About Sen-Press Release

14 October 1998

The Royal Swedish Academy of Sciences has decided to award the 1998 Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel, to

Professor **Amartya Sen**, Trinity College, Cambridge, U.K. (citizen of India)

for his contributions to welfare economics.

Social Choice, Welfare Distributions, and Poverty

Amartya Sen has made several key contributions to the research on fundamental problems in welfare economics. His contributions range from axiomatic theory of social choice, over definitions of welfare and poverty indexes, to empirical studies of famine. They are tied closely together by a general interest in distributional issues and a particular interest in the most impoverished members of society. Sen has clarified the conditions which permit aggregation of individual values into collective decisions, and the conditions which permit rules for collective decision making that are consistent with a sphere of rights for the individual. By analyzing the available information about different individuals' welfare when collective decisions are made, he has improved the theoretical foundation for comparing different distributions of society's welfare and defined new, and more satisfactory, indexes of poverty. In empirical studies, Sen's applications of his theoretical approach have enhanced our understanding of the economic mechanisms underlying famines.

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Can the values which individual members of society attach to different alternatives be aggregated into values for society as a whole, in a way that is both fair and theoretically sound? Is the majority principle a workable decision rule? How should income inequality be measured? When and how can we compare the distribution of welfare in different societies? How should we best determine whether poverty is on the decline? What are the factors that trigger famines? By answering questions such as these, Amartya Sen has made a number of noteworthy contributions to central fields of economic science and opened up new fields of study for subsequent generations of researchers. By combining tools from economics and philosophy, he has restored an ethical dimension to the discussion of vital economic problems.

Individual Values and Collective Decisions

When there is general agreement, the choices made by society are uncontroversial. When opinions differ, the problem is to find methods for bringing together different opinions in decisions which concern everyone. The theory of social choice is preoccupied precisely with this link between individual values and collective choice. Fundamental questions are whether - and, if so, in what way - preferences for society as a whole can be consistently derived from the preferences of its members. The answers are crucial for the feasibility of ranking, or otherwise evaluating, different social states and thereby constructing meaningful measures of social welfare.

Majority rule

Majority voting is perhaps the most common rule for making collective decisions. A long time ago, this rule was found to have serious deficiencies, in addition to the fact that it may allow a majority to suppress a minority. In some situations it may pay off to vote strategically (i.e. by not voting for the preferred alternative), or to manipulate the order in which different alternatives are voted upon. Voting between pairs of alternatives sometimes fails to produce a clear result in a group. A majority may thus prefer alternative *a* to alternative *b* whereas a (second) majority prefers *b* to *c* ; meanwhile, a (third) majority prefers *c* to *a*. In the wake of this kind of "intransitivity", the decision rule cannot select an alternative that is unambiguously best for any majority. In collaboration with Prasanta Pattanaik, **Amartya Sen** has specified the general conditions that eliminate intransitivities of majority rule.

In the early 1950s, such problems associated with rules for collective choice motivated economics laureate Kenneth Arrow (1972) to examine possible rules for aggregating individual preferences (values, votes), where majority rule was only one of many alternatives. His surprising but fundamental result was that no aggregation (decision) rule exists that fulfills five conditions (axioms), each of which appears very reasonable on its own.

This so-called impossibility theorem seemed to be an insurmountable obstacle to progress in the normative branch of economics for a long time. How could individual preferences be aggregated and different social states evaluated in a theoretically satisfactory way? Sen's contributions from the mid-1960s onwards were instrumental in alleviating this pessimism. His work not only enriched the principles of social choice theory; they also opened up new and important fields of study. Sen's monograph *Collective Choice and Social Welfare* from 1970 was particularly influential and inspired many researchers to renew their interest in basic welfare issues. Its style, interspersing formally and philosophically oriented chapters, gave the economic analysis of normative problems a new dimension. In the book as well as many separate articles, Sen treated problems such as: majority rule, individual rights, and the availability of information about individual welfare.

Individual rights

A self-evident prerequisite for a collective decision-making rule is that it should be "non-dictatorial"; that is, it should not reflect the values of any single individual. A minimal requirement for protecting individual rights is that the rule should respect the individual preferences of at least some people in at least some dimension, for instance regarding their personal sphere. Sen pointed to a fundamental dilemma by showing that no collective decision rule can fulfill such a minimal requirement on individual rights and the other axioms in Arrow's impossibility theorem. This finding initiated an extensive scientific discussion about the extent to which a collective decision rule can be made consistent with a sphere of individual rights.

Information about the welfare of individuals

Traditionally, the theory of social choice had only assumed that every individual can rank different alternatives, without assuming anything about interpersonal comparability. This assumption certainly avoided the difficult question of whether the utility individuals attach to different alternatives can really be compared. Unfortunately, it also precluded saying anything worthwhile about inequality. Sen initiated an entirely new field in the theory of social choice, by showing how different assumptions regarding interpersonal comparability affect the possibility of finding a consistent, non-dictatorial rule for collective decisions. He also demonstrated the implicit assumptions made when applying principles proposed by moral philosophy to evaluate different alternatives for society. The utilitarian principle, for instance, appeals to the sum of all individuals' utility when evaluating a specific social state; this assumes that *differences* in the utility of alternative social states can be compared across individuals. The principle formulated by the American philosopher John Rawls - that the social state should be evaluated only with reference to the individual who is worst off - assumes that the utility *level* of each individual can be compared to the utility of every other individual. Later developments in social choice rely, to a large extent, on Sen's analysis of the information about, and interpersonal comparability of, individual utilities.

Indexes of Welfare and Poverty

In order to compare distributions of welfare in different countries, or to study changes in the distribution within a given country, some kind of index is required that measures differences in welfare or income. The construction of such indexes is an important application of the theory of social choice, in the sense that inequality indexes are closely linked to welfare functions representing the values of society. Serge Kolm, Anthony Atkinson and - somewhat later - Amartya Sen were the first to derive substantial results in this area. Around 1970, they clarified the relation between the so-called Lorentz curve (that describes the income distribution), the so-called Gini coefficient (that measures the degree of income inequality), and society's ordering of different income distributions. Sen has later made valuable contributions by defining poverty indexes and other welfare indicators.

Poverty indexes

A common measure of poverty in a society is the share of the population, H , with incomes below a certain, predetermined, poverty line. But the theoretical foundation for this kind of measure was unclear. It also ignored the degree of poverty among the poor; even a significant boost in the income of the poorest groups in society does not affect H as long as their incomes do not cross the poverty line. To remedy these deficiencies, Sen postulated five reasonable axioms from which he derived a poverty index: $P = H \cdot [I + (1 - I) \cdot G]$. Here, G is the Gini coefficient, and I is a measure (between 0 and 1) of the distribution of income, both computed only for the individuals below the poverty line. Relying on his earlier analysis of information about the welfare of single individuals, Sen clarified when the index can and should be applied; comparisons can, for example, be made even when data are problematic, which is often the case in poor countries where poverty indexes have their most intrinsic application. Sen's poverty index has subsequently been applied extensively by others. Three of the axioms he postulated have been used by those researchers, who have proposed alternative indexes.

Welfare indicators

A problem when comparing the welfare of different societies is that many commonly used indicators, such as income per capita, only take average conditions into account. Sen has developed alternatives, which also encompass the income distribution. A specific alternative - which, like the poverty index, he derived from a number of axioms - is to use the measure $y \cdot (1 - G)$, where y is income per capita and G is the Gini coefficient.

Sen has emphasized that what creates welfare is not goods as such, but the activity for which they are acquired. According to this view, income is significant because of the opportunities it creates. But the actual opportunities - or capabilities, as Sen calls them - also depend on a number of other factors, such as health; these factors should also be considered when measuring welfare. Alternative welfare indicators, such as the UN's *Human Development Index,* are constructed precisely in this spirit.

Amartya Sen has pointed out that all well-founded ethical principles presuppose equality among individuals in some respect. But as the ability to exploit equal opportunity varies across individuals, the distribution problem can never be fully solved; equality in some dimension necessarily implies inequality in others. In which dimension we advocate equality and in which dimensions we have to accept inequality obviously depends on how we evaluate the different dimensions of welfare. In analogy with his approach to welfare measurement, Sen maintains that capabilities of individuals constitute the principal dimension in which we should strive for equality. At the same time, he observes a problem with this ethical principle, namely that individuals make decisions which determine their capabilities at a later stage.

Welfare of the Poorest

In his very first articles Sen analyzed the choice of production technology in developing countries. Indeed, almost all of Sen's works deal with development economics, as they are often devoted to the welfare of the poorest people in society. He has also studied actual famines, in a way quite in line with his theoretical approach to welfare measurement.

Analysis of famine

Sen's best-known work in this area is his book from 1981: *Poverty and Famines: An Essay on Entitlement and Deprivation.* Here, he challenges the common view that a shortage of food is the most important (sometimes the only) explanation for famine. On the basis of a careful study of a number of such catastrophes in India, Bangladesh, and Saharan countries, from the 1940s onwards, he found other explanatory factors. He argues that several observed phenomena cannot in fact be explained by a shortage of food alone, e.g. that famines have occurred even when the supply of food was not significantly lower than during previous years (without famines), or that faminestricken areas have sometimes exported food.

Sen shows that a profound understanding of famine requires a thorough analysis of how various social and economic factors influence different groups in society and determine their actual opportunities. For example, part of his explanation for the Bangladesh famine of 1974 is that flooding throughout the country that year significantly raised food prices, while work opportunities for agricultural workers declined drastically as one of the crops could not be harvested. Due to these factors, the real incomes of agricultural workers declined so much that this group was disproportionately stricken by starvation.

Later works by Sen (summarized in a book from 1989 with Jean Drèze) discuss - in a similar spirit - how to prevent famine, or how to limit the effects of famine once it has occurred. Even though a few critics have questioned the validity of some empirical results in *Poverty and Famines,* the book is undoubtedly a key contribution to development economics. With its emphasis on distributional issues and poverty, the book rhymes well with the common theme in Amartya Sen's research.