

Comment: James E. Foster

Measurement as Social Choice

I am terribly biased when it comes to Professor Sen and hence feel obligated, in the spirit of full disclosure, to let you know why. I first met A. K. Sen in a welfare economics class at New College, Florida, in 1976—not in person, but through his book *Collective Choice and Social Welfare*. The starred chapters captured me and wouldn't let go until I had extended his liberal paradox to a world where groups, rather than persons, were decisive. I sent a draft to Professor Sen, and he responded with guidance on how to revise the paper and where to publish it, which happened soon after. Thus began my journey from mathematics to economics via social choice theory, guided at a distance by Professor Sen.

We met in person a few years later, when I was a graduate student at Cornell. As Andrew D. White Professor-at-Large at Cornell, Professor Sen encouraged me to consider research in poverty measurement, which led to my work with Joel Greer and Erik Thorbecke. He also provided a list of problems on partial orderings to explore along with my thesis advisor (and his coauthor), Mukul Majumdar, which—alas—we never jointly pursued. In 1982, there was a wild ride from London to Oxford in a yellow Alfasud, during which Professor Sen explained how, despite Thatcher's cutbacks, he was able to conduct a research project on gender discrimination in Indian villages by diverting funds from his telephone budget. In 1993 we began a project to expand his classic *On Economic Inequality*, which led to many late nights, as my wife remembers well. Then in 2008, we co-taught Economics 2054, *Social Choice and Welfare Economics*, at Harvard. Now an expanded edition of *Collective Choice and Social Welfare* has been published—the book that began the process some 40 years ago. Professor Sen has been an

inspiration to generations of researchers. I have received a full measure of his generosity, for which I am most grateful.

The present chapter is a prime example of why we love to read Sen: remarkably clear summaries of difficult literatures, woven together with entertaining quotes and remarkably apt phrases. On one hand, it is a lucid exposition of the key results from social choice, including Condorcet's voting paradox, Arrow's pathbreaking general possibility theorem, Gibbard's equivalent result on strategic voting, the Arrow-Black theorem on single-peaked preferences and majority voting, and Sen's result on the impossibility of a Paretian liberal. On the other hand, it is a masterful exposition of the downs and ups of welfare economics: including Bentham's utilitarianism, the Robbins "logical positivist" revolution and its progeny, "new welfare economics," which privileged "Pareto efficiency" and its "remarkable reticence" to discuss distributional issues. Then the paper moves on to Bergson-Samuelson social welfare functions and back to Arrovian social welfare and its accompanying informational privations, with no cardinal or interpersonal comparisons allowed and in a world of purely welfarist information. The final section breaks free from the tyranny of impossibility and narrow informational bases, through rigorous definitions of partial comparability and an expansion of the informational basis of comparisons to human capability and freedom. It concludes with a discussion of poverty measurement—both monetary and multidimensional.

All right, you say, this is a fine exercise in the history of economic thought. But what practical lessons does social choice and welfare economics have for the World Bank, or for that matter, policymaking in general? My answer focuses on metrics and measurement, a topic of particular interest to me, and the foundation of policy analysis, wherein data are identified and aggregated in meaningful ways to inform social decisions. Let us examine a few of the messages that are especially pertinent to the process of measurement.

Broadening the informational basis. Sen attributes the impossibility in Arrow's theorem to the paucity of information contained in its preference profiles. His characterization of the Pareto-extension rule also illustrates how restricting consideration to interpersonally noncomparable profiles of individual orderings leaves decision-makers unable to address distributional issues.¹ Broader bases of information are necessary to overcome

1. See Sen (2017, Theorem 5*3).

these challenges. The capability approach, which operates in the space of “functionings” and considers achievements as well as “capability sets” of achievements (containing both chosen and unchosen alternatives), is one answer. The approach has become a generally accepted way of conceptualizing well-being, opportunity, and empowerment, and it is the notion of progress underlying Sen’s (1999) masterpiece *Development as Freedom*. The approach also leads to measures that are multidimensional and linked across dimensions at the individual level, such as the multidimensional poverty measures of Alkire and Foster (2011). However, it presents challenges to empirical researchers, as traditional datasets and measurement methodologies may not be applicable.

The measurement properties of variables. Broader information brings with it the need to use that information appropriately. After data have been identified, the next important task is to understand the measurement properties of the data’s underlying variables and apply a methodology that is suitable. For example, ordinal variables are commonly used in measurement, whether as part of self-reports (such as self-reported health or life satisfaction) or due to the inherently qualitative characteristics of the indicators (such as the quality of floors or sanitation facilities). In addition, issues of noncomparability or partial comparability can easily arise across persons or dimensions. The variables cannot simply be treated as if they were monetary—fully cardinal and fully comparable across different individuals. An intuitive way of thinking about this issue is to view it as a form of robustness. If many rescalings of the data are possible, or if many ways of relating the data across persons (or across dimensions) could be used, would each of the possibilities yield the same results? The results for a single cardinalization or one way of one of linking data across persons or dimensions are not enough. Meaningful interpretation of the data requires agreement across the full range of possibilities.²

Axioms as policy. A third message pertains to the centrality of axioms and the axiomatic approach in this literature.³ Although it is not always apparent, axioms are in essence chunks of policy—basic requirements or qualities that an object must exhibit if it is to be seen as functioning appropriately. For an Arrovian social welfare function, axioms can ensure that it is broadly

2. See Alkire et al. (2015, section 2.3).

3. See Foster and Sen (1997, 119).

applicable, is appropriately oriented when preferences are in agreement, ignores irrelevant information, or rules out unambiguously problematic methods. For measurement, axioms ensure that a measure is capturing the desired phenomenon. The main axioms come in three varieties: invariance axioms (like anonymity), which identify the sorts of information a measure should ignore; subgroup axioms (like decomposability), which specify how local and national measures are to be linked; and dominance axioms (like the transfer principle), which require the measure to move in a specific direction in the presence of an unambiguous change in the data.⁴ Axioms help define what the measure should be measuring.

Desiderata. Some authors also include a list of desiderata or “proto-axioms” to help guide the construction of measurement methodologies.⁵ A common desideratum is that the measure should be understandable and easy to describe—a requirement that can trump formal axioms when communication is important. This property might explain: the prevalence of the headcount ratio in poverty measurement despite its axiomatic failings; how the traditional Human Development Index (based on the arithmetic mean) might be preferable to the post-2010 Index (based on the geometric mean); and why the mean of the bottom 40 percent—the measure underlying the World Bank’s shared prosperity goal—was selected instead of an Atkinson “equally distributed equivalent” income function or the Sen welfare measure. There is a clear tension between this key desideratum and the more nuanced policy aims embodied in axioms.

The use of partial orderings. Partial orderings are central to Sen’s presentation of social choice theory and also are at the core of measurement.⁶ To determine whether the income distribution has taken an unambiguous turn for the worse, the Lorenz criterion or the various orders of stochastic dominance can be consulted. Likewise, poverty orderings point out when poverty has fallen for an entire range of poverty lines (or measures). In multidimensional analysis, dashboards of dimensional achievements provide a partial order for assessing well-being when there is little guidance on how to value dimensions.

4. See Alkire et al. (2015, section 2.5).

5. See, for example, Székely (2005), who gives the list used in setting the Mexican income poverty methodology.

6. See Sen (2017, xxix–xxxi) and Foster and Sen (1997, 120–121).

Partial orderings identify unambiguous (or unanimous) changes; however, they are also incomplete and unable to decide between certain pairs of options. Axioms and desiderata can help narrow options and reduce the incompleteness. But policy discussion typically demands a headline measure that is real valued as well as complete, facilitates discussion, and encourages policy analysis. Once again, there may be tension between communication and other policy objectives. In some circumstances, however, a partial ordering can actually facilitate the selection of a specific measure. For example, the choice of a specific monetary poverty line seems less problematic when a poverty ordering is available to test robustness for a range of poverty lines.

Measurement as choice. The process of measurement, like that of description, “involves the exercise—possibly difficult—of selection” across the many ways of viewing a phenomenon.⁷ Over time, the justification for the choices underlying measurement tends to become “this is how it has always been done.” Institutions like the World Bank are the repositories of the art of measurement, and they have the responsibility of being transparent and, from time to time, re-evaluating their methods. With the establishment of its Commission on Global Poverty, the World Bank is working toward fulfilling this goal for the flagship monetary poverty measure and may consider a multidimensional approach to poverty as outlined in the present chapter and other writings. In any event, Professor Sen’s many contributions to measurement will undoubtedly prove useful in guiding this and other related efforts.

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7. Sen (1980, 353).

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