Inequality, income, and well-being*

Koen Decancq† Marc Fleurbaey‡ Erik Schokkaert§

October 2013

Contents

*We are grateful to the editors and John Roemer, Tim Smeeding, Tom Trimpeneers, Aki Tsuchiya, Gerlinde Verbist, and Frederic Vermeulen for helpful comments and suggestions on an earlier version.

†Centre for Social Policy Herman Deleeck (University Antwerp), Department of Economics (Katholieke Universiteit Leuven), and CORE (Université catholique de Louvain). Email: koen.decancq@uantwerp.be.

‡Princeton University. Email: mfleurba@princeton.edu.

§Department of Economics (Katholieke Universiteit Leuven) and CORE (Université catholique de Louvain). Email: erik.schokkaert@econ.kuleuven.be.

1 Introduction

The economic literature on inequality has traditionally focused on income inequality. One reason to be interested in income inequality is that it may be linked to potential economic growth, to aggregate consumption, and to the occurrence and size of cyclical movements (see Chapter 15 in this Handbook). From this perspective, income (in)equality is instrumental to reach other social objectives. A second reason is a normative one, considering the distribution to be a matter of social concern in itself, independently of its effects on other variables. In this chapter, we focus on the latter reason, leaving the instrumental concerns aside.

One normative reason to be concerned with income distribution is that we are ultimately interested in the distribution of well-being, and that we consider income as a proxy for well-being. A related argument emphasizes the right of everyone to have access to a minimum level of resources, income then being an indicator of these resources. These two approaches are closely related if we define well-being directly in terms of resources, but they may differ if one adopts alternative definitions of well-being, for instance in terms of functionings or capabilities or in terms of subjective satisfaction with life. A third normative reason why people are interested in income distribution has to do with the fairness of the process through which income is acquired. There are strong convictions in society that individuals should be paid in a fair way and that effort should be somehow rewarded. There is more discussion about the ethical desirability of remunerating productivity differences stemming from differences in innate talent or in socio-economic

background. These considerations are linked to the debate about the content of "desert" and "merit" and their relevance for evaluating the income distribution. At first sight, such a focus on the process of income formation is very different from a concern for the final distribution of well-being. Yet, while the latter is the connecting thread of the chapter, fairness judgments will play an important role at some points in our discussion.

It is not obvious that income is indeed an adequate proxy for well-being. It is well accepted that the same monetary amount may yield a different level of well-being for individuals with different needs. Moreover, individuals do not care only about their income. A consensus seems to be emerging that information on other dimensions of life (such as health, job quality, the natural and social environment in which people are living) should be integrated in a richer view of well-being (see Stiglitz et al. 2009, and the references therein). This broadening of the perspective on well-being has led to a growing aversion against the use of (even a "corrected" or "extended") income metric to measure well-being on the ground that this would reflect a kind of "resource fetishism". Yet, from an applied viewpoint, monetary measures have the obvious advantage that they yield an operational and cardinal measure.

This brings us to the main question for this chapter: is it possible to formulate an ethically attractive notion of individual well-being that is richer than monetary income and that is still sufficiently operational to be used in applied welfare analysis?[1]

[1]In a macro setting, the criticism of "income fetishism" is voiced even more loudly against the use of GDP (growth) as an indicator of welfare. We do not go into the debate on sustainability or on the different ways of "correcting" GDP to include distributional issues. A critical discussion of different

The concept of individual "well-being" can be approached from many different perspectives. One could, e.g., take a psychological perspective and investigate what is the best measure of well-being for describing and explaining the emotion of "feeling well" (Kahneman and Krueger 2006). However, according to the welfare economic perspective taken in this chapter, the choice of an adequate measure of individual well-being is not a psychological, but a normative question. An adequate measure of well-being makes interpersonal comparisons such that redistribution from a better off individual to a worse off individual yields a better state of affairs as seen from the social welfare point of view.[2] In other words, an adequate measure of well-being serves as equalisandum for an egalitarian policy.

The choice of a particular metric of well-being is inevitably a matter of value judgments. Selecting income as the measure of well-being, or deciding to go beyond the income dimension is a normative choice. Indeed, the argument that we should include other dimensions than income because people care about these other dimensions, for instance, is only valid if we accept the normative position that society should care about what people care about.

approaches can be found in Fleurbaey and Blanchet (2013). In this chapter we focus on the derivation of a measure of well-being at the individual level. However, in Section 5 we will discuss some of the implications of our discussion for international welfare comparisons.

[2] When we talk about redistribution here, we refer to redistribution of well-being. This is not necessarily restricted to income redistribution, but may also take place through spending more or less on health care or education for specific groups in the population.

Since defining an adequate concept of well-being is a normative choice, it is no surprise that opinions differ about what is the best measure of well-being. As soon as one moves beyond the single income dimension to describe well-being, at least two sets of issues come to the fore. First, what additional dimensions should be included? Or, more fundamentally, what justification can or should be given for this choice of dimensions? Second, should these different dimensions be seen as incommensurable or is it possible to aggregate them into one measure of individual well-being? If one takes the former position and sticks to a vector representation of well-being, how should one handle interpersonal comparisons involving a trade-off between the different variables? If one takes the latter position, what should be the normative logic underlying the aggregation across dimensions?

In this chapter, we will describe the answers proposed by different approaches to these two sets of questions and we will discuss their normative implications. In particular, we will look at the different approaches from two specific perspectives. First, we focus on the extent to which the proposed measure of individual well-being respects individual preferences. The principle of individual sovereignty has always been one of the main tenets of economics and remains a hotly debated issue (see, amongst others, Hausman and McPherson 2009). One of the difficulties in the debate is that different interpretations have been given to the concept of preferences. In this chapter, we will interpret preferences as reflecting people's well-informed and well-considered ideas about what is a good life. The recent literature has documented many behavioral anomalies and has convincingly shown

that these well-informed preferences are not always revealed in actual choice behavior (see Della Vigna 2009, for an overview). Preferences as the representation of a life project therefore do not coincide with the traditional economic concept of revealed preferences. We will come back to these distinctions later on.

Second, we will focus on the implications of selecting a specific measure of well-being for the delineation of the domain of personal responsibility. If we start from the idea that a redistribution from someone with a higher level of well-being to someone with a lower level of well-being is an improvement from the social point of view, this implies (even when this is not made explicit) that the person at the lower level of well-being is not held responsible for this lower level of well-being. This responsibility perspective helps to interpret some of the normative differences between the various approaches. As responsibility and freedom are closely related concepts, a focus on responsibility will also allow us to comment on the different interpretations of freedom embedded in the different approaches.

The chapter is structured as follows. Section 2 gives a brief historical sketch of the development of the literature. Section 3 is the core of the chapter. It contains a critical discussion of the three prominent proposals for a measure of well-being capturing non-income dimensions: the capabilities approach, the subjective well-being approach, and the equivalent income approach. In Section 4 we consider the literature on multidimensional inequality measurement and on multidimensional stochastic dominance, which has taken up a direct concern for the distribution in multiple dimensions without introduc-

ing explicitly a measure of individual well-being. We refer to Chapter 4 in this volume for more details on the different indices that have been proposed, and we focus on their theoretical foundations in the light of our normative criteria. In Section 5, we apply the general insights from Sections 3 and 4 to a series of issues that have played a prominent role in the applied literature: the use of equivalence scales to deal with heterogeneous households, the inclusion of the value of public and non-marketed goods and services in the measurement of inequality, and the measurement of inequalities at the world level. This last point will also give us the opportunity to link the discussion on the limitations of GDP as a measure of aggregate social welfare to the normative issues discussed in the previous sections.

Before starting, we make two remarks. First, this chapter is about evaluating states of affairs. For such a broad evaluation, the income distribution is not sufficient, it is necessary to work with a broader concept of well-being. This does not mean that it would not be relevant to argue in favor of a *re*distribution of income. In fact, as soon as we define well-being to include personalized and non-transferable characteristics (such as health), a direct redistribution of well-being is not feasible. If income has a positive effect on well-being, a redistribution of income can be an effective instrument to realize a more equal distribution of well-being. Yet, this will not necessarily be a redistribution from the (income-)rich to the (income-)poor, since the income-rich can be at a lower level of well-being than the income-poor. This is precisely where different approaches to well-being will make a difference.

Second, we will focus on inequality rather than on poverty. The two concepts are complementary, but may still involve different ethical intuitions, especially if one accepts that poverty has an absolute component. It is probably not a coincidence that the concept of multidimensional deprivation has traditionally played a more important role in poverty than in inequality research. Poverty researchers are generally more sympathetic towards rights-based approaches. They are also less inclined to accept the idea that different life dimensions can be traded off. We will discuss these issues where needed.

2 A brief historical sketch

As we defined the quest for a measure of well-being ultimately as a quest for an attractive equalisandum for egalitarian policy, our discussion is related to the large welfare economic literature on consequentialist versus non-consequentialist approaches and within the consequentialist approach on welfarist versus non-welfarist criteria. While this literature is rich and inspiring, it is also plagued by some terminological confusion. This problem is, e.g., very acute for the (for our purposes essential) notion of "welfarism". We will therefore briefly situate our topic against the background of the debate around Arrow's (1951) impossibility theorem. We will do so in an informal way without going into technical details.[3]

As a matter of fact, the initially dominant interpretation of Arrow's theorem was that

[3]Pattanaik and Xu (2012) offer a conceptual framework to structure the various approaches. See also Fleurbaey (2003) for a more formal treatment.

it was impossible to define a non-dictatorial social ordering of social states, satisfying the Pareto principle of respect for individual preferences. It was soon realized, however, that the independence condition, which was necessary to arrive at the impossibility result, was a strong one. It basically stated that the social ranking of any pair of two alternatives should depend only on the ordinal non-comparable individual preferences over these two alternatives. The so-called "informational approach" to social choice (Sen 1970; d'Aspremont and Gevers 1977)[4] showed that the impossibility is lifted as soon as one accepts that it is meaningful to represent individual preferences with an interpersonally comparable utility function. Depending on the specific informational assumptions made, a whole range of social orderings can then be defined, ranging from the utilitarian sum of utilities to the leximin ordering giving priority to the worst off. The lesson seemed to be that the only way to escape from Arrow's impossibility was to work with such an interpersonally comparable notion of utility, i.e., to go beyond ordinal noncomparable individual preferences.

Amartya Sen, who was one of the main contributors to this literature, later became one of the main critics of what he coined as welfarism, i.e., the approach in which the social evaluation is based solely on individual but interpersonally comparable levels of subjective well-being (see, e.g., Sen and Williams 1982). Important social philosophers had already rejected the welfarist approach. Rawls (1971, 1982) stated that individuals have life projects and that these life projects should be respected, but that it does not

[4]See d'Aspremont and Gevers (2002) for a survey.

make sense to reduce them to the objective of reaching the maximum level of welfare. What matters to individuals is the content of their project, not the satisfaction following from its realization. These projects are incommensurable. Dworkin (1981a) emphasized the problem of expensive tastes: according to him, someone with expensive tastes (e.g. for "prephylloxera claret and plover's eggs", as in Arrow's (1973) famous example), cannot claim that he should be compensated for his ambitions at the expense of those with more modest tastes. Sen (1985) reformulated similar arguments in an elegant way by pointing out that subjective welfarism suffered from two problems. The first he calls "physical-condition neglect": utility is only grounded on the mental attitude of the person, and does not sufficiently take into account the real physical conditions of the person. This has two aspects. One is the issue of expensive tastes, the other is that persons may adapt to their objective circumstances or realistic expectations: "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" (Sen 1985, p. 21). The second problem is "valuation neglect". Valuing a life is a reflective activity in a way that 'being happy' or 'desiring' need not be (Sen 1985, p. 29). An acceptable approach to well-being should explicitly take into account this valuational activity by the persons themselves.

In a long series of books and papers, Sen proposed his own concept of well-being in terms of functionings, and of "advantage" in terms of capabilities. This approach is the first notion of well-being that we discuss in more detail in Section 3. It is definitely non-

welfarist in Sen's own original meaning of the word, as it does not interpret well-being in terms of subjective welfare. It is even explicitly formulated as an alternative to subjective welfare. Yet, it does evaluate social states in terms of the individual achievements (the individual advantage levels) in these social states. It is therefore consequentialist and individualist. And here the terminological confusion starts. Some authors (e.g. Pattanaik and Xu 2012) claim that it is natural to use the term welfarist also for such approaches that are centered on personal well-being, even if they use a well-being concept that is *not* subjective utility. While we prefer the original (narrower) use of the term by Sen, we will try to avoid confusion by adding the word "subjective" each time we use the notion of welfarism in this original meaning.

At a time when the criticism on subjective welfarism was winning ground among welfare economists, there was a surprising and spectacular growth of the interest in the measurement of happiness in other domains of economics. Advances in survey research suggested more and more convincingly that happiness and/or life satisfaction could be measured and that interpersonal comparisons of these measured concepts yielded meaningful results. A rapidly growing stream of empirical papers showed that life satisfaction is not exclusively determined by income but is strongly influenced by non-monetary dimensions of life (such as health, social interactions and job market status). The econometric results were reasonably robust. While a large part of this literature is meant to be only explanatory, the implicit suggestion that what contributes to happiness must *per se* be good is very strong. Moreover, some authors (Kahneman et al. 1997; 2004; Frey and

Stutzer 2002; Layard 2005) have been explicit about the normative implications of their empirical work: now that we know how to measure utility, why not go back to Bentham? This position reflects a remarkable revival of subjective welfarism, and it is striking that the happiness literature has largely disregarded the arguments against subjective welfarism of the philosophical and welfare economic literature. The life satisfaction approach is the second notion of well-being that will be discussed in Section 3.

The third notion of well-being that we will explore in detail is that of "equivalent income" or money-metric utility. It also has a somewhat surprising history. Money-metric utility was introduced as a representation of preferences by Samuelson (1974) and Samuelson and Swamy (1974) and had some impact on the applied welfare economic literature during the eighties (see Deaton and Muellbauer 1980 and King 1983, for instance). It lost popularity, however, as authors argued that it relied on an arbitrary choice of reference values and could have non-egalitarian implications (Blackorby and Donaldson 1988). While it slowly disappeared from the applied welfare economic literature, it was (more or less independently) developed within the social choice literature in what is called the theory of fair allocation. This theory looked for a social ordering that was based only on non-comparable ordinal preferences, i.e., non-comparable life projects. At first sight, this attempt may look hopeless, since it should run against Arrow's impossibility result. However, closer investigation shows that Arrow's independence axiom can be decomposed in two components (Roemer 1996; Fleurbaey and Mongin 2005): the first is "ordinal non-comparability", stating that the only information that can be used is information about

individual ordinal preferences; the second is "binary independence", requiring that the ranking of two alternatives should depend only on the individual evaluation of these two alternatives (see Fleurbaey and Blanchet 2013, p. 139). The welfarist approach relaxes the first component, the fair allocation approach the second. Going beyond binary independence makes it possible to use information about the indifference curves for the two alternatives. Moreover, it turns out that the theory of fair allocation has a (more or less convincing) reply to the criticism that had been raised against the use of money-metric utilities. We summarize this debate in Section 3.

Note that the equivalent income is yet another concept of individual well-being that does not coincide with subjective welfare, but is based on individual preferences. Again, some authors claim that "respecting individual preferences" boils down to welfarism. This is then a third possible interpretation of the term (the first relating to the use of comparable subjective utility levels, the second to any measure of personal well-being). As mentioned already, we will not follow this line of thinking and we will reserve the use of the term subjective (non)welfarism to its original meaning.

While the three approaches that we sketched until now can be related more or less explicitly to the welfare economic literature on the measurement of well-being, this is much less the case for another strand of economic research that aimed at broadening the concern for income inequality to include other dimensions. This literature deliberately remains agnostic about the formulation of an individual measure of well-being and focuses directly on Pigou-Dalton axioms in a multidimensional space. We will discuss the relationship

between this approach and the welfare economic literature in Section 4.

3 Inequality of what?

We first discuss the approach that defines well-being in terms of functionings and capabilities, then consider the normative interpretation of happiness and life satisfaction data and, finally, turn to the equivalent income approach. In each case we investigate whether the well-being concept respects individual preferences and what the underlying (implicit or explicit) delineation of individual responsibility is.

It is useful to introduce some notation. Let ℓ_i denote the vector of m aspects of life that may matter to individual i. Examples are consumption or income, health, longevity, leisure, status, and job characteristics. One of the variables in ℓ_i is income (or consumption) y_i. Individuals have a life project, i.e., an informed judgment about what makes a life good or bad. We represent this life project for each individual i by a preference ordering R_i over the vectors ℓ_i: $\ell_i R_i \ell_i'$ if i weakly prefers the life described by ℓ_i to the life described by ℓ_i'. Let $\ell_i P_i \ell_i'$ denote strict preference and $\ell_i I_i \ell_i'$ denote indifference. These well-informed preferences are individual-specific. We do not assume that these preferences are always revealed in actual choices. Subjective individual satisfaction is given by a "satisfaction function" $S_i(\ell_i)$.[5]

[5] We do not use the term "utility function" here, because this refers to *any* representation of the ordinal preference ordering. The "satisfaction function" is one choice out of all the possible utility functions. As we will see, the equivalent income function is another.

We assume that, from a normative point of view, individual i's situation is completely described by the triplet (ℓ_i, R_i, S_i), that consists of the vector of life dimensions ℓ_i, the preference ordering R_i and the satisfaction function S_i. This means that personal characteristics (e.g., cognitive capacities) are only relevant in so far as they influence preferences or satisfaction, or if they are part of the vector of relevant life dimensions for individual i. A method of interpersonal well-being comparisons must be able to rank such triplets (ℓ_i, R_i, S_i). Since ℓ_i by definition describes all the aspects of life that matter to individual i, measuring i's well-being involves constructing an interpersonally comparable index in which the various elements of ℓ_i are weighted. Different well-being concepts are represented by a well-being measure WB. The value $WB(\ell_i, R_i, S_i)$ is to be interpreted as the well-being of individual i with life ℓ_i, preference ordering R_i, and satisfaction function S_i.

3.1 Functionings and capabilities

The origins of the capability approach within welfare economics are to be found in a series of influential papers and monographs, written by Amartya Sen in the eighties of the previous century (Sen 1980, 1985; Sen et al. 1987). He developed and discussed the approach further in some widely read books (Sen 1992, 1999, 2009; Nussbaum and Sen 1993). On the philosophical side, important contributions have been made by Nussbaum (2000, 2006, 2011). Both authors, and the many papers following in their wake, are explicit about the normative purpose of the approach. Their aim is to define individual well-being such that it can be used in a meaningful way as the equalisandum for an

egalitarian policy. The important question is: "Equality of what?" (Sen 1980).

Sen's own answer to this question starts from the rejection of two extreme alternative approaches. We have seen in the previous section that Sen considers subjective welfarism unacceptable because of the problems of "physical condition-neglect" and "valuation neglect". But focusing exclusively on income or on material resources would not do justice to the heterogeneity among human beings, he argues. What does matter to define well-being is the vector of functionings of a person, i.e., his achievements: what this person manages to do or to be (such as being well-nourished, well-clothed, mobile, being able to appear in public without shame).

These functionings have to be distinguished from the resources or commodities which are used to achieve them. Personal and environmental characteristics, to a large extent, determine what people can achieve with a given amount of resources. How well-nourished a person is does not only depend on the amount of food that he eats, but also on the biological characteristics of his body and the work he does; books do not contribute to the personal development of persons who were never taught to read; whether a person is mobile does not only depend on whether he owns a bicycle, but also on the availability of safe road infrastructure, and so on. The well-being of person i can be seen as the person-specific valuation of the vector of functionings ℓ_i:

$$WB^F(\ell_i, R_i, S_i) = v_i(\ell_i), \tag{1}$$

where the superscript F refers to the functionings approach. The crucial question is of course how to interpret the valuation function v_i. We return to this question later in this

section.

In a further step, Sen claims that a description of well-being in terms of achieved functionings is not sufficient, because it does not integrate the essential notion of freedom. His classical example involves the comparison between two individuals who are both undernourished. For the first person, the undernourishment is the result of material deprivation. The second person, on the contrary, is wealthy but freely chooses to fast for religious reasons. While their achievements in terms of the "being well-nourished" functioning are exactly identical, it is intuitive to say that their situations are not the same in terms of well-being. Therefore Sen introduces the notion of "capabilities" to capture the real opportunities of persons. The capabilities of person i are given by the set of functionings vectors that are accessible to the person, i.e., the set from which he can choose. Loosely formalized, we can represent the set as $Q_i = \{\ell_i \mid \ell_i \text{ is feasible for individual } i\}$. The "advantage" of person i is then the evaluation of his capability set Q_i.

We will now first discuss the implications of moving from functionings to capabilities, i.e., from achievements to opportunities.[6] This will allow us to discuss the interpretation of freedom and responsibility within the capability approach. We then move to the issues of choosing the relevant dimensions to be included in the vector ℓ_i, and whether and how to aggregate them in a single well-being indicator. This will clarify the position

[6] There is some terminological confusion in the literature. While the distinction between "functionings" and "capabilities" is clear in Sen's approach, other authors have later used the term "(basic) capabilities" to refer to functionings. In this chapter we aim to remain as close as possible to the original meaning of the terms.

of the capability approach with respect to the other normative criterion, i.e., respecting individual preferences.

3.1.1 Capabilities, responsibility and freedom

Capabilities, defined as the opportunity set from which people can choose, are a reflection of the real (positive) freedom of individuals and are definitely not restricted to the securing of negative freedoms alone. People should not only have the legal right to provide themselves with food, they should also have the economic possibilities to do so. Equalizing capabilities also goes beyond eliminating discrimination, although the latter is an important element of it. This integration of positive freedom issues in the measurement of well-being is an attractive idea. However, it also raises some difficult questions.

A first issue was raised by Basu (1987) in his review of Sen (1985), and was taken up again in Basu and Lopez-Calva (2011). It can best be illustrated in the usual Edgeworth-box of a two-person two-good exchange economy (see Figure 1). This figure depicts a general equilibrium situation (point e), in which relative prices are given by the slope of the line AB and the initial endowments of persons 1 and 2 are given by point a. In this setting it might seem straightforward to say that individuals choose within their budget sets, i.e., the areas O_1CAB for person 1 and O_2DBA for person 2. But the figure immediately shows that their freedom to choose within the budget set is illusory: what is open to one person depends on what the other person chooses. If person 2 sticks to the bundle he has in e, it is impossible for person 1 to pick bundle b. In fact, in that case

he can only choose bundles from the rectangle O_1FeG. In general terms, changes in the choices by one person (induced by changes in preferences, for instance) will change relative prices and therefore the opportunity set of the other person. While Figure 1 represents the very peculiar case of a two-person two-good exchange economy, the point made by Basu is more general. The achieved functionings of any person do not only depend on the choices made by that individual, but also on actions taken by other individuals. How to define the capability set of any person in such a situation?[7]

In general, defining well-being in terms of opportunity sets requires that one can put a value on these sets in a normatively attractive way. This is a difficult problem, as demonstrated by the formal (and abstract) literature on the topic (see, amongst others, Barbera et al. 1998 and Foster 2010). If one does not include information about preferences, a set of reasonable axioms soon leads to the unattractive solution of evaluating opportunity sets by simply counting the number of its elements without taking any account of the "quality" of these elements (Pattanaik and Xu 1990). Yet, introducing preferences does not lead to easy solutions either. One of the proposals by Sen (1985) is to evaluate sets by the value of their best element. He calls this the "elementary evaluation", but immediately acknowledges that this method does not do justice to the idea of freedom. Another proposal would be to say that the set Q is "better" than Q' if there is an element in Q that is considered by all individuals to be better than all elements in Q'. This is a very

[7]Basu's example of the Edgeworth box loses some of its relevance in a many-person society, but the issue of social interdependencies is a more general one. See Pattanaik and Xu (2009) for a discussion leading to the conclusion that none of the solutions proposed for this problem is entirely satisfactory.

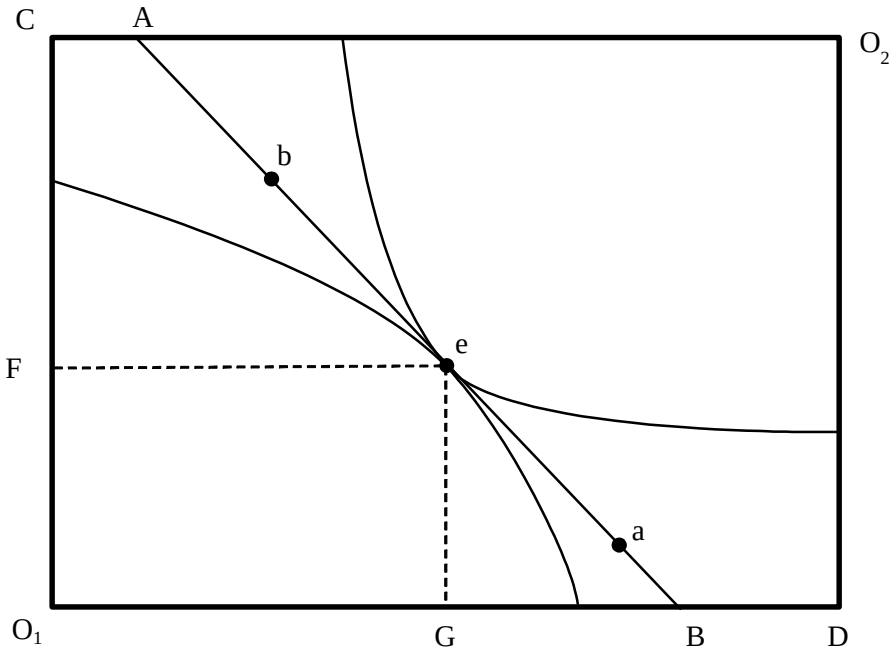

Figure 1: Capabilities and social interactions

strict criterion that leaves many sets incomparable when there is sufficient interpersonal heterogeneity in preferences. At this moment, there seems to be no single proposal which has gained enough theoretical support to become the prime candidate to be implemented in applied work. As a matter of fact, except for the simple proposals such as elementary evaluation, none of the proposed methods appears easy to operationalize. This lack of practical applicability is worrying if we opt for "advantage" as our preferred measure of well-being.

An even more fundamental problem with the proposals to value sets that have been made in the literature until now is that the proposed methods go against a compensation principle that has been a cornerstone of the theory of equality of opportunity (Fleurbaey and Blanchet 2013, p. 218). This principle says that individuals that are at the same level of individual responsibility (say, effort) should also obtain an equally valuable outcome. The literature on equality of opportunity is surveyed in Chapter 5 of this Handbook.

Another important question is the following. If we want to measure well-being, is it then sufficient to look at opportunity or capability sets while neglecting completely the realized achievement or functioning? Fleurbaey (2006a) argues that focusing exclusively on capability sets suffers from two problems. First, it leads to a loss of information. Consider the following example. Two individuals Ann and Bob face the capability sets Q and Q' respectively, with $Q \subset Q'$. Bob has all opportunities that Ann has, and he even has some opportunities that are not feasible for Ann. In such a case of set inclusion, it seems reasonable to say that Bob's opportunities are at least as good as those of Ann.

But now suppose that Ann selects option a in Q, while Bob picks option b in Q', such that $a \gg b$. Then it seems reasonable to say that Ann's achievement is "better" than that of Bob. Such an example is not irrelevant within the capability approach, as many of its advocates stress that individuals do not necessarily choose within their capability set the functioning vector that would give them the highest level of individual well-being. Whatever conclusion one wants to draw from this example in terms of who is worse off, it is clear that limiting our attention to sets and neglecting actual achievements leads to a loss of information. Comparing sets and knowing the selected option is not the same as comparing sets without knowing the selected option.

Second, an evaluation purely on the basis of capability sets may reflect a harsh attitude about individual responsibility, given the well-documented limitations of individual decision-making capacities. With capabilities as the measure of well-being, individuals are held responsible for their mistakes when selecting a particular option from their capability set. The question gets even more pressing when considering choices over the life-cycle. The opportunity sets of older people are determined by their decisions when they were young, and the question arises for how long individuals have to remain responsible for potential "mistakes" committed earlier in life.

The previous discussion raises the question whether focusing on capability sets is indeed the best way to introduce freedom considerations into the measurement of well-being. From his first writings on the topic, Sen has hinted that an alternative is to work with so-called "refined functionings" or "comprehensive outcomes", where the "refinement" refers

to the operation of including additional information on the available alternatives or on the process of choice itself. Let us reconsider the example of the two individuals who are fasting and starving. The fasting person is choosing to eat less; the poor starving person is exercising no choice at all. These can be seen as two different "refined" functionings —choosing a when b is also available is a different refined functioning than choosing a when b is not available (Sen et al. 1987, p. 36-37). Alternatively, in addition to the functioning of being well-nourished, one could consider another functioning "exercising choice with respect to what one eats".

Fleurbaey (2009) extends this idea and argues that all the relevant aspects of freedom can be captured through refined functionings. Basic freedoms of thought, speech, political activity, travel, and so on are clearly part of the functioning vector. The freedom from avoidable disease can be approximated in terms of the achieved health functioning, of the accessibility of the health care system and of the environmental and social factors influenced by public health policy. These examples immediately show that the refined functionings approach too raises formidable challenges. Understanding the "process of choosing" is not straightforward. As soon as one has to resort to indirect indicators (such as education, income, social relations, accessibility of the health care system), it is important to carefully consider the specific social, environmental and individual variables that determine the influence of these indicators. In moving from "capability sets" to "refined functionings", we replace the problem of evaluating sets with the challenge of understanding the process of "producing" refined functionings. However, it seems that

the notion of refined functionings is better suited for a careful empirical analysis which is needed to answer these questions about choice, well-being and differences in opportunities.

3.1.2 Choice of dimensions

Whether we prefer a definition of well-being based on capabilities or (refined) functionings, inevitably we face the question of how to select the list of relevant dimensions. It follows from a focus on freedom and agency that only dimensions that people have reason to value should be included. Yet, this notion of "reason to value" can be interpreted in different ways.

A natural choice in a freedom perspective is to include all dimensions that are considered by the individuals themselves to be relevant within their own personal life projects. This matches the normative purpose of respecting individual preferences. From the applied point of view, however, it raises the question how one should collect the necessary information about these preferences. There is a conceptual distinction between very specific dimensions (such as "not suffering from malaria") and more encompassing dimensions (such as "having a good overall health situation"). While a consensus could perhaps be reached on the relevant dimensions at a more encompassing level, substantial disagreement may remain about the dimensions to be included at a more specific level. Direct surveys should therefore be structured carefully.[8]

[8] Clark (2005) investigated through a small number of high-quality interviews how the South African poor perceive "development" (a good form of life). He concludes that the intrinsic value of material things matters a lot. A challenging example is Coca-Cola, which turns out to be very important to many

Most researchers within the capability approach do not follow this preference-based approach. Their suspicion towards preferences can at least partly be explained by the multiplicity of preference concepts that coexist in the literature. If preferences are interpreted as revealed through actual choice behavior, a dose of suspicion is indeed justified based on the well-documented behavioral anomalies that individual choices display in real life. However, in an approach that puts great emphasis on freedom and agency, it seems less easy to discard preferences understood as reflecting the individual's well-considered life projects. One possible justification is that one considers it unrealistic to assume that individuals have such well-defined preferences. We will come back to this viewpoint later in the chapter.

Let us now describe the two alternative ways of selecting the list of relevant dimensions that have been proposed by Nussbaum and Sen, respectively. Inspired by Aristotle, Nussbaum (2000, 2006, 2011) starts from an "objective" view about what constitutes human flourishing and defines a list of abstract essential capabilities (or functionings). She presents the list as universal, but is well aware of the fact that the translation of the abstract capabilities in implementable terms will depend on the specific social, cultural and economic context. Sen, on the other hand, prefers to leave the definition of the list of functionings deliberately open, as he believes that the list should be drawn up

poor respondents. While the nutritional value of Coca-Cola is low, it is "perceived as a superior first world product" (Clark, 2005, p. 1353) and is important "to achieve other important functionings such as relaxing, facilitating social life and enhancing friendships" (Clark, 2005, p. 1354). But is "having the opportunity to drink Coca-Cola" really a crucial dimension of life?

in a democratic process through public reasoning (see, e.g., Sen 2004). This dynamic process creates room for participation of the people concerned —which in itself is already a crucial functioning. Sen's focus on public reasoning is inspired by an activist perspective that aims at implementing the capability approach by means of social change. From an analytical and ethical point of view, however, it seems to raise many questions. If one reaches an agreement through a public deliberation process, is this agreement a kind of compromise between the different preferences of the individuals involved? If so, how is the compromise to be interpreted? Does the process not induce the risk of a tyranny of the majority or of the most outspoken personalities? If we were to accept that preferences are not given ex ante, but are formed in and through the deliberation process itself, one could perhaps even aim at a real consensus rather than a compromise. Yet, without a good understanding of (and arguably well-defined conditions imposed on) these public deliberations, it is not clear what the normative status of such a consensus should be.

While the conceptual differences between these different approaches are important, the problem seems less acute when it comes to practical applications. Alkire (2002) gives an extensive overview of different lists of dimensions that have been proposed in the literature and reaches the following —perhaps surprising— conclusion. Despite the large variety of approaches and the differences in opinion about the underlying logic, the specific proposals are strikingly similar. As a matter of fact, the same is true for the lists of dimensions that have been proposed for practical applications by, e.g., the OECD (2011), the European Statistical System (2011) or Stiglitz et al. (2009). All proposals

include material consumption and housing quality, health, job market status and leisure, the quality of social interactions and of the natural environment. To be precise, this consensus is about the first layer of encompassing dimensions and dissipates when we turn to a second layer of more specific dimensions. However, even at that lower level the similarities are sufficiently reassuring, if one accepts the ultimate aim of arriving at a single synthetic indicator of well-being. Indeed, (partial) overlap can be taken care of through the choice of the weights used to get at the synthetic indicator (see Decancq and Lugo 2013 for an overview on setting weights in synthetic well-being indicators). Let us now turn to this aggregation step.

3.1.3 Aggregation and respect for preferences

Note first that the construction of a synthetic indicator of well-being is not really necessary, if the purpose of the analysis is to construct a richer description of individual well-being than is possible with a one-dimensional approach in terms of monetary income alone. In fact, for this purpose, a simple observation of the vectors ℓ_i is sufficient, and any aggregation procedure may be interpreted as leading to a loss of information. Yet, as soon as one wants to make interpersonal comparisons of well-being between all individuals of society (for instance, when computing inequality) it is necessary to go beyond the simple description in terms of vectors. In this section, we therefore focus on the construction of synthetic well-being indicators. In Section 4 of this chapter we will consider approaches that introduce a multidimensional version of the Pigou-Dalton Transfer Principle directly

at the level of the vectors of relevant life dimensions.

An influential stream within the capability approach emphatically rejects the idea that the different life dimensions are commensurable. Again, Nussbaum (2000, 2006, 2011) is the main proponent of this view. There is an immediate normative reason for this position. Nussbaum focuses on capabilities as basic needs and she accepts the "union" identification strategy to the measurement of multidimensional poverty, in which someone is considered poor as soon as he does not reach a minimum level for at least one dimension. A union approach to identify the multidimensional poor is closely related to a "rights-based" view on poverty measurement. One can interpret this approach as implying a very simple ranking of individuals in which only two groups are distinguished, the poor and the non-poor, and no further comparisons are made within these groups. This approach may be sufficient for some purposes (such as identifying the poor) but is too coarse if we want to derive conclusions about inequality in society, for instance.

If we want to derive a measure of individual well-being that can be used for the measurement of inequality, the possible trade-offs between the different dimensions can no longer be neglected. This brings us back to the interpretation of the valuation function v_i in expression (1). If individuals indeed have a continuous preference ordering over life dimensions and if one accepts the normative relevance of this preference ordering, then v_i could be a representation of their preference ordering:

$$\ell_i R_i \ell_i' \Leftrightarrow v_i(\ell_i) \geqslant v_i(\ell_i').$$

Note, however, that different individuals may have different valuation functions (each

representing their own personal preference ordering about what is a good life) and that, moreover, for each preference ordering there is an infinity of valuation functions which represent it (indeed, any monotonic increasing transformation of v_i is also a representation of R_i). This raises a fundamental question of interpersonal comparability. We return extensively to that problem in Section 3.3.

On the other hand, in the capability approach (with its suspicion for individual preferences), researchers typically aim to use a common valuation function v which is the same for all individuals. If we do not rely on personal preferences, the question becomes how to construct such a function. Here again, we can rely on public deliberation, but this raises issues similar to those encountered when discussing the choice of relevant dimensions. Alternative, more analytical, proposals have been discussed in Sen (1985). The most prominent of these proposals is the so-called "intersection approach", which makes use of a dominance principle. We can write this principle more formally, using the notation that was introduced at the beginning of this section:[9]

Dominance Principle: (ℓ', R', S') is at least as good as (ℓ'', R'', S'') if $\ell' R \ell''$ for all R, and strictly better if $\ell' P \ell''$ for all R.

This principle states that if a situation ℓ' is preferred to a situation ℓ'' for *all* admissible individual preference orderings (and hence also by all individuals in society), then we consider the individual in ℓ' to be better off (from a normative perspective) than the individual in ℓ'', *irrespective* of the differences in the actual preference orderings or

[9] Assuming anonymity, we drop the individual subscripts to simplify notation.

the satisfaction functions of the individuals.[10] With monotonic preference orderings the Dominance Principle implies that (ℓ', R', S') be better than (ℓ'', R'', S'') whenever $\ell' \gg \ell''$.

One immediate problem with this approach (acknowledged explicitly by Sen) is that the resulting partial ordering may be very coarse. Not many triplets can be effectively ranked with respect to well-being. The deeper question, however, is why it is so difficult to obtain a more complete ordering. One answer is to say that well-being and advantage are objective concepts, and that the incompleteness follows from the fact that it is intrinsically difficult to define what a good life is. We mentioned already that this perfectionist idea is prominent in the work of philosophers in the Aristotelian tradition (most notably Martha Nussbaum). An alternative answer would be that the valuation of functionings bundles should be at least partly based on the valuations by the persons themselves (which seems to be more in line with the idea of freedom) and that the difficulty of defining a common valuation function v reflects the fact that it is not straightforward to find a kind of "overlapping consensus" on what is a good life (see, e.g., Sugden 1993).

This difficulty is indeed fundamental. At first sight, the Dominance Principle appears to be in line with the respect for personal preferences. However, this first impression is misleading, as has been shown by Brun and Tungodden (2004), Fleurbaey (2007) and Pattanaik and Xu (2007) (see Weymark 2013 for a survey). The underlying intuition is that the Dominance Principle implies that (ℓ, R, S) is at least as good as (ℓ, R', S') for all ℓ and all R, R', S, S', so that preferences can play *no* role in the evaluation of (ℓ, R, S).

[10] This latter conclusion is natural, since the capability approach does not take into account subjective satisfaction for the ranking of well-being levels, if it is not part of the vector ℓ.

We further illustrate the difficulty by making use of the following principle:

Personal-Preference Principle: (ℓ, R, S) is at least as good as (ℓ', R, S) if $\ell R \ell'$ and strictly better if $\ell P \ell'$.

The Personal-Preference Principle requires that the (normative) evaluation of well-being in two situations should follow the preferences of the individual involved. As this principle only involves intrapersonal comparisons, it is a weak requirement of respect for preferences, but even this weak requirement is already incompatible with the weak form of the Dominance Principle stating that (ℓ, R, S) is strictly better than (ℓ', R', S') whenever $\ell \gg \ell'$. This incompatibility is shown by the following example. Figure 2 illustrates. Take $\ell_i, \ell_j, \ell'_i, \ell'_j$ and R_i, R_j such that $\ell_i \gg \ell_j, \ell'_j \gg \ell'_i$, $\ell'_i P_i \ell_i$, and $\ell_j P_j \ell'_j$. The Personal-Preference Principle implies that (ℓ'_i, R_i, S_i) is strictly better than (ℓ_i, R_i, S_i) and that (ℓ_j, R_j, S_j) is strictly better than (ℓ'_j, R_j, S_j) while the Dominance Principle implies that (ℓ_i, R_i, S_i) is strictly better than (ℓ_j, R_j, S_j) and that (ℓ'_j, R_j, S_j) is strictly better than (ℓ'_i, R_i, S_i). By transitivity, this is impossible.

This incompatibility confronts us with a deep clash between two different normative principles. If one constructs a partial well-being ordering based on the idea of dominance (or consensus), one almost immediately gets a conflict with even a minimal form of respect for individual preferences. Later in this chapter we will show that it is possible to operationalize the concept of a valuation function that respects preferences, and therefore necessarily violates the Dominance Principle. If one endorses a more objective view of well-being, this may be seen as a bridge too far.

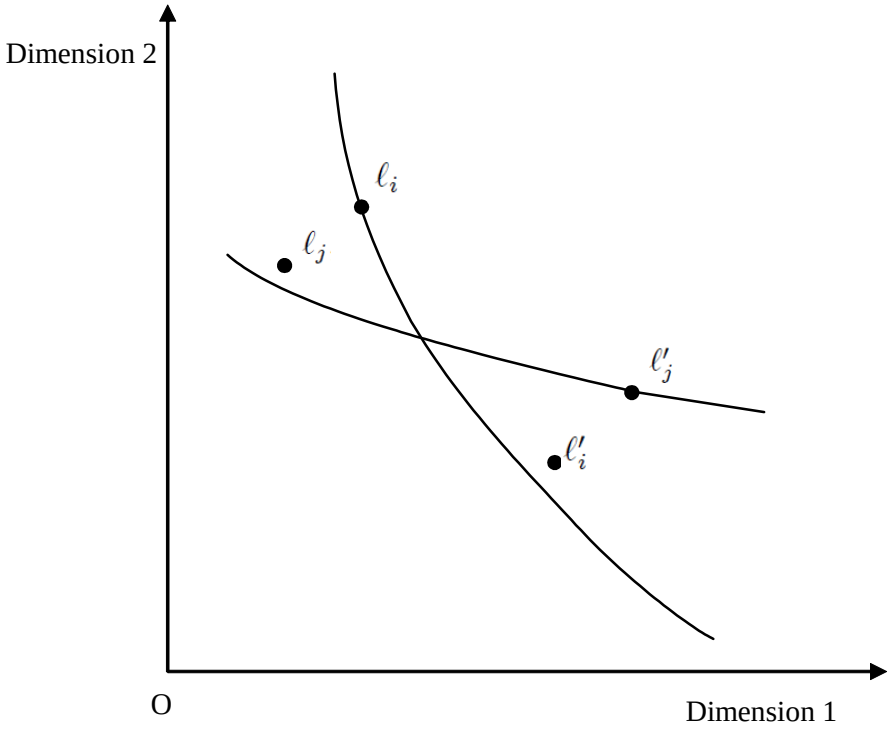

Figure 2: The Dominance Prinicple and the Personal-Preference Principle are incompatible

Moving from the basic theoretical discussion to the applied work, a large number of empirical applications are focussing only on a description of functionings vectors. At the other extreme, we can find some examples in which one synthetic well-being index is constructed in an explicit way. The best known example of a synthetic well-being index (at the country level) is the Human Development Index (HDI) of the UNDP that will be described in more detail in Section 5. As a matter of fact, we will argue that this popular measure presents a good illustration of the problems raised with an objective approach.

3.2 Utility and happiness

In the recent decades there has been a strong upsurge of economic research on happiness. Given the traditional reluctance of economists about the use of subjective information obtained through questionnaires, this is a somewhat surprising phenomenon. Data on subjective well-being have by now been collected for thousands of respondents throughout the world with large-scale surveys. Many variants of the subjective well-being question have been studied, all being relatively simple.[11]

It is useful to distinguish between two broad categories of subjective well-being questions. We illustrate both categories using the European Social Survey. The first question refers to life satisfaction and goes as follows: "All things considered, how satisfied are you with your life as a whole nowadays? Please answer using this card, where 0 means

[11] We focus in this chapter on the questions concerning "overall" satisfaction or happiness with life. Many surveys include in addition questions on satisfaction with specific life domains, such as health or job market status.

extremely dissatisfied and 10 means extremely satisfied". The second question refers to happiness: "Taken all together, how happy would you say you are? Please use this card." Analysis suggests that the results for both questions are generally highly correlated and that they can be explained to a large extent by the same set of correlates. Not surprisingly, many economists have concluded that both questions measure the same underlying concept —which is then equalized with the traditional notion of utility. This interpretation is not supported by psychologists, however, who make a clear distinction between affective and cognitive components in the experience of life satisfaction. As a matter of fact, there is growing evidence that affective scores are less sensitive to objective conditions of life, such as income, and more prone to adaptation.[12] We will return to this distinction and to its normative consequences in the first subsection, but for the moment we do as if both questions reflected the same underlying concept of utility that can either be measured by questions on happiness or by questions on life satisfaction and that we will label generically as "subjective well-being".

It is not our ambition here to give an extensive overview of the large empirical literature on the topic (see Chapter 15 in this Handbook). We will only draw attention to three key findings that are relevant to our quest for an attractive measure of individual well-being. First, the answers to the subjective well-being questions are empirically robust and show regular patterns that are intuitively reasonable. This is not a trivial finding in the light of the traditionally dominant view that interpersonal comparisons of utility are necessarily

[12] A more complete discussion of the issue can be found in Chapter 5 of Fleurbaey and Blanchet (2013).

normative and can have no empirical basis (Robbins 1938).

Second, the literature convincingly shows that answers to subjective well-being questions are not only, perhaps not even mainly, determined by monetary income or material consumption. The life dimensions that have been found to be relevant for subjective well-being almost coincide with the lists of functionings that were described in the previous section: in addition to income, also health, job market status, quality of relations and social interactions, and even political rights and freedom of speech have been shown to have a significant impact (Frey and Stutzer 2002). The initial interest in subjective well-being in economics has largely been driven by the striking findings of Easterlin (1974), showing that despite the strong economic growth since the Second World War, subjective well-being has remained almost constant. Recent work (e.g., by Stevenson and Wolfers 2008) has questioned the empirical validity of the so-called Easterlin-paradox, but has not shaken the consensus that subjective well-being is crucially influenced by non-material factors.

A third finding is also related to the Easterlin paradox. Respondents rate their subjective well-being by comparing their actual situation with a set of variable reference standards. They compare their own life conditions with those of their reference groups. Moreover, there is a dynamic process of adaptation of standards through which people lower their aspirations when things go badly and raise their standards when things go well. The empirical literature on subjective well-being now offers plenty of examples showing that adaptation is indeed a pervasive real-world phenomenon. The most striking examples

of adaptation are found in the sphere of health, but they also occur in other dimensions of life. Deaton (2008) finds that countries with higher rates of HIV prevalence do not systematically report a lower life (or even health) satisfaction, whereas individuals (and countries) care about HIV and would prefer not to suffer from it. Individuals who have lost a limb may, after adaptation, recover a good subjective well-being score —but still express a strong aversion to disability (Loewenstein and Ubel 2008, Oswald and Powdthavee 2008). Interestingly, the recent work on subjective well-being has produced convincing empirical evidence confirming Sen's concern about physical-condition neglect.

The literature on subjective well-being is largely descriptive and seldom engages in an explicit normative discussion. Yet, even if there are no explicitly normative conclusions drawn, often it seems implicitly understood that a higher subjective well-being is better. Using subjective well-being as a measure of individual well-being is understandable given the dominance of subjective welfarism in (applied) economics. A successful measurement of utility allows shortcutting the use of its imperfect monetary approximations (such as the consumer surplus). Moreover, the data on life satisfaction are readily available and easy to collect.[13] If one is willing to accept the answers as an interpersonally comparable measure of utility, one obtains a ready-to-use one-dimensional measure of well-being expressed on a convenient scale, which can then be plugged in a social welfare function. All relevant non-monetary dimensions are included in the measure, based on the personal evaluation of the individuals themselves. Relying on the earlier notation, this approach uses the

[13] Pragmatic arguments are emphasized, e.g., by Oswald (1997).

subjective well-being scores as aggregator of the various life dimensions and therefore as the measure of individual well-being:

$$WB^{SA}(\ell_i, R_i, S_i) = S_i(\ell_i), \tag{2}$$

where the superscript SA refers to satisfaction.

Using subjective well-being as the measure of well-being, i.e., returning to subjective welfarism, implies that it is ethically desirable to redistribute from someone with a high level of subjective well-being to someone with a low level of subjective well-being. It is regrettable that the happiness and welfare economic literature have developed largely in separation, so that there is little debate in the former literature on Sen's original —but very topical— arguments of "physical-condition neglect" and "valuation neglect" against this subjective welfarist position (see also Section 2 of this chapter). This separation may partly be caused by a difference in focus, since the happiness literature is more interested in "average" or "aggregate" results at the level of the whole society, and less on inequality and redistribution. Yet, this different focus offers only a partial explanation, as there is by now a growing number of papers focusing on inequality in happiness (see van Praag and Ferrer-i-Carbonell 2009 and Dutta and Foster 2013, for instance).

Before turning to the central questions of this chapter about respect for preferences and responsibility, we first have to return to the question of whether happiness and life satisfaction indeed measure a single concept of utility.

3.2.1 Feelings of happiness and hedonic welfarism

The conclusion that there is one concept of utility, underlying both happiness and life satisfaction measures, is contested by most psychologists. They emphasize that "well-being" is a multifaceted experience, and that it is at least essential to distinguish two of its components: affects (feelings, emotions) and cognitions (Diener et al. 1999; Kahneman and Krueger 2006). For the cognitive component, individuals take some distance to formulate a judgment over their life. Positive and negative emotions, on the other hand, come in a permanent flow when individuals are awake. They are related to Bentham's pleasures and pains. If one accepts this distinction, the finding that the answers to questions on happiness and life satisfaction are highly correlated becomes worrying rather than reassuring. It suggests that what is measured by the questionnaires is a kind of hybrid mixture of feelings and cognitions without much psychological relevance. In fact, this is precisely the judgment of psychologists like Kahneman, who argue that to measure the affective experience of happiness other methods (such as experience sampling or day reconstruction) should be used (Kahneman and Krueger 2006). Application of these methods shows that adaptation is even stronger for feelings than for judgments of satisfaction. Individuals seem to be characterized by a (largely genetically determined) baseline level of happiness, to which they return after having experienced positive or negative shocks.

The distinction between affects and cognitions is not only psychologically relevant but also resonates with welfare economic arguments. It is common to distinguish two variants of welfarism. "Hedonic welfarism" bases the evaluation of individual well-being on feelings

of happiness, "preference welfarism" starts from judgments about what is a valuable life and aims at respecting these preferences. There is a clear link with the distinction between affects and cognitions.

Let us first comment on "hedonic welfarism", a modern version of traditional Benthamite utilitarianism. Influential advocates of this variant of welfarism are Kahneman et al. (1997, 2004) and Layard (2005). This approach argues that only feelings of happiness matter for well-being.[14] One of the main reasons for adopting hedonic welfarism is skepticism about the idea that preferences over life dimensions can be meaningfully defined. This skepticism towards preference welfarism leaves hedonic welfarism as the only feasible approach if one cares about individual well-being as experienced by the individuals themselves. Yet, it seems a quite radical position to state that human beings have no single idea about what is valuable in their life.[15] Rejecting this extreme position, we turn to the central questions of this chapter on respect for preferences and responsibility.

Defining individual well-being in terms of feelings of happiness alone does *not* respect preferences. Such feelings may be very important to individuals, but they are not the only consideration entering the assessment of life (Nussbaum 2008; Benjamin et al. 2012). Individuals may consider Vincent Van Gogh's life to be more valuable than that of another

[14] Layard (2005, p. 121) writes: "Ethical theory should focus on what people feel, rather than what other people think is good for them".

[15] One can easily admit that the preference relation R_i is incomplete, or that there may be inconsistencies in individual evaluations of what is a good life. We will come back to these issues in the next section.

person who had only pleasant feelings but did not leave any trace after his death. Moreover, using feelings of happiness as the measure of well-being for inequality measurement implies that individuals are not to be held responsible for any factor that influences these (after all extremely subjective) feelings. One immediately runs into the issue of expensive tastes, which is nicely illustrated by Sen's colorful story of the unhappy millionaire:

> "I haven't seen you for many years-since I was chucked out of school in fact. I run into you one day in the West End waving at me from your chauffeur-driven Rolls-Royce, looking shockingly prosperous and well-heeled. You give me a ride, and invite me to visit you at your mansion in Chelsea. I remark that I am pleased to see what a high standard of living you are enjoying. 'Not at all', you reply, 'My standard of living is very low. I am a very unhappy man.' 'Why so?' I have to probe. 'Because', you reply, 'I write poems - damn good ones too - but nobody likes my poems, not even my wife. I am always depressed about this injustice, and also sorry that the world has such deplorable taste. I am miserable and have a very low standard of living.' By now I can see no reason to doubt that you are indeed unhappy, but I feel obliged to tell you that you don't know the meaning of 'standard of living'. So you drop me off at the next Tube station (remarking: 'My standard of living high/What a plebeian lie!', adding to the set of people who don't think much of your poetry)" (Sen 1984, p. 75).

Arguably, it is not ethically attractive to compensate the unhappy millionaire for his

lower level of subjective well-being. As a matter of fact, given the strong adaptation of happiness feelings, it is even unlikely that any redistribution of income would contribute to a higher level of social welfare. Hedonic welfarists therefore emphasize the importance of investing more in the mental health of the citizens (see, e.g., Layard 2005) —to the point perhaps of convincing the unhappy millionaire that he is on the wrong track.

While "hedonic welfarism" reduces the scope of individual well-being to feelings of happiness, a broader scope on well-being does not necessarily discard these feelings completely. Indeed, "it would be odd to claim that a person broken down by pain and misery is doing very well" (Sen 1985, p. 17). It is easy to integrate this intuition in other approaches to well-being, by treating emotions as aspects of life over which individuals may have preferences. In our formal notation, they are then seen as one (but definitely *not* the only) component of vector ℓ_i.[16] In this interpretation, hedonic welfarism respects preferences only under the unrealistic assumption that the only thing that individuals ultimately care about is their own feelings, i.e., a subset of ℓ_i. Yet, including feelings in the list of dimensions of life raises some additional hard questions. Here are some examples. The CEO of a large firm may "need" a certain material lifestyle to be respected in his group of peers, whereas a university professor in a philosophy or welfare economics department may perhaps earn more prestige through a sober lifestyle (Robeyns 2006). Do we accept these "needs" in our definition of well-being? And, what about feelings of depression that are not obviously linked to physical conditions? Where should we draw

[16] See, among others, Kimball and Willis (2006), Loewenstein and Ubel (2008) and Rayo and Becker (2008).

the line between real psychiatric problems (which most observers would include in the definition of well-being) and overly subjective reactions, which can be easily manipulated and are situated within the sphere of private information? Leaving these questions aside, we now move to "preference welfarism".

3.2.2 Life satisfaction, experienced and decision utility

Rather than interpreting subjective well-being as an expression of emotions, one can also see it as reflecting a cognitive judgment about the extent to which one is leading a good life. The satisfaction function S_i is then basically an aggregation function, giving a synthetic evaluation of the complete vector ℓ_i of relevant life dimensions (as we have just seen, this vector may include some pleasant and unpleasant feelings). Various authors in the literature argue that using the satisfaction function means that one evaluates well-being with the value system that is used by the respondents themselves. "If we accept the Marxist idea of 'false consciousness', we play God and decide what is good for others, even if they will never feel it to be so" (Layard 2005, p. 121). The argument seems straightforward: if we care for what people care about, we should care for their own perception of life satisfaction. Even if this reasoning may seem convincing at first sight, it requires some further scrutiny.

To do so, let us first consider the relation between the satisfaction function S_i and the preference relation R_i. Clearly, the idea of respecting preferences is only meaningful if one accepts that individuals have well-considered ideas about the good life, that can be repre-

sented by a (possibly incomplete) preference relation R_i. The precise interpretation of R_i is somewhat ambiguous in the literature, however. Happiness researchers have introduced a distinction between "experienced utility" and "decision utility" (Kahneman et al. 1997, Kahneman and Sugden 2005). While decision utility is linked to prospective choices, experienced utility would be better reflected in survey questions that are answered ex post. It turns out that there is frequently a discrepancy between experienced utility and decision utility, in the sense that individuals apparently misperceive the effects of their choices on their future experienced utility (see, e.g., Layard 2005, Gruber and Mullainathan 2005, Stutzer and Frey 2008). In such cases, it is argued, the focus should be on experienced utility.

It is possible to interpret the limitations of decision utility in two different ways. The first interpretation is that stable preferences do not exist. Preference welfarism then is simply not meaningful and we are back in the hedonic welfarist approach of the previous subsection, albeit possibly with some (undesirable) confusion between affects and cognitions. The second interpretation is that the relevant preferences about life dimensions should involve correct information and proper deliberation and that they therefore are not always revealed in actual choice behavior —and hence in decision utility. The difference between decision utility and experienced utility then justifies skepticism about the use of *revealed* preferences as a criterion for evaluating well-being, does not exclude the interpretation of S_i as a representation of the true underlying preferences of individuals. As we have stressed already before, R_i does not necessarily coincide with revealed pref-

erences in our formal framework. In fact, if psychological feelings of happiness are part of ℓ_i, and insofar as decision utility suffers from imperfect forecast of the psychological effects of choices, we suggest that R_i should not be equated to decision utility, but should be corrected for mistakes and misperceptions.

With this caveat in mind, we can now put forward the obvious point that a necessary condition for S_i to respect preferences is that it is a representation of the preference ordering R_i:

Consistency Assumption $S_i(\ell_i) \geq S_i(\ell_i')$ if and only if $\ell_i R_i \ell_i'$.

The formal analogy between the satisfaction function S_i and the valuation function v_i that was introduced before is obvious. Yet, the interpretation of satisfaction as a cardinally measurable and interpersonally comparable variable, which is common in the applied literature, implies that the satisfaction function is more than a general representation of ordinal preferences. Satisfaction scores select one particular "utility" function from the set of all positive monotonic transformations representing the same preference ordering.

Selecting a particular cardinalization imposes a particular scaling. This scaling will reflect comparisons with reference situations such as the worst possible and the best possible situation, the situation one expected at some earlier stage in life (aspirations or expectations), the situation of one's parents, the situation of reference groups such as one's peers or one's fellow citizens... We can call all such components of the judgment the scaling factors. Obviously, scaling factors may differ across individuals and change over time, as aspirations and the choice of reference groups may change. Moreover, the specific scaling

may depend on the way the satisfaction question is formulated, or even on its location in the overall questionnaire. It is crucial to realize that the consistency assumption only refers to ordinal preferences, and not to these scaling factors. This immediately implies that preferences R_i, which, as discussed before, do not necessarily coincide with revealed preferences, do not necessarily correspond to experienced utility either. Experienced utility as it is typically observed with empirical methods may incorporate a shift in scaling factors and therefore a change from an initial function S_i to another function S_i'. The consistency assumption says nothing about inequalities of the form $S_i(\ell_i) \geq S_i'(\ell_i')$. We will explore the implications of this insight in the following subsection.

It is hard to test the consistency assumption empirically, because in practice it seems almost impossible to make sure that preferences and scaling factors remain fixed when an individual moves from ℓ_i to ℓ_i'. We propose to interpret the assumption as a requirement on the measurement of $S_i(\ell_i)$. In other words, we assume that the satisfaction question is sufficiently well-crafted so that the answers reflect the individual's views about what is good in life, as embodied in R_i. This is not an innocuous assumption,[17] but from now onwards, we will accept that it holds, as it is a necessary condition for subjective well-being measures to respect preferences.

[17] See Fleurbaey and Blanchet (2013) for a discussion. The authors discuss problems related to *scope* (what part of ℓ_i is relevant), *ranking* (how does ℓ_i stand in the set of relevant possible lives) and *calibration* (how does a position in the ranking translate into a category of the questionnaire).

3.2.3 Respect for preferences

Using life satisfaction as a measure of individual well-being does respect preferences, *provided* that the consistency assumption holds. Indeed, combining the latter assumption with expression (2) immediately confirms that a measure of well-being directly based on $S_i(\ell_i)$ satisfies the Personal-Preference Principle that was introduced in the previous section. Note that this necessarily implies that such a measure will *not* satisfy the Dominance Principle.

However, one can argue that respecting preferences for the measurement of well-being requires going beyond intrapersonal comparisons at one point in time (this is the scope of the Personal-Preference Principle). For evaluating inequality, the idea of respecting preferences needs to be extended to situations where scaling factors are different. Such cases can reflect *interpersonal* comparisons between a pair of individuals who share the same preferences but have different scaling factors, or *comparisons over time* for a given individual with stable preferences and shifting scaling factors. Consider two triplets (ℓ_i, R_i, S_i) and (ℓ'_i, R_i, S'_i) such that $\ell_i P_i \ell'_i$ but $S_i(\ell_i) \leqslant S'_i(\ell'_i)$. There is a preference for ℓ_i against ℓ'_i, but the situation (ℓ'_i, R_i, S'_i) exhibits a greater or equal level of satisfaction. This configuration is not a mere theoretical *curiosum*. The empirical happiness literature contains many examples of shifting scaling factors. Recall the earlier example of the individuals who express a preference for not being disabled but, after having lost their limbs, recover a good satisfaction score because their aspirations have been adapted to their actual situation (Loewenstein and Ubel 2008; Oswald and Powdthavee 2008). Graham (2009) insists

that the diversity of scaling factors across individuals generates "happy peasants and miserable millionaires". Her findings do not imply that the poor would prefer to remain poor above getting rich, neither that the rich would prefer to be thrown into poverty. All these examples can be understood as cases of shifts or differences in scaling factors with common preferences in the background. In these examples there is a clear echo of Sen's criticism of "physical-condition neglect" towards subjective welfarism.

It is therefore *not* obvious that using life satisfaction as a measure of well-being does indeed respect preferences. If one endorses the value judgment that the happy poor are worse off than unhappy millionaires, and hence that redistribution from the millionaire to the poor would lead to an improvement from a social welfare point of view, one has to give priority to the information about (common) preferences over the information about satisfaction levels. This idea is embodied in the following principle which logically strengthens the Personal-Preference principle:

Same-Preference Principle: (ℓ, R, S) is at least as good as (ℓ', R, S') if $\ell R \ell'$, and strictly better if $\ell P \ell'$.

Clearly, the Same-Preference Principle is *not* satisfied by an approach that uses life satisfaction scores as individual well-being measure.

3.2.4 Responsibility and freedom

The discussion in the previous subsection also addresses our second central question on responsibility and freedom. Using life satisfaction as the measure of well-being and as

the equalisandum in egalitarian policy implies that redistributing from i to j is ethically desirable if $S_i(\ell_i) > S_j(\ell_j)$. We have seen, however, that in this case it is possible that both individuals prefer ℓ_j to ℓ_i, so that the difference between the life satisfaction scores would only reflect a difference in scaling factors such as aspirations. By choosing this well-being measure, individuals are not held responsible for their aspirations and are compensated for them. Redistributing from a poor peasant to a rich millionaire would then be ethically desirable if the rich millionaire were less satisfied with life, because the millionaire would not be held responsible for his ambitious aspirations.

As another example, consider two individuals occupying the same job. The first individual comes from a poor family and has received little education: he is satisfied to have found a job. The other individual has rich parents and a university degree: he is dissatisfied because he is convinced that he was entitled to a "better" job.[18] Since using life satisfaction scores as the measure of well-being does not question the higher aspirations of the rich person, some redistribution of income from the modest to the ambitious individual is socially desirable. This is a conclusion which will appear counter-intuitive to many.

[18] The empirical relevance of this example is supported by data on Belgian school-leavers in Schokkaert et al. (2011).

3.3 Respecting preferences: equivalent income

We have seen that neither the capability approach nor the happiness approach (in its hedonic or its satisfaction interpretation) respects the Same-Preference Principle. The third approach covered in our survey, that of equivalent income or money-metric utility, does.[19] The somewhat surprising history of the concept has been sketched in Section 2. We will first introduce the approach and then turn to the most prominent points of criticism.

3.3.1 The equivalent income

Let us write the vector of relevant life dimensions for individual i as $\ell_i = (y_i, x_i)$, where x_i contains all the non-income dimensions and y_i his income.[20] Now, choose reference values $\widetilde{x}$ for all the non-income dimensions. The choice of reference values is a crucial

[19] The equivalence approach, as it has been introduced in the recent welfare economic literature, is broader than the concept of equivalent income, on which we focus in this chapter (see Fleurbaey and Maniquet 2011; Fleurbaey and Blanchet 2013). First, the choice of equivalent income with reference values for all non-income dimensions is a special case of an approach in which the well-being levels of individuals are ranked on the basis of the intersections of their indifference curves with any monotone path (see, e.g., Fleurbaey et al. 2009). Second, the model can even be further extended to include the notion of equivalent *sets*. In this chapter, we will not elaborate on these generalizations.

[20] In the original literature on money-metric utility, the focus was on comparing consumption bundles and the non-income variables then referred to the price vector $\widetilde{p}$. This is just a special case of our approach. Indeed, the vector x may contain the prices of the commodities as one feature of the environment of the individuals.

question, to which we will return in the following subsection, but let us first assume that we can take them as given. The equivalent income y_i^* for individual i is then defined as the solution to the equation

$$(y_i, x_i)\, I_i\, (y_i^*, \widetilde{x})\,. \tag{3}$$

In other words, the equivalent income is the level of income that would make the individual indifferent (as judged by his own preferences) between his current situation and the hypothetical reference situation where he would be at the reference values for all non-income dimensions of life. We then take this equivalent income as the measure of individual well-being:

$$WB^{EI}((y_i, x_i), R_i, S_i) = y_i^*.$$

The function that gives the equivalent income for individual i for each combination of (y_i, x_i) is the so-called equivalent income function $y_i^*(y_i, x_i)$.[21]

The concept is illustrated in Figure 3 for the case of income-health combinations. Suppose we have to compare the situation of Ann (in A) and Bob (in B). Taking normal health as the reference for the health-dimension (we will see in the next section that this is indeed an attractive choice), we can define the equivalent income y_A^* for Ann as the income that would bring her in situation A', i.e., the (income, normal health) bundle that is just as good for her as her actual bundle A. Similarly, we obtain for Bob an equivalent income of y_B^*. We see that Bob's well-being (in B), as measured by y_B^*, is larger than

[21] As can be seen from expression 3, the equivalent income depends on the choice for the reference value $\widetilde{x}$. To avoid notational clutter, we suppress this dependency in the notation, however.

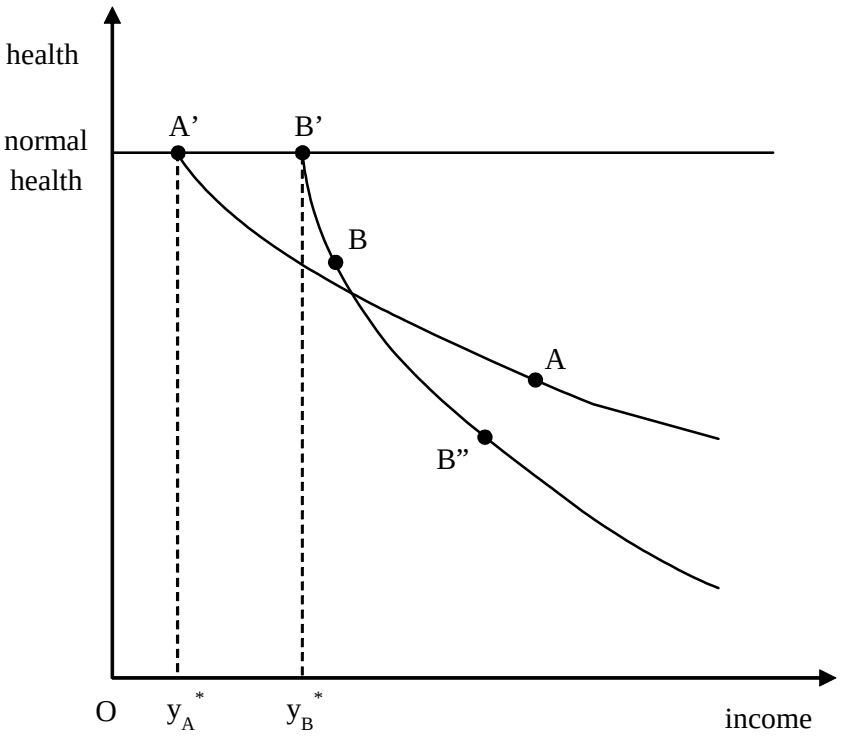

Figure 3: Equivalent income

Ann's well-being y_A^* (in A).

Conveniently, the equivalent income is expressed in monetary terms. It has all the operational advantages of a cardinal and interpersonally comparable measure, so that it can be used in traditional inequality measures. On the other hand, however, it takes into account all the relevant dimensions in the vector ℓ_i, weighted according to the preferences of individual i herself.

To see this, note first that the equivalent income is a representation of the preference ordering. Indeed if preferences are monotonic in income, it follows immediately that

$$\ell_i R_i \ell_i' \Leftrightarrow y_i^* \geqslant y_i^{*\prime}.$$

This shows that, just like subjective well-being under the consistency assumption, the equivalent income function is one possible "utility" function from the set of all positive monotonic transformations representing the same preference ordering. Contrary to life satisfaction scores, however, this specific cardinalization of the utility function does respect the Same-Preference Principle. This is immediately clear from Figure 3. The equivalent income uses only ordinal information about the shape of the indifference curves and is not sensitive to differences in aspirations or expectations captured by the satisfaction function S.

Recall that a measure that satisfies the Personal-Preference Principle (and, *a fortiori,* the Same-Preference Principle) does not satisfy the Dominance Principle. If, in Figure 3, Bob were in situation B" rather than in B, his equivalent income would not change (since B and B" are on the same indifference curve). He would still be better off than Ann, while B" is dominated by Ann's situation A. The figure also shows why this result is obtained: with his indifference curves which are "steeper", Bob gives a smaller weight to health than Ann and therefore suffers less from the fact that his health is not at the reference value.

Another way of interpreting the equivalent income refers to willingness-to-pay. It follows from expression (3) that

$$y_i^* = y_i - WTP_i(x_i \rightarrow \widetilde{x}; y_i, x_i), \tag{4}$$

where $WTP_i(x_i \rightarrow \widetilde{x}; y_i, x_i)$ denotes the willingness-to-pay of individual i for a move from x_i to $\widetilde{x}$. It is clearly conditional on the level of the actual income level y_i and the level

of other life dimensions contained in x_i. Since this willingness-to-pay can be large, it is obvious from expression (4) that the ranking of individuals on the basis of equivalent incomes can be very different from the ranking on the basis of their incomes. This is also illustrated in Figure 3, where Bob obtains a larger equivalent income than Ann, despite the fact that his income is smaller.

3.3.2 Concavity failures and choice of reference values

One of the reasons why the equivalent income approach lost popularity in the applied welfare economic literature was the finding by Blackorby and Donaldson (1988) that the equivalent income function $y_i^*(y_i, x_i)$ is not necessarily concave in income. As expression (4) shows, this will occur if $\partial^2 WTP_i/\partial y_i^2 < 0$. In general, the problem is avoided if preferences are homothetic. Blackorby and Donaldson (1988) then argued that using y_i^* as an indicator of individual well-being in a social welfare function may lead to undesirable redistributive consequences. A regressive income transfer (i.e. a transfer of *income* from someone with a low equivalent income to someone with a high equivalent income) might be seen as a welfare improvement. Of course, this point only concerns income transfers: a "transfer" of equivalent income itself will lead to an increase in the value of any social welfare function that is concave in equivalent incomes (and to a decrease in inequality with any inequality measure satisfying the Pigou-Dalton Transfer Principle).

A similar result has been found in the theory of fair allocation, stating that *any* approach —and not only an approach based on the equivalent income function— that

evaluates well-being on the basis of individual indifference curves may clash with a multidimensional Pigou-Dalton Transfer Principle (see Fleurbaey and Maniquet 2011). We return to this issue in Section 4, but note here already that the only way to avoid the problem is to work with a social welfare function that is of the leximin type, i.e., gives absolute priority to the worse-off.

A second point of criticism relates to the dependency of the equivalent income method on the choice of the reference parameters $\widetilde{x}$. The dependency is clear: if one moved the reference line in Figure 3 sufficiently downwards, the relative well-being positions of Ann and Bob would change. Yet, the fact that reference values have to be chosen does not mean that they are necessarily arbitrary (which is the position taken by Blackorby and Donaldson 1988, and Donaldson 1992). Given that we are looking for an answer to the normative question "equality of what?", normative choices are inevitable. It is then better to make them explicit, so that they are open to debate and scrutiny. This is precisely the approach taken in the literature on fair allocation. Fleurbaey and Maniquet (2011) provide many examples of applications of money-metric utility in which the reference is selected on the basis of clear normative principles. We will focus here on the choice of references for the calculation of equivalent incomes.

Suppose we want to compare the well-being of two individuals who are in the reference situation for all the non-income dimensions (e.g., in Figure 3 we would consider Alice in A' and Bert in B'). By definition, their equivalent income then coincides with their actual income —implying that the comparison of well-being levels for Alice and Bert reduces

to a comparison of their actual income levels, despite the fact that they have different preferences (Bert cares less about health). This example suggests a general criterion for choosing the reference situation. Reference values should be set in such a way that we can accept the implication that when all individuals are in the reference situation for the non-income dimensions, differences in preferences do not matter to determine who is worse or better off. Namely, if all individuals are in the reference situation, we can focus on income only.

When there exists a "normal" level for the non-income dimensions to which all individuals aspire, it seems natural to take this normal value as the reference. An obvious example is health, since we may assume that, despite some interpersonal differences, there is a large degree of consensus about what is a normal, unproblematic health level. Return to the example of Alice and Bert. It appears counter-intuitive to claim that a Pigou-Dalton transfer of income from Bert to Alice would lead to a more *un*equal distribution of well-being on the ground that Bert cares less about health, since they are both in normal health anyway. On the contrary, redistributing income may increase inequality when comparing two individuals at the same health level, when this health level is not the normal one. Indeed, it may happen that the richer individual cares more about health and therefore suffers more from this health condition than the poorer individual. Recall that a similar reasoning has already led us to the conclusion that deviations from the Dominance Principle can be justified when preferences differ. With this choice of reference, the equivalent income measures the welfare loss that results from deviations from

the "normal" level, and this loss is dependent on preferences, which can also be seen from expression 4).

However, it is not possible to define a normal level to which everybody would aspire, for all life dimensions. First, the idea of a "normal" level may be different for different individuals. Leisure (or hours worked) offers a challenging example. While it may be safe to assume that employment is desirable for everybody (and hence that being employed is a good choice for the reference), people are likely to have different ideas about what is a normal amount of hours of work (and hence of leisure time). Some individuals (academics?) love their work. Others only have access to unpleasant jobs —and while they prefer having a job to being unemployed, they would prefer to have to work as few hours as possible. As shown in Fleurbaey and Blanchet (2013), such differences can be accommodated by selecting individual-specific "normal" values as the reference. While this complicates the calculations, the interpretation still holds that the difference between income and equivalent income is the welfare loss that results from deviations from the normal level.

Second, even this personalized approach does not work well when the non-income dimension is unbounded and people have monotonic preferences over it. It is not interesting in this case to take the "best" or a very large reference value, because this would lead to extremely small equivalent incomes. A practical solution is then to pick some upper bound (or a variable such as the median) as the reference, but this remains rather ad hoc. More theoretical work is needed to solve this issue.[22]

[22] Difficult questions also arise if the commodity prices are part of the vector x. Fleurbaey and Blanchet

3.3.3 Freedom and responsibility

As was emphasized before, the most significant feature of the equivalent income approach is that it satisfies the Same-Preference Principle. It is important to note that this respect for preferences is in line with the perspective on personal responsibility that has been put forward by some prominent social philosophers. Rawls (1971, 1982) argued that treating persons as autonomous moral agents necessarily implies that they should assume responsibility for their goals and their conception of the good life. Dworkin (1981a,b, 2000) stresses that individuals should be held responsible for their preferences: in his view, an individual cannot sensibly identify with his own preferences about how to conduct his life and at the same time request compensation on the ground that his preferences are a sort of handicap.

This view on responsibility for preferences is not beyond criticism, however. In the literature on equality of opportunity and responsibility-sensitive egalitarianism, it has been attacked by authors such as Arneson (1989), Cohen (1989), and Roemer (1998).

(2013, Appendix A) suggest that it would be good to have a reference situation that is as close as possible to the actual market situation faced by the individuals. This intuition is indeed closely related to that of a "normal" value. They then suggest to take as a reference the so-called Scitovsky reference price, defined as the supporting price of the bundle λX (where X is the total actual consumption vector) that belongs to the lower boundary of the Scitovsky set (which contains the vectors of total consumption that can be distributed so as to keep all individuals on their current indifference curve). While they show that there are good reasons to pick this reference, the normative justification may appear less compelling than in the cases of health or (un)employment.

They claim that preferences are often the product of upbringing and social influences, for which individuals cannot be held responsible, and they instead advocate the "common-sense" view that individuals should be held responsible only for what they have genuinely chosen. This, however, raises similar questions as the ones that were encountered before when discussing the opportunity-set approach to capabilities. Choices are also determined by factors that are not under the control of the individuals. An attractive theory of responsibility as choice seems to require that one corrects for interpersonal differences in the environment and also for differences in the choice-making abilities of the individuals. Yet, this brings us on a slippery slope. Is there any room left for individual responsibility in a deterministic world, if we better and better understand and explain behavior? The question is especially acute within the paradigm of rational choice (Fleurbaey 2008). In this paradigm, genuine choice is an elusive notion, as individual decisions result from a mechanical optimization exercise with a given objective (preferences) and a given set of options (determined by the budget set and possibly additional constraints). On the other hand, the equivalent income approach makes use of the preferences that are one of the essential building blocks of the economic model. Recall, however, that one should be careful about equating "revealed" preferences with the *authentic* views of the good life that have to be respected.

Rawls (1971) already made the connection between respecting different conceptions of the good life and the notion of real freedom. In the same spirit, Fleurbaey (2008) defends the view that individuals should be put in good conditions of autonomy and freedom so

that they can be the master of their lives and participate fully in social interactions. He argues that respect for freedom implies respect for personal preferences. In this view, a policy that is successful in reducing inequality in well-being, defined as equivalent income, can also be seen as reducing inequalities in the real freedom of the individuals.

3.3.4 Measurement of preferences

Compared to the other methods proposed in this section, the equivalent income approach requires additional information. More specifically, for each individual one needs to know not only his actual situation in terms of the relevant life dimensions, ℓ_i, but also his preferences, R_i. While recovering this information may be hard, it is not a hopeless task. Nor is it a new problem. Economics has a long tradition in identifying preferences, both for market and for non-market goods. Three methods have been proposed and applied in the literature on equivalent income, each of them with its own strengths and weaknesses.

Revealed preferences The first method uses revealed preferences, i.e., preferences that are derived from an analysis of observed choice behavior. This approach is common in consumption and labor supply analysis. In fact, the first applications of money-metric utilities made use of it. As an example, King (1983) analyses the welfare implications of housing subsidies with equivalent incomes that are derived from observations of choices on the housing market. Recently, Decoster and Haan (2013) and Bargain et al. (2013) have estimated preferences over consumption-leisure combinations on the basis of a discrete labor supply model. The authors then derived estimates of equivalent incomes for different

choices of the reference values.

Within the perspective of the measurement of equivalent income, an important challenge for this approach is to incorporate preference heterogeneity in an adequate way. More generally, the method only works if individuals have a real choice and can be assumed to choose rationally. This observation points at two limitations. First, the revealed preferences approach cannot give information on the relative value of dimensions which are not chosen by the individual. An example is health: while it can be influenced by lifestyle choices to some extent, health remains largely outside the sphere of private decisions. Second, choice behavior does not always reveal the informed and authentic preferences of individuals. Human beings make mistakes or take decisions under imperfect information or under social pressure. Behavioral economics has shown that it is not always possible to identify preferences in such situations, since the outcomes of two different behavioral models (with different underlying preference relations) may be observationally equivalent in terms of choices (Bernheim 2009; Bernheim and Rangel 2009).

Stated preferences The second method is based on stated preferences and makes use of the contingent valuation methods that are typically used in environmental economics and in health economics to measure the subjective willingness-to-pay for goods that cannot be bought on a market.[23] The contingent valuation method consists in asking people to evaluate the income they would need in order to be as well off in different reference

[23] Other stated preferences methods (e.g. discrete choice analysis) could in principle also be useful to estimate preferences.

scenarios as they are currently. As expression (4) shows, as soon as the actual income of individuals and their willingness-to-pay to be in the reference situation is known, equivalent income can be computed easily. This method is indeed the most direct way to make the notion of equivalent income operational.

To analyze policies, it is generally not sufficient to register the willingness-to-pay and the equivalent income of the individuals. One also would like to derive information about their entire indifference map. Since the equivalent income function $y_i^*(y_i, x_i)$ is a representation of the preference ordering, observations on y_i^* (or on WTP_i) can be used to estimate the parameters of a utility function. Fleurbaey et al. (2013) have used this method to calculate equivalent incomes for income-health combinations with survey data collected in Marseilles.[24] The authors use the estimated parameters to derive a set of distributional weights that could be implemented in a cost-benefit analysis of medical interventions.

It is fair to say that within the economic literature there is no consensus about the validity of these stated preferences techniques. There are strong believers and at the same time ruthless critics. Two titles in a recent symposium of the *Journal of Economic Perspectives* summarize the debate. Carson (2012) claims that contingent valuation is a practical alternative when prices are not available, whereas Hausman (2012) argues that the results range from dubious to hopeless. This is not the place to settle this debate. Let us simply note that the applications in the context of equivalent income may be among

[24] A similar analysis with data from a representative survey in France is presented in Fleurbaey et al. (2012).

the least contested, since they are based on realistic and understandable alternatives, with which the respondents may have had some previous experience (like being in good health), rather than more esoteric alternatives (like the survival of a particular whale) with which they are not familiar.

Using satisfaction data The third method to estimate preferences makes use of the answers to a "satisfaction with life" (or happiness) question. At first sight, this may seem a surprising venture, given our earlier emphasis on the fact that the answers to these satisfaction questions do not satisfy the Same-Preference Principle. Yet, we have seen that the satisfaction function S_i can be interpreted as one utility function representing the preference ordering of individuals, *provided* the consistency assumption holds. By modeling carefully the effects of aspirations and expectations on subjective well-being, one can retrieve the ordinal information about preferences that is embodied in the satisfaction answers. This method is in line with a growing body of research that estimates willingness-to-pay for non-market goods through their effects on subjective satisfaction (see, e.g., Clark and Oswald 2002; van Praag and Ferrer-i-Carbonell 2007).

Denoting by π_i the individual characteristics of individual i, that are not seen as life dimensions but as factors that do influence life satisfaction (the scaling factors), we can rewrite the satisfaction function as $S(y_i, x_i; \pi_i)$. The equivalent income can then be computed by solving

$$S(y_i, x_i; \pi_i) = S(y_i^*, \widetilde{x}; \pi_i)$$

for y_i^*. If we adopt a log-linear approximation (which is the dominant model in the em-

pirical happiness literature), this yields

$$\ln y_i^* = \ln y_i - \sum_j \left(\frac{\partial S / \partial x_{ij}}{\partial S / \partial \ln y_i} \right) (\widetilde{x_j} - x_{ij}), \tag{5}$$

where the subscript j refers to the different life dimensions. Expression (5) shows that interpersonal variation in the psychological characteristics π_i will only influence the value of the equivalent income if it influences the marginal rates of substitution. Differences in scaling factors that only influence the satisfaction level, without affecting the relative weights given to the different dimensions, will not influence the estimated y_i^*. The satisfaction method has been used to calculate equivalent incomes by Fleurbaey et al. (2009) and by Schokkaert et al. (2011). In both papers it is shown that the ranking of well-being on the basis of subjective satisfaction differs considerably from the ranking of equivalent incomes.

Like the stated preferences approaches, the use of satisfaction data allows for the incorporation of non-choice dimensions in the evaluation. However, the precise specification of the function $S(y_i, x_i; \pi_i)$ and the identification of the relative effects of x_i and π_i raise difficult issues.[25] Most importantly, the method rests on the acceptability of the consistency assumption. To be useful, the satisfaction question should be formulated in such a way that it can safely be assumed to capture the respondent's cognitive views on what

[25] The treatment of education illustrates the problem. Having a good education may be seen as an important dimension of life (it is, e.g., emphasized by Nussbaum, 2000). At the same time, however, education may also have a direct influence on aspirations (e.g. with respect to job characteristics, as in Schokkaert et al., 2011). With the satisfaction approach it is impossible to disentangle the two effects.

constitutes a good life.[26]

3.3.5 What if preferences are incomplete?

The equivalent income approach, as described until now, rests on the assumption that well-defined individual preferences exist. Many researchers expressed their skepticism about the use of preferences. We have already seen that, in the light of the many instances of differences between "decision utility" (the perceived utility on which decisions are based) and "experience utility" (the real after-decision utility), some researchers from the subjective well-being approach suggest to focus on the latter in case of conflict. Their skepticism seems to be supported by the recent findings of behavioral economics that a large number of "behavioral anomalies" make it difficult to interpret individual choice behavior as the maximization of well-defined preferences. We have argued before that the latter point urges to focus not on revealed, but on "authentic" preferences.

Other researchers reject the idea that individuals "authentically" have a complete preference relation over all possible lives. The assumption of a complete preference relation over all possible lives is indeed a strong one, implying that individuals can order states with which they may not be familiar at all. The psychological uncertainty about preferences may be expected to be larger further away from the actual situation. To calculate healthy-equivalent incomes as depicted in Figure 3, for instance, one needs non-local information on the indifference curve. Is someone who has been chronically ill for a long time (or is handicapped since birth) able to evaluate trade-offs in a situation of normal health?

[26] See Fleurbaey and Blanchet (2013) on the wording of subjective satisfaction questions.

And, even if individuals have clear ideas about what a good life is for them, the available techniques to recover these preferences are still in their infancy and far from perfect. In fact, it is quite likely that different techniques will lead to conflicting results.

If one does not believe that authentic preferences do exist or can be recovered, one could conclude that the equivalent income approach to measuring well-being is not meaningful and that one has to go back to either more "objective" applications of the capability approach or the direct use of subjective satisfaction measures. An alternative approach, however, is to keep individual preferences as the underlying foundation for measuring individual well-being, but to accept that the preference relation is not complete if choices (or stated preferences) are conflicting and context-dependent. This route has been explored by Fleurbaey and Schokkaert (2013) who implement the notion of incomplete preferences (or choices) that was suggested by Bernheim and Rangel (2009) in the context of the measurement of individual well-being. They show that incomplete preferences can be accommodated by introducing upper and lower bounds to equivalent income. Figure 4 illustrates the suggested method for the example that was already used in Figure 3. Suppose the individual has the income-health combination depicted in Z. Imagine that his preference relation is incomplete: bundles in the region UC are seen as better by him, bundles in the region LC are worse, but bundles in the region NC are noncomparable to bundle Z. This way of modeling preferences embodies the natural assumption that individuals have finer preferences when comparing closer alternatives. Figure 4 then immediately shows (using the same assumption about the choice of the reference situation

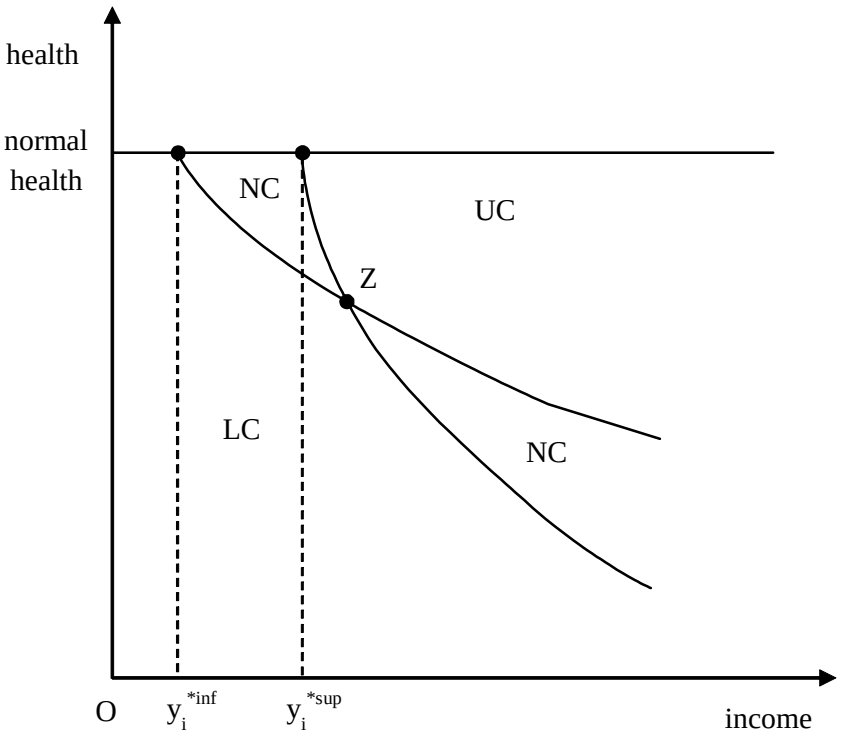

Figure 4: Equivalent income with incomplete preferences

as discussed before) that it is possible to derive an upper limit $y_i^{*\,\sup}$ and a lower limit $y_i^{*\,\inf}$ for the equivalent income. One can then argue that individual i is better off than individual j if $y_i^{*\,\inf} > y_j^{*\,\sup}$. Arguably, this condition is a stringent one and Fleurbaey and Schokkaert (2013) show how it is possible to weaken it so as to be able to compare more individual situations. The less stringent conditions do not preclude mistakes in interpersonal comparisons, but they prevent the evaluator from missing a situation in which the worse-off is really badly-off.[27]

[27]The idea is that if the evaluator is wrong about the worse-off in a pairwise comparison, the true worse-off is not as badly off as he could be if the mistake was in the opposite direction.

3.4 Conclusion

Choosing a meaningful measure of individual well-being for the analysis of inequality is a normative exercise. The underlying value judgment is the following: when is it ethically acceptable to say that one individual is worse off than another, in the sense that redistribution is desirable from a social perspective?

In this section, we focused on the normative foundations of the three most popular approaches to measure well-being in a multidimensional setting: the capability approach, the subjective well-being approach (with its two variants: hedonic and preference welfarism) and the equivalent income approach. If one interprets the capability approach in terms of (refined) functionings and one opts for a measurement tool that respects preferences, one arrives at the equivalent income approach. Yet, most followers of the capability model are skeptical about respecting preferences and the idea of trading-off different life dimensions against each other. In these concluding remarks, we will follow this dominant perspective on the capability approach.

A first ethical requirement for a measure of well-being could be that individual i is said to be better off than individual j, if he has higher achievements in all life dimensions compared to individual j. This is the so-called Dominance Principle. We have seen that this seemingly innocuous principle cannot be reconciled with respect for preferences and that it is therefore not satisfied by the happiness and equivalent income approaches. It can be satisfied by the capability approach, on the other hand, if the latter is implemented with an aggregation procedure that gives objective weights to all dimensions. This observation

immediately implies that the capability approach in this interpretation cannot respect preferences.

Respect for preferences comes in a weak and a strong form. The Personal-Preference Principle is satisfied by the subjective well-being approach, provided that the answers to satisfaction questionnaires are consistent with preferences. The Personal-Preference Principle is also satisfied by the equivalent income approach. Only the equivalent income approach satisfies the stronger Same-Preference Principle, which extends respect for preferences to interpersonal comparisons. The crucial difference between the two approaches is the treatment of aspirations and expectations, and hence of adaptation. These phenomena are taken up in the life satisfaction measure of well-being, whereas they are corrected for by the equivalent income approach. The hedonic version of the subjective well-being approach goes very far in its rejection of the relevance of preferences by putting forward that only ex post-feelings should matter to determine who is worse off. This appears to be a radical position, given the widespread observation that people care about more than their subjective feelings.

The choice of a metric of well-being has implications for the implied cut between personal and social responsibility. In its opportunity set interpretation, the capability approach holds people responsible for their choices. This can be harsh in the light of significant differences in the decision-making capacities of individuals. Correcting for these differences is probably easier when we turn to an interpretation in terms of refined functionings. The satisfaction approach compensates individuals with expensive tastes

(high aspirations) and will not compensate them if they adapt to poor physical conditions. The equivalent income approach evaluates individual achievements. However, since it evaluates these achievements on the basis of the own conceptions that individuals have about what is a good life, individuals are held responsible for these conceptions.

For practical purposes it is important to realize that the different perspectives on well-being also impose different informational requirements. If one deems that life satisfaction questionnaires yield meaningful answers, this approach is the easiest to implement. The hedonic approach requires that feelings be registered, ideally with a day reconstruction or an experience sampling method. Both the capability and the equivalent income approaches need information about the different life dimensions at the level of the individual. To calculate equivalent incomes one moreover has to know individual preferences. We discussed three methods to retrieve these preferences.

A final word of caution. The happiness literature has looked at the effect of economic inequality on life satisfaction (see also Chapter 14 in this Handbook). To give one example, Alesina et al. (2004) show that respondents report a lower level of happiness when inequality is high. This effect is larger and statistically more significant in Europe than in the US. More strikingly, there are also differences across groups. In Europe mainly the leftist and the poor suffer from inequality, while in the US the strongest negative effect is on a subgroup of leftist rich. This fascinating result might be explained by differences in perceived mobility. However, for our purposes it is important to be clear about the normative status of these findings. One interpretation is that people care about their

social environment, i.e., that perceived inequality (or injustice) is one of the relevant dimensions influencing the quality of their life. This can be easily incorporated in all three approaches in this section. Only the life satisfaction approach would go further, however, and would claim that inequality only matters from an ethical point of view if it influences satisfaction —which would imply that the fact that it is felt as less important in the US would also imply that it is indeed less important from an ethical perspective. This conclusion is not acceptable for the two other approaches. Both for the capability and for the equivalent income approach, inequality is a problem of justice and justice remains ethically important, even if people do not (seem to) care.

4 Multidimensional inequality and dominance

The route taken by most welfare economists to evaluate the multidimensional distribution of well-being consists of two steps. In a first step, an appropriate measure of individual well-being is derived by answering the question "equality of what?". In the previous section we studied three prominent answers to that question. In a second step, social welfare or inequality is measured consistently with the analogue of the Pigou-Dalton Transfer Principle defined in the space of the well-being measures, which have been obtained in the first step. As a consequence, the ethical attractiveness of the Pigou-Dalton Transfer Principle and the well-being measure are intimately linked.

An alternative, more direct route has been followed in the recent literature on multidimensional inequality. It consists of first generalizing the Pigou-Dalton Transfer Principle

towards a multidimensional framework and then imposing this principle directly in the multidimensional space of achievements. At first sight, this route appears to be shortcutting the problem of constructing a well-being measure in the initial step. We have seen indeed that a number of authors within the capability approach are reluctant to construct one single index of well-being. We will investigate whether the methods developed in the literature on multidimensional inequality allow studying the multidimensional well-being distribution without constructing such an index.

For this section, we introduce some additional information. Consistent with the previous section we assume that a social situation can be described as $(\ell_i, R_i, S_i)_{i=1}^n$. In addition, it will turn out to be convenient to summarize only the achievements of all individuals by means of a so-called distribution matrix. Below we give an example of a distribution matrix L of a society with n individuals and m dimensions of life. Let ℓ_i^k be the achievement of individual i in dimension k. As before, ℓ_i refers to the m-dimensional vector of all achievements of individual i (a row of the matrix), and ℓ^k refers to the n-dimensional vector of achievements of all individuals in dimension k (a column of the

matrix).

$$L = \begin{bmatrix} \ell_1^1 & \dots & \ell_1^m \\ \ell_2^1 & \dots & \ell_2^m \\ \vdots & \vdots & \vdots \\ \ell_n^1 & \dots & \ell_n^m \end{bmatrix} \begin{matrix} \leftarrow \text{Individual 1} \\ \leftarrow \text{Individual 2} \\ \vdots \\ \leftarrow \text{Individual } n \end{matrix} \qquad (6)$$

$$\begin{matrix} \uparrow & & \uparrow \\ \text{Dim. 1} & \dots & \text{Dim. } m \end{matrix}$$

The literature on multidimensional inequality studies how to summarize the information in a distribution matrix by means of a single numerical value.[28] By taking a distribution matrix as the only information basis, it is clear that the standard multidimensional social welfare measures proposed in the literature are not sensitive to the preferences held in the society. We return to this topic in the next subsection.

4.1 Two-step aggregation and cumulative deprivation

Although the aggregation of a distribution matrix into a numerical value is not always performed by an explicit two-step procedure, most of the existing multidimensional measures

[28] We refer the reader to Chapter 4 in this handbook or to Weymark (2006) for detailed surveys on the literature on multidimensional inequality. Following Kolm (1977), a measure of multidimensional inequality can be derived from a measure of multidimensional social welfare as the fraction of the aggregate amount of each dimension that could be destroyed if every dimension of the matrix were equalized while keeping the resulting matrix socially indifferent to the original matrix. We will focus primarily on measures of social welfare in this section.

combine two one-dimensional aggregations. One aggregation is across the n individuals in the society. The other aggregation is across the m dimensions of well-being. Different multidimensional measures of social welfare differ in the functional specifications of both aggregations and in the sequencing of both steps.

Let us describe two procedures to sequence this two-step aggregation. In the first procedure, we first aggregate across the different individuals in each dimension. In this step we obtain for each dimension a single summary statistic, so that an m-dimensional vector of summary statistics is generated. In the second step, this vector is further aggregated across dimensions. Kolm (1977) calls this procedure a *specific* one. Pattanaik et al. (2012) refer to it as the column-first two-step aggregation procedure. In the second procedure, the order of aggregation is reversed: in the first step one aggregates for each individual i the dimensions of well-being, which generates a measure of well-being. All the obtained well-being measures generate an n-dimensional vector of individual well-being measures. In the second step, this vector is aggregated across individuals. Following Kolm (1977) this second procedure will be referred to as an *individualistic* one, or a row-first aggregation procedure according to Pattanaik et al. (2012).

In general the two procedures lead to different results (see Kolm 1977, Dutta et al. 2003, and Decancq and Lugo, 2012). Most theoretical multidimensional inequality measures follow the individualistic procedure and aggregate first across dimensions and then across individuals. Some authors have followed the other track, however. A notable example is provided by Gajdos and Weymark (2005) who impose separability between

dimensions. Imposing this requirement brings them to a specific procedure. Specific procedures have the operational advantage that they allow the use of different information sources for the different dimensions of well-being. The summary statistic of one dimension may come from one survey, whereas the summary statistic of another dimension may be based on a different survey. A prominent example of such an approach is the Human Development Index (HDI) that will be discussed in more detail in the next section.

The flexibility of the specific procedure with respect to the data sources comes at a (high) price however. The second aggregation function used in a specific procedure aggregates across the different dimensionwise summary statistics. This aggregation may appear to be largely arbitrary. Contrary to an aggregation across dimensions of well-being at the individual level, a theoretical framework for aggregation of summary statistics is indeed missing. This arbitrariness probably underlies the reluctance of various researchers and statistical agencies to pursue an aggregation of summary statistics. A portfolio or dashboard of separate summary statistics, which each can be monitored in separation, is often presented as alternative. This method is consistent with the view that different dimensions of life are incommensurable, as we have encountered, e.g., in our overview of the capability approach.

Irrespective of the choice whether and how the summary statistics are aggregated in its second step, a specific procedure has an additional drawback. An important aspect of the information on well-being is lost, namely the correlation between the positions of the individuals across the different dimensions (see Decancq 2013 for a discussion). When

the dimensions of life are correlated, deprivations in one dimension are cumulated with deprivations in other dimensions. Compare, for instance, the following two distribution matrices L and L' :

$$L = \begin{bmatrix} 10 & 10 \\ 20 & 70 \\ 70 & 20 \end{bmatrix} \quad L' = \begin{bmatrix} 10 & 10 \\ 20 & 20 \\ 70 & 70 \end{bmatrix}.$$

In both matrices, there are two dimensions of life (columns) and three individuals (rows). It is easy to see that each of the four dimension-wise distributions is the same and hence that each specific aggregation across individuals should lead to exactly the same result. Yet, in the distribution matrix L', there is one individual who is bottom-ranked in both dimensions of life, another individual who is second-ranked in all dimensions and still another individual who is top-ranked in all dimensions. This society is arguably more unequal than the society represented by L with exactly the same distributional profile in each dimension, but where the achievements of individuals two and three are more mixed. It seems natural to require that the multidimensional evaluation is at least sensitive to the degree to which deprivations in each dimensions are cumulative across dimensions. Pogge (2002, p. 11), for instance, writes: "Consider institutional schemes under which half the population are poor and half have no access to higher education. We may plausibly judge such an order to be more unjust when the two groups coincide than when they are disjoint (so that no one bears both hardships)".

The above example illustrated that all measures obtained through a specific procedure are blind to the correlation between the dimensions of life. It follows that a concern for

correlation or an aversion to cumulative deprivation rules out the specific (or column-first) sequencing of both aggregations as well as dashboard approaches.[29] This brings us to the alternative, individualistic sequencing in which the dimensions of life are first aggregated for each individual and then across all individuals. Interestingly, this procedure coincides with the welfare economic approach surveyed in the previous section. While the literature on multidimensional inequality measurement offers a coherent axiomatic justification for the functional specification of the various measures, the link between the formal axioms used (such as homotheticity or separability) and the normative foundations of the implied well-being measure is usually not explained in detail, however.

4.2 Multidimensional Pigou Dalton transfer principles and respect for preferences

A central question in the literature on multidimensional inequality deals with the generalizations of the standard one-dimensional Pigou-Dalton Transfer Principle and the restrictions that each of these generalizations impose upon the functional specifications of the aggregation across dimensions and individuals.[30] In this section we are particularly concerned with the question whether such generalizations can be reconciled with a general respect for individual preferences.

[29] See Dardanoni (1995), Gajdos and Weymark (2005) and Pattanaik et al. (2012) for formal discussions.

[30] See Weymark (2006) and Fleurbaey (2006b) for surveys.

4.2.1 Multidimensional Pigou-Dalton transfer principle(s)

In a one-dimensional setting, a Pigou-Dalton transfer consists in transferring a positive amount of income from a richer to a poorer individual without reversing the ranking between both individuals. A natural generalization into a multidimensional framework is the following (see Fleurbaey 2006b and Fleurbaey and Maniquet 2011).

Pigou-Dalton Transfer Principle $(\ell_i, R_i, S_i)_{i=1}^n$ is strictly better than $(\ell'_i, R_i, S_i)_{i=1}^n$, if for all individuals $k \neq i, j$, we have that $\ell'_k = \ell_k$, and for individuals i and j, we have that for $\delta \in \mathbb{R}^m_+ \setminus \{0\}$

$$\ell'_i = \ell_i + \delta \leq \ell_j - \delta = \ell'_j. \tag{7}$$

A positive bundle δ is transferred from a donor j to the recipient i, where the donor has achievements which are at least as good as the recipient in all dimensions of life. In the axiomatic literature on multidimensional social welfare, on the other hand, it is more common to work with transfers where the transferred bundle is a fraction of the difference between the achievement vector of donor and recipient of the transfer, so that $\delta = \lambda(\ell_j - \ell_i)$. Moreover, often expression (7) is replaced by the following expression,

$$\ell'_i = \ell_i + \lambda(\ell_j - \ell_i) \text{ and } \ell'_j = \ell_j - \lambda(\ell_j - \ell_i), \tag{8}$$

for $\lambda \in (0, 1)$.[31] The most important difference between expressions (7) and (8) is the fact that the achievements of the donor of the transfer should no longer be larger than the

[31] Any sequence of these transfers can be written as a bistochastic matrix (see Weymark 2006 for details). The converse of this statement does not always hold. When $n \geq 3$ and $m \geq 2$ not all bistochastic matrices

achievements of the recipient in all life dimensions. Consequently, the transfers may go in opposite directions for different dimensions. Consider the following distribution matrices L and L'' as example, where

$$L = \begin{bmatrix} 10 & 10 \\ 20 & 70 \\ 70 & 20 \end{bmatrix} \quad L'' = \begin{bmatrix} 10 & 10 \\ 50 & 40 \\ 40 & 50 \end{bmatrix}. \tag{9}$$

One easily checks that a transfer of 30 units is carried out between individual 2 and 3 in distribution matrix L to reach matrix L''. In the first dimension the units are transferred from individual 3 to individual 2, whereas in the second dimension the 30 units are transferred in the other direction from individual 2 to individual 3.

This example illustrates a fundamental problem with using expression (8) in a richer setting where individuals may have different preferences (Fleurbaey 2006b). Distribution matrix L'' is obtained from L by a multidimensional transfer. Yet, individual 2 may prefer his bundle in the distribution L to the one in L'', as he may give more weight to the second dimension. Also individual 3 may prefer his bundle in the distribution L, if he cares more about his achievement in the first dimension. The transfers may therefore go against unanimous individual opinions on the change in well-being. At first sight, this

can be obtained as a sequence of transfers described by expression (8) (Marshall and Olkin 1979, p. 431). The class of multidimensional transfers that can be expressed by means of a bistochastic matrix is the workhorse of many (axiomatic) studies of multidimensional inequality. It has the advantage of imposing a clear structure on the functional specifications of the aggregation across dimensions and individuals. (See, e.g., Kolm 1977 and Tsui 1995).

problem seems to be avoided by restricting the transfers to cases where the donor vector-dominates the recipient, as in the definition of a multidimensional Pigou-Dalton transfer based on expression (7), so that there is an unambiguous recipient who benefits from the transfer and an unambiguous donor whose well-being is worsened. Yet, we will now see that even these transfers are incompatible with a respect for preferences.

4.2.2 The impossibility of a Paretian egalitarian

Let us assume, as in the previous section, that all individuals have an informed judgment about what a good life is. Respect for these individual opinions may in this context be expressed by the following Pareto condition:

Weak Pareto Principle $(\ell_i, R_i, S_i)_{i=1}^n$ is strictly better than $(\ell'_i, R_i, S_i)_{i=1}^n$ if for all i, $\ell_i P_i \ell'_i$.

The (Weak) Pareto Principle and the multidimensional Pigou-Dalton Transfer Principle conflict as soon as at least two individuals have different preferences. This impossibility result is intuitive. The Pareto Principle requires that individual preferences are respected, whereas the multidimensional Pigou-Dalton Transfer Principle advocates some transfers irrespective of the individual preferences. Figure 5 illustrates a simple graphical proof (see Fleurbaey and Maniquet 2011 (Theorem 2.1) and also Fleurbaey and Trannoy 2003). The Pareto Principle requires that distribution matrix L^1 is strictly better than L^4, because for all individuals the achievement vector in L^4 is below the indifference curve containing the achievement vector in distribution matrix L^1. Similarly, L^3 is strictly better than L^2.

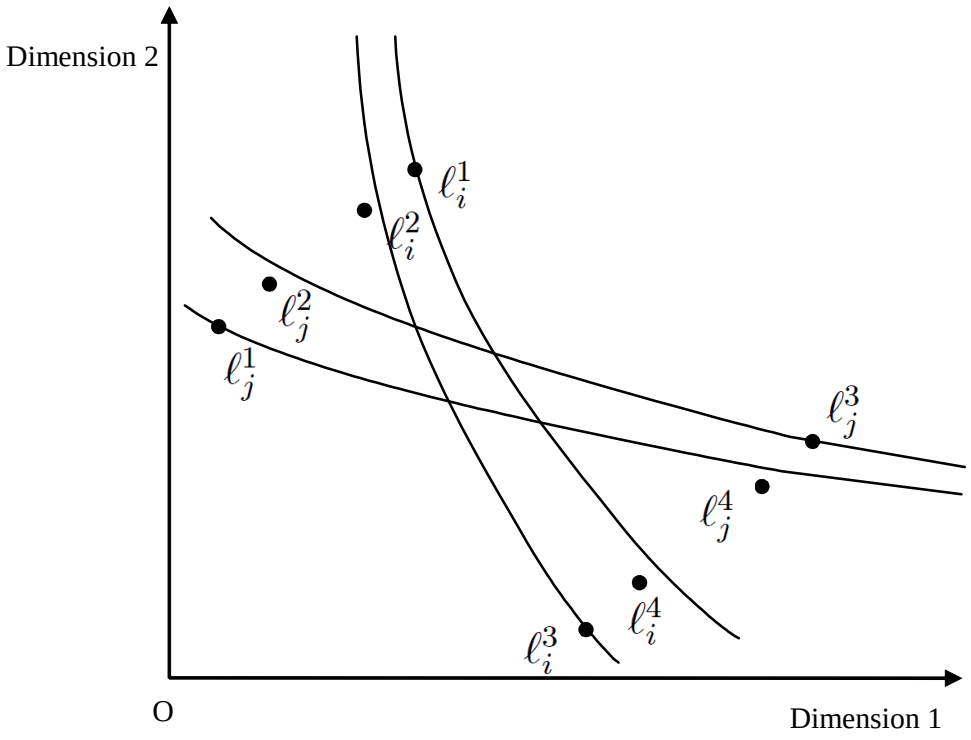

Figure 5: Impossibility of a Paretian egalitarian

On the other hand, the multidimensional Pigou-Dalton Transfer Principle requires that L^2 is strictly better than L^1, and L^4 is strictly better than L^3, which creates a cycle.

This impossibility reflects a deep tension between two ways of interpreting what it means to respect unanimous preferences. As the donor of the transfer has a higher achievement in all dimensions of life than the recipient, all individuals with monotonic preferences will agree that the donor is indeed better off, so that a transfer from the donor to the recipient is a social improvement. On the other hand, it may be the case that all individuals are indifferent between the current distribution and a new one, where the initial donor now has a lower achievement in all dimensions of life than the initial recipient. Note

that the same tension is underlying the incompatibility between the Personal-Preference Principle and the Dominance Principle that was discussed in the previous section.

The impossibility result brings us to a crossroad. We can take two directions from here. Either we give priority to the Pareto Principle and look for appropriate weakenings of the multidimensional Pigou-Dalton Transfer Principle. This route is taken by Fleurbaey and Maniquet (2011), amongst others. A natural weakening of the multidimensional Pigou-Dalton Transfer Principle is to impose the additional requirement that both donor and recipient of the transfer should have the same preferences, i.e., agree on the good life. This restricted transfer principle is arguably a weak one (as it remains silent on the evaluation of all transfers where donor and recipient disagree on the good life), yet in terms of implications on the social welfare function it turns out to be very strong. Together with the Pareto Principle and the requirement that the comparison of two allocations only depends on the indifference curves at these two allocations, it imposes a leximin aggregation across individuals that gives priority to the worse-off. This result echoes our earlier findings when we described the problems with the non-concavity of the equivalent income in the previous section.

Alternatively, one can give priority to the multidimensional Pigou-Dalton Transfer Principle. This implies that the resulting social evaluation procedure will not be able to respect individual preferences. The literature on multidimensional inequality measurement has taken this second route by assuming that the well-being of a society can be described using information on achievements alone (i.e. a distribution matrix), disregarding

information on the preferences of the individuals themselves.[32] This assumption imposes the requirement that the social welfare function is anonymous in the achievement space (see, for instance, Kolm 1977, Tsui 1995, and Weymark 2006). A social welfare function is anonymous in the achievement space whenever permuting individual achievement vectors is a matter of social indifference. As a consequence, the well-being measures used to aggregate across dimensions are identical for all individuals. This assumption is defended as requiring equal treatment of all individuals i with the same achievement bundle ℓ_i either because the observer is unable to distinguish between other possibly relevant individual characteristics (such as the individual opinions on what constitutes a good life) or because the observer considers the other individual characteristics to be ethically irrelevant.

In his seminal article Kolm (1977) suggests that a common well-being measure can be seen as "the observer's evaluation of the individual welfare". Alternatively, the common objective opinion on the good life is rooted in some "reasoned social agreement on basic components of well-being and on the relative 'urgency' of claims to different goods" (Scanlon 1975). These options are closely linked to the perfectionist approach and the focus on public reasoning that we found within the capability approach by Nussbaum and Sen respectively.

[32] For a more subtle weakening, see Sprumont (2012).

4.3 Dominance and agnosticism on preferences

Whether a social agreement on the components of well-being can effectively be reached is doubtful. Yet, even if it is hard to reach a social agreement on which common well-being measure to use, it may be possible to reach an agreement on some of its basic features while remaining agnostic on other features. This agnosticism comes at a price, as the social evaluation criterion will become incomplete and indecisive on the comparison of some social situations.

The dominance approach studies these incomplete orderings. In their seminal contribution, Atkinson and Bourguignon (1982) extend the existing one-dimensional dominance approach to a multidimensional framework.[33] A distribution matrix is said to dominate another one if the sum of well-being measures is greater for each and every well-being measure in a given set of measures that satisfy certain sign-restrictions on its partial derivatives.

In general, the class of measures that satisfy given sign restrictions contains infinitely many members, so that checking for dominance involves checking infinitely many inequalities. Luckily, dominance with respect to classes of well-being measures can be shown to be equivalent with implementable criteria. In a two-dimensional framework, Atkinson and Bourguignon (1982) show, for instance, that dominance with respect to the class of

[33]Related approaches focus on the measurement of inequality, rather than social welfare. These approaches start from a multidimensional generalization of the Lorenz criterion, based on the so-called zonotope (Koshevoy 1995). Unfortunately, the equivalence between second-order stochastic dominance and the Lorenz criterion breaks down in the multidimensional case.

increasing well-being measures with a negative cross-derivative is equivalent to first-order stochastic dominance in terms of the joint distribution functions corresponding to the distribution matrices. Various statistical tests have been developed to test whether distribution functions first-order stochastically dominate one another (see Chapter 7 of this Handbook). By imposing a negative cross-derivative, the marginal increase in well-being from having a small increase in the achievement of the first dimension decreases with the level of the achievements in the second dimension. In other words, if some manna would become available in the first dimension, the social planner prefers it to go to the worse-off individual in the second dimension. This restriction introduces again some aversion to correlation and cumulative deprivation between the two dimensions of well-being. Atkinson and Bourguignon also looked for the consequences of imposing further restrictions on the partial derivatives, and later work has extended these results (see Trannoy 2006 and the references therein). The more sign-restrictions are imposed, the more complete the ordering becomes. However, the results become arguably harder and harder to interpret, as higher order cross-derivatives are involved.

The dominance approach moves us away from the perfectionism that is implicitly underlying approaches that impose a single well-being measure for all individuals. Yet, the unanimous judgment of a class of social welfare functions remains based on a common well-being function for all individuals, so that the dominance approach ignores the diversity of individual preferences. Whether one finds this problematic or not depends on the attitude one takes towards the idea of respecting preferences. Multidimensional inequality

measures and dominance approaches are arguably the best way to proceed if one believes that individuals do not have well-defined conceptions of the good life, *or* that, even when they exist, it is impossible to know them, *or* that, even when they exist and one can approximate them, one should not do so but rather implement an objective conception of the good life. Again, this is an essentially normative debate.

5 Applications

While our discussion so far has remained at an abstract level, the different positions described suggest different approaches to many applied issues that are of great importance for measuring inequality. An important application is the booming literature on socioeconomic inequality and racial disparities in health, in which the issue of cumulative deprivation (with respect to income and health) plays a crucial role. Since this literature has been discussed in great detail in Fleurbaey and Schokkaert (2012), we will not repeat this analysis here. We will illustrate the practical relevance of the previous sections by focusing on three applications. We first discuss the issue of household equivalence scales and (related to that) the measurement of intrahousehold inequality. We will then look at the different methods that have been proposed to include the value of public goods and services into the analysis of inequality. Our third application is the analysis of world inequalities, including a discussion of purchasing-power parity indices. In each of these subsections, we do not go into the technical details but focus on the relationship with the normative analysis in the previous sections.

5.1 Household equivalence scales

It is widely agreed that the quality of social relations is one of the most important dimensions of life. For many people this is particularly true for their relationship with a partner and the quality of their family life. Also the presence of children changes life deeply (for better or for worse). Therefore, it seems natural to include these family-related dimensions in a broader view of well-being. Family relations have been introduced in the capability approach, often with a focus on gender issues (see, for instance, Nussbaum 2000 and Robeyns 2003). Moreover, family relations have been shown to have a strong effect on happiness or life satisfaction. A famous example is offered by Blanchflower and Oswald (2004). The authors estimate that a lasting marriage (compared to widowhood as a natural experiment) is worth $100,000 a year. As far as we know, there are no applications in the equivalent income tradition yet.[34] It would not be difficult to derive equivalent incomes on the basis of a life satisfaction equation, however, and the marginal rate of substitution estimated by Blanchflower and Oswald shows that the willingness-to-pay for a good family life is likely to be considerable.

In these studies, the ultimate goal is to measure well-being as an aggregate over many dimensions. This has also been the perspective of Section 3. It is instructive to compare this perspective to that taken by the large body of literature that tries to calculate so-called equivalence scales. The basic question to be answered by this approach is the

[34] Household size plays an important role in the application of Fleurbaey and Gaulier (2009), but this application is at the country level - see section 5.3.

following: "How much income does a household with characteristics z need to reach the same level of well-being as a reference household?", where the latter is usually —but not always— taken to be a single. Therefore, the proclaimed ambition of this literature is also to compare the well-being of different households. The problem that researchers working in this field want to tackle is that income (and consumption) are usually reported at the level of the household and not at the level of the individual. Yet, it is obvious that living in a household involves returns to scale, including the consumption of household public goods. Think about housing or about the use of a car, for instance. It is natural to assume that a couple needs less than twice the income of a single to reach the same level of well-being. The challenge is then to try to correct reported incomes at the household level to take into account differences in household composition.

This is a very old problem, about which no consensus has been reached yet. As a matter of fact, despite the large academic literature on the topic, most practitioners are still using equivalence scales without a coherent theoretical foundation. A typical example is the so-called modified OECD scale used by Eurostat, in which the first adult counts for 1, the second adult and each subsequent person aged 14 and over counts for 0.5, and for each additional child under 14 one adds 0.3. The household income is then divided by this scale to get the "equivalized income".[35] Alternatively, the OECD divides the household income by the square root of the household size. In both cases the reference household (for which the equivalized income equals the original income) is a single. The

[35] We use the term "equivalized income" to denote the income divided by an equivalence scale. This is to be distinguished from the "equivalent income" that was introduced in Section 3.

lack of consensus about the exact scale to be used has also stimulated the use of stochastic dominance approaches (Atkinson and Bourguignon 1987; Bourguignon 1989; Fleurbaey et al. 2003; Ooghe and Lambert 2006). We will not summarize the large literature on equivalence scales here, but rather focus on the differences and similarities with the approaches to measuring well-being that are the topic of this chapter.

Using the cost function $C(u, p, z)$ to denote the minimum expenditure needed by a household with characteristics z to reach utility level u if prices are p, and denoting the reference household characteristics by $\overline{z}$, the equivalence scale is defined as

$$ES(u, p, z) = \frac{C(u, p; z)}{C(u, p; \overline{z})}, \tag{10}$$

and the equivalized income as

$$y_E(u, p, z) \equiv \frac{y}{ES(u, p, z)} = y\frac{C(u, p; \overline{z})}{C(u, p; z)} = C(u, p; \overline{z}).$$

By far most attention went to the derivation of equivalence scales on the basis of observed consumption behavior. Traditionally, the analysis of consumption behavior was based on the assumption of a "unitary" household, with preferences and optimization behavior defined at the level of the household. To go beyond the household level and compute individual well-being, it was then commonly assumed that all household members experience the same well-being level. It is clear that in this approach the calculation of equivalence scales requires interpersonal comparisons of well-being between households of different sizes. It is not easy, however, to give an intuitively attractive interpretation to well-being at the level of the household. More importantly, it is immediately obvious that

consumption data do not yield sufficient information to allow for such inter-household comparisons of well-being. More specifically, what we can (under some conditions) identify are different sets of indifference curves (one for each household type), but observed consumption does not give us any clue about how to link these indifference curves to utility levels. Stated more formally, the cost functions $C(u, p, z)$ and $C(\delta(u, z), p, z)$ will induce exactly the same consumption behavior —where the transformation $\delta(u, z)$ may depend on z.

Identification of the equivalence scales can only be achieved by introducing additional assumptions. The most famous of these is the so-called IB-assumption, where IB stands for "independence of base" (Lewbel 1989).[36] This assumption states that the equivalence scale is independent of utility, i.e. $C(u, p; z) = C(u, p; \overline{z})EB(p, z)$, where $EB(p, z)$ refers to an equivalence scale that satisfies the IB-assumption. This assumption implies a restriction on the cost functions and therefore leads to testable restrictions on the consumption behavior of different households. A crucial part of the identifying assumption is not testable, however, notably the assumption that all households with the same value for $y/EB(p, z)$ indeed reach the same level of utility.

How to interpret this approach in the light of our broader questions about well-being? First, the concept of well-being used is a restricted one. In fact, as argued in the short but influential paper by Pollak and Wales (1979), equivalence scales as derived from consump-

[36]The same assumption has been proposed by Blackorby and Donaldson (1993) under the name "equivalence-scale exactness". It has later been generalized by Donaldson and Pendakur (2003), but this generalization does not solve the basic issue described here.

tion behavior do not include the direct effects of z on utility —and unless one includes choice of household size in the analysis, choice behavior can never reveal any information about preferences with respect to household size. Pollak and Wales draw a distinction between *situation comparisons* and *welfare comparisons*. Situation comparisons are based on the conditional cost function, giving the minimum expenditures needed to reach a given utility level u, conditional on having characteristics z. Welfare comparisons, on the other hand, require the estimation of an unconditional cost function, giving the minimum expenditures needed to reach a given utility level u, taking into account the direct effect of the characteristics z on utility. In fact, Pollak and Wales are critical of the traditional approach and state that "conditional equivalence scales estimated from observed differences in the consumption patterns of families with different demographic profiles cannot be used to make welfare comparisons" (Pollak and Wales 1979, p. 220). Unconditional utility (or cost) functions are the representation of preferences over bundles of life dimensions, with household characteristics z as elements of those bundles. Pollak and Wales therefore reject the relevance of traditional equivalence scales and advocate the use of the methods that have been described in the previous sections.

Many (or even most) authors studying equivalence scales take a less negative position and argue that situation comparisons, despite their limitations, are meaningful on their own. They do not yield real welfare comparisons, because they do not take into account the direct effect of family life (having a partner and children) on well-being. However, they do make sense in a resource-based approach, focusing on incomes and ma-

terial consumption only. Some would even claim that inequality in material welfare, as measured by equivalized incomes, is more relevant for policy purposes than inequality in overall well-being, as it is not generally accepted that households should be compensated, e.g., for the fact of having children or not. The relevant question then becomes whether the IB-assumption that the equivalence scale is independent of utility is attractive from a normative point of view. This turns out to be a difficult question as the concepts of preferences and utility are difficult to interpret when applied at the level of the household.

As a matter of fact, this issue extends beyond the problem of correcting for household size. Similarly, one can calculate equivalence scales for other characteristics z. As an example, Jones and O'Donnell (1995) present equivalence scales for disability, focusing on "the extra expenditure required by a household with a disabled person to achieve the same level of welfare as a reference household without any disabled individuals". In such a context of disability, the distinction between situation and welfare comparisons seems even more relevant, although (as noted by the authors) in this setting one can consider these extra expenditures as a lower bound on the welfare loss resulting from disability.

A major drawback of the traditional approach is its assumption that preferences and welfare can be defined at the level of the household. It is much more natural to see the household as consisting of individual members, each with their own individual preferences and deciding jointly about household consumption.[37] In this respect, an important recent breakthrough has been the move from the "unitary" to the "collective" model of house-

[37] Early examples of this approach are Manser and Brown (1980) and McElroy and Horney (1981).

hold behavior (Chiappori 1988; Apps and Rees, 1988). Some goods are purely private (food or clothing), others are public, and some may be mixed (a car can be used by all household members to make a trip jointly, but it can also be used by only one member of the household). Household resources are allocated to the consumption of each of the household members on the basis of a sharing rule. This rule reflects the relative power positions of the different household members. Finding the restrictions needed to identify the individual preferences of the household members and the sharing rule on the basis of observed consumption behavior in a setting with joint consumption and externalities is a very active and rapidly expanding field of research. This literature is discussed extensively in Chapter 17. Here we focus on the crucial relevance of this work for measuring individual well-being. Indeed, moving from the unitary to the collective model is an important advance in this regard.

A first approach to measuring individual well-being focuses on the sharing rule. If one reasons within a resource-based approach, the share of resources devoted to the consumption of individual i (as influenced by the distribution of power within the household) is an important indicator of his relative well-being level. Identification of the level of the sharing rule is not easy and requires additional restrictions, but Cherchye et al. (2013) show that upper and lower boundaries can be identified in a non-parametric setting. Applying their method to observations in the 1999-2009 Panel Study of Income Dynamics on childless couples where both adult members participate in the labor market, leads to some interesting insights. As an example, while 11% of their restricted sample have

incomes below the two-persons poverty line, between 16% to 20% of individuals are below the individual poverty line. Using semiparametric restrictions, Dunbar et al. (2013) identify the resource shares of different household members, including children. Using data for Malawi, they find that the overall poverty rate calculated at the household level understates the incidence of child poverty.

The sharing rule-approach defines well-being in terms of income. For our purposes, another application of the collective approach is more relevant, however. Given that (under some assumptions) it is possible to identify individual preferences, one can formulate an answer to the question: "How much income would an individual living alone need to attain the same indifference curve over goods that the individual attains as a member of the household?" (see, e.g., Lewbel 2003; Browning et al. 2013). There is an essential difference between this question and the one that was formulated earlier in the context of traditional equivalence scales. To answer this question one just needs information about the indifference map of the individual, without having to label them. The resulting so-called "individual indifference scales" are closely related to the notion of equivalent income, since they obviously are a form of money-metric utility that can be calculated on the basis of ordinal preference information only. Indifference scales will depend on these preferences, on the "consumption technology" used by the household (in terms of private, public and mixed goods) and on the sharing rule, i.e., the distribution of power within the household. Applications of this approach have focused, among others, on the adequate compensation in case of wrongful death (Lewbel 2003) and on poverty among the elderly

(Cherchye et al. 2012).

While the introduction of the collective model constitutes an important step forward, it does not bridge the gap between welfare and situation comparisons. Indifference scales do not capture the direct utility effects of partnership and children and remain therefore situated within a resource-based approach. They therefore do not yield a complete measure of well-being taking all relevant life dimensions into account. Whether one considers this to be a problem or not, depends on whether one thinks that resource-based (situation) comparisons are relevant from a policy point of view.

Until now, we discussed the approach to equivalence scales that focuses on observed consumption behavior. Since the focus is on identifying individual preferences, this approach is close to the intuitions underlying the equivalent income approach. Let us now see how the two other approaches to well-being measurement have been applied to tackle the equivalence scales problem.

There are almost no applications within the capabilities framework. Lelli (2005) calculates the equivalence scale of a household with characteristics z as the income needed to reach the same level of functioning (in her case housing) as the reference household. Her application thus remains limited to one functioning —and the resource-based perspective underlying this analysis goes in fact against the basic inspiration of the capability approach.

The subjective (or satisfaction) approach has been used more extensively for the construction of equivalence scales. The pioneering work in this field has been done by Van

Praag (1971) and Kapteyn and Van Praag (1976). Originally, these authors assumed that there was a cardinal utility function of income $U(y; z)$, where z represents - as before - all relevant non-income variables. They assumed (on the basis of a theoretical reasoning) that this utility function takes the form of a lognormal distribution function $U(y; \mu(y^A, z), \sigma(y^A, z))$, with the mean and the standard deviation dependent on z and on the actual income y^A of the household. The parameters of that function were estimated on the basis of the answers obtained from what was called the "Income Evaluation Question" (Van Praag 1971). This question goes as follows:

> "Please try to indicate what you consider to be an appropriate amount for each of the following cases. Under my (our) conditions I would call a net household income per week/month/year of:
>
> about_____ very bad
>
> about_____ bad
>
> about_____ insufficient
>
> about_____ sufficient
>
> about_____ good
>
> about_____ very good."

Giving specific values to the labels allowed them to estimate the utility function, and hence to derive equivalence scales as in expression (10). This original Van Praag-approach has never become very popular, partly because of the strong assumptions of cardinality and lognormality.

In later work (e.g., Van Praag and van der Sar 1988), the cardinality assumption was dropped and the only assumption that was retained was that the different labels (from "very bad" to "very good") correspond to the same utility values for all individuals, i.e., that they were interpersonally comparable. Denoting the answers given by individual i for label k by c_{ik}, Van Praag and van der Sar (1988) then specify and estimate a (loglinear) function $c_{ik}(y_i, z_i)$:

$$\ln c_{ik} = \beta_{0k} + \beta_{1k} \ln z_i + \beta_{2k} \ln y_i + \epsilon_{ik},$$

where z_i is the size of individual i's household and ϵ_{ik} is an error term. The coefficients β_{2k} turn out to be highly significant. Respondents with a higher income evaluate the income needed to reach a given utility level as significantly higher than respondents with a lower income. Van Praag talks about a "preference drift" effect and there is clear echo of the phenomenon of adaptation that has been discussed before. Taking this preference drift into account one can derive that the "true" cost level needed to reach utility level k is found where $c_{ik} = y_i$, i.e.

$$\widehat{c}_k(z) = \exp\left[(\beta_{0k} + \beta_{1k} \ln z_i)/(1 - \beta_{2k})\right].$$

The equivalence scale at level k can then be calculated as $\widehat{c}_k(z)/\widehat{c}_k(\overline{z})$, where $\overline{z}$ again denotes the reference household. In their sample of eight European countries and the US, the equivalence scales are reasonably similar at the different k levels, which gives some support for the IB assumption used in the consumption approach.

Other authors (e.g. Koulovatianos et al. 2005) have implemented a similar method with different formulations of the subjective question. A few papers have combined con-

sumption data and subjective questions (Kapteyn 1994; de Ree et al. 2013). This is a promising approach, since it allows to identify preference parameters on the basis of the subjective information. As an example, de Ree et al. (2013) reject the IB-assumption (and its generalisations) for a sample of Indonesian households.

The question arises whether the subjective method yields welfare or situation comparisons. Surely, the analyses on the basis of overall life satisfaction that we discussed in the beginning of this section yield welfare comparisons. This is much less clear for the subjective questions used in the literature on equivalence scales, however. Do individuals responding to the income evaluation question take into account the direct effect of household size on well-being? They probably do not, but it is not fully clear for the income evaluation question given before. Koulovatianos et al. (2005) confront their respondents with hypothetical household situations and then ask: "Given that someone has an extra child, how much would they need to reach the same level of well-being?" They argue that this yields conditional scales. The subjective information used by de Ree et al. (2013) is even more related to adequacy of resources. The subjective approach to equivalence scales estimation therefore also yields only situation comparisons —and deliberately so.

We can conclude that most of the studies within the equivalence scale approach do *not* aim at comparisons of well-being, taking into account at the same time the effects of income and of the quality of family life. On the contrary, they aim at needs-corrected values of income, i.e., at conditional comparisons of well-being. It is therefore rooted in a resourcist view on well-being. However, the methods that have been used to calculate

equivalence scales are similar to the methods that we described in Section 3. The capability approach has hardly been used in this context. Equivalence scales derived from consumption behavior are based on preferences. While the traditional literature based on the unitary model requires arbitrary assumptions about interpersonal comparability, the recent work with the collective model derives indifference scales using only ordinal preference information. The intuition underlying this approach is closely related to that behind the concept of equivalent income. Subjective evaluations have also been used, and in some of the work there is explicit consideration of the adaptation phenomenon. We will see in the next section that the issue of welfare versus situation comparisons is also relevant to interpret the literature on publicly provided services and benefits.

5.2 Publicly provided services and benefits

Countries differ in the extent to which services are provided publicly rather than through the private market, for instance. Comparing the income distribution of two countries, one where health services are primarily covered by private out-of-pocket payments and another where such services are provided free of charge, may result in misleading conclusions on which country is preferable from a social welfare point of view. In addition, publicly provided services and benefits may have an impact on the inequality within a country.[38]

[38] The publicly provided services which are typically covered in the applied literature include educational benefits, health care, social housing, food stamps and child care. On average across OECD countries, the first two listed services are estimated to add up to about 13% of GDP, ranging from 8% in Turkey up to 20% in Denmark and Sweden (Verbist et al. 2012).

As a starting point it is fruitful to recall the distinction between functionings and resources. We argued that what matters to define well-being are the functionings of a person, i.e., his "beings" and "doings". Resources, on the other hand, can be used to achieve certain functionings. These two concepts are different, as individuals may differ in how they convert resources into functionings. An analysis of well-being inequality using a broad set of functionings as the relevant space of well-being includes automatically the publicly provided services, insofar as they contribute to the functionings of the individuals. This approach seems natural in view of the discussions of this chapter. Yet, to the best of our knowledge, examples of this direct method to include publicly provided services into distributional analysis are scarce. Instead, a resource-based approach is standard practice in the literature. In this method, disposable income is extended with a monetary valuation of the publicly provided services. The resulting measure of extended income uses a monetary valuation of the external resources which an individual has at his disposal to obtain functionings and to reach well-being. The inspiration of this approach is therefore closely related to that of equivalence scales as described in the previous section.

In this section, we will first shortly survey the popular approach to extend disposable income with information on publicly provided services. Then we will discuss the issue of the valuation of public services and the adjustment for needs in view of the normative issues discussed in this chapter.[39]

[39] More extensive surveys can be found in Smeeding (1982) and Marical et al. (2008), and Verbist et al. (2012).

5.2.1 The extended income approach

The extended income approach consists of three steps. In a first step, one *selects* the government services to be included. Then, second, these services are *valued* at their production cost for the government. Finally, the value of the service is *allocated* to the beneficiaries based on their actual consumption or the insurance value, depending on the benefit at hand.[40] The obtained value of the monetary value of the publicly provided service is added to the disposable income of the household to obtain its extended income. The distribution of extended income is then analyzed with standard inequality measures.

Applying an extended income approach, the OECD flagship report "Growing unequal?" (OECD 2008; Chapter 9) has obtained the following findings. First, the inclusion of publicly provided services reduces income inequality within countries, because of their predominantly uniform character. Yet, this reduction is typically lower than the inequality reduction obtained by tax and cash benefits. Second, the differences in income inequality between countries are reduced as well, but the ranking of the countries with respect to extended income inequality remains similar to the ranking according to income inequality (affirming earlier findings of Smeeding et al. 1993).

The extended income approach has the advantage of being implementable for many

[40] The insurance value method is commonly used in the case of health care services, where the allocation is based on the average spending on the relevant age-sex group irrespective of the actual use that was made of the service. This method interprets health care as an insurance benefit received by all covered individuals. The value of the insurance benefit approximates an actuarially fair insurance premium assuming that all individuals with the same age-sex characteristics are paying the same premium.

countries. It requires income data that are readily available in standard household surveys and some additional macro-estimates of the production cost of public services. Yet, in view of the normative issues raised in this chapter, the extended income approach appears to take an overly pragmatic view on the valuation of the contribution of publicly provided services to well-being.

5.2.2 Valuing publicly provided services and respect for preferences

How a publicly provided service should be valued depends arguably on the purpose of the valuation exercise. Whereas valuing the benefit by means of its production cost may give a good estimate of its budgetary cost, this valuation method seems less appropriate for the purpose discussed in this chapter, i.e., an analysis of the distribution of individual well-being.

An example illustrates why this is the case. Imagine that the value of publicly provided education benefits is determined by its production cost. An increase in the wages of teachers increases the production cost, but it seems counter-intuitive to say that the value of the service for the recipients has increased *because* the production cost has increased. Indeed, this valuation method neglects the efficiency of the production process and potential quality differences between equally expensive services. A valuation by means of the production cost can therefore best be seen as an approximation when no other information is available. Alternative valuation methods have been proposed that are more closely related to the preferences of the population.[41]

[41] See Smeeding (1982) for a more extensive survey. In the 1980s, the market valuation and cash

A first alternative would be to use the *market value* of the public services rather than the production cost. Under some circumstances market prices may indeed give an indication of willingness-to-pay. Of course, this method can only be applied to the publicly provided services for which a private market exists. For food stamps and social housing, for instance, the market value can either be inferred directly or obtained by a hedonic regression. However, the prices of privately provided services do not always reflect the valuation of the recipients either. Stiglitz et al. (2009, p. 99) give an example in the market for privately provided medical services where informational asymmetries disconnect market prices from marginal valuations and preferences.

A second alternative valuation method relies directly on the preferences of the recipients and measures the value of the publicly provided service by its so-called *cash-equivalent*. That is the amount of cash needed to induce an individual to forgo a particular publicly provided service (see, Smeeding 1977, for instance). Insofar as the individual's own preferences (her own willingness-to-pay) are used to compute these cash-equivalents, this method respects the Same-Preference Principle. Figure 6 illustrates the cash-equivalent valuation method graphically in the income-health space. Consider two individuals, Alexandra and Benny, who are equally rich (their income equals OA on the graph). Alexandra is in better health than Benny (their health is respectively OG and

equivalent valuation have played a central role in the computation by the US Census Bureau of an "experimental" poverty measure for the U.S. including the value of publicly provided services (Fisher, 1997). More recently, the production cost approach seems to have become the gold standard in the applied literature, as can be witnessed from the survey by Marical et al. (2008).

OE). Both individuals receive publicly provided health services, without which Alexandra's health would be OF, whereas Benny's health would be only OD. It is clear from the figure that the publicly provided health services generate a larger increase in the health of Benny than they do for Alexandra. However, Benny cares relatively less about his health than Alexandra does (as Benny's indifference curve is "steeper"). Benny's cash equivalent for the health service is AB as Benny is willing to forgo the publicly provided health service for an additional income of AB. Alexandra's cash equivalent, on the other hand, equals AC. Even if the health service generates a smaller health increase for Alexandra, her cash equivalent is larger as she cares more about health than Benny does.

Estimating a cash-equivalent requires additional information compared to the production cost approach. As illustrated by the above example, one needs to know the preferences of Alexandra and Benny, since the magnitude of their cash-equivalent is determined by the shape of their indifference map. To obtain the necessary information on preferences, the methods surveyed in Section 3 can be used, i.e., revealed preferences, stated preferences and satisfaction data. The revealed preferences method seems to be favored in the applied literature. Typically, the preferences are derived from consumption behavior by means of an estimated system of demand equations (Smolensky et al. 1977; Slesnick 1996). Life satisfaction data can also be used to estimate willingness-to-pay for publicly provided services. Levinson (2012), for instance, estimates the willingness-to-pay for air quality and computes the compensating variation for air pollution.

Typically the cash-equivalent method is not formulated in the space of functionings

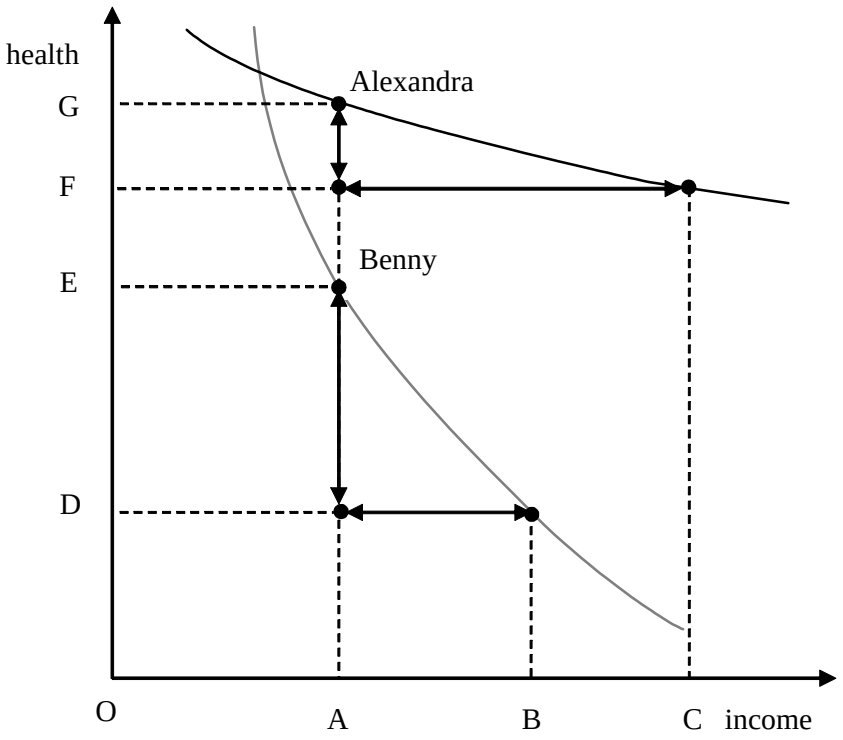

Figure 6: Cash Equivalent

(or life dimensions) and it does not yield an overall measure of well-being that is based on a coherent ethical reasoning. We will come back to this issue in the following subsection. However, since it focuses on the individual willingness-to-pay, its inspiration remains similar to that of the equivalent income approach to well-being as defined in Section 3.3. Other approaches reject completely the idea that individual preferences and willingness-to-pay provide the best guidelines to value publicly provided services.

Governments may provide these in-kind services exactly because they are inspired by paternalistic motives or by a concern about consumption externalities (see Currie and Gavhari 2008, and the references therein for a detailed discussion). The paternalistic motivations reflect Musgrave's (1959) idea that some goods are merit goods, which leads to an immediate conflict with the idea of respecting individual preferences. A paternalistic government values the publicly provided services according to an objective valuation function which requires arguably a perfectionist or objective theory of well-being. As suggested before, the gap between these two approaches may be bridged to some extent by introducing a distinction between informed and uninformed preferences.

5.2.3 Adjusting for needs and individual responsibility

Since extended income focuses on the willingness-to-pay for the services, it does not at all take into account the functioning levels that the individuals would obtain in absence of any publicly provided service. This can be seen using Figure 7, depicting the functionings and indifference curves of Alexandra and Charlotte in the income-health space. Alexandra

and Charlotte have the same income (OA) and obtain the same increase in their health from the publicly provided health services (ED = FG). Moreover they have the same preferences so their cash equivalents are equal to AC.[42] Hence, the extended income of both individuals is equal (OC). Consequently, when extended income would be used as measure of well-being, both individuals would be considered as equally well-off. Yet, no account is taken of the fact that the health levels that the individuals would obtain in absence of any publicly provided health service may be very different (Alexandra is in much better health than Charlotte, OF > OD). Radner (1997) illustrates a similar issue by showing how the well-being of elderly (Charlotte in Figure 7) would be overestimated as the value of publicly provided services is included in their extended income without taking account of their needs. This observation lead Paulus et al. (2010, p. 263) to doubt whether results derived using the extended income approach can have a straightforward welfare interpretation.

This discussion echoes the distinction that was introduced in the previous section between welfare and situation comparisons. As a matter of fact, in the recent applied literature, the solution has been sought in adjusting the equivalence scales of the recipients

[42] The argument does not depend on the choice for a particular valuation method for the publicly provided service.

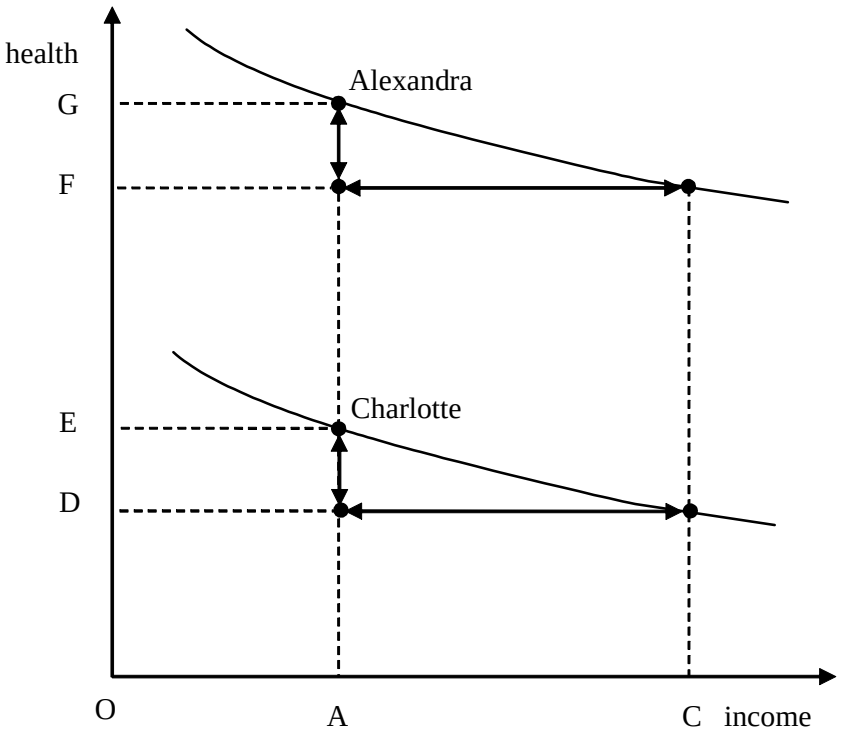

Figure 7: Cash Equivalents and needs

for differences in needs.[43] Paulus et al. (2010) adopt a "fixed cost" approach, in which the needs of a recipient are assumed to be equal to a specific fixed monetary amount. In particular, it is assumed that the per capita amounts spent for age-specific population groups on public services accurately depict the corresponding needs of these groups. Under this assumption an equivalence scale for extended income can be inferred for each household. The authors then perform a sensitivity analysis of the inequality reducing effect of public services from changing the amount of received publicly provided services to the European average for the age-specific groups.

Aaberge et al. (2010) derive needs-adjusted equivalence scales consistent with their preferred allocation method of the production costs across target groups, i.e., a model of spending behavior of local governments. The equivalence scale for non-cash income is obtained from the estimates of the relative needs of different target groups which are derived from the minimum expenditures identified in the spending model. Using data from Norway, they find that including publicly provided services reduces income inequality considerably, but that adjusting for needs offsets about half of the inequality reduction. The method hinges on two strong assumptions on the interpretation of the spending model for the local governments (Aaberge et al. 2010, p. 552). First, the estimated minimum expenditures are to be interpreted as originating from an implicit consensus

[43] It should be noted that Smeeding et al. (1993) apply different equivalence scales to disposable income and the value of the publicly provided services. A standard equivalence scale based on household size and number of children is applied to disposable income. The publicly provided services received by the household, on the other hand, are distributed on a per-capita basis over all its members.

among local governments about how much spending the different target groups need minimally. Second, the functional form of the individual well-being measure derived from public services is assumed to coincide with the functional form used by local governments to decide the spending on public services. A priori, it seems hard to square such a (heroic) assumption with the idea of respecting individual preferences.

Both approaches to compute a needs-adjusted extended income rely on a two-step procedure. In a first step, the extended income is computed by adding a monetary value of the publicly provided services to the disposable income of the individual. Then, in a second step, these extended incomes are adjusted for differences in individual needs by means of an equivalence scale. A natural alternative would be to measure well-being directly in the desired space, i.e., functionings or capabilities themselves. For that purpose, a well-being measure should be developed along the lines described in Section 3 of this chapter. The relationship between these broader measures and the resource-based measures that are used now deserves a deeper exploration.

5.3 International comparisons

The international comparison of living standards is fraught with many difficulties (see also Chapter 12 in this Handbook). Since the focus in this literature has often been on comparing real incomes, we will first discuss the difficulties related to differences in prices for market commodities and we will show how they are linked to the normative issues discussed in the previous sections. We will then show the relevance of introducing

non-market dimensions into the evaluation of living standards.

5.3.1 Purchasing-power parity (PPP) indexes

International comparisons of living standards involve the search for price deflators that make it possible to compute comparable real incomes.[44] Pragmatic convenience motivates approaches in which indexes are computed directly from prices and quantities, without depending on an estimation of consumer preferences. The theory of index numbers initiated by Fisher (1922) and developed by Diewert (1976, 1992a,b) is an important source of inspiration for such indexes. Pragmatic convenience also encourages seeking formulae which make the comparison of two countries independent of data from third countries.

Consistency is akin to transitivity in the comparison of real incomes, but a cardinal form of transitivity (involving orders of magnitude) appears desirable, not just an ordinal form. For instance, if Q_{ij} is a quantity index that compares real income in country i to country j, consistency is achieved when the chain relation $Q_{ij} = Q_{ik}Q_{kj}$ holds for every third country k. A popular way of achieving consistency computes real income as the value of quantities consumed at reference prices $\bar{p}$, so that $Q_{ij} = \bar{p}q_i/\bar{p}q_j$, where q_i is the vector of total consumption in country i.

All approaches have a connection with consumer preferences, but the conditions required are more or less restrictive, and the connection therefore more or less loose. There seems to be near consensus, in the PPP literature, that 'in so far as data on real income

[44] Good introductions to this field are offered by Neary (2004), Deaton (2010), and Deaton and Heston (2010).

have any meaning, it is that they provide an answer to the question: "How well off would the same reference consumer be in different countries?" ' (Neary 2004, p. 1425). In other words, even if heterogeneous preferences may be the fact of the matter, there is no real attempt to formulate indexes that reflect this diversity of preferences. The main implicit underlying argument seems to be that ordinal preferences do not allow for interpersonal comparisons, unless arbitrary assumptions are made. In particular, money-metric utilities are not considered a possible option, although very similar notions are sometimes used, as explained below. This observation again suggests that the focus is not on welfare comparisons, but on situation comparisons.

Let us first briefly describe the two most popular PPP methodologies. The Eltetö-Köves-Szulc (EKS) quantity indices, used by the OECD and Eurostat are multilateral extensions of the Fisher index:

$$\begin{aligned} Q_{ij}^{EKS} &= \prod_{k=1}^{n} \left(Q_{ik}^{F} Q_{kj}^{F}\right)^{1/n}, \\ Q_{ik}^{F} &= \sqrt{\frac{p_i q_i}{p_i q_k} \frac{p_k q_i}{p_k q_k}}. \end{aligned}$$

They satisfy consistency in the form of the chain relation, but depend on third country data. They do not require estimation of preferences, and the link to consumer preferences is usually made by referring to Diewert's (1976) argument that the Fisher quantity index Q_{ik}^{F} is equal to the exact index $e\left(p_k, u\left(q_i\right)\right) / e\left(p_k, u\left(q_k\right)\right)$ of a flexible expenditure function $e\left(p, u\right)$, i.e., a function that approximates any twice differentiable expenditure function to the second order. Along a similar vein, Neary (2004) proves that Q_{ij}^{EKS} is equal to the ratio of utilities when utility is quadratic $u = \sqrt{q' A q}$, for some suitably chosen symmetric

matrix A. Again, a quadratic utility is a flexible form. These approximation results, however, are compatible with the index being sometimes wrong in the first order even for small changes —as must happen with any index that ignores preferences.[45]

Another popular approach, used by the U.N. International Comparison Project and the Penn World Table (PWT), relies on the Geary-Khamis (GK) indices which compute PPP expenditures as the value of consumption at reference prices, $\bar{p}q_i$, and the reference prices are derived from the system

$$\bar{p}_k = \frac{\sum_i s_{ik}\bar{p}q_i}{\sum_i q_{ik}}, \tag{11}$$

where s_{ik} is the budget share of commodity k in country i. If one defines $\bar{s}_{ik} = \bar{p}_k q_{ik}/\bar{p}q_i$, one sees that the GK system can be written as

$$\sum_i \bar{s}_{ik}\bar{p}q_i = \sum_i s_{ik}\bar{p}q_i.$$

This approach obviously satisfies consistency. It depends on third country data, but only in the computation of $\bar{p}$. The link with consumer preferences is tenuous because $\bar{p}q_i$ provides a good index only for Leontief preferences (which would imply that all countries consumption vectors should be proportional to one another). Neary (2004) then proposes, as a variant, to estimate world consumer preferences and substitute compensated demands q_i^* to actual quantities q_i for the computation of reference prices in system (11). Taking $\bar{p}q_i^* = e\left(\bar{p}, u\left(q_i\right)\right)$ as the real income values is then truly faithful to the estimated preferences —but not necessarily to the population's actual preferences if they are heterogeneous, as noted in van Veelen and van der Weide (2008).

[45] See Fleurbaey and Blanchet (2013, p. 95) for more details.

Interestingly, nothing in (11) as modified by Neary requires identical preferences, so that one could apply Neary's methodology to a population with country-specific estimated preferences, in which case the real incomes $\bar{p}q_i^* = e_i(\bar{p}, u_i(q_i))$ would be money-metric utilities at the country level. This idea is not considered in van Veelen and van der Weide (2008) or in the reply by Crawford and Neary (2008). As mentioned before, Fleurbaey and Blanchet (2013) propose to take other reference prices for the computation of money-metric utilities, namely, prices $\bar{p}$ that maximize $\sum_i e_i(\bar{p}, u_i(q_i)) / \sum_i \bar{p}q_i$. This minimizes the aggregate Gershenkron effect[46] and renders $\sum_i q_i^*$ proportional to $\sum_i q_i$.

van Veelen (2002) proves an impossibility theorem that is similar to the incompatibility between the Personal-Preference Principle and the Dominance Principle discussed earlier in this chapter. This theorem says that there is no measure of real income (based on prices and quantities in all countries) that is continuous, is not independent of prices, satisfies dominance ($q_i > q_j$ implies that real income is greater in i), and such that pairwise comparisons are independent of third countries.[47] The EKS and GK methods satisfy all conditions except the last one. A money-metric approach that estimates preferences on the same data may, in addition, fail to satisfy dominance in the case of heterogeneous estimated preferences. We know that this is a necessary consequence of respecting heterogeneous preferences.[48]

[46] The Gershenkron effect is the observation that the more p_i differs from $\bar{p}$ and q_i differs from q_i^*, the more $\bar{p}q_i$ overestimates $\bar{p}q_i^* = e_i(\bar{p}, u_i(q_i))$.

[47] See Quiggin and van Veelen (2007) for a further analysis of similar ideas.

[48] Note that if preferences were known on the basis of other data, then a money-metric approach with a fixed reference price would satisfy the last condition but would fail the price-dependence condition, as

In a recent paper, Almås (2012) considers exploiting preference data by estimating budget coefficients with household surveys, but retains the assumption of identical preferences. Instead of estimating a complete system of demand functions in order to compute expenditure functions and money-metric utilities, however, she focuses on food and assumes that the equation of food share, conditional on demographic characteristics, is the same everywhere. Estimating it with the PPP price indexes from the PWT, she includes country dummies and assimilates these dummies to a bias in the PPP indices. This method relies on the assumption that preferences for food versus other goods are identical all over the world, and it is not indicative of welfare because incomes deflated with the corrected indices are *not* money-metric utilities for the AIDS model that is estimated.[49]

Deaton (2010) and Deaton and Heston (2010) study the difficulties created by the fact that different countries in fact consume different lists of commodities, with great differences between countries with very unequal standards of living. The worst configuration would of course be the case in which every country consumes its own specific list, that has no intersection with the list of other countries. In this case, it is hard to imagine how to perform comparisons on the basis of observed market demand data. But even when all pairs of countries have a non-empty intersection of lists, the imperfect overlap creates difficulties. Practical methods that single out identical but often non-representative goods appear unsatisfactory (a popular example, however, is the so-called Big Mac Index,

quantities would provide all needed information about welfare.

[49] In fact she does not estimate the AIDS model, but only the equation of food share in which the deflator of income is the PWT PPP index rather than the AIDS deflator.

published yearly by the Economist). Using proximate countries to compute chained indexes may lead to compounding errors as one compares distant countries. Deaton (2010) suggests that non-demand data, such as well-being questionnaires, may provide useful additional information for comparisons across countries. On the theory side, Fleurbaey and Tadenuma (2007) show that imperfect overlap of commodity lists generates Arrow-like impossibility theorems even if one only relies on the weak independence axiom stipulating that the evaluation of two allocations should only depend on preferences over the commodities that appear in either allocation. As a way out, they suggest focusing on lists of functionings that have a common set of core components, which is not very different from Deaton's suggestion to go beyond market data. Of course, these suggestions immediately bring us the more general topic of introducing non-market dimensions.

5.3.2 Non-market dimensions

The recognition that living standards incorporate public goods of many sorts (e.g., the environment), as well as non-marketed goods and "functionings" (e.g., health), has played an important role in the motivation to go "beyond GDP" not just for the evaluation of growth and public policy in a given country, but also in international comparisons. In fact, all three approaches that have been reviewed in Section 3, have been applied in empirical work on intercountry comparisons.

The simplest approach consists in aggregating indices of the different dimensions of life into a single composite indicator. This approach follows the objective interpretation

of the *capability approach*. The most popular example is the Human Development Index (HDI) that aggregates three indices (which are normalized between 0 and 1 from the range of achievements by the various countries of the world): national income, life expectancy, and education. While the initial version of the index made a linear aggregation (UNDP 1990) and therefore implied perfect substitutability between the dimensions, the geometric mean has recently been adopted in order to reflect the greater importance of a dimension when its level is low compared to the others (UNDP 2010). In a variant of the new index, the average indices per domain can be adjusted for inequality, so as to make each index a geometric mean of individual achievements. In this fashion, the global index can then also be written as the geometric mean of individual Cobb-Douglas indexes, due to the following identity (where I_i, L_i, E_i denote income, life expectancy and education for individual i):

$$\prod_i \sqrt[3]{I_i L_i E_i} \equiv \sqrt[3]{\left(\prod_i I_i\right)\left(\prod_i L_i\right)\left(\prod_i E_i\right)}.$$

This variant alleviates the criticism raised against specific composite well-being indicators, that they fail to take the correlations between the dimensions or cumulative deprivation into account as they start from dimension-by-dimension summary statistics (See Section 4 of this chapter). In the above formula, the same elasticity of substitution is applied in the aggregation across dimensions and across individuals, so that the sequencing of both aggregations does not matter. This makes the index impervious to correlations between dimensions. Moreover, the present version of the HDI is clearly an objective index which - according to some - implies troubling trade-offs between the

dimensions (see Ravallion 2012, for instance).

There are many composite indicators which mimic the HDI methodology.[50] Some focus on social issues while others focus on sustainability issues. The key difficulty for such indices is the choice of the weighting system for the various dimensions. It is quite common to perform sensitivity analysis to ascertain the robustness of conclusions to the weights (Decancq and Ooghe 2010; Foster et al. 2013), which boils down to a dominance analysis. Another approach is to give up the aggregate index altogether and immediately apply multidimensional inequality indices to the same data (Decancq et al. 2009). Of course, as we have seen in Section 4, none of these approaches allows to respect international preference heterogeneity.

The *happiness approach* has also been used for international comparisons, although much of the literature on cross-country data has focused on the link between happiness and income (Deaton 2008, Stevenson and Wolfers 2008, Diener et al. 2010). The great variations in average satisfaction with life at any given level of income may reflect differences in non-market dimensions of life, but also cultural variations. Helliwell et al. (2010) study a large sample of countries and derive two conclusions. First, non-market dimensions play a large role in econometric regressions of life satisfaction. Such dimensions include having a partner, being able to count on friends, having freedom to choose, not perceiving corruption around oneself, having been generous, practicing religion. These dimensions play a role at the individual level, but for some of them the national average

[50] Surveys can be found in Gadrey and Jany-Catrice (2006), Stiglitz, Sen and Fitoussi (2009) and Fleurbaey and Blanchet (2013).

also plays a role (including healthy life expectancy, which is not observed at the individual level). The second conclusion is that once one incorporates these social dimensions in the analysis, in a single equation of satisfaction with the same coefficients for all countries, the difference between predicted and actual values for the average level of satisfaction per country is small for most countries and has no systematic pattern, with one exception: the Latin-American countries in general have a higher well-being than predicted.

However, the results of country and regional equations also show that the coefficients of income and social dimensions vary substantially, revealing that the association between life satisfaction and the various dimensions of life is heterogeneous over the world. One can suspect that interpersonal heterogeneity may be even more important. If the satisfaction equations can be interpreted as giving some evidence on population preferences, this raises the interesting issue of comparing the situations of populations with different preferences —an issue that has been central in this chapter. Helliwell et al. (2010) propose to compute income equivalent variations via the ratios of coefficients of social dimensions over the income coefficient. This method is one of those that have been introduced in Section 3 to estimate preferences necessary to calculate equivalent incomes.

The method of *income equivalent variations* has been used by Becker et al. (2005) in order to estimate the income growth that would have been equivalent to the observed increase in life expectancy for various countries of the world. Their main finding is that the large increase in life expectancy in developing countries, once converted into a monetary equivalent, produces a much rosier picture of world inequalities than standard income

measures. They assumed homogeneous preferences in the world and their estimation of preferences relied on US data on revealed preferences about job risks.

A combination of equivalent variations and compensating variations has been used by Jones and Klenow (2010), with a preference relation similar to that used in Becker et al. (2005), but extending the list of non-income dimensions to include leisure time and inequalities. Letting I and Q denote income and quality of life (life expectancy, leisure, inequalities), and V a utility function representing the preference ordering (assumed to be common across countries), the equivalent variation approach solves the following equation, for each country i:

$$V\left(I_i, Q_i\right) = V\left(\lambda_i^{EV} I_{USA}, Q_{USA}\right),$$

while the compensating variation approach solves the equation

$$V\left(I_{USA}, Q_{USA}\right) = V\left(I_i/\lambda_i^{CV}, Q_i\right).$$

They then propose to take $\sqrt{\lambda_i^{CV}\lambda_i^{EV}}$ as the index for comparisons across countries. A difficulty with the compensating variation approach, as they implement it, is that one may have $V\left(I_i, Q_i\right) > V\left(I_j, Q_j\right)$ but $\lambda_i^{CV} < \lambda_j^{CV}$. This problem is avoided with their equivalent variation approach, because $\lambda_i^{EV} I_{USA}$ is a money-metric index based on quality of life in the USA as the reference.

Compensating and equivalent variation approaches are in general problematic when they make references vary with the object of comparison. Money-metric indexes avoid that difficulty by taking a fixed reference. Fleurbaey and Gaulier (2009) adopted a *money-metric* approach for international comparisons of OECD countries, with non-income di-

mensions including leisure, life expectancy, unemployment risk, household composition, income inequalities. They allowed for heterogeneous preferences for leisure only, and relied on the Becker et al. (2005) preference ordering otherwise. While the approach is in theory compatible with heterogeneous preferences at the individual level and the computation of a distribution of equivalent incomes within each country, they only focused on average levels for each country. Decancq and Schokkaert (2013) calculate individual equivalent incomes on the basis of the life satisfaction data from the European Social Survey with as non-income dimensions health, employment status, quality of social interactions and personal safety. They introduce these equivalent incomes into a concave social welfare function and compare the social welfare of 18 European countries for the years 2008 and 2010 taking into account the distribution of individual well-being. The ranking of the different countries in terms of equivalent incomes is different from the ranking of countries in terms of income. A striking example is the dramatic fall in the well-being of Greece and Spain as a result of the economic crisis. Bargain et al. (2013) study heterogeneous preferences over consumption and leisure in various European countries and the USA and compute several money-metric indexes for the analysis of welfare level and inequalities. In their analysis also, preference heterogeneity plays an important role in the welfare rankings.

6 Conclusion

Egalitarian thinkers are usually concerned about the distribution of well-being. Individual well-being depends not only on income but also on other dimensions of life, such as health, the quality of social relations and of the environment, employment, and job satisfaction. In this chapter we have surveyed the economic literature on how to construct such overall measures of well-being. We distinguished three approaches: the capability (and functionings) approach, the use of subjective life satisfaction measures and the calculation of equivalent incomes. We argued that the choice of measure ultimately is a normative issue and we discussed the normative assumptions underlying the measurement of individual well-being, focusing on two issues: the degree to which individual preferences are respected and where in each approach the boundaries of individual responsibility are drawn. The three approaches take a different stance on these issues. We also compared the measurement of inequality in well-being with the use of multidimensional inequality measures. The latter only fit in a perfectionist perspective, completely neglecting interpersonal preference differences.

In most of the applied work on inequality measurement the ambition is more limited. One keeps focusing on resource-based measures, that are then extended to include other considerations: household size and composition (and other needs) in the literature on equivalence scales, the value of publicly provided goods and services, or differences in prices in the contect of international PPP comparisons. In each of these cases one usually does not aim at constructing an overall measure of well-being. One neglects (respectively)

the direct effects of family relations on well-being, the attainment of functionings as a result of the public provision of goods and services, and the effect of international preference heterogeneity. In all these three domains one focuses on situation rather than welfare comparisons. However, the most common approaches are not really satisfactory, even from this more limited perspective, and the proposals to improve on these existing measures (the construction of indifference scales, the use of subjective satisfaction information, the introduction of willingness-to-pay and differences in needs in the context of public service provision, the introduction of preference differences in international comparisons) move the approaches in the direction of the construction of more global well-being measures and use methods that have also been explored and developed for the latter purpose. In fact, in some cases, the informational requirements become similar. Analysing the exact relationship between "extended (or corrected) incomes" and overall measures of well-being is a fruitful area for further research.

References

Aaberge, R., M. Bhuller, A. Langørgen and M. Mogstadt. 2010. The distributional impact of public services when needs differ. Journal of Public Economics 94: 549-562.

Alesina, A., R. Di Tella, and R. MacCulloch. 2004. Inequality and happiness: are Europeans and Americans different? Journal of Public Economics 88: 2009-42.

Alkire, S. 2002. Dimensions of human development. World Development 30: 181-205.

Almas, I. 2012. International income inequality: measuring PPP bias by estimating Engel curves for food. American Economic Review 102: 1093-1117.

Apps, P. and R. Rees. 1988. Taxation and the household. Journal of Public Economics 35: 355-369.

Arneson, R. 1989. Equality and equal opportunity for welfare. Philosophical Studies 56: 77-93.

Arrow, K. 1951. Social choice and individual values. New York: Wiley.

Arrow, K. 1973. Some ordinalist-utilitarian notes on Rawls's theory of justice. Journal of Philosophy 70: 245-263.

Atkinson, A., and F. Bourguignon. 1982. The comparison of multi-dimensioned distributions of economic status. Review of Economic Studies 49: 183-201.

Atkinson, A., and F. Bourguignon. 1987. Income distribution and differences in needs. Arrow and the foundation of the theory of eonomic policy. ed. G. F. Feiwel. Macmillan, London, 350-370.

Barbera, S., W. Bossert, and P. Pattanaik. 1998. Ranking sets of objects. Handbook

of Utility Theory. eds. S. Barbera, P. Hammond, and C. Seidl, Chapter 17. Dordrecht and New York: Kluwer Academic Press.

Bargain, O., A. Decoster, M. Dolls, D. Neumann, A. Peichl, and S. Siegloch. 2013. Welfare, labor supply and heterogeneous preferences: evidence for Europe and the US. Social Choioce and Welfare 41: 789-817.

Basu, K. 1987. Achievements, capabilities and the concept of well-being. Social Choice and Welfare 4: 69-76.

Basu, K., and L. Lopez-Calva. 2011. Functionings and capabilities. Handbook of Social Choice and Welfare. eds. K. Arrow, A. Sen, and K. Suzumura, 153-187. Amsterdam: Elsevier.

Becker, G., T. Philipson, and R. Soares. 2005. The quantity and quality of life and the evolution of world inequality. American Economic Review 95: 277-291.

Benjamin, D., O. Heffetz, M. Kimball, and A. Rees-Jones. 2012. What do you think would make you happier? What do you think you would choose? American Economic Review 102: 2083-2110.

Bernheim, D. 2009. Behavioral welfare economics . Journal of the European Economic Association 7: 267-319.

Bernheim, D., and A. Rangel. 2009. Beyond revealed preference: choice theoretic foundations for behavioral welfare economics. Quarterly Journal of Economics 124: 51-104.

Blackorby, C., and D. Donaldson. 1988. Money metric utility: a harmless normaliza-

tion? Journal of Economic Theory 46: 120-129.

Blackorby, C., and D. Donaldson. 1993. Adult-equivalence scales and the economic implementation of interpersonal comparisons of well-being. Social Choice and Welfare 10: 335-361.

Blanchflower, D., and A. Oswald. 2004. Well-being over time in Britain and the USA. Journal of Public Economics 88: 1359-1386.

Bourguignon, F. 1989. Family size and social utility: income distribution dominance criteria. Journal of Econometrics 42: 67-80.

Browning, M., P.-A. Chiappori, and A. Lewbel. 2013. Estimating consumption economies of scale, adult equivalence scales, and household bargaining power. Review of Economic Studies 80: forthcoming.

Brun, B., and B. Tungodden. 2004. Non-welfaristic theories of justice: Is the "intersection approach" a solution to the indexing impasse? Social Choice and Welfare 22: 49-60.

Carson, R. 2012. Contingent valuation: a practical alternative when prices aren't available. Journal of Economic Perspectives 26: 27-42.

Cherchye, L., B. De Rock, A. Lewbel, and F. Vermeulen. 2013. Sharing rule identification for general collective consumption models. Mimeo.

Cherchye, L., B. De Rock, and F. Vermeulen. 2012. Economic well-being and poverty among the elderly: an analysis based on a collective consumption model. European Economic Review 56: 985-1000.

Chiappori, P.-A. 1988. Rational household labor supply. Econometrica 56: 63-89.

Clark, A., and A. Oswald. 2002. A simple statistical method for measuring how life events affect happiness. International Journal of Epidemiology 31: 1139-1144.

Clark, D. 2005. Sen's capability approach and the many spaces of human well-being. Journal of Development Studies 41: 1339-1368.

Cohen, G. 1989. On the currency of egalitarian justice. Ethics 99: 906-944.

Crawford, I., and P. Neary. 2008. Testing for a reference consumer in international comparisons of living standards. American Economic Review 98: 1731-1732.

Currie, J., and F. Gahvari. 2008. Transfers in cash and in-kind: Theory meets the data. Journal of Economic Literature 46: 333-383.

d'Aspremont, C., and L. Gevers. 1977. Equity and the informational basis of collective choice. Review of Economic Studies 44: 199-209.

d'Aspremont, C., and L. Gevers. 2002. Social welfare functionals and interpersonal comparability. Handbook of Social Choice and Welfare, Vol. 1. eds. K. Arrow, A. Sen , and K. Suzumura, 459-541. Amsterdam: Elsevier.

Dardanoni, V. 1995. On multidimensional inequality measurement. Research on Economic Inequality. eds. C. Dagum, and A. Lemmi, 201-7. Vol. 6. London: JAI Press.

Deaton, A. 2008. Income, health, and well-being around the world: evidence from the Gallup World Poll. Journal of Economic Perspectives 22: 53-72.

Deaton, A. 2010. Price indexes, inequality, and the measurement of world poverty. American Economic Review 100: 5-34.

Deaton, A., and A. Heston. 2010. Understanding PPPs and PPP-based national accounts. American Economic Journal: Macroeconomics 2: 1-35.

Deaton, A., and J. Muellbauer. 1980. Economics and consumer behaviour. Cambridge: Cambridge University Press.

Decancq, K. 2013. Copula-based measurement of dependence between dimensions of well-being. Oxford Economic Papers, forthcoming.

Decancq, K., A. Decoster, and E. Schokkaert. 2009. The evolution of world inequality in well-being. World Development 37: 11-25.

Decancq, K., and M. A. Lugo. 2012. Inequality of well-being: a multidimensional approach. Economica 79: 721-746.

Decancq, K., and M. A. Lugo. 2013. Weights in multidimensional indices of well-being: an overview. Econometric Reviews 32: 7-34.

Decancq, K. and Ooghe, E. 2010. Has the world moved forward? A robust multidimensional evaluation. Economics Letters 107: 266-269.

Decancq, K., and E. Schokkaert. 2013. Beyond GDP: measuring social progress in Europe. KU Leuven: Mimeo.

Decoster, A., and P. Haan. 2013. Empirical welfare analysis in random utility models of labour supply. International Tax and Public Finance: forthcoming.

Della Vigna, S. 2009. Psychology and economics: evidence from the field. Journal of Economic Literature 47: 315-372.

de Ree, J. , R. Alessie, and M. Pradhan. 2013. The price and utility dependence of

equivalence scales: evidence from Indonesia. Journal of Public Economics 97: 272-281.

Diener, E., J. Helliwell, and D. Kahneman, eds. 2010. International differences in well-being. Oxford: Oxford University Press.

Diener, E., E. Suh, R. Lucas, and H. Smith. 1999. Subjective well-being: three decades of progress. Psychological Bulletin 125: 276-302.

Diewert, W. 1976. Exact and superlative index numbers. Journal of Econometrics 4: 115-145.

Diewert, W. 1992a. Exact and superlative welfare change indicators. Economic Inquiry 30: 565-583.

Diewert, W. 1992b. Fisher ideal output, input, and productivity indexes revisited. Journal of Productivity Analysis 3: 211-248.

Donaldson, D. 1992. On the aggregation of money measures of well-being in applied welfare economics. Journal of Agricultural and Resource Economics 17: 88-102.

Donaldson, D., and K. Pendakur. 2003. Equivalent-expenditure functions and expenditure-dependent equivalence scales. Journal of Public Economics 88: 175-208.

Dunbar, G., A. Lewbel, and K. Pendakur. 2013. Children's resources in collective households: identification, estimation, and an application to child poverty in Malawi. American Economic Review 103: 438-471.

Dutta, I., and Foster, J. 2013. Inequality of happiness in the U.S.: 1972-2010. Review of Income and Wealth 59: 393-415.

Dutta, I., P. Pattanaik, and Y. Xu. 2003. On measuring deprivation and the standard

of living in a multidimensional framework on the basis of aggregate data. Economica 70: 197-221.

Dworkin, R. 1981a. What is equality? Part 1: Equality of welfare. Philosophy and Public Affairs 10: 185-246.

Dworkin, R. 1981b. What is equality? Part 2: Equality of resources. Philosophy and Public Affairs 10: 283-345.

Dworkin, R. 2000. Sovereign virtue. Cambridge: Cambridge University Press.

Easterlin, R. 1974. Does economic growth improve the human lot? Some empirical evidence. Nations and households in economic growth: essays in honor of Moses Abramovitz. eds. P. David, and M. Reder, 89-125. New York: Academic Press.

European Statistical System. 2011. Sponsorshop Group on Measuring Progress, Well-being and Sustainable Development: Final Report.

Fisher, I. 1922. The making of index numbers. Boston: Houghton Mifflin.

Fisher, G. M. 1997. The development of the Orshansky poverty thresholds and their subsequent history as the official U.S. Poverty Measure. Mimeo on http://www.census.gov/hhes/povmeas/publications/orshansky.html.

Fleurbaey, M. 2003. On the informational basis of social choice. Social Choice and Welfare 21: 347-384.

Fleurbaey, M. 2006a. Capabilities, functionings and refined functionings. Journal of Human Development 7: 299-310.

Fleurbaey, M. 2006b. Social welfare, priority to the worst-off and the dimensions

of individual well-being. Inequality and economic integration. eds. F. Farina, and E. Savaglio. London: Routledge.

Fleurbaey, M. 2007. Social choice and the indexing dilemma. Social Choice and Welfare 29: 633-648.

Fleurbaey, M. 2008. Fairness, responsibility and welfare. Oxford: Oxford University Press.

Fleurbaey, M. 2009. Equality of functionings, [redacted], http://socprob.ru/2009/equality-of-functionings-mark-flerbe.html.

Fleurbaey, M., and D. Blanchet. 2013. Beyond GDP. Measuring welfare and assessing sustainability. Oxford: Oxford University Press.

Fleurbaey, M., and G. Gaulier. 2009. International comparisons of living standards by equivalent incomes. Scandinavian Journal of Economics 111: 597-624.

Fleurbaey, M., C. Hagneré, and A. Trannoy. 2003. Welfare comparisons with bounded equivalence scales. Journal of Economic Theory 110: 309-336.

Fleurbaey, M., S. Luchini, C. Muller, and E. Schokkaert. 2013. Equivalent income and the economic evaluation of health care. Health Economics 22: 711-729.

Fleurbaey, M., S. Luchini, E. Schokkaert, and C. Van de Voorde. 2012. Evaluation des politiques de santé: pour une prise en compte équitable des intérets des populations. Economie et Statistique 455-456: 11-36.

Fleurbaey, M., and F. Maniquet. 2011. A theory of fairness and social welfare. Cambridge: Cambridge University Press.

Fleurbaey, M., and P. Mongin. 2005. The news of the death of welfare economics is greatly exaggerated . Social Choice and Welfare 25: 381-418.

Fleurbaey, M., and E. Schokkaert. 2012. Inequity in health and health care. Handbook of Health Economics, vol. 2. eds. P. Barros, T. McGuire, and M. Pauly, 1003-1092. New York: Elsevier.

Fleurbaey, M., and E. Schokkaert. 2013. Behavioral welfare economics and redistribution. American Economic Journal: Microeconomics 5: 180-205.

Fleurbaey, M., E. Schokkaert, and K. Decancq. 2009. What good is happiness? CORE : Discussion Paper 2009/17.

Fleurbaey, M., and K. Tadenuma. 2007. Do irrelevant commodities matter? Econometrica 75: 1143-1174.

Fleurbaey, M., and A. Trannoy. 2003. The impossibility of a Paretian egalitarian. Social Choice and Welfare 21: 243-263.

Foster, J. 2010. Freedom, Opportunity, and Well-being. Handbook of Social Choice and Welfare, vol. 2. K. J. Arrow, A. K. Sen and K. Suzumura (eds.) North Holland. 687-728.

Foster, J., M. McGillivray, and S. Seth. 2013. Composite indices. Rank robustness, statistical association and redundancy. Econometric Surveys 32: 35-56.

Frey, B., and A. Stutzer. 2002. What can economists learn from happiness research? Journal of Economic Literature 40: 402-435.

Gadrey, J., and F. Jany-Catrice. 2006. The new indicators of well-being and develop-

ment . London: Macmillan.

Gajdos, T., and J. Weymark. 2005. Multidimensional generalized Gini indices. Economic Theory 26: 471-496.

Graham, C. 2009. Happiness around the world: the paradox of happy peasants and miserable millionaires. Oxford: Oxford University Press.

Gruber, J., and S. Mullainathan. 2005. Do cigarette taxes make smokers happier? Advances in Economic Analysis and Policy (Www.Bepress.Com) 5: Article 4 .

Hausman, D., and M. McPherson. 2009. Preference satisfaction and welfare economics. Economics and Philosophy 25: 1-25.

Hausman, J. 2012. Contingent valuation: from dubious to hopeless. Journal of Economic Perspectives 26: 43-56.

Helliwell, J., C. Barrington-Leigh, A. Harris, and H. Huang. 2010. International evidence on the social context of well-being. International differences in well-being. eds. E. Diener, J. Helliwell, and D. Kahneman. Oxford: Oxford University Press.

Jones, A., and O. O'Donnell. 1995. Equivalence scales and the costs of disability. Journal of Public Economics 56: 273-289.

Jones, C., and P. Klenow. 2010. Beyond GDP? Welfare across countries and time. NBER: Working Paper 16352.

Kahneman, D., and A. Krueger. 2006. Developments in the measurement of subjective well-being. Journal of Economic Perspectives 20: 3-24.

Kahneman, D., A. Krueger, D. Schkade, N. Schwarz, and A. Stone. 2004. Toward

national well-being accounts. American Economic Review (Papers and Proceedings) 94: 429-434.

Kahneman, D., and R. Sugden. 2005. Experienced utility as a standard of policy evaluation. Environmental and Resource Economics 32: 161-181.

Kahneman, D., P. Wakker, and R. Sarin. 1997. Back to Bentham? Explorations of experienced utility. Quarterly Journal of Economics 112: 375-406.

Kapteyn, A. 1994. The measurement of household cost functions: revealed preference versus subjective measures. Journal of Population Economics 4: 333-350.

Kapteyn, A., and B. Van Praag. 1976. A new approach to the construction of family equivalence scales. European Economic Review 7: 313-335.

Kimball, M., and R. Willis. 2006. Utility and happiness. Mimeo.

King, M. 1983. Welfare analysis of tax reforms using household data. Journal of Public Economics 23: 183-214.

Kolm, S.-Chr. 1977. Multidimensional egalitarianisms. Quarterly Journal of Economics 91: 1-13.

Koshevoy, G. 1995. Multivariate Lorenz majorization. Social Choice and Welfare 12: 93-102.

Koulovatianos, C., C. Schröder, and U. Schmidt. 2005. On the income dependence of equivalence scales. Journal of Public Economics 89: 967-996.

Layard, R. 2005. Happiness: lessons from a new science. Allan Lane.

Lelli, S. 2005. Using functionings to estimate equivalence scales. Review of Income

and Wealth 51: 255-284.

Levinson, A. 2012. Valuing public goods using happiness data: the case of air quality. Journal of Public Economics 96: 869-880.

Lewbel, A. 1989. Household equivalence scales and welfare comparisons. Journal of Public Economics 39: 377-391.

Lewbel, A. 2003. Calculating compensation in cases of wrongful death. Journal of Econometrics 113: 115-128.

Loewenstein, G., and P. Ubel. 2008. Hedonic adaptation and the role of decision and experienced utility in public policy. Journal of Public Economics 92: 1795-1810.

Manser, M. and M. Brown, M. 1980. Marriage and household-decision making: a bargaining analysis. International Economic Review 21: 31-44.

Marshall, A., and I. Olkin. 1979. Inequalities: theory of majorization and its applications. New York: Academic Press.

Marical, F., M. Mira d'Ercole, M. Vaalavuo, and G. Verbist. 2008. Publicly Provided Services and the Distribution of Households' Economic Resources OECD Economic Studies No. 44, 2008/1.

McElroy, M. and J. Horney. 1981. Nash-bargained household decisions: towards a generalization of the theory of demand. International Economic Review 22: 333-349.

Neary, P. 2004. Rationalizing the Penn World Table: true multilateral indices for international comparisons of real income. American Economic Review 94: 1411-1428.

Nussbaum, M. 2000. Women and human development: the capabilities approach.

Cambridge: Cambridge University Press.

Nussbaum, M. 2006. Frontiers of justice: disability, nationality, species membership. Cambridge, Mass.: Harvard University Press.

Nussbaum, M. 2008. Who is the happy warrior? Philosophy poses questions to psychology. Journal of Legal Studies 37: S81-S113.

Nussbaum, M. 2011. Creating Capabilities: The Human Development Approach. Belknap Press of Harvard University Press.

Nussbaum, M., and A. Sen, eds. 1993. The quality of life. Oxford: Clarendon Press.

Musgrave, R. A. 1959. The Theory of Public Finance. New York and London: McGraw-Hill.

OECD. 2011. How's life? Measuring well-being. Paris, OECD Publishing: http://dx.doi.org/10.1787/9789264121164-en.

OECD. 2008. Growing Unequal? Income Distribution and Poverty in OECD Countries. Paris, OECD Publishing.

Ooghe, E. , and P. Lambert. 2006. On bounded dominance criteria. Mathematical Social Sciences 52: 15-30.

Oswald, A. 1997. Happiness and economic performance. Economic Journal 107: 1815-1831.

Oswald, A., and N. Powdthavee. 2008. Does happiness adapt? A longitudinal study of disability with implications for economists and judges. Journal of Public Economics 92: 1061-1077.

Pattanaik, P., S. Reddy, and Y. Xu. 2012. On measuring deprivation and living standards of societies in a multi-attribute framework. Oxford Economic Papers 64: 43-56.

Pattanaik, P., and Y. Xu. 1990. On ranking opportunity sets in terms of freedom of choice. Recherches Economiques de Louvain 56: 383-390.

Pattanaik, P., and Y. Xu. 2007. Minimal relativism, dominance, and standard of living comparisons based on functionings. Oxford Economic Papers 59: 354-374.

Pattanaik, P. and Y. Xu, Y. 2009. Conceptions of individual rights and freedom in welfare economics: a re-examination. Against injustice: the new economics of Amartya Sen. eds. Gotoh, R. and Dumouchel, P.: 187-218. Cambridge: Cambridge University Press.

Pattanaik, P., and Y. Xu. 2012. The ethical bases of public policies: a conceptual framework. Mimeo.

Paulus, A., H. Sutherland, and P. Tsakloglou. 2010. The Distributional Impact of In-Kind Public Benefits in European Countries. Journal of Policy Analysis and Management. 29: 243-266.

Pogge, T. 2002. Can the capability approach be justified? Philosophical Topics 30: 167-228.

Pollak, R., and T. Wales. 1979. Welfare comparisons and equivalence scales. American Economic Review (Papers and Proceedings) 62: 216-221.

Quiggin, J., and M. van Veelen. 2007. Multilateral indices: conflicting approaches?

Review of Income and Wealth 53: 372-378.

Radner, D.B. 1997. Noncash income, equivalence scales, and the measurement of economic well-being. Review of Income and Wealth 43: 71-88.

Ravallion, M. 2012. Troubling tradeoffs in the Human Development Index. Journal of Development Economics 99: 201-209.

Rawls, J. 1971. A theory of justice. Cambridge, Mass.: Harvard University Press.

Rawls, J. 1982. Social unity and primary goods. Utilitarianism and beyond, eds. A. Sen, and B. Williams: 159-185. Cambridge: Cambridge University Press.

Rayo, L. , and G. Becker. 2007. Habits, peers and happiness: an evolutionary perspective . American Economic Review (Papers and Proceedings) 97: 487-491.

Robbins, L. 1938. Interpersonal comparisons of utility: a comment. Economic Journal 48: 635-641.

Robeyns, I. 2003. Sen's capability approach and gender inequality: selecting relevant capabilities. Feminist Economics 9: 61-92.

Robeyns, I. 2006. The capability theory in practice. Journal of Political Philosophy 14: 351-376.

Roemer, J. 1996. Theories of distributive justice. Cambridge: Harvard University Press.

Roemer, J. 1998. Equality of opportunity. Cambridge, Mass.: Harvard University Press.

Samuelson, P. 1974. Complementarity: an essay on the 40th anniversary of the Hicks-

Allen revolution in demand theory. Journal of Economic Literature 12: 1255-1289.

Samuelson, P., and S. Swamy. 1974. Invariant economic index numbers and canonical duality: survey and synthesis. American Economic Review 64: 566-593.

Scanlon, T. 1975. Preference and urgency. Journal of Philosophy 72: 655-669.

Schokkaert, E., L. Van Ootegem, and E. Verhofstadt. 2011. Preferences and subjective job satisfaction: measuring well-being on the job for policy evaluation. CESifo Economic Studies 57: 683-714.

Sen, A. 1970. Collective choice and social welfare. San Francisco: Holden Day.

Sen, A. 1980. Equality of what? Choice, Welfare and Measurement. A. Sen, 353-369. Oxford: Blackwell.

Sen, A. 1984. The living standard. Oxford Economic Papers 36: 74-90.

Sen, A. 1985. Commodities and capabilities. Amsterdam: North-Holland.

Sen, A. 1992. Inequality re-examined. Oxford: Clarendon Press.

Sen, A. 1999. Development as freedom. New York: Knopf.

Sen, A. 2004. Capabilities, lists, and public reason: continuing the conversation. Feminist Economics 10: 77-80.

Sen, A. 2009. The idea of justice. London: Allen Lane.

Sen, A., J. Muellbauer, R. Kanbur, K. Hart, and B. Williams. 1987. The standard of living. Cambridge: Cambridge University Press.

Sen, A., and B. Williams, eds. 1982. Utilitarianism and beyond. Cambridge: Cambridge University Press.

Slesnick, D.T. 1996. Consumption and poverty: how effective are in-kind transfers? Economic Journal 106: 1527-1545.

Smeeding, T. 1977. The antipoverty effectiveness of in-kind transfers. Journal of Human Resources, 12: 360-378.

Smeeding, T. 1982. Alternative methods for valuing in-kind transfer benefits and measuring their impact on poverty. Technical Report 50, U.S. Bureau of the Census. Washington, D.C.

Smeeding, T., P. Coder Saunders, S. Jenkins, J. Fritzell, A.J.M Haagenaars, R. Hauser, and M. Wolfson. 1993. Poverty, inequality, and family living standards impact across seven nations: the effect of noncash subsidies for health, education and housing. Review of Income and Wealth 39: 229-256.

Smolensky, E., L. Stiefel, and M. Schmundt. 1977. Adding in-kind transfers to the personal income and outlay account: implications for the size distribution of income. in: Juster, T.F. Distribution of economic well-being. NBER. 9-50.

Sprumont, Y. 2012. Resource egalitarianism with a dash of efficiency. Journal of Economic Theory 147: 1602-1613.

Stevenson, B., and J. Wolfers. 2008. Economic growth and subjective well-being: reassessing the Easterlin paradox. Brookings Papers on Economic Activity 1: 1-97.

Stiglitz, J., A. Sen, and J.-P. Fitoussi. 2009. Report by the Commission on the Measurement of Economic Performance and Social Progress. Paris.

Stutzer, A., and B. Frey. 2008. Stress that doesn't pay: the commuting paradox.

Scandinavian Journal of Economics 110: 339-366.

Sugden, R. 1993. Welfare, resources and capabilities: a review of "Inequality Reexamined" by Amartya Sen. Journal of Economic Literature 31: 1947-1962.

Trannoy, A. 2006. Multidimensional egalitarianism and the dominance approach: a lost paradise? Inequality and economic integration. eds. F. Farina, and E. Savaglio, 284-302. London: Routledge.

Tsui, K.-Y. 1995. Multidimensional generalizations of the relative and absolute inequality indices: the Atkinson-Kolm-Sen-approach. Journal of Economic Theory 67: 251-265.

UNDP. 1990. Human Development Report 1990. New York: Oxford University Press.

UNDP. 2010. Human Development Report 2010. The real wealth of nations: pathways to human development. New York: Oxford University Press.

Van Praag, B. 1971. The welfare function of income in Belgium: an empirical investigation. European Economic Review 2: 337-369.

Van Praag, B., and A. Ferrer-i-Carbonell. 2007. Happiness quantified: a satisfaction calculus approach. Oxford: Oxford University Press.

Van Praag, B., and A. Ferrer-i-Carbonell. 2009. Inequality and happiness. In: W. Salverda, B. Nolan, and T. Smeeding (eds.), Oxford Handbook of Economic Inequality. Chapter 17. Oxford: Oxford University Press.

Van Praag, B., and N. van der Sar. 1988. Household cost functions and equivalence scales. Journal of Human Resources 23: 193-210.

van Veelen, M. 2002. An impossibility theorem concerning multilateral international comparisons of volume. Econometrica 70: 369-375.

van Veelen, M., and R. van der Weide. 2008. A note on different approaches to index number theory. American Economic Review 98: 1722-1730.

Verbist, G., M. F. Förster and M. Vaalavuo. 2012. The impact of publicly provided services on the distribution of resources: review of new results and methods, OECD Social, Employment and Migration Working Papers, No. 130.

Weymark, J. 2006. The normative approach to the measurement of multidimensional inequality. Inequality and economic integration. eds. F. Farina, and E. Savaglio, 303-328. London: Routledge.

Weymark, J. 2013. Conundrums for nonconsequentialists. Vanderbilt University Department of Economics Working Papers 13-00010.