

2 Social Choice and Welfare Economics

Amartya Sen

In the making of acceptable social decisions for a group (such as a nation, a community, a committee, or any other collectivity), the diverse views and interests of members of the group must receive attention and importance. This can be an exacting task, because people's views can differ, and as Horace pointed out a long time ago, there may be as "many preferences as there are people." Choosing actions and policies for a group can be formidably difficult.

And there are, in addition, difficult issues even in describing what exactly is happening to a group as a whole. Is it better off or worse? Are its members happier? Do they have more freedom than before? Is there more poverty or less than in the past? Has social inequality in the group diminished or increased? Can the social decisions that emerge be seen as democratic, or are they, in some important sense, authoritarian? Methods of aggregative assessment are central to the subject of social choice in general and welfare economics in particular.

People have speculated on social aggregation throughout human history. However, social choice theory as a formal discipline first came into its own around the time of the French Revolution. The subject was pioneered by French mathematicians in the late eighteenth century, particularly J.-C. Borda (1781) and Nicolas de Condorcet (1785). They addressed social choice problems in rather mathematical terms and initiated the intellectual discipline of social choice theory in terms of voting and related procedures. The intellectual climate of the period was greatly influenced by the European Enlightenment, with its interest in reasoned construction of a social order.

Indeed, some of the early social choice theorists, most notably Condorcet, were also among the intellectual leaders of the French Revolution. Condorcet noted that Anne Robert Jacques Turgot, the pioneering French

economist (and also the governor of the province of Limoges), whom Condorcet greatly admired, was the first statesman who “deigned to treat the people as a society of reasonable beings” (Condorcet 1847, 9, 15, 18). Condorcet admonished Jacques Necker, an opponent of Turgot, for “exaggerating the stupidity of people.” Condorcet took great interest, especially in his later works, on interactive decision-making in assemblies, including “assemblées d’administration,” charged with making decisions about taxation, public works, militias, the use of public funds, and the management of public goods.

The motivation for the early social choice theorists included the avoidance of authoritarianism as well as arbitrariness in social choice. Their work focused on the development of a framework for rational and democratic decisions for a group, paying adequate attention to the preferences and interests of its members. However, even the theoretical investigations typically yielded rather pessimistic results. Condorcet noted, for example, that majority rule can be caught in an impasse when every alternative is defeated in voting by some other alternative. To illustrate the “voting paradox,” first spotted by Condorcet, consider a 3-member community in which person 1 strictly prefers x to y and that to z ; person 2 ranks them in the strict order of y , z , and x ; and person 3 strictly ranks them as z , x , and y . Then x will defeat y by majority vote, while y defeats z , and z vanquishes x , thereby generating a “cycle.” More particularly, every alternative is rejected in a majority vote by some other alternative, and there will be no “Condorcet winner,” that is, an alternative that wins against (or at least stays undefeated against) every other alternative.

Even though there is no continuous line of work on social choice theory following the early lead of French mathematicians, the subject received sporadic attention in various writings, often from distinguished intellectuals, such as Lewis Carroll, the author of *Alice in Wonderland* (he wrote some engaging and important papers on group decisions under his real name, C. L. Dodgson (1876, 1884)).

However, in its modern—and fully axiomatized—form, modern social choice theory had to wait until the middle of the twentieth century for its first rigorous foundation in the work of Kenneth J. Arrow. His famous “impossibility theorem,” contained in his PhD dissertation, was first reported in a journal article (Arrow 1950). His thesis was published shortly thereafter as a monograph (Arrow 1951), which became an instant classic.

Economists, political theorists, moral and political philosophers, sociologists, and even the general public took rapid notice of what seemed like—and indeed was—a devastating result. And in a comparatively short time, social choice theory in a modernized and systematically axiomatic form was firmly established as a discipline with immediate and extensive implications for economics, philosophy, politics, and the other social sciences. Very rarely in intellectual history has a young graduate student so profoundly influenced the course of social thought in the world.

Like Condorcet with his “voting paradox,” Arrow was also concerned with the difficulties of group decisions and the inconsistencies to which they may lead. Arrow’s “impossibility theorem” (formally, the “general possibility theorem”) is a result of breathtaking elegance and power. The theorem shows that even some very mild conditions of reasonableness could not be simultaneously satisfied by any social choice procedure in the wide family of such procedures that identify a social ordering for any collection of individual preference orderings over social alternatives.

The fundamental challenge that Arrow considered is that of going from individual preferences over the different states of affairs to a social preference over those states, reflecting something like an “aggregation” of the points of views of all members of the society. He wanted the social preference to be an “ordering” (sometimes called a “complete ordering”). A ranking is an ordering if (1) any two alternatives can be ranked—one preferred to the other, or the opposite, or they are indifferent to each other (this is called the “completeness” of the ranking), and (2) the ranking has a requirement of coherence that goes by the name of “transitivity” (a flash of grammatical language in the field of preferences). Transitivity demands that if an alternative x is taken to be at least as good as y , and y to be at least as good as z , then x must be judged to be at least as good as z . Arrow saw these demands on the social choice as requirements of “collective rationality.”

A social choice procedure that takes us from a cluster (or “profile”) of individual preference orderings (one ordering per person) to a social preference ordering is called a “social welfare function,” as defined by Arrow. Interpreting this in the context of welfare economics, if a state of affairs x is socially ranked above another state y , then state x yields more “social welfare” than does y . The impossibility theorem shows that if there are at least three distinct alternatives and at least two different individuals (though only a finite number of them), then a set of very mildly demanding

conditions of reasonableness cannot be satisfied together by any possible social welfare function.

Consider the following four axioms characterizing a social welfare function, specifying a social ordering of alternative states of affairs for each profile of individual preference orderings over those states.¹

Unrestricted domain (U) claims that a social welfare function must work for every profile of individual preferences (that is, it must generate a social ordering for every cluster of individual preferences).

Independence of irrelevant alternatives (I) requires that the social ranking of any pair of alternatives must depend only on the individual rankings over just that pair (the “relevant” pair).

The Pareto principle (P) instructs that if everyone strictly prefers some alternative x to another alternative y , then social ordering too must place x strictly above y .

Non-dictatorship (D) demands that there should be no dictator such that when that person strictly prefers any x to any y , then society must invariably place x strictly above y .

Arrow’s impossibility theorem shows that these mild-looking axioms U, I, P, and D cannot be simultaneously fulfilled by any social aggregation procedure (or social welfare function).

This is not only an astonishing analytical result, but also one that generated much despair in the search for rational social choice procedures based on individuals’ preferences. It also seemed like an antidemocratic result of profound reach (which, in fact, is not quite the correct interpretation). One common take on this result was that only a dictatorship would avoid social inconsistencies, but a dictatorial rule would, of course, involve (1) an extreme sacrifice of participatory decisions and (2) a gross inability to be sensitive to the heterogeneous interests of a diverse population.

Two centuries after the flowering of the ambitions of social rationality in Enlightenment thinking and in the writings of the theorists of the French Revolution, the subject seemed to be inescapably doomed. Social appraisals, economic evaluations, and normative statistics would have to be, it seemed, inevitably arbitrary or irremediably despotic.

1. This is a somewhat simplified version of the set of conditions that Arrow himself used (see Sen 1970a).

The Idea of Social Preference

Arrow's framework makes substantial use of the idea of social preference, and Arrovian conditions of "collective rationality" seen in terms of direct use of maximization based on the binary relation of social preference, or indirect use of the idea through imposing internal consistency conditions of choice that has a binary representation. The binary relation can be seen as an "as-if social preference." James Buchanan (1954) has argued powerfully against the alleged cogency of the idea of social preference, because society is not an individual and so cannot have any self-evident attribute of a "preference." The objection is particularly relevant in dealing with political decisions rather than social welfare evaluation, because the latter demands some notion of a socially acceptable idea of a possibly binary social welfare ranking relation. But the case for relying on institutional outcomes rather than on any implicit idea of social preference can be seen to be strong for political processes.

The possibility of a nonbinary formulation of the social choice has received considerable attention in the literature of social choice theory in recent years, led by contributors like Bergt Hansson, Thomas Schwartz, Peter Fishburn, Donald Campbell, and Charles Plott. In some cases, the impossibility results of the Arrow type seem resolved, and in others, they have been revived in the choice-functional framework. The question that arises, however, is whether the impossibility results, thus derived, have been crucially dependent on imposing conditions of internal consistency of choice, which tend to take us in the direction of a binary representation of the choice function. However, it turns out (see Sen 1993) that Arrow's impossibility theorem can be generalized to hold without any condition of internal consistency of choice and without imposing any demands of collective rationality. Through seeing the fuller implications of the relation between individual preferences and social choice (including seeing independence of irrelevant alternatives in a more demanding light), the Arrow impossibility can be shown to resurface without any use of internal consistency in social choice functions and without any idea—explicit or implicit—of a social preference.

Voting and Majority Decisions

As far as political decisions are concerned (postponing for the moment welfare economic investigations), it seems fair to conclude that there is not going to be any perfect resolution through voting procedures of the social choice dilemmas of the kind identified by Arrow. This leads to two different kinds of questions. First, even though there may not be any faultless voting procedure, do some of them function much better than others? Second, is voting a good way at all of trying to resolve social choice problems of all kinds?

Majority voting has many rather attractive qualities and is considered by many as a quintessential component of democratic decision making. Can the grip of inconsistent choices—and more particularly, of not having a “Condorcet winner”—be at least partially subdued? One of the ways of coping with this challenge that has been much explored in this context is the use of a “restricted domain” of the social welfare function—through limiting the preference profiles that are allowed—that would avoid problems of inconsistency in voting results and also avoid the nonexistence of a “Condorcet winner.” Arrow (1951) himself had initiated, along with Duncan Black (1948, 1958), the search for adequate restrictions that would guarantee consistent majority decisions, and he had identified a class of preference profiles (“single-peaked” preferences) that would work.

In fact, the Arrow-Black identification of sufficiency for consistent majority rule (single-peaked preference profiles) can be vastly expanded through using a process of reasoning not dissimilar to Arrow’s own, which results in a much more general condition: “value restriction” (Sen 1966). Value restriction demands that in every triple of alternatives (x, y, z), there is one alternative (say, x) such that everyone agrees that it is either “not best,” or “not worst,” or “not medium” (the position on which there is such an agreement can vary from one triple to another).

Going from sufficiency conditions to the demands of necessity, the necessary and sufficient conditions of domain restriction for consistent majority decisions can also be precisely identified (see Sen and Pattanaik 1969). If individual preferences are strict—that is, they have no indifferences—then these rather complex necessary and sufficient conditions boil down simply to value restriction. However, even though these conditions are much less restrictive than the earlier conditions that had been identified, they are still

quite demanding; indeed, it can be shown that they can be easily violated in many actual situations.

Even though a voting impasse cannot be generally eliminated, it appears that majority rule is, in fact, far less vulnerable to contradictions than other procedures of voting. It can be shown that if there is a domain restriction for which any voting rule other than the majority rule works well, then so will majority rule (see Maskin 1995, 2014; Dasgupta and Maskin 2008). Furthermore, for any nonmajority voting rule, there is a class of preference profiles for which majority rule works well, but the other voting rules do not. This powerful “dominance result” shows that even though all voting rules are subject to impasse or contradictions, the method of majority rule, which has other attractions too, is the least vulnerable among them. The comparative robustness of majority rule is surely a pointer to its strength that cannot but be important for many social and political decisions. But that comfort may not be available for many other types of social choice. For example, voting rules, including majority rule, may be quite inappropriate as a basis for welfare economic judgments (on which more presently).

Liberty and Rights

Majority rule can also be severe against minority rights and may also work against individual liberty. More than a century and a half ago, John Stuart Mill ([1859] 1959) investigated how a good society should try to guarantee the liberty of each person. Liberty has many different aspects, including two rather distinct features:

- 1) *The opportunity aspect*: We should be able to achieve what we choose to achieve in our respective personal domains, for example, in our private life.
- 2) *The process aspect*: We can make our own choices in our personal domains (no matter whether we achieve what we want).

In social choice theory, the formulation of liberty has been primarily concerned with the former, that is, the opportunity aspect.

Seen in the perspective of the opportunity aspect, liberty demands that each person should be decisive in safeguarding certain things in his or her “personal domain,” without interference by others (even if a majority is keen to interfere). J. S. Mill considered various examples of such

personal domains over which the person involved should be able to prevail, including—for example—in the practice of his or her own religion. Note that the “opportunity aspect” cannot be safeguarded, as it is sometimes wrongly presumed, by leaving to the person the choices to be made in her personal domain, as an alleged “process guarantee.” The trouble is that others can interfere in the practice of this person through their own actions (for example, a person may be allowed to choose her religious practices, but others could interfere through making hugely distracting loud noises, or even by organizing disturbing demonstrations outside her home, making life difficult for the person involved). It is the duty of the society, Mill argued, to make sure that the person’s own choices over a personal domain prevail (in this case, guaranteeing that the person can perform his or her private religious actions, without being stopped by others, *and also* without being hindered by the actions of others).

It is the conflict of this opportunity aspect of liberty with the Pareto principle (given unrestricted domain) that is the subject matter of an impossibility theorem, which is sometimes referred to as “the liberal paradox,” or “the impossibility of the Paretian liberal” (See Sen 1970a, 1970b). Unlike the Arrow theorem, this impossibility theorem does not depend on the independence of irrelevant alternatives (condition I), which is not invoked at all. Instead, it is shown that unrestricted domain (U) and the Pareto principle (P) cannot be combined with “minimal liberty,” demanding only that at least two persons are each decisive over the choice over one pair each. There is a huge literature on the subject, including contributions that (1) dispute the result, (2) extend it, (3) attempt to resolve the conflict, and (4) question the interpretation of liberty. The theorem shows the impossibility, given unrestricted domain, of satisfying even a very mild demand for “minimal liberty” when combined with an insistence on Pareto efficiency.

Turning to the process aspect, seeing liberty as a guaranteed process of leaving people free to do certain things in their own personal sphere is a requirement that has been particularly pursued by various writers in this field (led by Robert Nozick (1974), and joined in many distinct ways by others). In this perspective, what liberty demands is that people remain free to choose what to do in their personal domain, but it does not really matter what the actual outcome is (that is, it does not matter as far as liberty is concerned). I cannot pretend that I find this conclusion particularly persuasive, because the opportunity aspect of liberty can also be very important.

In modern societies in particular, it is hard to give people the agency to control what happens in all aspects of their lives. My liberty to fly safely is better guaranteed by leaving many decisions to the pilot, rather than my taking charge of the agencies in the cockpit. Our lives are saved by better policing and effective epidemiology, which involve the agencies of many other people (and not just on what we ourselves do).

However, it is hard to deny that liberty has both opportunity and procedural aspects. If being free to smoke is an important liberty (there can be a debate on this), then surely a procedural system that allows anyone to decide whether to smoke can rightly be seen as a part of liberty. However, if a person who shuns smoking does not want smoke to be blown in her face, her liberty to secure this does not depend primarily on what she does, but mostly on what others do. Leaving her free with her action cannot eliminate this violation of her personal liberty.

In the recent literature, the formulation of process-based liberty has been much refined from the simple statements originally made by Nozick (1974). In particular, the specification of liberty has been given “game-form” formulations (see Gaertner, Pattanaik, and Suzumura 1992), so that agency freedoms are judged by the acceptability of combinations of different persons’ actions (e.g., do not smoke if others are present, or—as a stricter demand—do not smoke in places where others can be present if not deterred by the presence and activities of smokers). This refinement is surely an important one, but as Gaertner, Pattanaik, and Suzumura explain, it does not eliminate the impossibility of the Paretian liberal. Its merit lies elsewhere, in particular, in capturing better the common idea of liberty with the assignment of individual agency freedoms. It does not, however, eliminate the relevance of social choice in assessing different game forms (see Sen 1992; Hammond 1996). Game forms do help the specification and analysis of liberty, but the motivation behind social choice theory would continue to apply in the assessment of alternative game forms. And in that context, we must take note of outcomes as well as processes.

Crisis in Welfare Economics

I turn now to welfare economics. Social choice difficulties apply *inter alia* to what is called “welfare economics”—an old subject aimed at judging social states in terms of the well-being (and other concerns) of the people,

on which A. C. Pigou's (1920) distinguished book, *The Economics of Welfare*, had been something of a classic account. The subject, however, had taken quite a hard hit in the 1930s, even before Arrow's impossibility result further darkened—or seemed to darken—the prospects of systematic welfare economics. The initial crises came because of the economists' newfound—but rather hastily argued—conviction that there was something quite unsound in making use of interpersonal comparison of individual utilities, which had been the basis of traditional welfare economics

Welfare economics had been developed by utilitarian economists (such as Francis T. Edgeworth (1881), Alfred Marshall (1890), and Arthur C. Pigou (1920)) and had taken a very different track from the vote-oriented social choice theory. It took inspiration not from Borda (1781) and Condorcet (1785), but from their contemporary, Jeremy Bentham (1789). Bentham had pioneered the use of utilitarian calculus to obtain judgments about social interest by aggregating the personal interests of the different individuals in the form of their respective utilities.

Bentham's concern—and that of utilitarians in general (John Stuart Mill was the exception here)—was with the *total utility* of a community. The focus, which has problems of its own, was on the total sum of utilities, irrespective of the distribution of that total, and in this, we can see a partial blindness of considerable ethical and political import. For example, in the utilitarian best world of maximizing utility, a person who is unlucky enough to have a uniformly lower capability to generate enjoyment and utility out of income (say, because of a physical or mental handicap) would be given even a lower share of a fixed total income, because of her lower ability to generate utility out of income. This is a consequence of utilitarianism's single-minded pursuit of maximizing the sum-total of utilities—no matter how unequally distributed. However, the utilitarian interest in taking comparative note of the gains and losses of different people is not in itself a negligible concern. And this concern makes utilitarian welfare economics deeply interested in using a class of information—in the form of comparison of utility gains and losses of different persons—with which Condorcet and Borda had not been directly involved.

Utilitarianism has been very influential in shaping welfare economics, which was dominated for a long time by an almost unquestioning adherence to utilitarian calculus. But by the 1930s, utilitarian welfare economics came under severe fire. It would have been quite natural to question (as

Rawls (1971) would do masterfully in formulating his theory of justice) the utilitarian neglect of distributional issues and its concentration only on utility sum-totals (in a distribution-blind way). But that was not the direction in which the anti-utilitarian critiques went in the 1930s and in the decades that followed. Rather, economists came to be persuaded by arguments presented by Lionel Robbins and others (who were themselves deeply influenced by the then-fashionable philosophical approach of “logical positivism”) that interpersonal comparisons of utility had no scientific basis: “Every mind is inscrutable to every other mind and no common denominator of feelings is possible” (Robbins 1938, 636). Thus, the epistemic foundations of utilitarian welfare economics were seen as incurably defective.

There followed attempts to do welfare economics on the basis of each person’s respective ordering of social states, without any interpersonal comparisons of utility gains and losses of different persons. Although utilitarianism and utilitarian welfare economics are quite indifferent to the distribution of utilities among different persons (concentrating, as they do, only on the sum-total of utilities), the new regime, without any interpersonal comparisons in any form, further reduced the informational base on which social choice could draw. The already limited informational base of Benthamite calculus was made to shrink further to the narrow electoral plane of Borda and Condorcet (I should explain that I am referring here to Condorcet as a voting theorist, not as a general social philosopher—in that capacity, his attention was much broader). The use of different persons’ utility rankings without any interpersonal comparison is analytically quite similar to the use of voting information—each individual taken separately—in making social choice.

Attempted Repairs and Further Crises

Faced with this informational restriction, utilitarian welfare economics gave way, from the 1940s on, to what came to be called—hugely overambitiously—“new welfare economics,” which used only one basic criterion of social improvement: the “Pareto comparison.” The Pareto criterion for social improvement only asserts that a situation can be seen as definitely better than another if the change would increase the utility of every one (or at least increase the utility of someone without reducing the utility of anyone

else). A good deal of subsequent welfare economics restricted attention to “Pareto efficiency” only (that is, only to making sure that no further Pareto improvements are possible). This criterion takes no interest whatsoever in distributional issues, which would tend to involve conflicts of interests of different persons). So if one person gains while everyone else loses (no matter how many—and by how much), we were not allowed to declare this change to be a deterioration, if we seek only Pareto efficiency.

This remarkable reticence, it seems fair to guess, would have appealed to Emperor Nero, who evidently enjoyed playing his music while Rome burned and all other Romans were plunged into misery. In general, the Pareto efficiency of a state of affairs would not be disturbed even if many people are forced into terribly famished lives, while some others lead lives of extreme luxury, provided the misery of the destitute cannot be reduced without cutting into the lives of the super-rich.

Some further criterion—beyond Pareto efficiency—is clearly needed for making social welfare judgments with a greater reach, and this was insightfully explored by Abram Bergson (1938) and Paul A. Samuelson (1947). This search led directly to Arrow’s (1950, 1951) pioneering formulation of social choice theory, relating social preference (or decisions) to the set of individual preferences, that is, to the search for what Arrow called a “social welfare function.” It was in the framework of social welfare functions that Arrow (1951, 1963) established his powerful impossibility theorem, showing the incompatibility of some very mild-looking conditions (discussed earlier), including Pareto efficiency, nondictatorship, independence of irrelevant alternatives, and unrestricted domain. This generated further gloom in an already gloomy assessment of the possibility of having a reasoned and satisfactory welfare economics.

To escape the impossibility result, different ways of modifying Arrow’s requirements were tried out in the literature that followed, but other difficulties continued to emerge. The force and widespread presence of impossibility results generated a consolidated sense of pessimism, and this became a dominant theme in welfare economics and social choice theory in general. By the middle 1960s, William Baumol, a distinguished contributor to economics in general and welfare economics in particular, judiciously remarked that “statements about the significance of welfare economics” had started having “an ill-concealed resemblance to obituary notices” (Baumol 1965, 2). This was certainly the right reading of the prevailing views.

Welfare Economics and Voting Information

It can be argued that the “obitutorial” climate of welfare economics in its postutilitarian phase was related largely to the epistemic penury of welfare economics based on confining informational inflow to voting-like inputs. Voting-based procedures are entirely natural for some kinds of social choice problems, such as elections, referendums, or committee decisions. They are, however, altogether unsuitable for many other problems of social choice. For example, when we want to get some kind of an aggregative assessment of social welfare, we cannot rely on such procedures for at least three distinct reasons.

First, there are some serious problems in the correspondence between actual preferences and the votes cast, which must take note of the possibility of strategic voting, aimed at manipulating the voting outcomes. The impossibility of having strategy-proof voting procedures has been well established.² The subject occupies a huge literature.

Second, voting requires active participation, and if some groups tend not to exercise their voting rights (perhaps due to cultural conditioning or because of procedural barriers that making voting difficult and expensive), then the preferences of those groups tend to have quite inadequate representation in social decisions. Because of lower participation, the interests of substantial groups—for example, of African Americans in the United States—can have a quite limited influence on national politics.

Third, even with the active involvement of everyone in voting exercises, we will still be short of important information needed for welfare economic evaluation. It is absurd to think that social welfare judgments can be made without some understanding of issues of inequality and disparities that characterize one society or another. Voting information, taken on its own, turns a blind eye to such comparisons—its takes no direct note of how deprived different voters may be, nor of the extent to which their preference reflects large differences or small ones. These limitations are related to the eschewing of interpersonal comparison of well-being, on the impossibility of which for several decades, professional economists remained prematurely convinced.

2. See Gibbard (1973), Satterthwaite (1975), and also Pattanaik (1973, 1978), Maskin (1985) and Maskin and Sjöström (2002).

There was also the exclusion of what economists call “cardinal utility,” which takes us beyond relying merely on the ranking of alternatives in terms of being better or worse (or indifferent)—the so-called ordinal utility—to giving us some idea of the relative gaps between the utility values of different alternatives. Utilitarian welfare economics uses cardinality of utilities as well as interpersonal comparison of these utilities, and the new orthodoxy that emerged in the 1930s disputed the scientific status of both cardinality and of interpersonal comparison of utilities of different persons.

Informational Penury as a Cause of Social Choice Problems

It is also worth recollecting that utilitarian philosophy—and influenced by it, traditional welfare economics as well—had huge informational restrictions of their own. It was not allowed to make any basic use of non-utility information, because everything had to be judged ultimately by utility sum-totals in consequent states of affairs. To this informational exclusion was now added the further exclusion of interpersonal comparisons of utilities, along with cardinal utility, which disabled the idea of utility sum-totals without removing the exclusion of non-utility information. This barren informational landscape makes it hard to arrive at any systematic judgment of social welfare, based on informed reasoning. Arrow’s theorem can be interpreted, in this context, as a demonstration that even some very weak conditions—in this case, Arrow’s axioms—relating individual preferences to social welfare judgments cannot be simultaneously satisfied in a world of such informational privation (see Sen 1977b, 1979).

The problem is not just one of impossibility. Given Arrow axioms U (unrestricted domain), I (independence of irrelevant alternatives), and P (Pareto principle), the relation between the profile of individual preferences and the social ranking emerging from it has to forgo taking any note of the nature of the alternatives (that is, the social states). The relation must simply go by the individual preferences over the alternatives, no matter what they are. If person 1 is decisive in the choice over any pair (a, b)—for whatever reason—then that person would be decisive in the social preference over every other pair of alternatives (x, y) as well, even though the nature of the choice involved may radically differ because of the nature of the social alternatives involved.

This requirement is sometimes called “neutrality” (a usage that had the support—I very much hope only half-hearted—of Arrow (1963) himself). It is, in fact, a peculiarly kind term for what is after all a sanctification of blindness to all information other than utility information. Perhaps the alternative term used for it (namely, “welfarism”) is more helpful, in that it focuses on the limitation imposed by forbidding any direct use of any information about the states of affairs other than the individual welfares they respectively generate—and that again only in the form of utilities. Adding to that the further requirement that the utility information used must not involve any cardinality, or any interpersonal comparison of utilities, amounts to insisting that social choices must be made with extremely little information indeed.

The demand of so-called neutrality tends to play havoc with the discipline of reasoned social choice. Consider, for example, a cake division problem, in which everyone prefers to have a larger share of the cake. If, in this cake division problem, an equal division between two persons in the form (50, 50) is socially preferred to person 1 having 99 percent of it, with the other having only 1 percent in the form (99, 1), it is clearly being judged that person 2’s preference should prevail over person 1’s, in this case. But if so-called neutrality is demanded, then due to the insistence that the nature of the alternatives should not make any difference to whose preference prevails, an opposite type of inequality—with person 2 having nearly all in the form of (1, 99)—should be socially preferred to a (50, 50) division, through the requirement that person 2, decisive over the earlier choice, should be decisive over all other pairwise conflicts as well. It is hard to escape the thought that something has gone badly wrong in the underlying intellectual system—and that problem arises even before any impossibility result emerges.

What is being presumed here is to insist that welfare judgments must be based on something like voting data, taking note of who prefers what but ignoring who is rich and who is poor, and who gains how much from a change compared with what the losers lose. We must go beyond the class of voting rules (explored by Borda and Condorcet as well as Arrow) to be able to address distributional issues, particularly in welfare economics.

Arrow had ruled out the use of interpersonal comparisons, because he had followed the general consensus that had emerged in the 1930s that (as Arrow put it) “interpersonal comparison of utilities has no meaning” (Arrow 1951, 9). The totality of the axiom combination used by Arrow had

the effect of confining social choice mechanisms to rules that are, broadly speaking, of the voting type. His impossibility result relates, therefore, to this class of rules with this informational abstinence.

It should be emphasized that, unlike ruling out the use of interpersonal comparison of utilities, which Arrow explicitly invoked, the insistence on restricting social choice procedures only to voting rules is not an assumption that is directly imposed by Arrow. It is, in fact, a combined result—quite startling in its own right—of the different axioms that Arrow uses. It can be seen as an analytical consequence of a set of apparently reasonable axioms postulated for social choice. Interpersonal comparison of utilities is, of course, explicitly excluded, but in the process of proving his impossibility theorem, Arrow also shows that a set of seemingly plausible assumptions, taken together, logically entail other features of voting rules as well, in particular something close to so-called neutrality (discussed earlier). This requires that no effective note be taken of the nature of the social states, and that the social decisions must be based only on the votes that are respectively cast in favor of—and against—them. Although the eschewal of interpersonal comparisons of utilities eliminates the possibility of taking note of the inequality of utilities (and also of differences in gains and losses of utilities), the entailed component of so-called neutrality (or welfarism) prevents attention being indirectly paid to distributional issues through taking explicit note of the nature of the respective social states (for example, of the incomes or wealth levels of different persons, as in the cake-division example discussed earlier).

This also brings out the disanalogy between Condorcet's voting paradox and Arrow's much more general impossibility theorem (in contrast to some common statements in the literature). Condorcet's analysis begins with the world of voting rules, whereas Arrow gets there only after establishing a remarkable analytical theorem showing that the combination of a few very apparently plausible axioms leaves us no option but to confine our vision to voting rules. Some of the hard work in establishing Arrow's theorem ends where the Condorcet exercise begins.

Incorporating More Information in Social Decisions

To lay a broader foundation for a constructive social choice theory (broader than the framework Arrow developed), we have to resist the historical consensus against the use of interpersonal comparisons in social choice that was

dominant when Arrow began his research on social choice. That historical consensus was based on a rather fragile understanding of epistemology, derived from the short-lived boom of logical positivism. The case for unqualified rejection of interpersonal comparisons of mental states is hard to sustain (quite aside from the fact that these comparisons need not be of mental states only—on which more presently).³ Indeed, as has been forcefully argued by the philosopher Donald Davidson (1986), it is difficult to see how people can understand anything much about other people's minds and feelings without making some comparisons with their own minds and feelings. Such comparisons may not be extremely precise, but then again, we know from analytical investigations that very precise interpersonal comparisons may not be needed to make systematic use of such comparisons in social choice.

However, aside from doubts about the evidential basis of interpersonal comparisons, there were also questions about the possibility of a systematic analytical framework for comparing and using the accounting of different persons' welfare magnitudes for social decisions, especially because interpersonal comparisons can take many different forms. John Harsanyi (1955) and Patrick Suppes (1966) made some early departures in that direction. But they were more concerned with using interpersonal comparisons (of "units" in the case of Harsanyi and of "levels" in the case of Suppes) rather than with working out a comprehensive analytical framework for interpersonal comparisons in general, including the possibilities of specific features of interpersonal welfare calculus.

Inspired by this challenge, I tried my hand at developing a comprehensive analytical framework for interpersonal comparisons in my book *Collective Choice and Social Welfare* (Sen 1970a) and in follow-up contributions (Sen 1977b, 1982). Happily, the 1970s and 1980s also saw the publication of major contributions on the subject from a dazzling group of social choice theorists, including Peter Hammond (1976); Claude d'Aspremont and Louis Gevers (1977); Eric Maskin (1978, 1979); Louis Gevers (1979); Kevin Roberts (1980a, 1980b); Kotaro Suzumura (1983, 1997); Charles Blackorby, David Donaldson, and John Weymark (1984); d'Aspremont (1985); d'Aspremont and Mongin (1998); and others. Even Kenneth Arrow (1977) joined this

3. On this issue and that of making actual interpersonal comparisons with factual information, see Daniel Kahneman (1999, 2000), Alan Krueger (2009), and Krueger and Stone (2014).

exploration. It is fair to say that we now have a much clearer understanding of the analytical demands of different kinds and extents of interpersonal comparisons, and the ways and means of making systematic use of that information in social choice.

Without going into the technicalities that have emerged in the literature, it can be said that the extent and reach of different kinds of interpersonal comparisons can be explicitly invoked in a fully axiomatized form (prominent types include full comparability, level comparability, unit comparability, ratio-scale comparability, and so on; see Sen 1977b). Each kind of comparability imposes its own demands on combining welfare numbers of different persons. Consider, for example, a case of full comparability, by beginning with well-being numbers 1, 2, 3 for person 1, respectively, for social alternatives x , y , and z , with the corresponding numbers for person 2 being 2, 3, 1. Because there are no naturally fixed units of well-being, we can easily enough alter the well-being numbers of person 1 for x , y , and z to be 2, 4, 6 instead of 1, 2, 3. Full interpersonal comparability would demand that if we rescale person 1's well-being numbers by doubling them, then we must do the same for person 2, and transform her well-being numbers from 2, 3, 1 to a corresponding set 4, 6, 2. With such tying up (they are axiomatized through "invariance conditions") implied by full interpersonal comparability, it would not make any real difference whether we work with the original numbers (1, 2, 3 for person 1, and 2, 3, 1 for person 2), or deal instead with the symmetrically transformed numbers (2, 4, 6 for person 1, and 4, 6, 2 for person 2). As different types of interpersonal comparability (such as "level comparability" or "unit comparability") are considered, we shall have correspondingly different specifications of the invariance conditions (see Sen 1970a, 1977b; Roberts 1980a).

Through the use of "invariance conditions" in a generalized framework that allow the use of interpersonally comparable well-being numbers, going beyond simple rankings (to different extents, depending on the type of interpersonal comparability), we get what are called *social welfare functions*, which allow the use of much more information than Arrow's social welfare functions permit. Indeed, interpersonal comparisons need not even be confined to all-or-none dichotomies. We may be able to make interpersonal comparisons to some extent, but not in every comparison, nor of every type, nor with tremendous exactness. To illustrate, we may invoke the same example of Nero and the burning of Rome, discussed earlier. It

seems reasonable to argue that there should be no great difficulty in accepting that Emperor Nero's welfare gain from the burning of Rome was smaller than the sum-total of the welfare loss of all the other Romans put together—perhaps hundreds of thousands of them—who suffered from the fire. But this does not require us to presume that we can put everyone's welfares in an exact one-to-one correspondence with one another. Thus, there may be room for demanding “partial comparability”—denying both the extremes: full comparability and no comparability at all.

The different extents of partial comparability can be given mathematically exact forms (precisely articulating the extent of the variations that may be permitted). It can also be shown that terribly refined interpersonal comparisons may not be needed for arriving at definite social decisions. Quite often, rather limited levels of partial comparability will be adequate for making social decisions. Thus, the empirical exercise need not be as ambitious as is sometimes feared.

What Difference Does It Make?

How much of a change in the possibility of social choice is brought about by systematic use of interpersonal comparisons? Does Arrow's impossibility theorem (and related results) go away with the use of interpersonal comparisons in social welfare judgments? In brief, the answer is yes. The additional informational availability allows sufficient discrimination to escape impossibilities of this type. For example, with interpersonal comparability we can use the Rawlsian distributive principle of maximin (what he calls “the Difference Principle”), which takes the form of giving priority to the interests of the worst-off person (or persons).⁴ And this just demands “level comparability,” while the units of different persons' welfares need not be comparable at all.

There is an interesting contrast here. Although interpersonal comparability even without cardinality helps dissolve Arrow's impossibility theorem,

4. For compatibility with the Pareto principle (as well as for making reasonable sense), this Rawlsian approach has to be used in what is called a “lexicographic” form, so that in case where the worst-off persons tie with each other in the comparison between two states of affairs, we go by the interests of the second worst-off. And so on. For the wide reach of Rawls's criterion and its widespread relevance in public policy, see Edmund S. Phelps (1973).

cardinality without interpersonal comparability does nothing of the sort. In the absence of interpersonal comparability, Arrow's theorem can, in fact, be generalized to cover the case of fully cardinal utilities or welfares (see Sen 1970a, chapter 8). In contrast, the possibility of only "ordinal" interpersonal comparisons (so that the rankings of well-being between different persons remain invariant) is adequate to end the impossibility, even without any cardinality. We already know of course that with some types of interpersonal comparisons demanded in a full form (including cardinal interpersonal comparability), we can use the classical utilitarian approach. But it turns out that even weaker forms of comparability would still permit making consistent social welfare judgments, satisfying all of Arrow's requirements, in addition to being sensitive to distributional concerns (even though the possible rules may have to be confined to a relatively small class; see Roberts 1980a, 1980b).

Interpersonal Comparison of What?

Even though the analytical issues in incorporating interpersonal comparisons have been fairly well sorted out, there still remains the important practical matter of finding an adequate approach to the empirical discipline of making interpersonal comparisons and then using them in practice. The foremost question to be addressed is: interpersonal comparison of what? Even though the debates about interpersonal comparison of well-being have been, historically, concentrated on the comparison of "utilities" in which utilitarian philosophers were particularly interested, the subject of interpersonal comparison in general is much broader than that.⁵

It must be recognized that the formal structures of social welfare functions are not specific to utility comparisons only, and they can, in fact, incorporate other types of interpersonal comparisons as well. The principal conceptual issue is the accounting of individual advantage. This need

5. Along with broadening the coverage of information for a better understanding of poverty, there is also the important question of making sure that the empirical connections used in the informational expansion are appropriately tested and scrutinized. Recently, randomized trials have been skillfully used to make the informational broadening more sure footed, whenever possible (see particularly Banerjee and Duflo 2011).

not take the form of comparisons of mental states of happiness or desires (which have been exclusively championed by utilitarian philosophers). It could instead focus on some other way of looking at individual well-being, or freedom, or substantive opportunities.

Further, if the aggregation considered is that of individual judgments (not of individual interests), then the question can also be raised about how the divergent opinions or valuations of different persons may be combined (this is a social choice exercise of a rather different kind, on which, see Sen 1977a). This exercise, with complexities of its own, has also received some attention (see particularly Christian List and Philip Pettit (2002) and List (2005)). Furthermore, if utility comparisons are taken to be value judgments themselves, rather than purely observational assessments (this was the position strongly advocated by Lionel Robbins), then the assignment of individual utilities for use in social aggregation could itself be seen as involving aggregation of different individuals' assessments of people's utilities (see Roberts 1995).

Capabilities and Primary Goods

The main problem with relying on mental state comparisons may not be their feasibility but their relevance—at least their allegedly exclusive relevance in social choice. There are many difficulties in judging the well-being of a person by his or her mental state. Utilities may sometimes be very malleable in response to persistent deprivation. A hopeless destitute, or a downtrodden laborer living under inescapably exploitative arrangements, or a subjugated housewife in a society with entrenched gender inequality, or a tyrannized citizen under brutal authoritarianism may come to terms with her deprivation. She may take whatever pleasure she can from small achievements and adjust her desires to take note of feasibility (thereby helping the fulfillment of her downwardly adjusted desires). But her success in such adjustments will not make her deprivation go away. The metric of pleasure or desire may sometimes quite inadequately reflect the extent of a person's substantive deprivation.

There may indeed be a case for taking incomes, commodity bundles, or resources more generally to be of direct interest in judging a person's advantage. The interest in incomes or resources can arise for many different reasons—not merely for the mental states that opulence may help generate.

In fact, the Difference principle in Rawls's (1971) theory of "justice as fairness" is based on judging individual advantage in terms of a person's command over what Rawls calls "primary goods," which are general-purpose resources that are useful for anyone to have (no matter what her exact objectives are).

This procedure can be improved on by taking note not only of the holdings of primary goods and resources, but also of interpersonal differences in converting them to the capability to live well. Indeed, I have tried to argue in favor of judging individual advantages in terms of the respective capabilities that the person has reason to value, on which, see Sen (1980, 1985a, 1985b) and Nussbaum (1988, 1992, 2000, 2001, 2011). This approach focuses on the substantive freedoms that people have rather than only on the particular outcomes they obtain. For responsible adults, the concentration on freedom rather than only on achievement has some merit, and it can provide a general framework for analyzing individual advantage and deprivation in a contemporary society.

Normative Measurement

The variety of information on which social welfare analysis can draw can be well illustrated by the study of poverty and the battle against it. The intellectual challenges involved in what Angus Deaton (2013) has called "the great escape" are as important to the subject of social choice as they are central to the basic engagements of the social sciences in general.

In the standard measurement literature, poverty is typically seen in terms of the lowness of incomes, and it has been traditionally measured simply by counting the number of people below the poverty-line income; this is sometimes called the "head-count measure." A scrutiny of this approach, which has been an important part of contemporary social choice literature, yields two different types of questions. First, is it adequate to see poverty as equivalent to lowness of income? Second, even if poverty is seen as low income, is the aggregate poverty of a society best characterized by some index of the head-count measure of the number falling below the chosen cut-off poverty-line income?

I take up these questions in turn. Do we get enough of a diagnosis of individual poverty by comparing the individual's income with a socially

given poverty-line income? What about the person with an income well above the poverty line, who suffers from an expensive illness (requiring, say, kidney dialysis)? Is deprivation not ultimately a lack of opportunity to lead a minimally acceptable life, which can be influenced by a number of considerations, including of course personal income but also physical and environmental characteristics, and other variables, related to, say, epidemiological conditions of a person's regional location. It has been argued that poverty can be more sensibly seen as a serious deprivation of certain basic capabilities. This alternative approach leads to a rather different diagnosis of poverty from the ones that a purely income-based analysis can yield.

This is not to deny that lowness of income can be very important in many contexts, because the opportunities a person enjoys in a market economy can be severely constrained by her level of real income.⁶ However, various contingencies can lead to variations in the "conversion" of income into the capability to live a minimally acceptable life. And if that is what we are concerned with, there may be good reasons to look beyond income poverty (see Sen 1984, 1992; Foster and Sen 1997) without ignoring the income information. There are at least four different sources of variation: (1) personal heterogeneities (for example, disability or proneness to illness), (2) environmental diversities (for example, living in a storm-prone or flood-prone area), (3) variations in social climate (for example, the prevalence of crime or epidemiological challenges), and (4) differences in relative deprivation connected with customary patterns of consumption in particular societies (for example, being relatively impoverished in terms of income in a rich society can lead to deprivation of the absolute capability to take part in the life of the community—a point that was made with compelling force by Adam Smith (1776)).

I turn now to the second question. The most common and most traditional measure of poverty had tended to concentrate on head counting. But it must also make a difference as to how far below the poverty line the poor individually are, and furthermore, how the deprivation is *shared and distributed* among the poor. The social data on the respective deprivations of the individuals who constitute the poor in a society need to be aggregated

6. These issues have been insightfully scrutinized by Philippe Van Parijs (1995).

to arrive at informative and usable measures of aggregate poverty. This is a social choice problem, and axioms can indeed be proposed that attempt to capture our distributional concerns in this constructive exercise.⁷

Among the new developments in the field are multidimensional measures of poverty and inequality, powerfully pursued in different forms by Atkinson and Bourguignon (1982), Alkire and Foster (2011a, 2011b), and others.⁸ To understand poverty and inequality, a strong case can be made for looking at real deprivation and not merely at mental reactions to that deprivation. The point has been brought out particularly clearly by recent investigations of gender inequality that focus not just on happiness or unhappiness but also on women's deprivation in terms of undernutrition; clinically diagnosed morbidity; observed illiteracy; even unexpectedly high mortality (compared with physiologically justified expectations); and in an anticipatory context, sex-specific abortion of female fetuses.

Multidimensional interpersonal comparisons can be sensibly—and comfortably—accommodated in a broad framework of welfare economics and social choice theory, enhanced by the removal of informational constraints that are explicitly invoked or implicitly imposed in traditional welfare economics.

A Closing Remark

Broadening of the informational basis has become a major concern in modern social choice theory. This applies, first of all, to addressing Arrow's impossibility result. Second, it is central to being inequality sensitive in welfare economics. Third, it is relevant to being liberty conscious in politics, law, and the pursuit of human rights. Fourth, it is especially important for having better informed normative measurement of the well-being of people.

7. I will not survey here the huge axiomatic literature on this subject. The measure of poverty on the income space in Sen (1976) can, in fact, be improved by an important but simple variation illuminatingly proposed by Anthony F. Shorrocks (1995). I have to confess favoring the "Sen-Shorrocks measure" over the original "Sen index." See also Foster and Sen (1997).

8. See also Kolm (1977), Maasoumi (1986), Alkire et al. (2015), and Maasoumi and Racine (2016), among many other contributions to the rich literature on multidimensional aggregation in the context of the measurement of inequality and poverty.

As has been discussed and illustrated in different contexts in this chapter, the reasoned use of appropriate information involves both epistemology and ethics. More engagement in each is crucially important for further progress in social choice and welfare economics.

References

- Alkire, Sabina, and James E. Foster. 2011a. "Counting and Multidimensional Poverty Measurement." *Journal of Public Economics* 95 (7–8): 476–487.
- Alkire, Sabina, and James E. Foster. 2011b. "Understandings and Misunderstandings of Multidimensional Poverty Measurement." *Journal of Economic Inequality* 9 (2): 289–314.
- Alkire, Sabina, James E. Foster, Suman Seth, Maria Emma Santos, Jose Manuel Roche, and Paola Ballon. 2015. *Multidimensional Poverty Measurement and Analysis*. Oxford: Oxford University Press.
- Arrow, Kenneth J. 1950. "A Difficulty in the Concept of Social Welfare." *Journal of Political Economy* 58 (4): 328–346.
- Arrow, Kenneth J. 1951. *Social Choice and Individual Values*. New York: Wiley.
- Arrow, Kenneth J. 1963. *Social Choice and Individual Values*, second edition. New York: Wiley.
- Arrow, Kenneth J. 1977. "Extended Sympathy and the Possibility of Social Choice." *American Economic Review* 67 (1): 219–225.
- Atkinson, Anthony B., and François Bourguignon. 1982. "The Comparison of Multi-Dimensioned Distributions of Economic Status." *Review of Economic Studies* 49 (2): 183–201.
- Banerjee, Abhijit V., and Esther Duflo. 2011. *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. New York: Public Affairs.
- Baumol, William J. 1965. *Welfare Economics and the Theory of the State*, second ed. Cambridge, MA: Harvard University Press.
- Bentham, Jeremy. 1789. *An Introduction to the Principles of Morals and Legislation*. London.
- Bergson, Abram. 1938. "A Reformulation of Certain Aspects of Welfare Economics." *Quarterly Journal of Economics* 52 (2): 310–334.
- Black, Duncan. 1948. "The Decisions of a Committee Using a Special Majority." *Econometrica* 16 (3): 245–261.

Black, Duncan. 1958. *The Theory of Committees and Elections*. Cambridge: Cambridge University Press.

Blackorby, Charles, David Donaldson, and John A. Weymark. 1984. "Social Choice with Interpersonal Utility Comparisons: A Diagrammatic Introduction." *International Economic Review* 25 (2): 327–356.

Borda, Jean-Charles de. 1781. *Memoire sur les Elections au Scrutin*. Memoires de l'Academie Royal des Sciences. Translated by A. de Grazia. 1953. *Isis* 44 (1/2): 42–51.

Buchanan, James M. 1954. "Individual Choice in Voting and the Market." *Journal of Political Economy* 62 (4): 334–343.

Condorcet, Nicolas de. 1785. *Essai sur l'Application de l'Analyse à la Probabilité des Decisions Rendues à la Pluralité des Voix*. Paris: L'Imprimerie Royale.

Condorcet, Nicolas de. 1847. *Ouvres de Condorce*, edited by A. Condorcet O'Connor and M. F. Arago, vol X1. Paris.

Dasgupta, Partha, and Eric Maskin. 2008. "On the Robustness of Majority Rule." *Journal of the European Economic Association* 6 (5): 949–973.

d'Aspremont, Claude. 1985. "Axioms for Social Welfare Orderings." In *Social Goals and Social Organization: Essays in Memory of Elisha Pazner*, edited by Leonid Hurwicz, David Schmeidler, and Hugo Sonnenschein, 19–76. Cambridge: Cambridge University Press.

d'Aspremont, Claude, and Louis Gevers. 1977. "Equity and the Informational Basis of Collective Choice." *Review of Economic Studies* 44 (2): 199–209.

d'Aspremont, Claude, and Philippe Mongin. 1998. "Utility Theory and Ethics." In *Handbook of Utility Theory*, edited by Salvador Barberá, Peter J. Hammond, and Christian Seidl, Volume 1, 371–481. Dordrecht: Kluwer Academic.

Davidson, Donald. 1986. "Judging Interpersonal Interests." In *Foundations of Social Choice Theory*, edited by Jon Elster and Aanund Hylland, 195–211. Cambridge: Cambridge University Press.

Deaton, Angus S. 2013. *The Great Escape: Health, Wealth, and the Origins of Inequality*. Princeton, NJ: Princeton University Press.

Dodgson, Charles L. 1876. *A Method of Taking Votes on More Than Two Issues*. Oxford: Oxford University Press.

Dodgson, Charles L. 1884. *The Principles of Parliamentary Representation*. London: Harrison and Sons.

Edgeworth, Francis T. 1881. *Mathematical Psychics*. London: Kegan Paul.

- Foster, James E., and Amartya K. Sen. 1997. "On Economic Inequality after a Quarter Century." In *Economic Inequality* by Amartya K. Sen, expanded edition, 107–219. Oxford: Oxford University Press.
- Gaertner, Wulf, Prasanta K. Pattanaik, and Kotaro Suzumura. 1992. "Individual Rights Revisited." *Economica* 59 (234): 161–177.
- Gevers, Louis. 1979. "On Interpersonal Comparability and Social Welfare Orderings." *Econometrica* 47 (1): 75–89.
- Gibbard, Allan F. 1973. "Manipulation of Voting Schemes: A General Result." *Econometrica* 41 (4): 587–601.
- Hammond, Peter J. 1976. "Equity, Arrow's Conditions, and Rawls' Difference Principle." *Econometrica* 44 (4): 793–804.
- Hammond, Peter J. 1996. "Consequentialism, Structural Rationality and Game Theory." In *The Rational Foundations of Economic Behaviour. Proceedings of the IEA Conference held in Turin, Italy*, edited by Kenneth J. Arrow, Enrico Colombatto, Mark Perlman, and Christian Schmidt, 25–42. Basingstoke, UK: Macmillan
- Harsanyi, John C. 1955. "Cardinal Welfare, Individual Ethics, and Interpersonal Comparison of Utility." *Journal of Political Economy* 63 (4): 309–321.
- Kahneman, Daniel. 1999. "Objective Happiness." In *Well-Being: Foundations of Hedonic Psychology*, edited by Daniel Kahneman, Edward Diener, and Norbert Schwarz, 3–25. New York: Russell Sage Foundation.
- Kahneman, Daniel. 2000. "Evaluation by Moments: Past and Future." In *Choices, Values, and Frames*, edited by Daniel Kahneman and Amos Tversky, 673–692. Cambridge: Cambridge University Press.
- Kolm, Serge-Christophe. 1977. "Multidimensional Egalitarianism." *Quarterly Journal of Economics* 91(1): 1–3.
- Krueger, Alan B., ed. 2009. *Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being*. Chicago: University of Chicago Press.
- Krueger, Alan B., and Arthur A. Stone. 2014. "Progress in Measuring Subjective Well-Being." *Science* 346 (6205): 42–43.
- List, Christian. 2005. "The Probability of Inconsistencies in Complex Collective Decisions." *Social Choice and Welfare* 24 (1): 3–32.
- List, Christian, and Philip Pettit. 2002. "Aggregating Sets of Judgments: An Impossibility Result." *Economics and Philosophy* 18 (1): 89–110.
- Maasoumi, Esfandiar. 1986. "The Measurement and Decomposition of Multi-Dimensional Inequality." *Econometrica* 54 (4): 991–997.

Maasoumi, Esfandiar, and J. S. Racine. 2016. "A Solution to Aggregation and an Application to Multidimensional 'Well-Being' Frontiers." *Journal of Econometrics* 191 (2): 374–383.

Marshall, Alfred. 1890. *Principles of Economics*. London: Macmillan.

Maskin, Eric. 1978. "A Theorem on Utilitarianism." *Review of Economic Studies* 46 (4): 93–96.

Maskin, Eric. 1979. "Decision-Making under Ignorance with Implications for Social Choice." *Theory and Decision* 11 (3): 319–337.

Maskin, Eric. 1985. "The Theory of Implementation in Nash Equilibrium: A Survey." In *Social Goals and Social Organization: Essays in Memory of Elisha Pazner*, edited by Leonid Hurwicz, David Schmeidler, and Hugo Sonnenschein, 173–204. Cambridge: Cambridge University Press.

Maskin, Eric. 1995. "Majority Rule, Social Welfare Functions, and Games Forms." In *Choice, Welfare, and Development: A Festschrift in Honour of Amartya K. Sen*, edited by Kaushik Basu, Prasanta P. Pattanaik, and Kotaro Suzumura, 100–109. Oxford: Oxford University Press.

Maskin, Eric. 2014. "The Arrow Impossibility Theorem: Where Do We Go from Here?" In *The Arrow Impossibility Theorem*, edited by Eric Maskin and Amartya K. Sen, 43–55. New York: Columbia University Press.

Maskin, Eric, and Tomas Sjöström. 2002. "Implementation Theory." In *Handbook of Social Choice and Welfare*, edited by Kenneth J. Arrow, Amartya K. Sen, and Kotaro Suzumura, 237–288. Amsterdam: Elsevier.

Mill, John Stuart. [1859] 1959. *On Liberty*. New York: Gateway Editions.

Nozick, Robert. 1974. *Anarchy, State, and Utopia*. New York: Basic Books.

Nussbaum, Martha C. 1988. "Nature, Function, and Capability: Aristotle on Political Distribution." *Oxford Studies in Ancient Philosophy* (Supplementary Volume): 145–184.

Nussbaum, Martha C. 1992. "Human Functioning and Social Justice: In Defense of Aristotelian Essentialism." *Political Theory* 20 (2): 202–246.

Nussbaum, Martha C. 2000. *Women and Human Development*. New York: Cambridge University Press.

Nussbaum, Martha C. 2001. "Disabled Lives: Who Cares?" *New York Review of Books*, January 11, 34–37.

Nussbaum, Martha C. 2011. *Creating Capabilities*. Cambridge, MA: Harvard University Press.

Pattanaik, Prasanta K. 1973. "On the Stability of Sincere Voting Situations." *Journal of Economic Theory* 6 (6): 558–574.

- Pattanaik, Prasanta K. 1978. *Strategy and Group Choice*. Amsterdam: North-Holland.
- Phelps, Edmund S. 1973. *Economic Justice: Selected Readings*. Harmondsworth, UK: Penguin.
- Pigou, Arthur C. 1920. *The Economics of Welfare*. London: Macmillan.
- Rawls, John 1971. *A Theory of Justice*. Cambridge, MA: Harvard University Press.
- Robbins, Lionel. 1938. "Interpersonal Comparisons of Utility: A Comment." *Economic Journal* 48 (192): 635–641.
- Roberts, Kevin W. S. 1980a. "Interpersonal Comparability and Social Choice Theory." *Review of Economic Studies* 47 (2): 421–439.
- Roberts, Kevin W. S. 1980b. "Possibility Theorems with Interpersonally Comparable Welfare Levels." *Review of Economic Studies* 47 (2): 409–420.
- Roberts, Kevin W. S. 1995. "Valued Opinions or Opinionated Values: The Double Aggregation Problem." In *Choice, Welfare, and Development: A Festschrift in Honour of Amartya K. Sen*, edited by Kaushik Basu, Prasanta P. Pattanaik, and Kotaro Suzumura, 100–109. Oxford: Oxford University Press.
- Samuelson, Paul A. 1947. *Foundations of Economic Analysis*. Cambridge, MA: Harvard University Press.
- Satterthwaite, Mark A. 1975. "Strategy-Proofness and Arrow's Conditions: Existence and Correspondence Theorems for Voting Procedures and Social Welfare Functions." *Journal of Economic Theory* 10 (2): 187–217.
- Sen, Amartya K. 1966. "A Possibility Theorem on Majority Decisions." *Econometrica* 34 (2): 491–499.
- Sen, Amartya K. 1970a. *Collective Choice and Social Welfare*. San Francisco: Holden Day.
- Sen, Amartya K. 1970b. "The Impossibility of a Paretian Liberal." *Journal of Political Economy* 78 (1): 152–157.
- Sen, Amartya K. 1976. "Poverty: An Ordinal Approach to Measurement." *Econometrica*, 44 (2): 219–231.
- Sen, Amartya K. 1977a. "On Weights and Measures: Informational Constraints in Social Welfare Analysis." *Econometrica* 45 (7): 1539–1572.
- Sen, Amartya K. 1977b. "Social Choice Theory: A Re-examination." *Econometrica* 45 (1): 53–89.
- Sen, Amartya K. 1979. "Personal Utilities and Public Judgements: Or What's Wrong with Welfare Economics." *Economic Journal* 89 (355): 537–558.
- Sen, Amartya K. 1980. "Equality of What?" In *The Tanner Lectures on Human Values*, volume I: 197–220. Cambridge: Cambridge University Press.

- Sen, Amartya K. 1982. *Choice, Welfare, and Measurement*. Oxford: Blackwell.
- Sen, Amartya K. 1984. *Resources, Values, and Development*. Cambridge, MA: Harvard University Press.
- Sen, Amartya K. 1985a. *Commodities and Capabilities*. Amsterdam: North-Holland.
- Sen, Amartya K. 1985b. "Well-Being, Agency and Freedom: The Dewey Lectures 1984." *Journal of Philosophy* 82 (4): 169–221.
- Sen, Amartya K. 1992. *Inequality Reexamined*. Cambridge, MA: Harvard University Press.
- Sen, Amartya K. 1993. "Internal Consistency of Choice." *Econometrica* 61 (3): 495–521.
- Sen, Amartya K., and Prasanta K. Pattanaik. 1969. "Necessary and Sufficient Conditions for Rational Choice under Majority Decision." *Journal of Economic Theory* 1 (2): 178–202.
- Shorrocks, Anthony F. 1995. "Revisiting the Sen Poverty Index." *Econometrica* 63 (5): 1225–1230.
- Smith, Adam. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: George Routledge and Sons.
- Suppes, Patrick. 1966. "Some Formal Models of Grading Principles." *Synthese* 16 (3–4): 284–306.
- Suzumura, Kotara. 1983. *Rational Choice, Collective Decisions, and Social Welfare*. Cambridge: Cambridge University Press.
- Suzumura, Kotara. 1997. "Interpersonal Comparisons of the Extended Sympathy Type and the Possibility of Social Choice." In *Social Choice Re-Examined. Proceedings of the International Economic Association Conference held at Schloss Hernstein, Berndorf, Vienna, Austria*, edited by Kenneth J. Arrow, Amartya K. Sen, and Kotaro Suzumura, 202–229. London and New York: Palgrave Macmillan.
- Van Parijs, Philippe. 1995. *Real Freedom for All: What (If Anything) Can Justify Capitalism?* Oxford: Oxford University Press.

This is a section of [doi:10.7551/mitpress/11130.001.0001](https://doi.org/10.7551/mitpress/11130.001.0001)

The State of Economics, the State of the World

Edited by: Kaushik Basu, David Rosenblatt,
Claudia Sepúlveda

Citation:

The State of Economics, the State of the World

Edited by: Kaushik Basu, David Rosenblatt, Claudia Sepúlveda

DOI: 10.7551/mitpress/11130.001.0001

ISBN (electronic): 9780262353472

Publisher: The MIT Press

Published: 2020



The MIT Press



This work is available under the Creative Commons Attribution—NonCommercial—NoDerivatives 3.0 IGO license (CC BY-NC-ND 3.0 IGO) <http://creativecommons.org/licenses/by-nc-nd/3.0/igo>.

Some rights reserved

The findings, interpretations, and conclusions expressed in this work are those of the authors and do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent. The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

Attribution—Please cite the work as follows: The World Bank. 2019. *The state of economics, the state of the world* / edited by Kaushik Basu, Claudia Sepulveda, and David Rosenblatt. Published by MIT Press. © World Bank. License: Creative Commons Attribution—NonCommercial—NoDerivatives 3.0 IGO (CC BY-NC-ND 3.0 IGO).

Third-party content—The World Bank does not necessarily own each component of the content contained within the work. The World Bank therefore does not warrant that the use of any third-party-owned individual component or part contained in the work will not infringe on the rights of those third parties. The risk of claims resulting from such infringement rests solely with you. If you wish to re-use a component of the work, it is your responsibility to determine whether permission is needed for that re-use and to obtain permission from the copyright owner. Examples of components can include, but are not limited to, tables, figures, or images.

All queries on rights and licenses should be addressed to the Publishing and Knowledge Division, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: pubrights@worldbank.org.

This book was set in Stone Serif and Stone Sans by Westchester Publishing Services. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Names: Basu, Kaushik, editor. | Sepúlveda, Claudia Paz, 1969– editor. | Rosenblatt, David, editor.

Title: *The state of economics, the state of the world* / edited by Kaushik Basu, Claudia Sepulveda, and David Rosenblatt.

Description: Cambridge, MA : MIT Press, [2019] | Includes bibliographical references and index.

Identifiers: LCCN 2018046336 | ISBN 9780262039994 (hardcover : alk. paper)

Subjects: LCSH: Economic development. | Information technology—Economic aspects. | Monetary policy. | Social change.

Classification: LCC HD82 .S8223 2019 | DDC 330.1—dc23

LC record available at <https://lcn.loc.gov/2018046336>

10 9 8 7 6 5 4 3 2 1