Net satisfaction: a different point of view on the measurement of subjective wellbeing

Daria Mendola\textsuperscript{a}
Chiara Saturnino\textsuperscript{b}

\textsuperscript{a) University of Palermo;}
\textsuperscript{b) University of Rome – La Sapienza}
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Daria Mendola* and Chiara Saturnino**

ABSTRACT: Since subjective measures of wellbeing have entered the scholarly debate on quality of life, a large number of studies have looked at the meaning of life satisfaction. This paper adds to the literature on the measurement of subjective wellbeing. We propose an alternative method for evaluating individual wellbeing, introducing a new index based on the interplay between satisfaction and the importance individuals assign to a given set of life domains. Hence, we introduce the notion of "net satisfaction." To highlight certain characteristics of the measure proposed, we devote special attention to the comparative performance of our index with respect to other relevant examples in the literature. We show that the index is able to discriminate among individuals with different subjective wellbeing levels. Some tests of the properties of the index are performed on data from the second European Quality of Life Survey.

Keywords: subjective wellbeing, index, satisfaction, importance, quality of life, compensation

* Associate Professor of Social Statistics, Department of Economics, Business and Statistics, University of Palermo - Corresponding author: daria.mendola@unipa.it

** PhD candidate, Sapienza University of Rome, Department of Economics and Law, chisat@libero.it

Chiara Saturnino gratefully acknowledges financial support from Sapienza University of Rome.
INTRODUCTION

The term "wellbeing" appeared for the first time in the literature when scholars started pointing out the inadequacy of economic indicators (especially GDP) for assessing how well people live. While this was not the aim of those indicators, it was often assumed that greater economic output is generally associated with higher living standards. When the limits of economic growth indicators were recognized (Easterlin, 1974), the term wellbeing soon became the object of discussion and empirical analyses, and some classic themes such as happiness were reintroduced to the scientific literature. As time went on, the term wellbeing became increasingly subjective, as it had acquired varying meanings from psychology, social sciences, and behavioral economics. Even if subjective wellbeing (hereafter SWB) is, as Diener (2006, p.153) argued, "an umbrella term that includes the various types of evaluation of one's life one might make," in the literature new meanings of SWB were generally linked to either the cognitive concept of life satisfaction, or to emotional experiences. The former framing is in turn generally associated with concepts such as "quality of life" and "life satisfaction," while the latter framing is generally linked to "happiness." In particular, three kinds of measures of SWB are generally recognized: evaluation, experience, and eudemonic (Dolan, 2011).

Evaluations of SWB are, for example, made when people are asked to provide global assessments of their life or domains of life, such as their health or their job. In that sense, life satisfaction could be seen as a composite of satisfaction levels with different life domains. In the literature, evaluation measures are often derived from questions about satisfaction with life as a whole, or with different life domains. On the other hand, as Dolan (2011, p. 7) has argued, experience "is very closely associated with a 'pure' mental state account of wellbeing, which depends entirely upon feelings held by the individual during some stated period of time." Thus, the potential of Bentham’s concept of happiness as a sum of pleasure and pain is recognized. An example of this approach to the evaluation of SWB is the "Day Reconstruction Method" of Kahneman and Krueger (2006), in which wellbeing clearly assumes a hedonic meaning. In this sense, wellbeing corresponds to the maximization of pleasures (positive affects) and the minimization of pains (negative affects). This kind of measure is based on Aristotle’s concept of eudemonia, in which wellbeing is characterized as the realization of human potential. Thus, there are forms of meanings external to the individual which contribute to his/her wellbeing (Ryff, 1989).
In this work we will focus on evaluation measures, in particular on self-evaluated satisfaction with life, linked to the concept of quality of life proposed by Veenhoven (2012).

Considering different combinations of life chances and results together with quality of society and individual characteristics, Veenhoven (2012) has identified four different concepts of quality of life. In particular, at the intersection of life results (i.e., life outcomes such as happiness and longevity) and inner qualities (i.e., the qualities of the person) he found that quality of life corresponds to satisfaction with life. He therefore referred to the inner valuation of life, or, in his words, "quality of a life in the eye of the person living that life" (p. 5). Furthermore, Veenhoven distinguished four different kinds of life satisfaction, combining two characteristics: the level of disaggregation in the concept of life (i.e., composed of different dimensions or evaluated as a whole) and the duration of enjoyment (i.e., transitory or persistent).

In this paper we focus our attention on "enduring satisfaction," using a comprehensive approach that considers satisfaction with different life domains, and derives overall satisfaction as a sum of satisfaction achievements in these different domains.

The selection of life domains often depends on the approach adopted. But some key factors that determine wellbeing recur in the literature, such as those related to material living conditions (e.g., housing, income, job), or to a more narrow definition of quality of life (e.g., health, education, personal relations).

Our main objective in this paper is to propose a new measure of SWB which focuses on an experience measure that reflects a new way of considering the relationship between satisfaction with some life domains and their subjective importance for individual SWB. For the construction of this measure, we will rely on the life domains proposed by Eurofound in the European Quality of Life Survey.

This paper has four sections. In the first section, we analyze the characteristics of the relationship between satisfaction and importance, which is the core focus in our index. The rationale for this choice is presented and discussed in Section 2, while the analytical formulation of the index is provided in Section 3. Finally, we present some robustness tests to prove the validity and reliability of the instrument proposed. Some conclusions and ideas for the further development of this study are provided in the concluding section.
1. THE BAFFLING RELATIONSHIP BETWEEN SATISFACTION AND IMPORTANCE

An interesting aspect of theories on SWB evaluation concerns the baffling relationship between the satisfaction people derive from various domains of life, and the importance people assign to these life domains for their own overall wellbeing.

In a seminal paper about job satisfaction, Locke (1969, p. 319) argued that: "an individual's evaluation of an object or situation will be a function of the perceived relationship (discrepancy) between what he perceives and what he values." In other words, as reported by Wu (2009, p. 38) while referring to Locke's theory, "given the amount of discrepancy, items with high personal importance could produce a wide affective reaction ranging from great satisfaction to great dissatisfaction (hence) given the amount of discrepancy, range of satisfaction rating of an item is determined by the item importance."

Rejeski et al. (1998), studying older adults, found that the interaction between the satisfaction with the physical status of a sample of patients and the importance they assign to those functional skills is statistically significant, when controlling for the main covariates. In particular they showed that patients' physical achievements smoothed their satisfaction ratings, as the greatest degree of dissatisfaction was expressed by those who placed a high value on their function, regardless their true physical limitations.

Since Campbell et al. (1976) it has become common practice to weight life satisfaction values with ratings of importance in order to give a bigger weight to the domains judged as most important according to the respondent's personal evaluations. A decade later, Ferrans and Powers (1985) argued that the simple addition of satisfaction levels does not accurately represent quality of life, as "people differ with regard to which dimensions predominate in importance."

Given that for each individual and each domain of the SWB concept, both satisfaction and importance are rated on a scale with $H$ discrete points (e.g., five, seven, or 11 points), the archetype of the indices of SWB is composed of the sum, over the selected $k$ life domains, of the products of the item satisfaction ratings and the corresponding item importance ratings (e.g., Cummins (1997), Ferrans and Powers (1985) and Frisch (1992)).
An interesting paper by Hsieh (2003) reviewed and analyzed most of the methodological proposals for weighting satisfaction scores with importance evaluations. Hsieh (2003) introduced a normalizing denominator to the Cummins (1997) index, that is:

\[
\sum_{j=1}^{k} S_{ij} I_{ij} / \sum_{j=1}^{k} I_{ij}
\]

(1)

where \( S_{ij} \) is the satisfaction score of an individual \( i \) on the life domain \( j \), and \( I_{ij} \) is the importance score that individual \( i \) gives to the same domain. He called this approach the "discrete importance rating." Other alternatives were provided or illustrated in the same paper, such as weighting \( S_j \) by \( R_j \) (instead of \( I_j \)), where \( R_j \) is the rank given to the domain \( j \) in a comparison with all the remaining considered domains of wellbeing. In this case \( R_j \) equals one for the least important domain, and \( H \) for most important domain; which explains why the author called this "reverse value ranking." While Hsieh might not have recognized it, this last choice of weights introduces a sort of constraint of dependence among SWB domains, which should be discussed in depth. In order to investigate the hypothesis that satisfaction increases at decreasing rates—i.e., that upward movement toward ever-higher scores does not have the same effect as the first "doses" of satisfaction—Hsieh (2003) considered the possibility of introducing the weights \( I_i \), or, alternatively, \( R_i \), under the square root so as to obtain a sort of ceiling effect:

\[
\sum_{j=1}^{k} S_{ij} \sqrt{I_j} / \sum_{j=1}^{k} \sqrt{I_j}
\]

(2)

When, however, it is desirable to give an exponential weight to satisfaction scores as importance grows, squared \( I_i \), or squared \( R_i \), could be substituted in the equation (1) as weights:

\[
\sum_{j=1}^{k} S_{ij} I_{ij}^2 / \sum_{j=1}^{k} I_{ij}^2
\]

(3)
Although weighting satisfaction scores with importance ratings, or rankings, is still a common practice in SWB and QoL measurement, not all scholars agree with this procedure. Two main concerns have been raised: a) the life domains selected by the researcher may not be relevant to the respondent (this issue is discussed in Frisch, 1992); and b) the importance evaluations used in assessing the satisfaction levels may be redundant (among others, see Trauer and Mackinnon, 2001; Wu and Yao, 2006 and 2007; and Wu, 2009).

Addressing this topic, Trauer and Mackinnon (2001, p. 579) argued that weighting satisfaction scores with importance scores is unnecessary because "QoL domains are selected on the basis of their inherent importance, rendering separate importance rating partially redundant." They also referred to an "against the tide" approach adopted in the quality of life inventory index by Frisch (1992). In his paper, Frisch still used importance scores as weights, but he admitted that for some respondents some life domains do not concur at all with the global evaluation of their own wellbeing (i.e., the importance scores range from zero to two).

Moreover, information about the importance given to life domains could be misleading, and not simply redundant. Again, Trauer and Mackinnon (2001, p. 580) observed that "people vary in how important they regard different domains, however we should have regard for how domains have been selected, since the criterion of importance may have been implicit in the selection." But Hsieh (2011, p. 4) responded that "just because the domains have been pre-determined to be important, it does not have to mean that they must be equally important to every individual." Meanwhile, Wu and Yao (2006) examined the effect of importance weighting by means of correlation analyses, and found through a regression analysis that weights do not improve the explained variance of a global measure of QoL.

After decades of debate, Hsieh (2011) concluded that "importance is not unimportant." In his paper, which synthesized the findings of a large number of empirical studies, he proved that weighting methods are often able to improve the ability of the index to discriminate among individuals (among others, Russell et al., 2006). In particular, Hsieh agreed with the results of a study by Hagerty and Land (2007), in which it was proven that there are significant improvements (measured in terms of the correlation between the composite QoL index and the answers to a global life satisfaction question) when weights are computed as an average of scores derived from homogeneous groups of individuals.

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1 Note that the very inspiring paper by Trauer and Mackinnon [2001] widely discussed the properties of the scores of importance evaluations. The authors asserted that since the measurements are almost never made with a ratio level (due to the lack of a natural zero), any even mild transformation of the rating scale (for example, the choice of a scale from 1 to 7 rather than from 0 to 6) may change the rank order of an individual within the sample distribution of wellbeing. Similar considerations, we believe, stand for the scale adopted for the assessment of the satisfaction levels.
Meanwhile, Hsieh maintained that incorporating importance weighting into QoL/SWB measures is appropriate, but that this issue remains critical. In the next section, we introduce our contribution to this discussion.

2. THE RATIONALE OF OUR INDEX

In this section we introduce our proposal for an index of subjective wellbeing which relies on a combination of satisfaction and importance ratings. We adopt the hypothesis, argued in the previous sections, that importance could be collinear to satisfaction (hence redundant). For this reason, we maintain that in evaluating satisfaction with a domain of life, it is necessary to disentangle satisfaction from importance. Thus, we start with a statement by Trauer and Mackinnon (2001, p. 583-584), in which they observed that "most extreme satisfaction ratings were associated with higher importance ratings (... and most of all) satisfaction ratings already reflect a personal appraisal of the importance of the domain to the respondent." This suggests that satisfaction ratings are inherent in judgments of importance.

2.1 - The notion of net satisfaction

Our index is based on the interpretation of the discrepancies between satisfaction and importance scores. In essence, we assume that importance is included in the evaluations people make about their own satisfaction. Therefore, a discrepancy between satisfaction and importance could be considered a measure of "net satisfaction."

We assume that if a dimension of life is very important to us, we would like to be more satisfied in that dimension. We therefore expect more from this dimension, and this desire to "match" our expectations with reality will likely condition our evaluation of our own degree of satisfaction. We are thus moving away from the approach of the "have-want discrepancy" (Michalos, 1985; Solberg et al. 2002; Wu, 2008), because the question it is not whether "what I have is what I want;" but whether "what I have reflects that which I believe is important in life," based on my personal values, ideals, and principles.

In this paper, we do not adopt the practice of weighting the have-want discrepancies with the importance scores, but instead consider importance as a comparison term. Hence, we see a balance between satisfaction and importance (measured by their discrepancy) as a
correspondence between our "values" (considered as needs or expectations)\(^2\) and what we have.

Let us now define formally the discrepancy \(D_{ij}\) as the arithmetic difference between \(a\) the satisfaction score \(S_{ij}\) of individual \(i\) on the wellbeing domain \(j\); and \(b\) the importance score \(I_{ij}\) that individual \(I\) gives to the domain \(j\). Hence \(D_{ij} = S_{ij} - I_{ij}\). Suppose that ratings are given on a Likert scale from one to ten. It is then possible to build for each individual \(i\) and each domain \(j\) a matrix of discrepancies, such as the one shown in Table 1. Here, the \(x\)-axis reports the scores on importance, and the \(y\)-axis shows the scores on satisfaction. Each cell in the matrix is a potential value of the \(D_{ij}\). The bisector line represents the steady situation (perfect matching), and it separates the positive from the negative situations. The cell of the matrix in which we can situate an individual reveals her situation. In particular, corner triangles (shadowed areas) represent very positive and very negative life conditions. Moreover, at an aggregate level, the more an individual falls into the bottom shadowed triangle, the worse the situations in that life domain are.

Discrepancies, or net satisfactions, form the basis of our measurement proposal, as we illustrate in the next section.

<p>| Table 1 – Matrix of potential discrepancies for a given life domain and a given individual |</p>
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<th>10</th>
<th>9</th>
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</table>

\(^2\) Along the same lines, Oishi et al. [1999] who considered the importance of value orientation, and hence as a kind of measure of expectation and needs. See also Veenhoven [2002].
2.2 - A theoretical framework for interpreting discrepancies between satisfaction and importance evaluations

Suppose an individual is asked about the importance of and his or her satisfaction with three life domains ($j=1, 2, 3$): relationships, safety, and job. Both satisfaction and importance are evaluated using a scale from one to ten. To illustrate how this framework operates, we present here three reference cases: the "real situation," the "steady situation," and the "proxy to the ideal situation" or the "quasi-ideal situation" (see the three panels in Figure 1).

In panel $a$, as in real life, we can see that people assign different degrees of importance to their own life domains, and report different levels of satisfaction for each of these domains. For example, the individual in the real-life situation assigned a high degree of importance to her relationships and her job (scored seven and eight, respectively), but reported lower satisfaction levels on those domains (six and three, respectively). On the other hand, she reported being quite satisfied with her level of safety (scored six), but indicated that this domain was not very relevant to her (the importance score is four out of ten).

![Figure 1 – Reference cases](image)

We then look at two other situations. In the steady situation (panel $b$, Fig. 1), the individual’s satisfaction scores exactly match her importance scores. Thus, the individual was experiencing a perfect balance between the structure of her values and aspirations and her own experience of life. A balanced situation is an expression of a good level of SWB. However, any balanced situation, even that of $S=10$ and $I=10$, is a somehow fragile steady
point. Even a small negative shock in the individual life could move the individual wellbeing from a steady situation to a negative situation.  

It is important to note that in this case the life domains were not all equally important to the individual (who, in panel b of Figure 1, reported assigning greater importance to her relationships and to her job, and less importance to her own safety), and that the individual was, in any case, fully satisfied.

The last panel of Figure 1 shows a situation proxy to the ideal, in which the level of satisfaction was always at the maximum, regardless of the importance scores given by the individual. This case, which we dub "there is nothing better" (or "non plus ultra"), does not necessarily imply a specific ordering in the life domains (nor does it have to be imposed by a theory, such as that of Maslow’s followers). Each individual could have her own vector of preferences regarding the (order of) importance of life domains. What matters is that the satisfaction scores reach the maximum. This is almost utopian, and we expect that such hyper-optimistic individuals make up a very small percentage of the population. The reasons for their overwhelming optimism (their intense joy in life) should probably be studied separately and in greater depth, and may be related to attitudes or cultural traits.

Obviously the situations illustrated in Figure 1 only represent cornerstones, whereas the evaluation of net satisfaction by individuals can produce situations that vary greatly from those mentioned above. In particular, a negative discrepancy is a clear evidence of illbeing; whereas, a positive discrepancy -meaning an exceeded expectation- represents a robust (consolidated) situation of wellbeing. In some sense this condition provides some protection to individuals against bad events that could occur; that is, it represents a sort of stock of SWB. Table 2 sums up the range of possible net satisfactions.

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3 Even if, as far as we know, there are no empirical evidences, it appears reasonable supposing that, along the time, modified life conditions could affect easier and more rapidly the satisfaction evaluations, rather than importance ones. Indeed, it is reasonable to assume that, at least in the short term, in the occurrence of external negative shocks, the importance of involved life domain/s would not vary (due to its link to values and deep psychological traits), while satisfaction could diminish. In this sense we maintain that equilibrium is a potentially risky situation for the personal SWB.
Table 2 - Possible evaluations of a life domain

<table>
<thead>
<tr>
<th>Importance vs Satisfaction</th>
<th>Net satisfaction</th>
<th>Discrepancy sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance &lt; Satisfaction</td>
<td>positive condition</td>
<td>+</td>
</tr>
<tr>
<td>Importance &lt;&lt; Satisfaction</td>
<td>very positive condition</td>
<td>+</td>
</tr>
<tr>
<td>Importance &gt; Satisfaction</td>
<td>negative condition</td>
<td>-</td>
</tr>
<tr>
<td>Importance &gt;&gt; Satisfaction</td>
<td>very negative condition</td>
<td>-</td>
</tr>
<tr>
<td>Maximum Satisfaction and varying Importance scores</td>
<td>non plus ultra situation</td>
<td>+</td>
</tr>
<tr>
<td>Importance = Satisfaction</td>
<td>steady situation</td>
<td></td>
</tr>
</tbody>
</table>

2.3 - Some rough measures of wellbeing

From the setting given above, it is possible to formulate some initial, albeit rough, measures of wellbeing at the individual level. These can be derived from the interpretation of the distribution of the scores on both the importance and the satisfaction questions, and also from their discrepancies at the individual level.

A first measure is the "imbalance" among the life domain evaluations. In particular, a low value of the average discrepancy $\overline{D}_i$ (over the set of life domains considered) gives an indication of wellbeing in terms of the balance between the matched pairs of importance and satisfaction scores. Having a good balance over the whole set of life domains is an indication that the individual is in equilibrium, has fulfilled her desires, or has adapted her expectations to her real life experiences (Wu et al., 2009). Indeed, it could be argued that the process of adaptation is simply a reaction to disappointing experiences, and that it does not represent a desirable quality of life. Unfortunately, given the datasets that are generally available, the hypothesis of adaptation is usually not verifiable, but it could be helpful to place alongside the imbalance indicator another measure based on the average level of the importance scores. Indeed, according to Linville's theory, the more interests an individual has in her/his life, the more s/he is protected against depression, labor stress, and general ill-being ("Don’t put all your eggs in one cognitive basket," Linville, 1987). Thus, assigning low importance to many life domains, and hence having a lower mean value over the elements $I_{ij}$ of the vector $I$, regardless of any level of $S$, is an indication of a greater risk of depression and ill-being, and therefore of eventual low wellbeing.
In addition, having a relevant variability among the elements of the vector $I$ is also an indirect measure of potential low wellbeing. This is because some domains are considered very important and others far less important. Thus a failure in one of the important domains could push the individual toward significantly lower levels of SWB. As a consequence, $\sigma(I)$ is just an indicator of wellbeing: higher levels imply that the life domains are not well balanced, and that SWB could be therefore low.

3. NSAT: AN INDEX OF INDIVIDUAL SUBJECTIVE WELLBEING

The aim of this paper is to build a composite indicator of subjective wellbeing at the individual level. For this purpose, we believe it is useful to take into account simultaneously both the satisfaction and the importance evaluations made by individuals.

Building a composite indicator involves a number of steps, including standardizing the required procedures, ensuring the indicator's quality, and assessing its reliability (OECD, 2008). In this section we will focus on the statistical aspects concerned with the weighting and aggregation steps, and the test for robustness and validity. We are not, however, intending to construct a new classification of subjective wellbeing domains.

Given the notation in sub-section 2.1, we define our index of SWB (hereafter Net Satisfaction index or NSat), at the individual level, as follows:

$$NSat_i = \frac{\sum_{j=1}^{k} (S_{ij} - I_{ij})}{(H-1)k} = \frac{\sum_{j=1}^{k} D_j}{(H-1)k}$$

(4)

where:

- $k =$ number of domains of wellbeing or life domains ($j=1, 2, ..., k$);
- $S_{ij} =$ satisfaction score given by subject $i$ on the domain $j$;
- $I_{ij} =$ importance score given by subject $i$ on the domain $j$;
- $H =$ maximum scale score (scores from 1 to $H$)
Note that the denominator in equation (4) is the theoretical maximum of numerator,\(^4\) which is obtained when (e.g., on a scale from 1 to 10) each \(D_{ij}\) equals -9 (i.e., \(S_{ij} = 1\) and \(I_{ij} = 10\)) or +9 (i.e., \(S_{ij} = 10\) and \(I_{ij} = 1\)).

Hence, the index in (4) spans the (-1,+1) interval, and it is monotonic with respect to discrepancy (i.e., an increase in the discrepancy in one domain, all other things being equal, reduces the overall wellbeing index). In particular, \(NSat\) takes value -1 if \(D_{ij}\) is a minimum for each life domain; it takes value one if \(D_{ij}\) is a maximum for each life domain; and it takes value zero if \(D_{ij}\) equals zero for each life domain. All of the negative values refer to a deficiency in the satisfaction scores, while all of the positive values indicate high satisfaction scores. It is worth noting that the extreme values may also be achieved due to an internal compensation among the discrepancies, and that this is a recognized drawback common to all of the indices aggregated by a compensative pooling function. Similarly, the value zero could also be achieved in a situation of "global" balance which does not imply a perfect matching in each life domain.

Since we recognize the centrality of the compensation assumption (moving toward an index obtained by summing net satisfactions), in this paper we consider and try to verify two different theoretical schemes in order to allow for the possibility of compensation among life domains in our index. The first scheme relates to the well-known Maslow’s pyramid of needs (Maslow, 1954). Maslow, and many others after his seminal paper, argued that human needs could be ideally ordered in a pyramid; i.e., in a hierarchy. If basic physiological needs are not fulfilled, it is very difficult for other needs to emerge. That is, if an individual lives in a state of hardship, her needs will be related to hunger and other subsistence-level needs, and not to a desire for a car or another pair of shoes. The needs of people who live above a set poverty threshold (for whom we can assume that their basic needs are fulfilled, Ravallion, 1992) will be related to their personal values and expectations regarding what aspects of their life they would like to improve. Hence, we believe that for people with a living standard above the poverty line, compensation among life domains can be reasonably assumed.

The second theory that supports of the concept of compensation among satisfaction levels with different life domains is related to Linville’s so-called "self-complexity" theory (1987). According to this prominent psychologist, people with low self-complexity (i.e., those

\(^4\) Note that the same domain may need several variables in order to be properly measured. In this case it is necessary to pool the information for each domain in one single measure/number. A proper way to do this could be to use the median value of both the satisfaction and the importance scores, or, alternatively, to take the mean scores. This choice is motivated by the possibility of assuming the cardinal nature of the \(S\) and \(I\) scores, which is usually acceptable for scales with at least seven points.
who consider important only a few, undifferentiated aspects of their life) are at greater risk of being affected by a stressful event involving one of these key aspects than people with a higher degree of self-complexity (i.e., people who consider more aspects to be important and who differentiate between these aspects). Among people with high self-complexity, only a few aspects of the self are involved in events, and the other aspects remain unaffected. Thus people with low self-complexity tend to be more affected by negative events, whereas people with high self-complexity tend to maintain positive thoughts and feelings. If this assumption is verified, then compensation among life domains is feasible among people who are "highly complex." In the next section, we empirically address the compensation issue using data available from the Eurofound Survey.

Therefore, for policy purposes, it would be interesting to keep separate positive and negative discrepancies, so that we could define:

$$NSat = NSat^+ + NSat^- = \frac{\sum_{i=1}^{k} D_{ij}^+}{(H-1)k} + \frac{\sum_{j=1}^{k} D_{ij}^-}{(H-1)k}$$

(5)

which allows for separate analyses of the two set of domains moving toward net satisfaction and net dissatisfaction.\(^5\)

4. VALIDITY AND ROBUSTNESS CHECK

In order to provide some checks for the NSat index, in this section we perform some comparative analyses to highlight the characteristics and the potential of our SWB index.

4.1 - Data

The principal household surveys in the field of social sciences—such as the World Values Survey, the European Social Survey, the former European Community Household Panel, the German Socio-Economic Panel, the British Household Panel Survey, and the PSID—all contain similar questions on satisfaction with certain life domains and/or with life as a whole.

\(^5\) A further development for this index will be the introduction of a weighting scheme, not based on importance evaluations, that allows for the possibility that, as was also suggested by Frisch [1992], some domains could have no importance at all for some individuals.
However, it is worth noting that questions about satisfaction and importance are rarely present jointly for the same life domain.

The European Quality of Life Survey (EQLS), carried out by the Eurofound (European Foundation for the Improvement of Living and Working Conditions) every four years\(^6\) gathers information on the socioeconomic characteristics of individuals, the demographic structure of their families, and their personal values and beliefs. Luckily, in the 2007 questionnaire there were questions about both satisfaction with and the importance of seven different domains of life: family life, social life, health, education, job, standard of living, and accommodation. For the purposes of this study we selected only individuals with no missing observations on the 14 coupled questions on satisfaction and importance. The final sample consists of 16,280 individuals living in 31 different European countries. The smallest group is the Macedonians with 317 individuals, whereas the largest group is the Germans with 917 individuals. Satisfaction is scored on a scale from one to 10, while importance is scored on a scale from one to five. Since we need both \(S\) and \(I\) on the same scale, the satisfaction scores were reduced to a scale from one to five so they are comparable to the importance ratings. The reduction of the range of the satisfaction scores was obtained through a linear transformation (the new score is \(T = (S+1)/2\)). We are aware of the implications of this choice, especially on the variability of data, but we are reassured when we consider that, as it is common feature of all of the linear transformations, this scale guarantees the proportionality between the original scores and the transformed scores, while also preserving the metric nature of the scores. Moreover, the importance scales were reversed for all of the seven domains so that the two evaluations were in the same direction.

4.2 - Addressing the compensation issue

As we argued above, compensation among life domains is fully reasonable for people who are not poor, or for individuals with a "highly complex self." Unfortunately we do not have reliable information about income in the EQLS\_2007 due to that fact that 33.57% of the data on this variable are missing; thus, we were not able to distinguish the people above the poverty line. Instead, we decided to use a variable that measures perceived poverty (Q57: "Thinking of your household's total monthly income: is your household able to make ends meet?"; scored on a six-point scale, from "very easily" to "with great difficulty"). People with no perceived poverty (i.e., who responded very easily/easily/fairly easily to Q57) make up around the 64% of the sample. The literature has assessed the well-known differences in

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\(^6\) The first EQLS was in 2003, then in 2007 and in 2011.
perceived and objective poverty, but entering into this discussion is beyond the scope of this paper, and we are quite confident that most of the people who say they are not poor really are not poor (De Vos & Garner, 1991; Carletto & Zezza, 2006). Moreover, we believe that subjective poverty could influence SWB more than real (objective) economic poverty.

In order to better investigate how well the index performs, we decided to study its behavior across groups differentiated by the level of perceived poverty. Hence, we divided our sample into three classes. The first group is that of "definitely not poor" people: i.e., those who make ends meet very easily, easily, or fairly easily. They represent 63.53% of the sample. The second group is called "nearly poor;" i.e., those who make ends meet with some difficulty. They represent 25.07% of the sample. The last group is made up of "definitely poor" people: i.e., those who make ends meet with difficulty or with great difficulty. They represent 10.71% of the sample.

It is interesting to note that the average \( NSat \) for "definitely not poor," "nearly poor," and "definitely poor" follows a decreasing gradient. It assumes the lowest values (close to zero, tending toward a global balance between satisfaction and importance) for definitely not poor people, and rising with the perception of poverty (approaching -1; i.e., the value representing maximum ill-being). \( NSat \) is, on average, -0.10 for surely not poor people, -0.22 for nearly poor people, and -0.34 for definitely poor people. A disaggregated view by domains is available in Table 3.

<table>
<thead>
<tr>
<th>Life Domains</th>
<th>Definitely not poor</th>
<th>Nearly poor</th>
<th>Definitely poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>-0.56</td>
<td>-0.93</td>
<td>-1.38</td>
</tr>
<tr>
<td>Job</td>
<td>-0.54</td>
<td>-1.00</td>
<td>-1.57</td>
</tr>
<tr>
<td>Standard of Living</td>
<td>-0.29</td>
<td>-1.13</td>
<td>-1.97</td>
</tr>
<tr>
<td>Accommodation</td>
<td>-0.24</td>
<td>-0.77</td>
<td>-1.35</td>
</tr>
<tr>
<td>Family</td>
<td>-0.40</td>
<td>-0.72</td>
<td>-1.09</td>
</tr>
<tr>
<td>Health</td>
<td>-0.59</td>
<td>-0.86</td>
<td>-1.09</td>
</tr>
<tr>
<td>Social Life</td>
<td>-0.28</td>
<td>-0.66</td>
<td>-1.11</td>
</tr>
</tbody>
</table>

*potential range (-4,+4)

The second strand for verifying the possibility of the compensation among levels of satisfaction with different life domains pertains to the above-mentioned "self-complexity," a la Linville. Unfortunately, there are no direct measures of this psychological trait in the survey, so we searched the questionnaire to find a proxy measure. One option is to consider the number of domains judged as very important (scored four or five). If, for example, at least
five out of seven life domains were judged as being very important, we could assume that the individual has a complex structure of self, as s/he distributes his/her attentions and efforts among several life domains. For these people, the pooling function adopted in the NSat index seems to be reasonable. Hence, the idea was to compare the general results with those obtained on the sub-sample of people with high self-complexity. However given the scarce variability in the importance evaluations (quite concentrated at the higher values), likely due to the basic relevance of the life domains proposed in the survey (family, health, job, etc.), we were not able to use this proxy measure to test the hypothesis. We hope that in the future more psychological questions and tests become available that will allow us to integrate and to improve the measurement of subjective wellbeing.

4.3 - Validity
Data from EQLS were also used to assess the validity of NSat as an indicator of wellbeing. In particular, we tested for content validity and criterion validity (Schmitz, 1993).

Content validity:

We then estimated the correlation between the average value of NSat and the scores of satisfaction and importance for each of the domains considered and the three poverty classes (see Table 4). This allowed us to validate NSat as a measure of wellbeing, and, at the same time, to identify the factors that had the greatest influence on wellbeing. As is shown in Table 4, the index NSat has a high degree of correlation (at the individual level) with the satisfaction levels of all the seven considered domains (slightly lower values were recorded for the links with health and education, but, as expected, there was a high degree of correlation with the indicator "standard of living").

Among people who were definitely not poor or who were nearly poor, the main factors that influenced their wellbeing were their levels of satisfaction with their job and their standard of living. Meanwhile, the wellbeing of poor people was more influenced by their level of (gross) satisfaction with their standard of living, their accommodation, and their social life. It is interesting to note that the correlations with satisfaction are always positive, and that, when looking at the pattern, we always find the highest correlation among the people who were definitely not poor. The trend decreases for nearly poor people, and then increases

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7 Levels of satisfaction with the standard of living are closely correlated with S. with accommodation (0.60), S. with job (0.59) and, even if to a slightly lesser extent, with S. with social life. Thus, it is not strange that these factors would emerge jointly.
again for definitely poor people. These findings are consistent with the results reported in the literature for other indices.

Table 4 - Correlations between NSat and level of satisfaction and importance by life domains and levels of poverty

| Life Domains          | Definitely not poor |   | Nearly poor |   | Definitely poor |   | All     |   |
|-----------------------|---------------------|--|-------------|--|------------------|--|---------|--|--
|                       | Satisf. | Import | Satisf. | Import | Satisf. | Import | Satisf. | Import |
| Education             | 0.52    | -0.29  | 0.50    | -0.33  | 0.51    | -0.26  | 0.55    | -0.27  |
| Job                   | 0.61    | -0.34  | 0.57    | -0.38  | 0.59    | -0.36  | 0.64    | -0.35  |
| Standard of Living    | 0.68    | -0.40  | 0.63    | -0.42  | 0.67    | -0.37  | 0.73    | -0.41  |
| Accommodation         | 0.61    | -0.39  | 0.55    | -0.41  | 0.60    | -0.39  | 0.64    | -0.40  |
| Family                | 0.58    | -0.24  | 0.50    | -0.30  | 0.54    | -0.27  | 0.58    | -0.25  |
| Health                | 0.55    | -0.23  | 0.49    | -0.28  | 0.53    | -0.26  | 0.55    | -0.23  |
| Social Life           | 0.57    | -0.25  | 0.57    | -0.30  | 0.63    | -0.28  | 0.62    | -0.25  |

A similar pattern is evident when we consider the correlation between the average value of NSat and the scores on the importance of life domains (again in Table 4) even if, as is expected and was widely argued in Section 2, the correlations are always negative. In this case the factors influencing more NSat are the same ones that influence satisfaction, and they are also identical for the three groups of poor people: standard of living (i.e., material wellbeing) and accommodation.

Criterion validity:

This kind of validity can be assessed by comparing the results of NSat with those of some of the indices that are "standards" in the current literature: namely, the three indices constructed by Hsieh (see eq. 1 to 3), and the indices created by Cummins (1997) and by Ferrans & Powers (1985). As a test of their comparative performance, we computed the coefficients of variation for all the indices. This allowed us to assess which of the indices is better able to identify (i.e., distinguish one from another) individuals according to their level of subjective wellbeing. Table 5 below shows that a) the relative variability of NSat is always higher than that of the indices of Hsieh; b) the Hsieh index performs best for the group of "definitely poor people," though our assumptions suggest that compensation should be considered with more caution for this group; c) in a comparison of groups by levels of perceived poverty, NSat is
better able to identify the people who were not poor, which means that the assumption of compensation holds.

Table 5 - Coefficients of variation of the NSat index and of Hsieh indices by levels of poverty

<table>
<thead>
<tr>
<th></th>
<th>CV NSat</th>
<th>CV DI-Hsieh</th>
<th>CV Hsieh 2</th>
<th>CV Hsieh 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely Poor</td>
<td>0.64</td>
<td>0.24</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Nearly Poor</td>
<td>0.87</td>
<td>0.18</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>Definitely not Poor</td>
<td>1.72</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Furthermore, we compared NSat and Hsieh’s index (that in eq. 1) for the three groups of people who were definitely poor, nearly poor, and definitely not poor; contrasted with their own complementary set (e.g., definitely poor vs. nearly poor people + definitely not poor; nearly poor vs. definitely not poor + definitely poor; and definitely not poor vs. definitely poor + nearly poor). The resulting data (Table 6) show the same pattern for the two indices: they both follow a gradient, considering their different range intervals.⁸

Table 6 - Average values of the NSat index and of Hsieh index by levels of poverty (compared with their complementary set)

<table>
<thead>
<tr>
<th></th>
<th>Definitely Poor</th>
<th>Others</th>
<th>Nearly Poor</th>
<th>Others</th>
<th>Definitely not Poor</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NSat</strong></td>
<td>-0.34</td>
<td>-0.13</td>
<td>-0.22</td>
<td>-0.14</td>
<td>-0.10</td>
<td>-0.25</td>
</tr>
<tr>
<td><strong>DI Hsieh</strong></td>
<td>3.25</td>
<td>4.00</td>
<td>3.70</td>
<td>3.99</td>
<td>4.12</td>
<td>3.57</td>
</tr>
</tbody>
</table>

An interesting behavior stands out in Figure 2. The three panels show the cloud of points originated by the values of the two indices on the same individuals, by groups of perceived poverty intensity. Moving away from people with no economic problems (first panel) to people who can hardly cover their ordinary expenses (third panel), we note that the number of points that lie in the lower quadrant (i.e., below the zero value for NSat and below the central value for Hsieh index) progressively increases. This is reasonable given that the more you perceive yourself as being poor, the lower your wellbeing is likely to be. Similar patterns are observed when comparing NSat with the other two versions of the Hsieh index.

Finally, we present a test using macro-level data. Figure 3 shows the comparison of NSat with the mean satisfaction level for the 31 countries in the survey.⁹ On the x-axis are the

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⁸ See Section 2 for details on the construction of the DI index. NSat ranges from -1 to 1 while Hsieh’s index ranges from one to five. Hence, even if the scores are different, they both tend to grow up moving from the state of “definitely poor” to the state of “definitely not poor”.

⁹ Mean satisfactions is the kernel of the famous indices by Cummins [1997] and by Ferrans & Powers [1985].
values of $NSat$ at the country level, while on the y-axis are the average values of satisfaction scores. $NSat$ shows a very high correlation (both in terms of the ranking of countries and in terms of the correlation among the average values) with the average satisfaction (rank correlation = 0.876 and Pearson correlation = 0.912). These results confirm those in the literature, in which Nordic countries were found to have the highest levels of SWB and Eastern European countries were shown to have lower levels of SWB.

<table>
<thead>
<tr>
<th>Definitely not poor (n= 10,352)</th>
<th>Nearly poor (n=4,081)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Definitely not poor" /></td>
<td><img src="image2" alt="Nearly poor" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Definitely poor (n=1,743)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Definitely poor" /></td>
</tr>
</tbody>
</table>
CONCLUSIONS AND FINAL CONSIDERATIONS

This paper addressed some of the main issues relevant to the measurement of SWB at the individual level. The central idea that led us to construct this index is that weighting satisfaction scores with importance scores produces a redundancy in the SWB measure, and also ignores the effect of expectations and values (i.e., the importance) on self-reported satisfaction levels, which could strongly bias the measure. Thus, in this paper we paid special attention to the confounding effect of the interaction between evaluations of satisfaction and of importance.

We proposed a new index that introduces the concept of "net satisfaction" as the discrepancy between the level of satisfaction with life domains and the degree of relevance individuals assign to these domains. The $NSat$ index is compiled by adding up net evaluations of satisfaction with different life domains. As we highlighted in our paper, this could be a concern that, under some research assumptions, could be solved. The existing literature has devoted little attention to concerns related to the extent of compensation among different life domains used in the measurement of subjective wellbeing, and most of the published studies have simply ignored this question. We have discussed this issue in depth in this paper, and tried to test it with empirical data. Although the available surveys do not allow for conclusive results, we highlighted two cases in which compensation could be admissible and reasonable (i.e., when dealing with people who are not poor or who have high self-complexity), and we...
hope that in the future the data needed study wellbeing and quality of life will improve, and will include more information that will allow us to test these hypotheses.

Empirical analyses showed that the $NSat$ index is able to capture individual differences, and to give a central role to the respondent in the measurement of SWB. Moreover, $NSat$ performs better than some other indices present in literature.

The concept of "net satisfaction," i.e., the discrepancy $D_{ij}$, can also be used as a policy tool to highlight life domains in which people express lower levels of (net) satisfaction, and for which interventions are needed. In fact, the frequency distribution derived from the discrepancies in Table 1 over all of the individuals in a society provides evidence regarding which of the interventions are most needed (corresponding to the highest frequencies among the negative values of the distribution).

We recognize that some life domains are not, or are only slightly amendable to social policy interventions (such as, for example, satisfaction with family life). However, we agree with Veenhoven (2002) that it could be useful to combine "objective" and "subjective" measures of wellbeing in order to improve people’s quality of life.
REFERENCES


