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Excerpt  
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## Part I Introduction

## I The reason for the problems

The term *preferences* or *system of preferences* relates to tastes defined on a set of alternatives. The term *choice* refers to a pattern of behavior that takes the form of choice from a set of alternatives. In the context of collective choice, that is, choice by a number of individuals, the alternatives can be possible decisions of a group of judges or of a jury, the possible modes of action faced by a board of directors, different policies considered by a government, local community, committee of experts, a political party that wishes to win an election, or a group of civil servants. The use of the terms *social preferences* or *social choice* is common in social contexts in which the chosen alternatives affect several individuals (some or all members of society). These terms play an important role in areas of economics and political science that are concerned with decisions that affect different individuals. Not only are these individuals affected by the social decision, they or their representatives are often directly involved in making the decision. In economics, for example, decisions on family consumption are made by family members, decisions on the business strategy of a company are made by members of the board of directors and decisions on government policy are reached by members of a committee of experts. In political science, decisions that determine the form of government, identity of the ruler, the laws of the state or its policy are made by the eligible citizens or their representatives in the legislature and the government.

The first question that will be dealt with in Chapter 3 concerns the relationship between preferences and choice. This is a general question that arises on both the social and the individual levels; that is, in the context of collective and individual decision making. In contrast, questions that will be dealt in Chapters 4 onward arise only

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in the context of social preferences or social choice. One needs to consider the basic reasons for the emergence of these problems. Why are problems expected in the social context?

A multi-person society naturally needs a rule to transform individual preferences or choices into a social preference or social choice. Such a rule is referred to as an *aggregation rule*. It aggregates the individual preferences and transforms them into social preferences or aggregates individual choices and transforms them into social choice. In society, there are usually conflicts of interest among members. The need for an aggregation rule and the existence of conflicts of interest are the two basic reasons for the problematic nature of social preferences and social choice. Let us clarify them and their relationship to four types of fundamental problem that arise in the social context.

When there is only a single individual, it is plausible to assume that the preference relation of the single-member society is the preference relation of that member and that such a society chooses the alternative preferred by that individual. When society consists of more than one individual, a plausible social preference relation and a natural social choice do not exist. This situation raises the need for an aggregation rule that transforms the individual preference relations into a social preference relation or the individual choices into a social choice.

Technically, the social choice model can be applied to the case of individual choice. However, qualitatively, there is a significant difference between social and individual choice. An individual's choice usually affects only that individual and the complexity of that choice is relatively limited. In addition, when the individual's preferences are well defined, an alternative usually exists that is the best according to his or her preferences. In the social context, the alternatives are more complex and, in particular, affect the welfare of several and, possibly, all the individuals. Since individuals have different preferences, they prefer or wish to choose different alternatives. This means that in the social context there is a *conflict of interests* among the individuals

that has no counterpart and, in fact, is meaningless when there is only a single individual. In the social context, usually no single alternative is considered best by all individuals.

As already mentioned, the need for an aggregation rule and the existence of conflicts of interest cause four types of problem. Under individual decision making, the choice is controlled by the individual who can behave as he or she wishes. In contrast, in collective decision making, the chosen alternative depends on the different preferences or choices of the individuals; however, it also depends on the aggregation rule (the social choice function). Individuals wishing to choose different alternatives will want to apply different choice functions. For this reason, in the social context, the first problem is how to reach agreement on the social choice function: the problem of securing agreement on the aggregation rule.

Two additional general questions that arise in the social context relate to the functioning or performance of the aggregation rule, the rule that transforms the individual preferences (choices) into social preferences (choice). The first question is whether the aggregation rule preserves the existing desirable properties of the individual preference relations or choices. The second question is whether this rule satisfies new, desirable properties that are regarded as plausible in the social context. The performance of the aggregation rule can be considered deficient if it does not preserve some existing desirable properties of the individual preference relations or of their choices. Another general problem that arises in the social context relates to deficient functioning of this sort. The performance of the aggregation rule can also be considered deficient if it does not satisfy properties that are deemed desirable in the social context. The second type of general problem that arises in the social context relates to deficient functioning of this sort.

Finally, strategic incentives do not exist in the context of a single individual, because the behavior of a single-member society hinges only on the preferences or the behavior of that member. In contrast, in a multi-member society, an individual may be aware of

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the relationship between the preferences or the behavior of other individuals and the social choice and, consequently, behave strategically, taking into account the expected behavior (decisions, voting, choices) of the other individuals. In such a situation there are two types of strategic incentive that can harm the functioning of the social decision rule. First, the individual may have an incentive not to take part in the collective decision (the elections). On one hand, he or she may believe that participation in the collective decision has only a negligible effect on his or her welfare. On the other hand, such participation involves non-negligible costs. Second, the individual may have an incentive not to reveal his or her true preferences because such truthful preference revelation is not advantageous. Problems of the fourth type are due to the existence of such strategic incentives.

### I. I EXERCISES

#### **Question 1a**

Using a schematic diagram, explain why the problem of the relationship between preferences and choice is a general problem that arises both in the individual and in the social context.

#### **Answer**

The following simple diagram (Figure 1.1) clarifies that the question of the relationship between preferences and choice is meaningful in both contexts.

#### **Question 1b**

Explain why social choice can be viewed as a "game."

#### **Answer**

The social choice problem has a typical structure of a non-cooperative strategic game in normal form. Such a game has three components: a set of players, a strategy set for every player, and the players' pay-off functions. The players in the social choice game are the individual members of society. The strategy of a player is the answer to two

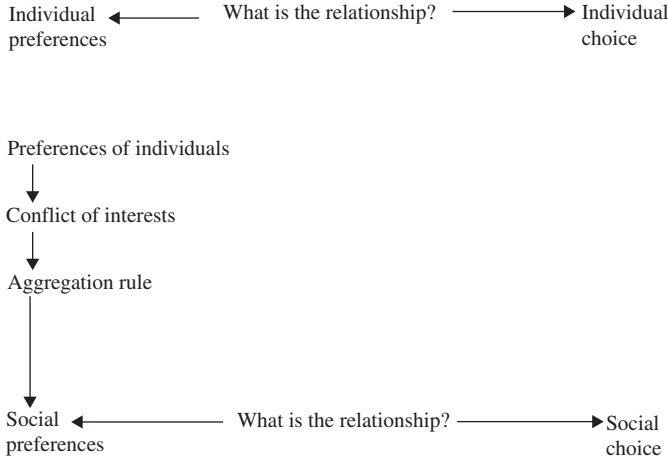


FIGURE 1.1 The relationship between preferences and choice

questions: shall I take part in the game or not; and if the answer to the first question is positive, then what preferences to report?

The aggregation rule transforms the individual strategies into a social choice, which is the outcome of the game. The payoff (utility, numerical representation of preferences) of every individual thus depends on the strategies chosen by that individual and by other individuals.

## 1.2 SUMMARY

- The first question that we will deal with is: What is the relationship between preferences and choice? This is a general question that arises on the social as well as the individual level.
- In the context of social preferences and choice, the need for an aggregation rule and the existence of conflicts of interest cause four types of problem.
- The existence of conflicts of interest implies that different individuals prefer different alternatives. Since different aggregation rules result in different social preferences, an individual prefers an aggregation rule that yields social preferences that coincide with his or her own preferences. The existence of conflicts of interest is therefore a basic reason

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for the difficulty involved in reaching an agreement on the aggregation rule applied by society.

- **First problem: The problem of securing agreement on the aggregation rule (the social preferences).**
- The second and third problems relate to the nature of the aggregation rule. This rule determines the properties of the social preferences and the question is whether or not these preferences satisfy certain plausible properties.
- **Second problem: Does the aggregation rule preserve existing desirable properties of the individual preferences?**
- **Third problem: Does the aggregation rule ensure that the social preferences satisfy some properties that are regarded as plausible in the social context?**
- The fourth type of problem relates to strategic incentives; namely, the possibility of viewing the social choice problem as a strategic game in normal form. In particular, one can ask the following question:
- **Fourth problem: Can individuals choose not to take part in the game or not to reveal their true preferences?**

## 2 Brief overview of the problems

In formal models, the individual preferences or the preferences of a group of individuals (family, society, economy, board of directors, committee of experts, government, general staff, etc.) are often represented by a *preference relation*. Individual or group behavior is represented by a function called a *choice function* or a *decision rule*. Naturally, one may think that there exists a firm relationship between preferences and behavior. In other words, it is natural to assume that a chosen alternative is the preferred one. The common attempt to derive the individual's preference relation from his or her behavior is based on the assumption that such a relationship indeed exists. The basic problem dealt with in Chapter 3 is that a strong connection between preferences and choice does not necessarily exist.

In this chapter, the student is first exposed to the basic concepts that relate to individual or social preferences and choice. We then examine two questions. On one hand, what properties does a preference relation have to satisfy in order to guarantee the existence of a well-defined choice function that is consistent with that preference relation? On the other hand, what properties does the choice function have to satisfy in order to ensure that it can be viewed as intrinsically and naturally related to some preference relation?

The demeanor of people, the resources available to them, their background, nature, attitudes, beliefs and wishes are different. Recognition of these differences raises a serious doubt regarding the assumption that individuals who take part in a social choice share the same preferences. If people were identical, the study of the social choice could be based on the analysis of a representative individual's choice,



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that of one of the homogeneous members of society. The reason for this is that in such a situation, the choice of a representative individual could be expected to be the same as the choice of society. In this simple case, one can make the common assumption in economics that the individual is rational. That is, the individual can be assigned a reasonable preference relation, such that he or she always chooses the best feasible alternative according to this preference relation. If individuals differ in their tastes, one can still ask whether it is possible to relate to social choice, like to an individual's choice, on the basis of the assumption that the social choice is rationalizable by some preference relation. Such a preference relation is usually called a *social preference relation* or the preference relation of an individual who represents society. The existence of a plausible social preference relation and of a corresponding *social choice function* ensures rational social behavior and is of major methodological significance. In particular, it enables the achievement of the positive objectives (explanation and prediction) of the theory that focuses on the study of social choice, employing the standard paradigmatic methodology in economics. In the normative social context, the existence of such a relation raises the question of what is the "desirable" or "appropriate" social preference relation. The answer to this question can be based on agreement regarding the properties that the desirable social preference relation should satisfy. Such an agreement may lead to the identification of a desirable social choice function that enables society to overcome the difficulty of taking action in situations characterized by conflicts of interest among individuals.

For this reason, this question is crucial for every society that seeks to adopt a decision rule that represents its preferences. Clearly, coping with this question is a major challenge of the theory of social choice and, in fact, of any theory that deals with the study of social behavior or attempts to come up with a recommendation regarding an appropriate social decision-making method.

The agreement on certain plausible properties of the social preference relation may result in a dead end if it turns out that the

properties are logically inconsistent. Such a situation means that the search for a social preference relation has failed, because a social preference relation that satisfies *all* the agreed-upon desirable properties does not exist. Alternately, one can argue that in such a situation, if the social preference relation satisfies some of the properties, then it must violate at least one of the remaining properties. Chapter 4 is devoted to a discussion of the non-existence of a plausible or desirable social preference relation. In that chapter, we present the two best-known problems of this type. The first is Arrow's impossibility theorem, sometimes referred to as Arrow's possibility theorem. The second is Sen's impossibility theorem, usually referred to as the Paretian liberal paradox (the efficiency notion in the theorem was proposed by the Italian sociologist-economist Wilfredo Pareto, 1848–1923).

Consensus on the desirable properties of the social preference relation may enable axiomatization of the social preference relation. Axiomatization implies identification of the only social preference relation that satisfies the desirable properties. Such a situation means that the search for a social preference relation has succeeded; not only does there exist a social preference relation that satisfies *all* the agreed-upon desirable properties, but no other relation satisfies these properties. Chapter 5 is devoted to the identification of the proper social preference relation or the appropriate social choice function by axiomatization. In that chapter, we will present two examples of this type of solution to the social choice problem: axiomatization of the simple majority rule and axiomatization of the Borda rule.

Agreement on the desirable properties of the social preference relation may lead to a third possibility: identification of a few, or many, social preference relations or social decision rules that satisfy the desirable properties. Such a situation means that the search for a social preference relation has resulted in "over success"; such success does enable selection of a desirable rule, but it nevertheless raises the question of which rule should be selected, out of the set of appropriate rules. Chapter 6 deals with this problem and proposes to resolve it by compromising with the unanimity criterion.