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Implementing the capability approach with respect for individual valuations: an illustration with Colombian data*

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Abstract

In many applications of the capability approach it is necessary to rank individuals with respect to their well-being. This raises the difficult question of how to select the weights to be attached to the relevant functionings or capabilities. We explore the possibility of using individual valuations to set these weights and we propose the equivalent income measure as a specific well-being measure that is consistent with these individual valuations. We discuss its implementation and compare the results to four alternative well-being measures based on Colombian data for 2008: income, subjective well-being, the official SISBEN index, and the Colombian Multidimensional Poverty Index (CMPI). We find that there is remarkably little overlap between the different measures. The different well-being measures identify different individuals as worst-off. This finding highlights the empirical relevance of the selection of the well-being measure when implementing the capability approach.

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1 Introduction

There is a growing consensus among academics and policy makers that individual well-being cannot be reduced to material consumption (or income) alone (see Stiglitz et al. 2010). Examples of other important aspects of well-being are health, educational achievements, work status, and social integration. The capability approach has played an important role in the development towards this multidimensional perspective on well-being. In fact, there has been influence in both directions: the growing awareness that well-being is not only material has also contributed to the growing popularity of the capability approach in policy circles.

While there seems to be a wide consensus on the relevance of the capability approach, there remains a vigorous (philosophical) debate on its precise interpretation. Two difficult questions are especially relevant for the purpose of implementing the capability approach. First, while the freedom aspect of capabilities is conceptually attractive, it raises some hard measurement issues and difficult ethical questions about the extent to which individuals are to be held responsible for their choices. Not all individuals have the same decision-making capacities and some of them may end up with poor final outcomes (functionings) even when they could choose from valuable opportunity sets (capabilities). Second, the multidimensionality of the capability approach raises an "indexing problem". Is it desirable to aggregate the different functionings or capabilities to obtain a one-dimensional measure of individual well-being? And, if one decides to do so, which weights should be assigned to the different dimensions?

There is some disparity between the lively philosophical debate on these questions and the applied capability literature. Notwithstanding some interesting attempts to operationalize the idea of capabilities with survey data (see Anand et al., 2008, for instance), most current applications fall short of fully capturing the richness of the theoretical concept of capabilities and have instead concentrated on functionings. We will follow the same route in this chapter. More progress has been made with respect to the indexing problem. We will focus on that problem and we will argue - contrary to the mainstream position within the capability approach - in favour of an aggregation of the different functionings, which relies on the valuations of the concerned individuals themselves. To do so, we will propose the so-called equivalent income measure as a specific well-being

measure that is consistent with these valuations.[1]

Recently, an important alternative to the capability approach has appeared on the scene. More and more social scientists argue that simple measures of subjective well-being such as "happiness" or "life satisfaction" prove meaningful in comparing well-being (see, e.g., Layard, 2005, van Praag and Ferrer-i-Carbonell, 2007, Diener et al., 2010). Presumably, the popularity of these subjective well-being measures can be explained by the ease with which data can be collected, and - more substantially - by the way these subjective well-being measures incorporate non-material aspects of life. Moreover, there is no doubt that feeling happy is an important dimension of well-being. "It would be odd to claim that a person broken down by pain and misery is doing very well" (Sen, 1985, p. 17). Some authors have introduced subjective well-being measures within the capability approach (see, e.g., Anand, 2015), while trying to avoid going against its original non-welfarist inspiration. We will be careful in this chapter to distinguish our proposal of using individual-specific valuations in an equivalent income measure from an approach based on subjective well-being measures.

One of the motivations of the capability approach is a deep concern for the worst-off. Some of its most interesting empirical applications deal with the question of identifying the worst-off or the poor. This will also serve as our own vantage point, and our empirical illustration will focus on multidimensional poverty in Colombia in 2008. Colombia is an interesting country for our analysis for a number of reasons. First, Colombia has a remarkably high performance in terms of subjective well-being (see, e.g., Helliwell et al. 2015), given its high level of inequality and income poverty. Second, the Colombian government has adopted the capability approach as guiding principle to design and target many of its social policies (OECD, 2016, chapter 4). To do so, an operational well-being measure has been constructed in the spirit of the capability approach, the so-called SISBEN index.

In the empirical part of this chapter, we will use the Colombian Encuesta Nacional de Calidad de Vida (ECV) data set for 2008. We will compare the identification of the worst-off in Colombia for a variety of measures: a well-being measure based on individual valuations, alternative well-being measures such as the official SISBEN index, the Colombian Multidimensional Poverty Index (CMPI), an exclusive focus on income, and a subjective well-being mea-

[1] Equivalent incomes have been discussed by Fleurbaey (2009), Fleurbaey and Blanchet (2013), and Decancq et al. (2015a,b) amongst others.

sure. The study of Vélez and Robles (2008) is related to our empirical analysis. They show that parameterizing axiomatically derived multidimensional poverty indices, while maintaining consistency with self-reported well-being, offers a coherent method to derive weights for the dimensions. However, they do not take into account individual valuations.

The chapter is structured as follows. In Section 2 we argue in favor of using individual-specific valuations for the construction of a well-being measure and we introduce the equivalent income measure to operationalize that idea. In Section 3 we discuss how the equivalent income measure can be implemented. Section 4 illustrates the implementation with Colombian data and compares the measure to alternative well-being measures in terms of which individuals are identified as the worst-off. Section 5 concludes.

2 Taking individual valuations seriously

In this section, we argue first that aggregating the functionings into a well-being measure is unavoidable for policy evaluation if one wants to go beyond a sufficientarian approach resulting in a simple headcount measure of poverty. We then advocate the use of the individual valuations by the concerned individuals as the guiding principle for the choice of the weights of such a well-being measure. We finally discuss one possible well-being measure that is consistent with the individual valuation by the concerned individuals: the equivalent income measure.

The following notation will be useful. We denote the vector comprising m functionings of individual i by $f_i = (f_i^1, f_i^2, \ldots, f_i^m)$. This vector f_i gives a complete description of what is important to make a life "good" or "bad". It can be interpreted as a vector of refined functionings, for instance. In fact, that is our own preferred interpretation. Refined functionings directly introduce information based on the extent of freedom and the possibility to choose into the f_i vector (see, e.g., Schokkaert, 2009, Fleurbaey and Blanchet, 2013, Decancq et al., 2015b). In the empirical analysis, however, data limitations will confine us to a more limited definition of functionings.

2.1 The indexing problem

Most proponents of the capability approach are reluctant to aggregate the different functionings and reject the idea of trade-offs between them (see, e.g., Nussbaum, 2000). This position is arguably most appealing in a setting where one is merely concerned with the satisfaction of basic needs. Leading a meaningful life can indeed be argued to require at least a minimum level of each of the considered functionings. Yet, as soon as the aim is to measure and compare well-being above (or below) that threshold, the case against trade-offs becomes much less appealing.

Rejecting trade-offs comes at a high price. Indeed, when functionings are not aggregated in some way, it is impossible to order all individuals from the worst-off to the best-off.[2] Cases will occur where one individual has a better outcome for one functioning, while another individual has a better outcome for another functioning. Without a well-being measure or a view on how to trade off both functionings, it is impossible to compare these two individuals and say who is worse-off. In the context of studying poverty-alleviating social policies, this means that it becomes impossible to prioritize among the poor, or to use an objective that is sensitive to inequality among the poor (Sen, 1976).

When it comes to measuring or comparing the extent of multidimensional poverty of different people, aggregation across the different functionings is unavoidable. Most empirical measures of multidimensional poverty therefore assume some commensurability of the functionings and make use of an explicit or implicit well-being measure. Let us consider the popular counting approach proposed by Alkire and Foster (2011a, 2011b) as an example. The authors explicitly warn against aggregation of incommensurable dimensions.[3] However, central to their approach is c_i, an individual measure of "weighted deprivation counts" for individual i. It is computed as follows

$$c_i = \sum_{j=1}^{m} w^j \times I(f_i^j \leq \overline{f}^j), \tag{2.1}$$

[2] An incomplete or partial ordering is possible if one accepts the idea that individual i is better-of than individual j if he is doing better for all functionings. This is the basic idea of the intersection partial ordering in Sen (1985).

[3] "If the aggregation method faithfully combines all the relevant resources (or achievements) into the right aggregate for every person (...) then a multidimensional method is not needed. (...) The difficulty arises when the aggregate is wrong, or when aggregation is used where aggregation is inappropriate (say, the two dimensions are fundamentally incommensurate achievements)" (Alkire and Foster, 2011b, p. 304).

where $\overline{f}^j$ is a minimal threshold in dimension j, $I(f_i^j \leq \overline{f}^j)$ is an indicator function taking the value 1 when individual i is deprived (that is, when $f_i^j \leq \overline{f}^j$) and 0 otherwise, and w^j are weights chosen by the analyst. This measure of weighted deprivation counts can be interpreted as a measure of the severity of the multidimensional poverty of individual i (the inverse of her well-being). To identify the multidimensionally poor individuals, Alkire and Foster (2011a, 2011b) propose to compare c_i to some cut-off level k.

The example with the Alkire-Foster methodology illustrates that in most popular measures of multidimensional poverty or inequality, an explicit or implicit well-being measure is embedded. Indeed, whether they are stated explicitly or not, it is clear that the set of common weights plays a crucial role by determining the trade-offs between the different functionings. Often the weights are set to be equal for all dimensions, but there does not seem to be a convincing normative rationale for this practice (see Decancq and Lugo (2013) for a discussion of alternative weighting schemes).

A natural question at this point is whether it is really unavoidable to rely on a set of common weights selected by the analyst. Is it not possible to take the opinions of the concerned poor individuals into account when comparing their well-being and identifying the worst-off? As Ravallion (2011, p. 246) writes: "... those with a stake in the outcomes will almost certainly be in a better position to determine what weights to apply than the analyst calibrating a measure of poverty." This question is even more relevant within the capability approach with its strong emphasis on freedom and agency.

2.2 The valuation ordering

A natural starting point to explore this possibility is Sen's notion of a valuation ordering (Sen, 1985). Let us assume first that all individuals have a well-defined idea about what is important in their life and that they are able to formulate a well-considered judgment over their lives. This implies that they are able to decide whether one life (defined by a functionings vector f_i) is "better" than another life f_i^* or not. We introduce the valuation ordering R_i to capture this idea, with $f_i R_i f_i^*$ meaning that life f_i is "at least as good" as life f_i^* according to individual i. We write $f_i I_i f_i^*$ to denote that individual i considers both lives equally good.

If individual i can order all possible lives in terms of their "goodness", her val-

uation ordering can be represented by a valuation function $V_i(\cdot)$. This means that, whenever $f_i R_i f_i^*$, we have that $V_i(f_i) \geq V_i(f_i^*)$. Because different individuals may have different ideas about what is important in life, such a valuation function is individual-specific. We believe that the disagreement on what is important in life is apparent in everyday experience. Moreover, it is reflected in the stories poor people tell about their life in qualitative interview studies (Narayan 2000).

It is important to be precise about the interpretation of the valuation ordering. First, the valuation function is not a measure of subjective well-being. "Valuing a life is a reflective activity in a way that 'being happy' or 'desiring' need not be" (Sen, 1985, p. 29). We will return to this essential distinction below.

Second, the valuation ordering R_i reflects well-considered judgments about what is important in life. By now, there is ample evidence that these well-considered judgments do not always coincide with the preferences that are revealed in behavior (see, e.g., Della Vigna, 2009). People make mistakes, they are often poorly informed, they may make decisions under social pressure, they may be addicted, or they may make for some other reason behavioral choices that are not in line with their valuation ordering. Therefore, the term "preferences" should be used with some care when dealing with the valuation ordering over lives, and we will replace it here with the term "valuations".

Third, it is obvious that the assumption of the valuation ordering being complete is strong and probably unrealistic. As emphasized by Sen (1985), it is likely that the valuation relation is incomplete. An appealing approach should be able to take this incompleteness into account. The equivalent income measure that we advocate in this chapter can accommodate an incomplete valuation relation (see Fleurbaey and Schokkaert, 2013). However, for simplicity of the exposition we will assume throughout this chapter the existence of a complete valuation ordering R_i that can be represented by a valuation function $V_i(\cdot)$.

Fourth, the valuation ordering may be unstable over time. People may change their mind through new experiences or discussions with others. After deliberation and discussion, they may even agree on the importance of some aspects of life. Sen (2004) advocates the role of public deliberation to reach agreement on a common valuation ordering. Yet, it appears unlikely that, even after extensive deliberation and discussion in ideal circumstances, a complete consensus among all individuals will be reached.[4]

[4]Sunstein (2000) discusses a wide body of evidence that illustrates how public deliberation

Summarizing our argument, it seems difficult to reject the idea that individuals have at least some idea about what they consider to be important in life. Moreover, it is likely that they disagree on the relative importance of some functionings. Respecting their ideas about what is important in life, suggests then to use individual-specific weights.

2.3 Taking the diversity of values into account

Most operationalizations of the capability approach offer some scope for variation in the weights at some aggregate community level. This is the case for Sen's proposal to decide on the relevant functionings and their relative weighting through public deliberation, at the level of the village, the country, or the regional level where policy decisions must be made (Sen, 2004). It is even true for Nussbaum (2000) who proposes an *a priori* list of essential capabilities but leaves room for differences in the way these capabilities are operationalized in different cultural environments. Also Alkire and Foster (2011b, p. 311) emphasize that the weights should "be tailored to institutional, cultural and data-specific circumstances".

The fundamental question is why one would accept that cultural differences should be respected in a comparison between communities, while existing cultural or ethnic differences should be neglected within a community. Why give a lower weight to work status in a country where work status is *on average* considered to be less important as a component of the good life, while not respecting that for some individuals within a community work status is a less important component in *their own* view on the good life? Neglecting the individual valuations can have counter-intuitive distributive implications. Consider Figure 2.1, which shows the indifference curves implied by the implicit or explicit well-being measure chosen by the analyst or community by means of the solid lines.[5] The analyst (or community) considers that the individual in life A is better off than the individual in life B. Now suppose that both individuals disagree with the imposed well-being measure, and both agree on the weighting scheme embodied in the dashed indifference curves. Therefore they both agree that the individual in B is better off than the individual in A. It may then appear counter-intuitive

may even lead to polarization rather than agreement.

[5] As stressed above, these indifference curves should be interpreted with caution. The representation is similar to the one that is popular in consumption theory, but the underlying valuation ordering is that of the analyst and need not coincide with the valuation ordering or the revealed preferences of the individuals.

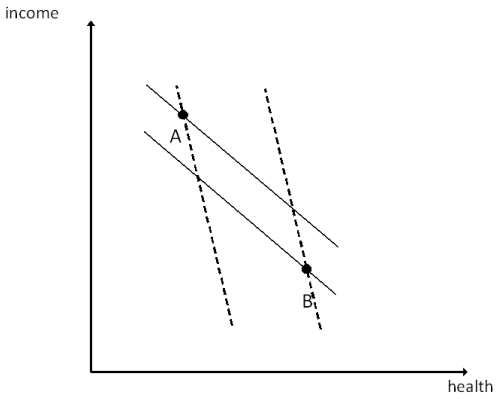
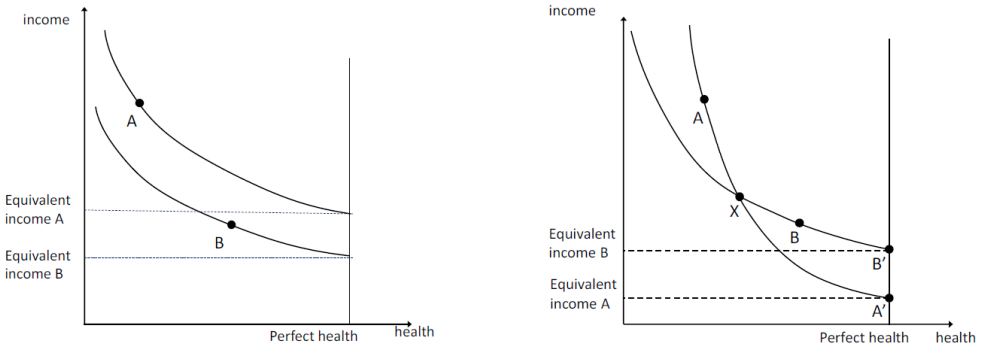


Figure 2.1: Consequences of using common weights

that the capability approach would advocate a redistribution of resources from the individual in life A to the one in life B.

There seem to be at least two reasons for the reluctance to accept individual-specific weights. The first expresses the concern that an approach based on the individual valuation ordering would drift in the direction of the traditional revealed preference approach that is most popular among economists or to the use of subjective utility as the criterion of individual well-being. When we make a concrete proposal for how to use individual valuations in the next section, we will be careful to explain the differences between our approach on one hand, and the revealed preference and subjective utility approaches on the other.

The second reason is more fundamental and goes back to Sen (1985) himself, who wrote: "If different people's valuations do differ, then we have a disagreement as to what the appropriate valuations are. (...) There is, in none of these cases, the possibility of using one valuation function for one person, another for the second, and then make inter-valuation-functional comparisons of the relative well-beings of the two persons" (Sen, 1985, pp. 57-58). The underlying idea is that it is not possible to "compare" the intensity with which lives f_i and f_j are valued by individuals i and j by simply comparing their individual-specific valuation functions $V_i(f_i)$ and $V_j(f_j)$. Fleurbaey and Blanchet (2013) discuss this issue in detail. They argue that for policy evaluation one cannot restrict oneself to considering only the vectors f_i. Two individuals in the same "objective" situation may have a different level of well-being, if they have different ideas about the good life. One should therefore construct an interpersonal well-



a. Identical values b. Different values

Figure 2.2: Equivalent income

being ordering of the combinations (f_i, R_i) in order to take into account the fit between situations of individuals and what they themselves consider to be important. This interpersonal ordering must be based on normative arguments, and an appealing option is to respect within this ordering the interpersonal variation in opinions on what one considers a good life. The equivalent income framework, which we will now introduce, does precisely that: it provides an interpersonal well-being ordering, while at the same time fully respecting the individual valuations.

2.4 The equivalent income measure

To introduce the equivalent income measure, it will be useful to split the functioning vector into its income and non-income component and to write $f_i = (y_i, x_i)$ where y_i denotes the income of individual i and x_i denotes a vector of all the non-income functionings. Recall that the valuation function $V_i(\cdot)$ is a representation of the individual valuation ordering R_i. At first sight, $V_i(\cdot)$ may look like a subjective well-being measure or standard utility function. This may create the impression that an approach which respects individual valuations boils down automatically to subjective welfarism. This is a mistake, however. We will illustrate the distinction between respecting individual valuations and using subjective well-being measures by means of Figure 2.2.

Consider first a situation in which two individuals have the same valuation

ordering over the two functionings income and health.[6] In the left-hand panel of Figure 2.2 both the individual in life A and the individual in life B agree that the life in A is better than the life in B. Respecting individual valuations then implies that life A is better than life B. Yet, this does *not* imply that the subjective well-being of the individual in A is always larger than that of the individual in B. It is possible that the individual in life A has high expectations and aspirations and therefore attaches low satisfaction scores to both situations, whereas the individual in B has low expectations and gives high satisfaction scores to both situations. In this case, it is possible that individual A scores her own life lower than individual B scores his own life. Respecting the individual valuations and using a subjective well-being measure may then contradict each other. In fact, these cases are not mere theoretical curiosa. The individual in life A may come from a wealthy family and may be used to a luxurious lifestyle. Alternatively, the individual in life B may just have a more positive and optimistic personality compared to the individual in A. This illustrates that the subjective well-being measure suffers from what Sen (1985, p. 21) has called "physical-condition neglect": "A person who is ill-fed, undernourished, unsheltered and ill can still be high up in the scale of happiness or desire-fulfillment if he or she has learned to have 'realistic' desires and to take pleasure in small mercies".

In the left-hand panel of Figure 2.2, we assumed that both individuals have the same valuation ordering. In this case it is straightforward to see what it means for a well-being measure to respect the individual valuations. The challenge is to formulate a measure of individual well-being that respects individual valuations in comparisons between individuals with different valuation orderings. Such a situation is represented in the right-hand panel of Figure 2.2. As mentioned at the end of section 2.3, in this case we are looking for an ordering of combinations (f_i, R_i) that has appealing normative properties. Here is one possibility.

Let us start with a comparison between some life situations in which the differences in valuation orderings do *not* matter for the measurement of well-being. One can argue that such a comparison occurs when both individuals are in the best possible situation on the non-income functioning, for instance when they both enjoy perfect health as the individuals in A' and B' in the right-hand panel of Figure 2.2. When both individuals are in perfect health, one can compare their well-being on the basis of their incomes irrespective of their valuation ordering, the argument goes. At any health level other than perfect health, a

[6] The reasoning can easily be extended to more than two dimensions.

similar argument would be much less appealing. To see this, consider a case where the two individuals are both in situation X, having precisely the same functionings. Despite the fact that they are in the same "objective" situation X, it can be argued that the individual with the "steeper" indifference curve is worse-off than the individual with the "flatter" indifference curve: she cares more about her health outcomes and, hence, suffers more from not reaching the situation of perfect health. This illustrates the importance of taking into account the fit between situations and valuation orderings.

Combining this insight with respect for individual valuations allows us to rank all possible situations. Call perfect health the "reference value" for the functioning health. We can easily introduce more non-income functionings into the analysis and define $\widetilde{x}$ as the vector of reference values for all these non-income functionings. We have argued that the well-being of individuals with non-income functionings equal to $\widetilde{x}$ can be evaluated on the basis of their incomes. Consider now the individuals in A and B. According to their own valuation ordering (which we want to respect) the individual in A is as equally well-off as in A' and the individual in B is as equally well-off as in B'. Given that we can evaluate the lives A' and B' on the basis of their incomes, we can also evaluate A and B on the basis of these incomes.

In short, we propose to measure well-being by looking at the hypothetical incomes that, if combined with the reference values for the non-income functionings, would put the individual in a situation that is as good as her actual situation according to her own individual valuation. These hypothetical incomes have been called "equivalent incomes" and their pedigree in welfare economics goes back to the late 1970s (see Fleurbaey 2009 and Fleurbaey and Blanchet 2013). More formally, we define the equivalent income measure y_i^* of individual i as

$$(y_i, x_i) I_i(y_i^*, \widetilde{x}). \tag{2.2}$$

It is clear that the equivalent income measure indeed respects individual valuations. At the same time it does not suffer from the problems discussed by Sen (1985). First, the equivalent income measure does not suffer from "physical-condition neglect". When there is a potential conflict between individual valuations and subjective well-being (as described on the basis of Figure 2.2a), equivalent incomes respect the (common) valuation ordering and "correct" for

differences in expectations and aspirations.

Second, the measure does not fall into the trap of "resource fetishism" either. Despite the fact that it is expressed in monetary terms (which has some practical advantages when it comes to measurement), it is an encompassing measure of well-being taking into account the well-being loss that follows from not achieving the reference values for the non-income functionings. This well-being loss is individual-specific as it does depend on the individual's own valuation ordering. To see this, return to the right-hand panel of Figure 2.2 and consider the situation of the two individuals in X. The equivalent income of the individual with the steeper indifference curve will be lower because she cares more about her loss in health. As will become clear in our empirical illustration, the ranking of individuals on the basis of equivalent incomes may be very different from a ranking on the basis of actual monetary incomes.

3 Implementing the equivalent income measure

In order to compute equivalent income measures with real world data, we need information on individual valuations, i.e., on the well-considered judgments by individuals concerning their lives. Economists often resort to revealed preference methods. Unfortunately, these methods are not useful for the many functionings that are not chosen by individuals, and even if they reflect choices, there is good reason to believe that choice behavior does not truly reflect what individuals consider as valuable. Alternatively, survey methods can be used to measure equivalent incomes directly, for instance by asking individuals how much income they are willing to give up to reach $\widetilde{x}$, the reference value for the non-income functionings. These questions may be cognitively challenging, however, and it is an open question as to how reliable empirical answers are.[7] It seems fair to say that, at this moment, there is no silver-bullet method to estimate individual valuations as needed to calculate equivalent incomes. This does not render the approach meaningless, however. It instead suggests that further research is needed.

Recently there have been some attempts to measure equivalent incomes starting from a standard happiness or life satisfaction regression (Decancq et al., 2015a; Decancq and Schokkaert, 2016; Decancq and Neumann, 2016). We follow the same approach here. Let us start by explaining the method and then later

[7] See Luchini et al. (2013) for an application to equivalent incomes in a health setting.

return to its core underlying assumption. Consider the following regression specification:[8]

$$s_i = \alpha + (\beta + \zeta \times d_i) \, ln\,(y_i) + (\gamma + \xi \times d_i)' \, x_i + \delta' z_i + u_i, \tag{3.1}$$

where s_i is a life satisfaction score derived from the answers to a survey question, z_i is a vector of individual characteristics, d_i is a vector of variables reflecting membership of socio-demographic groups, u_i is an error term and $(\alpha, \beta, \gamma, \delta, \zeta, \xi)$ are coefficients to be estimated.

The characteristics of an individual, such as the information on whether he or she lives in an urban region, may appear both in z_i and in d_i. Hence, such information may have a double effect on life satisfaction. First, personal characteristics may affect the shape of the valuation ordering: this effect is modeled in expression (3.1) by the interaction effects ζ and ξ. Note that our specification only allows us to model differences in valuations at the group level. We cannot identify heterogeneity in the valuations within these groups. Second, individual characteristics may influence aspirations and expectations, captured by the direct effect δ. Changing aspirations and expectations will affect life satisfaction, even when the vector of functionings f_i remains the same. The importance of distinguishing between these two effects becomes immediately clear when we calculate equivalent incomes y_i^* using expression (2.2) and expression (3.1). We start from

$$\begin{aligned} s_i &= \alpha + (\beta + \zeta \times d_i) \, ln\,(y_i) + (\gamma + \xi \times d_i)' \, x_i + \delta' z_i + u_i, \\ &= \alpha + (\beta + \zeta \times d_i) \, ln\,(y_i^*) + (\gamma + \xi \times d_i)' \, \widetilde{x} + \delta' z_i + u_i \end{aligned} \tag{3.2}$$

and after some reworking we obtain:

$$y_i^* = y_i \times \exp\left[\left(\frac{\gamma + \xi \times d_i}{\beta + \zeta \times d_i} \right)' (\widetilde{x} - x_i) \right]. \tag{3.3}$$

Expression (3.3) nicely illustrates the discussion presented earlier in Section 2.4. Aspirations and expectations ($\delta' z_i$) do not appear in (3.3). The same is true for the idiosyncratic disturbance term. One can say that the subjective well-being

[8] We present here the simple specification that will be used in the empirical illustration in the next section. It is obvious that other, more complicated, specifications are possible (see Decancq and Schokkaert, 2016 and Decancq and Neumann, 2016, for a non-linear specification, for instance).

is "cleaned" for these effects.[9] What does remain in the final expression are the differences in valuations that are linked to the socio-demographic variables in d_i. Indeed, the marginal rates of substitution between income and the other functionings are given by $y_i \times \left(\frac{\gamma+\xi\times d_i}{\beta+\zeta\times d_i}\right)$. As we will see in the empirical illustration, this will lead to considerable differences between subjective well-being on one hand and equivalent income on the other hand.

While this approach makes it possible to take into account the most important critiques against the use of subjective well-being measures, there is one crucial assumption that needs to be emphasized. We must assume that the marginal rates of substitution in eq. (3.3) indeed reflect the well-considered judgments of individuals about what a good life is. In formal terms this implies

$$f_i R_i f_i^{'} \Leftrightarrow S_i(f_i) \geq S_i(f_i^{'}),$$

where S_i is the individual-specific satisfaction function that each person i uses to map the functionings vector f_i on a particular satisfaction score s_i with $s_i = S_i(f_i)$. Formulated differently, it is assumed that the satisfaction function $S_i(\cdot)$ and the valuation function $V_i(\cdot)$ are ordinally equivalent. This is called the "consistency assumption" in Decancq et al. (2015a). It is unclear whether this assumption holds in the real world. It presupposes that individuals take a "cognitive" stance when they answer the life satisfaction question in the survey. The formulations that are most common in present empirical work are far from optimal in this respect (see Fleurbaey and Blanchet, 2013, for a detailed discussion). Therefore the empirical illustration presented in the next section must be seen as nothing more than an illustration.

4 Who are the worst-off in Colombia?

In this section we first discuss the implementation of five different well-being measures with real-world data from Colombia and then we investigate to what extent they identify different individuals as the worst-off. We use data from the Colombian Encuesta Nacional de Calidad de Vida (ECV) in 2008, which aims at tracking living conditions among the Colombian population. It is collected by the Statistical Agency of Colombia (DANE) and is nationally and regionally representative.

[9] A more primitive cleaning procedure has been proposed by Schokkaert (2007).

We will work with a subsample of 13,057 respondents for whom all the variables needed to compute the five well-being measures are available. In particular, the inclusion of the subjective well-being measure restricts the sample considerably since the relevant question is only asked to the single respondent in the household (the "household head"). Clearly, the restricted subsample is no longer representative (in fact, about 70% is male and the average age is 47 years), so none of our findings can be straightforwardly generalized to the overall Colombian population. However, the results empirically illustrate several interesting issues discussed in this chapter. We will zoom in on the comparison between rural and urban Colombia. About 60% of the (non-representative) subsample lives in an urban region. Summary statistics for the total sample and the rural and urban subsamples are given in Table 3 in the appendix. The final column presents a test of the significance of the rural-urban differences.

4.1 Implementing the well-being measures

We start by discussing the implementation of two standard well-being measures: income and subjective well-being. The dissatisfaction with both approaches formed an important impetus for the development of the capability approach (Sen, 1985). We present them here merely as benchmarks. Next, we discuss the implementation of three multidimensional approaches: the official SISBEN index, the CMPI, and equivalent incomes. These measures all aggregate different functionings, but they differ in the way they deal with individual valuations. Moreover, the three measures use a different unit of analysis: the SISBEN index and CMPI are defined at the level of the household, whereas equivalent income is an individual well-being measure.

4.1.1 Income

In collecting the ECV data, DANE asks household members of 18 years and older to be present at the moment of the survey. Therefore, in most cases each adult will be able to report his/her income.[10] We have summed all these income sources across all members of the household and then divided the sum by an equivalence scale to correct for differences in household composition (we use the square root of the household size as equivalence scale).

[10] This list contains wages in cash and in kind; subsidies for transportation, food, and family; different incentive payments: services, Christmas, vacation, bonus, etc ... ; pensions; profits; gains from selling properties; rents; and self-consumption.

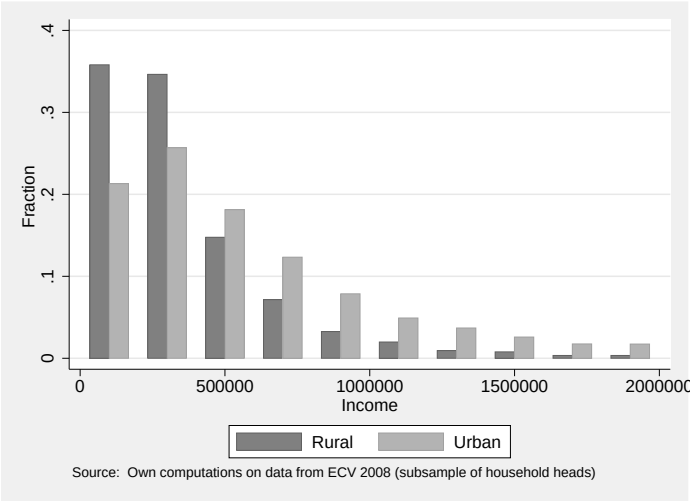


Figure 4.1: Income distribution

Figure 4.1 represents the income distribution for the rural and urban subsamples. All values are expressed in Colombian Peso (COP) (in 2008 about 1425 COP was equal to US$1). Looking at the figure, we see that the rural subsample is poorer than the urban subsample.

4.1.2 Subjective well-being

The ECV data set contains a standard life satisfaction question *"Considering all aspects, how satisfied or unsatisfied are you currently with your life?"* Respondents use a 0 to 10 scale to report their life satisfaction (with 10 being the highest level). The formulation of the question invites respondents to make a cognitive evaluation of their functionings. Yet, we do not know how respondents precisely interpreted the question and to what extent whimsical moods and feelings affected the answers. In other words, it is hard to judge how plausible the consistency assumption precisely is in this context.

Figure 4.2 shows the distribution of subjective well-being for the rural and urban subsample. The urban subsample reports higher satisfaction scores. It is unclear whether the Colombians value an urban life more than a rural life, or whether the urban subsample has a different composition in terms of valued functionings, or whether the urban life affects the expectations of the urban Colombians. We

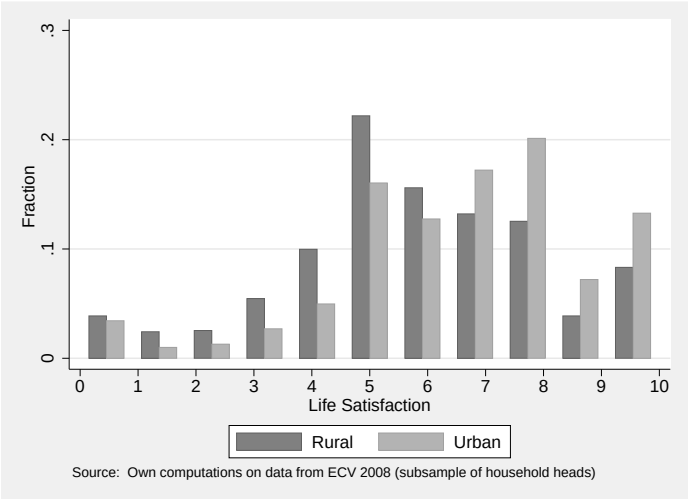


Figure 4.2: Subjective well-being

will be able to explain slightly more about this issue later.[11]

4.1.3 The SISBEN index

In the early 1990s, the SISBEN index was developed by the Colombian government as a tool to target social welfare spending. To identify beneficiaries of the different social welfare programs in a unified way, the government developed a novel proxy-means test, the SISBEN index, and carried out the so-called Census of the Poor. Based on the comprehensive information in this census each surveyed household was assigned a SISBEN index between 0 (poorest) and 100 (least poor). Eligibility rules for social welfare programs compare the index to specific thresholds (see Vélez et al. 1998).

Over the years, the SISBEN index has been twice revised and methodologically updated.[12] Thereby, its focus gradually shifted from a pure proxy-means test towards a standard of living index inspired by Sen's capability approach. Whereas the initial version of SISBEN only included information on demog-

[11] Table 3 in appendix hints at large compositional differences between the urban and rural subsamples.

[12] The precise formula of the currently used SISBEN 3 index is kept secret to avoid manipulation. Camancho and Conover (2011) use regression discontinuity techniques to document manipulation around the thresholds for the initial SISBEN 1 index. We thank the National Department of Planning of Colombia for providing us with the SISBEN 3 indices for the respondents of the ECV data set.

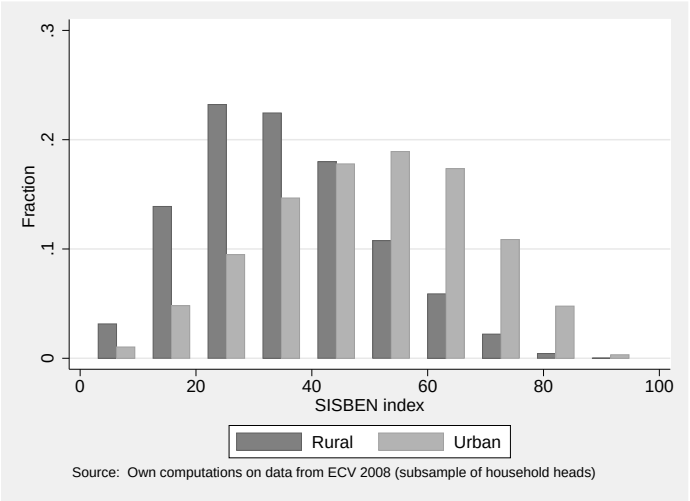


Figure 4.3: The SISBEN index

raphy, education, housing, and utilities, the third generation SISBEN indices include a broader set of functionings containing information on health, vulnerability, education, housing, and utilities. The SISBEN index is composed of 28 indicators and its weights are determined by a statistical algorithm based on the Fuzzy Set approach (Flórez et al. 2011). Figure 4.3 shows the distribution of the SISBEN index in our sample. Again we see that the rural subsample scores worse in comparison to the urban subsample.

4.1.4 The Colombian Multidimensional Poverty Index (CMPI)

The National Department of Planning, DNP, has developed a multidimensional poverty index based on the Alkire-Foster methodology. The measure is composed of 15 indicators in five dimensions (health, education, childhood and youth conditions, employment, and access to household utilities and living conditions). In a recent paper, Angulo et al. (2015) provide a detailed regional decomposition analysis of the index.[13] They have assigned equal weights to each of the five dimensions and to each of the indicators within each dimension.

Figure 4.4 shows the distribution of the weighted deprivation counts for the rural and urban subsample. To be precise, we show the distribution of $1 - c_i$, where

[13]We are grateful to Roberto Angulo and coauthors for sharing their Stata code with us. Relying on this code we have computed the CMPI for all individuals in our sample.

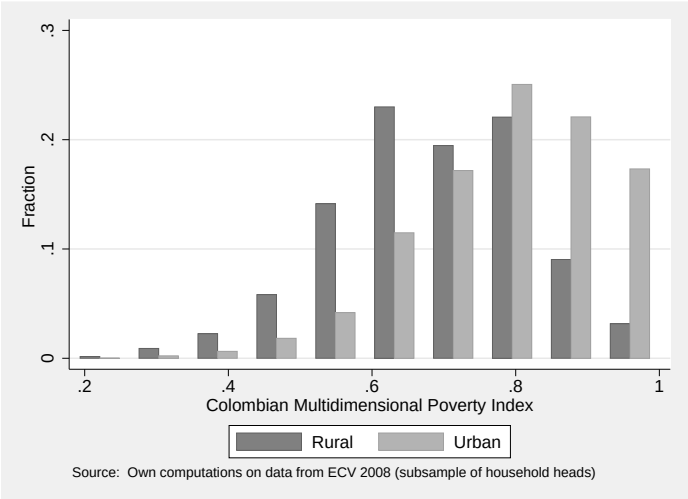


Figure 4.4: The CMPI

c_i is defined by expression (2.1). The resulting measure is a well-being index with larger values reflecting lower deprivation counts and lower multidimensional poverty. The urban subsample scores better on the CMPI.

4.1.5 The equivalent income measure

In Section 3 we discussed how to implement the equivalent income measure. We proceed in three steps: first we select and measure the functionings, then we estimate the valuations using a life satisfaction regression, and finally we compute the equivalent income measures using expression (3.3).

The first step is to select the relevant dimensions to be included in the vector of functionings f_i. Based on data availability we selected the following functionings: material living standards, health, education, housing, employment and security. *Material living standards* are measured by the income measure that was discussed in Section 4.1.1. *Health* is measured by self-assessed health. Even though this measure is vulnerable to scaling problems similar to those described in Section 2.4, self-assessed health is documented to be a good predictor of health outcomes.[14] The urban subsample reports a better self-assessed health compared to the rural subsample. *Education* is measured by a variable which

[14]There is extensive literature on this topic. See, e.g., DeSalvo (2005) for a recent meta-study.

takes 0 if the respondent has no education, 1 when the maximum outcome is primary education, 2 for secondary education and 3 for tertiary education. We estimate the value of *housing* by regressing the logarithm of imputed rent on a set of objective housing characteristics such as number of rooms and availability of utilities such as sewerage, and wall and floor materials. For each respondent we use the predicted value after correcting for regional price differences. Finally, we apply the square root of the household size to correct for family compositions (see Decancq et al. 2015a for a similar approach). *Unemployment* is measured by a binary variable indicating whether respondents are unemployed or not. Unemployment rates for household heads are generally low in Colombia, but are slightly higher for the urban subsample.[15] Finally, the functioning *security* is captured by a binary variable indicating whether the respondent is covered by health insurance or not. Health insurance coverage is slightly higher in the urban subsample.

The second step of our procedure is to run a life satisfaction regression using the life satisfaction variable described in Section 4.1.2 as the dependent variable. Since we focus on the comparison between the urban and rural subsample in this chapter, we allow for heterogeneity in the valuation between these two groups by including an interaction term between each of the functionings and a rural dummy variable. Admittedly, this interaction only captures a small part of the full heterogeneity of individual valuations. The vector of controls z_i contains age, age^2, gender, marital status, and regional fixed effects. The results of the regression based on our sample of household heads are given in Table 4 in the appendix.[16] All coefficients of the functionings stand to reason and are in line with findings from the literature.[17] We find mild heterogeneity in valuations with significant interaction terms for health and housing. Interestingly, the "direct" effect of the dummy variable urban is significantly negative. This means that after controlling for composition effects, the urban Colombians are no longer more satisfied with their lives than the Colombians living in rural regions, on the contrary. Our approach allows us to interpret the direct effect as resulting from

[15] The official unemployment rates for household heads in Colombia are 5.3%, 6.4% and 2.4% for the national, urban and rural areas respectively. The rural unemployment rate in our sample is close to the official rate, but the official urban unemployment rate is 2 pp higher than in our sample. For the whole population, unemployment rates are much larger (respectively 11.3%, 12.1% and 8.2%).

[16] The regression results are obtained by an ordered logit regression to take into account the ordinal nature of the life satisfaction scores. Results based on a standard OLS regression are qualitatively similar.

[17] See Krauss and Graham (2013) for a similar Colombian life satisfaction regression, yielding results that point in the same direction as ours.

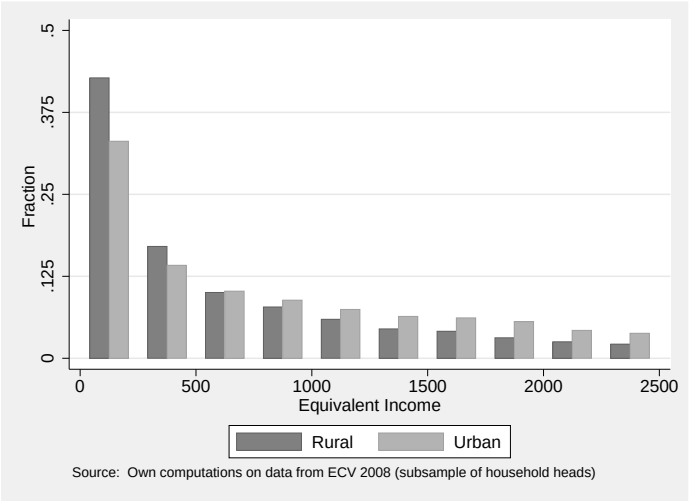


Figure 4.5: Equivalent income measures

changes in aspirations. After controlling for differences in preferences, urban Colombians have larger aspirations than rural Colombians. This result stands to reason.

Finally, we can compute the equivalent income measures using expression (2.2) and a certain choice for the reference values. These values are chosen to be the best possible value for each of the bounded functionings: health, education, unemployment and security. To avoid that the results are driven by outliers, we select the 90th percentile for housing. Figure 4.5 shows the distribution of equivalent incomes, zooming in on the lower tail of the distribution. Non-income dimensions have a large effect on well-being, leading to equivalent incomes that are very small for the worst-off in our sample.

4.2 Identifying the worst-off

In the previous section, we have discovered that the shape of the distributions of the different well-being measures is quite different. In this final section we focus on the more interesting issue of the consistency and overlap between the various well-being measures. Are the same individuals identified as the worst-off by the different measures? This question has clear policy relevance in a country such as Colombia that uses a multidimensional well-being measure to target its social welfare policies.

	income	SWB	SISBEN	CMPI
SWB	0.37			
SISBEN	0.49	0.30		
CMPI	0.53	0.32	0.63	
Equivalent income	0.78	0.44	0.65	0.68

Table 1: Pairwise rank correlation coefficients between the well-being measures

Table 1 shows that all pairwise Spearman rank correlation coefficients between the five well-being measures are positive (and significantly different from 0). We find the lowest correlation between subjective well-being (SWB) and the other measures and the highest correlation between the equivalent income measure and monetary income. High correlations are found between the multidimensional measures SISBEN, CMPI and equivalent income. It is notable that the equivalent income measure shows its lowest correlation with subjective well-being, which empirically illustrates the distinction between respecting individual valuations and using a subjective well-being measure.

Next we zoom in on the lower part of the distribution and compare the extent of consistency between the measures when identifying the worst-off. For each measure we identify the bottom 10% as the worst-off individuals.[18] The left-hand panel of Figure 4.6 presents the overlap between the groups of worst-off individuals as identified by the three multidimensional well-being measures and the right-hand panel shows the overlap between the worst-off according to the income, subjective well-being and equivalent income measures. The latter panel confirms the message of Table 1: the set of individuals with the lowest level of subjective well-being hardly overlaps with the worst-off according to income or equivalent income. There is more overlap between the latter two, but the identification of the worst-off still leads to very different results here. The left-hand panel compares the results for the three measures, which may be seen as operationalisations of the capability approach. Remarkably, we see that only 2.1% of the sample is identified as worst-off according to all three well-being measures. The equivalent income measure identifies 5.0% of the individuals as worst-off who do not belong to this group according to the official SISBEN index and the CMPI. It seems that the well-being measures are telling a very different story when it comes to identifying the worst-off. The choice of weights does matter.

[18]Since the subjective well-being and CMPI scores are discrete in nature, we randomly selected individuals from the group with the lowest score until we reach precisely 10%.

	all	income	satisfaction	SISBEN	CMPI	equivalent income
income	650,000	47,000	274,000	256,000	255,000	110,000
health	2.69	2.34	2.38	2.50	2.41	1.98
education	1.42	0.92	1.05	0.84	0.58	0.68
house	51,000	35,000	34,000	24,000	24,000	21,000
unemployment	0.03	0.09	0.06	0.05	0.04	0.11
security	0.88	0.84	0.84	0.82	0.68	0.79
age	47.34	51.19	47.40	46.69	49.90	50.80
male	0.69	0.56	0.67	0.64	0.69	0.69
widowed	0.09	0.14	0.09	0.11	0.12	0.11
divorced	0.13	0.17	0.17	0.16	0.13	0.12
single	0.11	0.14	0.12	0.09	0.07	0.09
literate	0.90	0.78	0.81	0.74	0.56	0.68
urban	0.59	0.44	0.47	0.33	0.30	0.32

Source: Own computations on data from ECV 2008 (subsample of household heads)

Table 2: Portrait of the worst-off

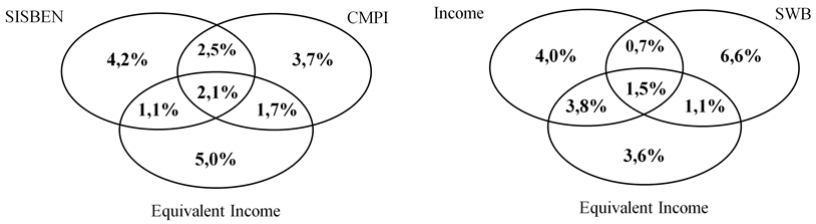


Figure 4.6: Overlap between the individuals identified as worst-off

To explore this, we show in Table 2 the characteristics of the individuals who are identified as worst-off according to the different well-being measures. Columns 3-7 show the mean of some socio-demographic variables for the group of worst-off identified by a particular well-being measure. To help interpret the results, the second column presents the characteristics of the overall sample. We see that the equivalent income measure identifies poorer individuals, who are in worst health, live in a house of lower value and have a larger chance of being unemployed. The CMPI, on the other hand, more readily selects lower-educated individuals without health insurance coverage as the worst-off. Remarkably, the official SISBEN index identifies individuals who score relatively better on all considered functionings, except unemployment, compared to the other two multidimensional measures. Individuals that score low for subjective well-being have a larger income, a better health state, a better house, more income security, a lower level of unemployment and a higher level of education than those with a low equivalent income. This again confirms that using individual valuations to weigh the different dimensions does not lead us in the direction of subjective well-being.

5 Conclusion

The computation of multidimensional measures of well-being or poverty, which is essential if we want to implement the capability approach, requires making an important decision on the weights attached to the different relevant dimensions (be it functionings, refined functionings, or capabilities). In the literature we find a variety of proposals on how to implement this: some have used equal weights, others have used weights obtained by statistical methods (such as fuzzy set or principal component analysis), while still others prefer a sensitivity analysis on different sets of weights chosen by the analyst. Such a sensitivity analysis can be

part of a process of deliberation by the people involved or the political decision makers. There is no guarantee that this process leads to the best outcomes, however. Striving for a consensus set of weights can be harsh for minority groups with dissenting values.

It is striking that there have been so few attempts to explicitly take the individual valuations of the people themselves into account. Of course, individual valuations must be viewed as well-informed and well-considered judgments of what is important in life, and these must be carefully distinguished from revealed preferences. Moreover, the individual valuation of a life does not necessarily coincide with the level of happiness or subjective well-being experienced in that life. However, with these caveats firmly in mind, it seems natural to take into account the individual valuations in an approach which emphasizes the importance of freedom and agency. In this chapter we have proposed a measure of individual well-being, the equivalent income, which does take into account individual valuations without falling into either of these traps.

In our empirical illustration for Colombia, we compare the results of the equivalent income measure with two other multidimensional indices commonly used in Colombia, the SISBEN index and the CMPI, and also with income poverty and subjective well-being as benchmarks. The choice of measure has important consequences for the identification of the worst-off. We are aware that our operationalisation of equivalent incomes on the basis of a life satisfaction equation is open to critique. In fact, it was not our intention in this chapter to argue that this is necessarily the best way of operationalising the capability approach. What we wished to stress is the need for an open and transparent discussion on the methodology that should be followed to set the weights in measures of well-being or poverty. Selecting weights is unavoidable. When they are not made explicit, there is the danger that the implicitly used weighting system remains intransparent. When selecting the weights, the following ultimate question comes to the fore: is it desirable to neglect individual ideas about what constitutes a good life in an approach that is inspired by a concern for human flourishing and freedom?

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Appendix

Variables	All	Rural	Urban	Rural-Urban
life satisfaction	6.314	5.791	6.674	-0.882***
income	650,000	390,000	830,000	-440,000***
health	2.687	2.600	2.746	-0.147***
education	1.423	1.014	1.704	-0.689***
house	51,000	31,000	64,000	-33,000***
unemployment	0.03	0.02	0.04	-0.01***
security	0.88	0.86	0.90	-0.04***
age	47.34	47.76	47.05	0.710***
male	0.69	0.79	0.63	0.16***
widowed	0.09	0.08	0.09	-0.01***
divorced	0.13	0.10	0.16	-0.06***
single	0.11	0.08	0.13	-0.06***
literate	0.90	0.84	0.94	-0.11***
urban	0.59	0	1	

Table 3: Summary statistics

	satisfaction	
income (in logarithm)	0.276***	(0.0257)
health [1,4]	0.326***	(0.0385)
education [0,3]	0.126***	(0.0371)
house (in logarithm)	0.642***	(0.0518)
unemployment (binary)	-0.309+	(0.162)
security (binary)	0.145*	(0.0706)
income × urban	0.0219	(0.0336)
health × urban	0.125*	(0.0490)
education × urban	-0.0537	(0.0447)
house × urban	0.127+	(0.0671)
unemployment × urban	-0.204	(0.197)
security × urban	0.0772	(0.0973)
age	0.00154	(0.00582)
age squared	-0.00000891	(0.0000570)
male	-0.0352	(0.0441)
widowed	-0.0824	(0.0675)
divorced	-0.387***	(0.0544)
single	-0.318***	(0.0560)
urban	-1.941**	(0.685)
Atlantica	0.0692	(0.0714)
Oriental	-0.132+	(0.0696)
Central	0.282***	(0.0692)
Pacifica	-0.220**	(0.0689)
Sanandres	-0.207+	(0.107)
Orinoquia and Amazonica	0.160+	(0.0921)
Antioquia	0.291***	(0.0710)
Valle	-0.0578	(0.0696)
N	13057	
pseudo R^2	0.053	
Log lik.	-26687.7	

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Life satisfaction regression