | (0.042) | 0.039 | (0.040) | -0.031 | (0.065) |
| No. of children aged 15-20 | -0.024 | (0.022) | -0.029 | (0.021) | -0.029 | (0.035) |
| No. adults | 0.059 | (0.037) | 0.077 ** | (0.032) | -0.118 * | (0.060) |
| Female | -0.143 *** | (0.038) | 0.051 | (0.032) | 0.148 *** | (0.057) |
| Married | -0.193 *** | (0.057) | 0.227 *** | (0.053) | -0.033 | (0.083) |
| Divorced | -0.175 ** | (0.082) | -0.128 | (0.082) | 0.046 | (0.119) |
| Widowed | -0.270 ** | (0.114) | 0.229 *** | (0.084) | 0.337 | (0.318) |
| Brussels | 0.079 | (0.062) | -0.241 *** | (0.068) | 0.048 | (0.105) |
| Flanders | 0.118 *** | (0.040) | 0.058 * | (0.033) | 0.452 *** | (0.066) |
| Compulsory education | -0.296 *** | (0.104) | -0.090 | (0.093) | 0.309 | (0.213) |
| Secondary school | 0.036 | (0.086) | 0.049 | (0.084) | 0.205 | (0.156) |
| University | 0.234 *** | (0.087) | 0.124 | (0.085) | 0.214 | (0.155) |
| Self-employed | 0.265 *** | (0.051) | 0.075 | (0.059) | 0.269 *** | (0.084) |
| Student | 0.040 | (0.091) | 0.166 ** | (0.080) | - | - |
| Unemployed | -0.318 *** | (0.079) | -0.170 ** | (0.080) | - | - |
| Retired | -0.446 *** | (0.083) | -0.064 | (0.062) | - | - |
| Home duties | -0.214 *** | (0.077) | -0.110 | (0.069) | - | - |
| Ownership | 0.047 | (0.107) | 0.528 *** | (0.107) | -0.011 | (0.190) |
| Rental | -0.107 | (0.112) | -0.536 *** | (0.114) | -0.063 | (0.193) |
| Adj. R-squared | 0.180 | | 0.181 | | 0.041 | |
| Sample size | 6,555 | | 6,509 | | 3,386 | |

Appendix Table C2—Italy

| Variables | Health | | Shelter | | Job satisfaction | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. err. | Coeff. | Std. err. | Coeff. | Std. err. |
| Intercept | -1.325 *** | (0.183) | -2.427 *** | (0.168) | -0.711 * | (0.407) |
| Ln (Y) | 0.218 | (0.103) | 0.278 *** | (0.096) | -0.503 ** | (0.218) |
| [Ln(Y)]² | -0.015 | (0.016) | 0.081 *** | (0.015) | 0.123 *** | (0.034) |
| Ln (fs) | 0.012 | (0.073) | -0.184 *** | (0.068) | -0.107 | (0.158) |
| Age 10-14 | 0.861 *** | (0.135) | -0.835 ** | (0.329) | - | - |
| Age 15-20 | 0.637 *** | (0.064) | 0.092 | (0.082) | -0.004 | (0.168) |
| Age 21-50 | 0.410 *** | (0.034) | -0.026 | (0.031) | -0.085 | (0.063) |
| Age over 70 | -0.600 *** | (0.064) | -0.112 ** | (0.049) | 0.307 | (0.347) |
| No. of children aged 0-4 | 0.126 *** | (0.030) | 0.066 ** | (0.033) | 0.008 | (0.072) |
| No. of children aged 5-9 | 0.064 ** | (0.031) | 0.079 ** | (0.032) | 0.078 | (0.067) |
| No. of children aged 10-14 | -0.010 | (0.029) | 0.100 *** | (0.030) | 0.025 | (0.066) |
| No. of children aged 15-20 | 0.001 | (0.027) | 0.034 | (0.027) | 0.052 | (0.057) |
| No. adults | 0.039 | (0.024) | -0.017 | (0.023) | 0.006 | (0.054) |
| Female | -0.004 | (0.021) | 0.024 | (0.019) | -0.121 *** | (0.047) |
| Married | -0.134 *** | (0.028) | 0.306 *** | (0.030) | 0.072 | (0.063) |
| Divorced | -0.228 *** | (0.069) | 0.240 *** | (0.069) | 0.006 | (0.124) |
| Widowed | -0.177 *** | (0.068) | 0.266 *** | (0.053) | 0.242 ** | (0.111) |
| North West | 0.217 *** | (0.031) | -0.132 *** | (0.026) | -0.080 | (0.065) |
| North East | 0.087 *** | (0.032) | 0.165 *** | (0.028) | 0.198 *** | (0.065) |
| South | 0.007 | (0.034) | -0.208 *** | (0.031) | -0.127 * | (0.069) |
| Islands | 0.058 | (0.043) | -0.418 *** | (0.041) | 0.268 *** | (0.087) |
| Compulsory education | 0.454 *** | (0.064) | 0.441 *** | (0.047) | 0.336 * | (0.177) |
| Secondary school | 0.603 *** | (0.067) | 0.791 *** | (0.052) | 0.570 *** | (0.181) |
| University | 0.592 *** | (0.073) | 0.944 *** | (0.061) | 0.834 *** | (0.191) |
| Self-employed | 0.058 ** | (0.025) | 0.310 *** | (0.029) | 0.355 *** | (0.052) |
| Student | 0.150 | (0.245) | 0.813 | (0.611) | – | – |
| Unemployed | -0.082 * | (0.049) | 0.045 | (0.050) | – | – |
| Retired | -0.463 *** | (0.042) | 0.088 ** | (0.034) | – | – |
| Home duties | -0.155 * | (0.088) | -0.079 | (0.081) | – | – |
| Manufacturing | 0.118 ** | (0.051) | 0.165 *** | (0.040) | 0.130 | (0.110) |
| Services | 0.110 ** | (0.050) | 0.212 *** | (0.040) | 0.439 *** | (0.107) |
| Ownership | -0.004 | (0.040) | 0.191 *** | (0.036) | 0.196 ** | (0.078) |
| Rental | -0.018 | (0.043) | -0.372 *** | (0.040) | 0.204 ** | (0.086) |
| Urban | 0.001 | (0.035) | 0.029 | (0.034) | 0.039 | (0.072) |
| Adj. R-squared | 0.264 | | 0.359 | | 0.084 | |
| Sample size | 12,838 | | 12,797 | | 3,895 | |

Note: Tests of equality of coefficients revealed a lack of statistical significance for marital differences among the Belgians (for both health and shelter), age groups 16-20 and 21-50 (for both health and shelter) as well as the labour market states of ‘unemployed’ and ‘home duties’ (for shelter). As for the Italian sample, in addition to marital status (for both shelter and health), no apparent statistically significant differences exist on the occupational sector (for health), housing tenure and geographical location (for job satisfaction).

## Appendix D—Parameter estimates of the Engel curve

| 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 education | -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 | |

Note: 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 group to total household size.