
Part

4

**Public
Choice**

Public Choice and Individual Values

Politics is not an exact science, as the professors are apt to suppose. It is an art.

Otto von Bismarck, German Chancellor, Prussian Upper House

Unanimous Collective Choice ♦ Other Collective Choice Methods ♦ Arrow's General Impossibility Theorem ♦ Conclusions

In a democratic society, collective decisions usually involve voting procedures of one kind or another. It is natural therefore to ask whether these voting processes result in preferred collective outcomes, however these may be defined, and indeed whether the processes can be said to maximise social welfare. Again, a major problem is aggregation of preferences. How can collective decision-making processes take the sets of individual preferences and produce overall collective outcomes that satisfy these preferences? In this chapter, we examine methods for making collective decisions and their strengths and weaknesses.

Unanimous Collective Choice

An attractive feature of market trades is that exchanges are voluntary and all participants expect to gain. No one loses: no one is forced to purchase something that he or she does not want or obliged to pay more for a good than its expected value. In the economics literature, this is described as a Pareto-beneficial outcome.

In the public sphere, collective provision of a good creates a Pareto-beneficial outcome only if someone votes for it and no one votes against (this is described as “weakly unanimous”).¹ If anyone votes against a proposal, a decision to adopt it involves some coercion. A coercion cost exists when someone must accept a collective decision to which he or she would not voluntarily assent. Thus, a coercion cost exists when a public good is over- or undersupplied for some individual. Oversupply occurs when an individual contribution for a marginal unit of the good exceeds what he or she would willingly pay for it. Undersupply occurs when an individual would be willing to pay for a marginal increase in the good, but this is not provided. Because a (weak) unanimous vote is necessary to avoid coercion, we need to consider how this vote might be achieved and whether it is practical.

¹ Strong unanimity requires everyone to vote for a proposal. The statements in this section require only weak unanimity.

Consider provision of a pure public good. All citizens enjoy the same quantity of the good, but if their preferences vary they are unlikely to be willing to pay the same amount for it. To achieve unanimous agreement on the quantity to be supplied, each individual must be able to make a different payment for the good (or at least for a marginal unit of the good). An individual's payment is a function of the total expenditure on the public good and his or her share of this (which is described as the tax price). The tax price may vary for each individual. This approach differs from private exchange where each person pays the same price for a good but consumes different quantities.

The literature (Mueller, 2003, Chapter 4) suggests that a public agency can determine the unanimously demanded amount of a public good in two ways. Both involve a central planner asking citizens what they want. Using one approach the planner announces various tax prices and asks citizens to state their desired quantity of the public good. Unanimity is achieved when everyone wants the same quantity.² Alternatively the planner can announce various quantities of the public goods and ask citizens what tax prices they would be willing to pay for these quantities. Unanimity is achieved when these voluntary tax prices sum to 100 per cent of the cost.

The following example illustrates the first approach. The problem is to determine the quantity of play pieces in a local park. Figure 9.1 shows Anne and Bruce's demand curves (D_A and D_B) for play equipment. Because the equipment is a non-excludable public good, the same amount of equipment must be available to both families. Therefore, total demand is obtained by adding up what Anne and Bruce are willing to pay for each quantity of the good. The marginal cost of producing an extra play piece is assumed to be constant. The efficient quantity is Q_E play pieces, because at this point the collective benefit (as measured by collective willingness to pay) of an extra play piece equals the marginal cost of supplying it. At any other level of supply, a change in the amount supplied could make at least one of them better off without making the other worse off. Note that neither Anne nor Bruce alone would be willing alone to pay for the Q_E equipment, so that individual action will be inefficient and collective action is required.

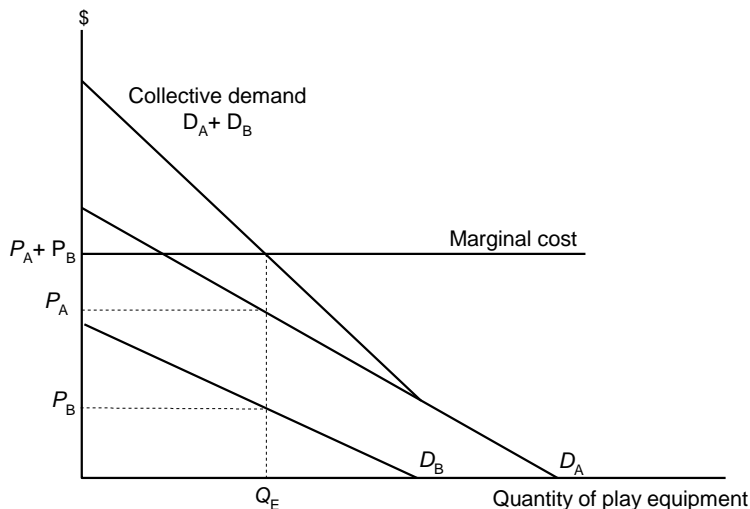


Figure 9.1 Efficient provision of a public good

² These personalised tax prices are often described as Lindahl prices. Lindahl (1919) proposed that tax shares should be adjusted until citizens agreed unanimously on the quantity of the public good to be supplied.

Table 9.1 Example of unanimous agreement

<i>Option</i>	<i>Proposed tax shares for</i>	<i>Play pieces demanded by</i>	
	<i>Anne and Bruce</i>	<i>Anne</i>	<i>Bruce</i>
1	50-50	10	5
2	75-25	6	8
3	66-33	7	7

A unanimous outcome is achieved when Anne and Bruce agree on both their tax contributions and their preferred number of play pieces. Suppose that the planner proposes that they share equally the cost of the equipment and finds that, as shown in Table 9.1, with these tax rates Anne wants more play pieces than Bruce does. The planner then adjusts the tax shares for Anne and Bruce to 75 per cent and 25 per cent respectively and finds that Bruce wants more pieces. Finally, when the planner adjusts the tax shares to 66 per cent and 33 per cent respectively, Anne and Bruce each vote for seven play pieces. Given these tax shares, there is unanimous support for this number of pieces.

Analysis of unanimity. Unanimous agreement is attractive. Each voter nominates the amount that he or she is willing to pay for the marginal unit provided. All collective decisions are based on the benefit principle. Given their initial income, no one loses from the outcome. Unanimity achieves a Pareto-efficient outcome for public goods like competitive markets achieve for private goods. At this efficient point, the marginal rate of substitution of public for private goods for each individual is equal to their tax price.

However, there are major difficulties with obtaining this Pareto-efficient outcome. One is the possibility that individuals will not reveal how much they are willing to pay for public goods when they have an incentive to conceal their preferences. Both Anne and Bruce have an incentive to understate what they are willing to pay for play pieces because this would reduce their tax share. This is known as free riding. **Free riding** occurs when individuals attempt to obtain a benefit without paying for it.

The traditional public finance assumption is that the incentive to free-ride encourages people to understate their demand for public goods and results in under-provision of public goods. The presumption is that each public good is financed by a separate tax.³ On the other hand, when public goods are financed from consolidated government revenue, which is much more common, responses to willingness-to-pay questions have minimal effect on taxes paid. In this case, voters have an incentive to over-state their demands for public goods, in the hope that this will influence government to provide more of the good, and over-provision of public goods is the likely outcome.

However public goods are financed, individuals often have an incentive to misrepresent the amount they would be willing to pay for public goods. Such dishonest responses are generally described as strategic behaviour! In the discussion of public goods in Chapter 11, we examine further whether individuals do respond strategically and whether they can be given incentives to respond honestly. It appears that strategic behaviour is a chronic problem in collective choice situations. Although economists have devised a survey method that should elicit honest answers, it is too complex to be practical. Generally, the requirement of unanimity encourages strategic behaviour because each voter knows that no decision can be made without his or her agreement.

³ The traditional assumption is derived from Wicksell (1896).

The second major problem with a unanimity requirement is the cost and time needed to achieve unanimity, if indeed it can be achieved. The cost of finding the tax prices required for unanimity for each public good would be very high. Indeed, given the difficulty of achieving this, it may be asked why economists consider such an impractical notion in the first place. The answer is that (weak) unanimity provides a welfare benchmark, like Pareto efficiency in private exchange, in which there is no coercion. All non-unanimous approaches to collective decisions involve some coercion. It is therefore necessary to be sure that there is no perfect collective solution.

Other Collective Choice Methods

Given that all non-unanimous decisions coerce someone, which non-unanimous method of social choice provides the best social outcome? To answer this question, Buchanan and Tullock (1962) proposed the **optimal majority rule**. This rule recognises that collective decisions have two main costs: in their terminology, these are external and decision-making costs. An external cost (also described as a coercion cost) occurs when an individual loses utility due to a collective decision. Decision-making costs are the costs incurred in reaching decisions. The optimal majority is the proportion of voters required to agree to a decision that minimises the sum of external and decision-making costs.

The concept of the optimal majority is illustrated in Figure 9.2. There are N voters. External costs fall as more voters must agree to a collective decision. On the other hand, decision-making costs rise with the number of people involved in making the decision. The optimal majority is K/N voters, where K is the number of voters that must agree to a proposal. This is the majority that minimises external (coercion) plus decision-making costs.

The optimal majority varies with the issues to be determined. The optimal majority is lower when there is consensus among individuals and low potential for coercion, and when individuals have a high cost of time. Conversely, the optimal majority is larger when the interests of minority groups are severely threatened. It is often argued that the more important the social issue, the greater should be the majority required.⁴ Thus changes to constitutions

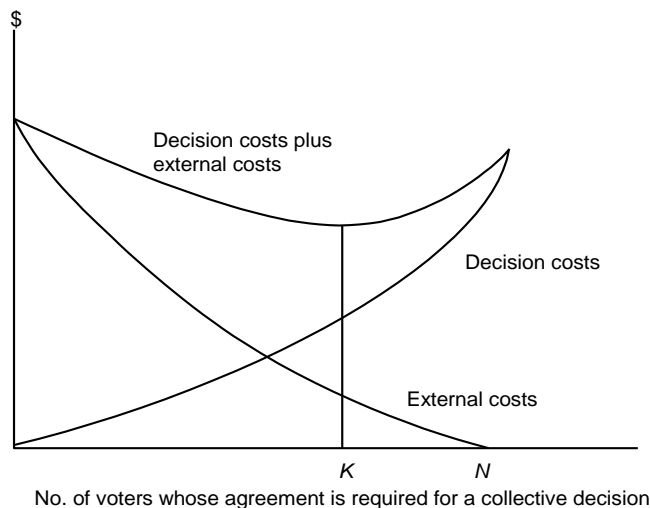


Figure 9.2 An optimal majority

⁴ Rousseau (1762) argued that 'the more grave and important the questions discussed, the nearer should the opinion that is to prevail approach to unanimity'.

often require special large majorities.⁵ However, requirements for large majorities imply a conservative view—the votes of supporters of the status quo have more weight than votes of supporters of change. This may be justified by the potential costs of change. It does not seem to be justified by appeal to the importance of the issue (however that may be defined).

Simple majority voting

The most common decision rule is simple majority voting (SMV). Where there are N voters, SMV requires that at least one voter above $N/2$ must vote for a proposal before it is approved.⁶ If voters have a similar intensity of preferences, a simple majority vote would represent a potential Pareto improvement because the gainers could compensate losers and no one would be worse off. However, the assumption of equal intensity of preference is unrealistic.

Nevertheless, SMV is practical and efficient in that it has lower decision-making costs than decision methods requiring larger majorities. A simple majority vote is the smallest possible majority that can make a decision without self-contradiction. A less than majority vote (say, a 45 per cent vote) could cause a proposal to be both passed and rejected. This would be impractical and lead to high decision-making costs. Note that this would imply a kink in the decision cost curve shown in Figure 9.2, with decision costs rising when fewer than $N/2$ voters are required for a collective decision.

SMV may also be regarded as fair in that it gives each vote an equal weight. Higher majority requirements allow a minority to block the interests of the greater number. On the other hand, out of all majority vote methods, a simple majority vote provides the greatest potential and incentive for coercion. A 51–49 vote maximises the number of possible losers and the potential gain per individual from redistribution. Thus SMV is fair when one voter—one vote is appropriate, but not when it results in high coercion of some voters.

SMV has other problems. A major one, known as the voting paradox, is the potential for inconsistency or intransitivity. Suppose there are three options, X , Y and Z . Transitivity requires that if X is preferred to Y , and Y is preferred to Z , then X should be preferred to Z . The choice is intransitive if Z is preferred to X .⁷ As an example, suppose that Anne, Bruce and Cathy must choose how to allocate a million dollars—on tertiary education, health care or Olympic athletes. Table 9.2 shows their preferences in rank order (1 = first). A 2–1 majority (Anne and Bruce) prefers spending on health care to tertiary education. But a 2–1 majority (Bruce and Cathy) prefers support for Olympic athletes to health care. Yet another majority (Anne and Cathy) favours tertiary education over Olympic athletes. The result is intransitive.

When social choice is intransitive the outcome from SMV depends on the order in which votes are taken. If the order is random, the outcome is determined by chance. Alternatively, if a chairperson knows the preferences of voters, he or she may rig the voting procedure to obtain a personally desired outcome. This process, called **agenda setting**, is clearly undemocratic. On the other hand, if voters realise what is happening, they may vote strategically. For example, although Anne prefers health care to tertiary education, she may know that if health care defeats education, the majority will then support Olympic athletes, which is her third preference. However, she can ensure that Olympic athletes lose if she allows education to defeat health care!

⁵ For example, as noted in Chapter 2, changes to the Australian Constitution require the support of both a majority of all voters and a majority of voters in a majority of the states.

⁶ If more votes are required to approve a proposal, the majority is described as a 'qualified majority'.

⁷ If an individual prefers X to Y and Y to Z , she is said to be irrational if she then prefers Z to X . Thus the requirement for transitivity is sometimes described as the axiom of rationality.

Table 9.2 Ranking over issues

<i>Voters</i>	<i>Tertiary education</i>	<i>Health care</i>	<i>Olympic athletes</i>
Anne	2	1	3
Bruce	3	2	1
Cathy	1	3	2

Another concern with SMV is that it may result in cycling over issues and instability. In the resource allocation example above, a majority can be found to vote against any winning proposal, leaving open the possibility of its reversal. SMV may also produce unstable outcomes on distributional issues. This reflects the phenomenon known as **cycling across gains**. Suppose that our three voters must decide how to distribute \$1000 of income benefits between themselves. The following could occur.

1. Anne and Bruce could split the gains 50–50 and take \$500 each, leaving Cathy with nothing.
2. Cathy then proposes a 40–60 split to Anne who gets \$600, leaving Bruce empty handed.
3. So Bruce proposes a 40–60 split to Cathy who gets \$600, which leaves Anne with nothing!

Cycling across gains is common in politics. Evidently the outcome may not be equitable. In addition, there may be no stable outcome to this process.

The nature of preferences and the median voter

Inconsistent voting is most likely to occur when voters allocate expenditures over different goods. But it can also arise when voters allocate expenditure to a single public good. Suppose that Anne, Bruce and Cathy must vote for expenditure on the local public school where there is a private substitute. Anne is rich and will send her children to a private school and gives first rank to low public expenditure. Bruce has a medium income. He favours high expenditure on the public school because he would then send his children to it, but his least preferred option is medium expenditure because he would pay medium taxes and send his children to a private school. Cathy is poor and wants medium expenditure on public schools but does not want higher taxes. Their preferences are ranked in Table 9.3. A majority prefers low expenditure to medium, medium expenditure to high expenditure and high expenditure to low expenditure. The outcome is intransitive.

Evidently, majority voting can also produce inconsistent results for single-issue decisions. This may arise from multi-peaked preferences.⁸ A voter has a single-peaked preference if her

Table 9.3 Voters' ranking of expenditure on local public school

<i>Voter</i>	<i>Expenditure on public school</i>		
	<i>low</i>	<i>medium</i>	<i>high</i>
Anne (rich)	1	2	3
Bruce (medium income)	2	3	1
Cathy (poor)	3	1	2

⁸ Multi-peaked preferences do not always create inconsistent voting.

Median voter

Where preferences on an issue can be represented on a single continuous scale, the median voter is the person with as many voters on either side of his or her position

Median Voter Theorem

Where preferences on an issue can be represented on a single continuous scale and voting is by simple majority vote, the preference of the median voter is decisive

utility falls as she moves away from her optimum outcome in any direction. Her preferences are double-peaked if her utility falls and then rises as she moves away from her peak. As shown in Figure 9.3, Anne and Cathy have single-peaked preferences for public school expenditure. However, Bruce has a double-peaked preference.

On the other hand, if voter preferences are single-peaked and the issue is uni-dimensional, an equilibrium result can be obtained and cycling avoided. Suppose there are five voters, now including David and Emma, and that each voter obtains utility from public expenditure as shown in Figure 9.4. All preferences are single-peaked. Cathy is in the central position and is the median voter. David and Emma prefer less expenditure. Anne and Bruce prefer less expenditure. In this case, majority voting yields a stable result (Q_e), which is the amount preferred by Cathy. All other possibilities are defeated by majority vote.

In general, if voters vote on a single issue and all preferences are single-peaked, majority voting produces a stable equilibrium outcome that reflects the peak preference of the median voter. This is known as the **median voter theorem**. Because many voting situations approximate to these situations, the median voter theorem has many significant practical implications (see Chapter 10).

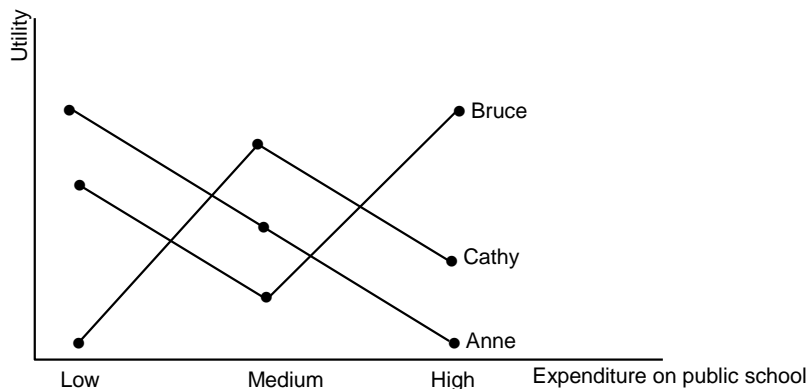


Figure 9.3 Single and double-peaked preferences

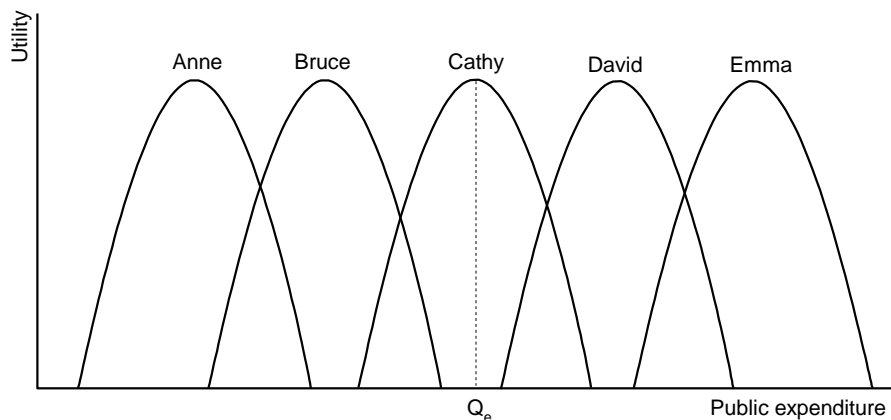


Figure 9.4 Single-peaked preferences, public expenditure and the median voter

Table 9.4 Voter utility and vote trading

<i>Voter</i>	<i>Utility from increased expenditure on</i>	
	<i>Environment</i>	<i>Defence</i>
Anne	+7	-2
Bruce	-1	+5
Cathy	-3	-4
Total	+3	-1

What are the welfare implications if the median voter's preference is decisive? There is in general no reason to suppose that the median voter's preference for a public good will necessarily coincide with the efficient amount of the good—which would require that the sum of marginal benefits from the good equal the marginal cost of the good.

Intensity of preference and vote trading

In simple majority voting, each vote has equal weight irrespective of the strength of a voter's preferences. This makes voting different from market transactions in which individuals can express preferences by spending more on some goods than others.

However, when voters feel strongly they may be able to influence the outcome by trading votes (American texts describe this as log-rolling). An example may show how this works. Table 9.4 shows the utility that Anne, Bruce and Cathy obtain from increased expenditure on environmental protection and defence. Anne strongly supports more expenditure on the environment but not on defence. Bruce's preferences are the opposite. Cathy opposes more spending on the environment and defence. With separate votes on each issue, a 2–1 majority would vote against more spending on either item. However, both Anne and Bruce prefer an overall outcome in which spending increases for both environmental protection and defence. They can achieve this by vote trading—Anne votes for more defence if Bruce votes for environmental expenditure.

Vote trading is common. There are many opportunities for it as the political process provides a continuous stream of choices. For vote traders, trading provides mutually beneficial exchange. It is how most democracies function.

Is vote trading desirable? It has some desirable characteristics. It allows for intensity of preference and it tends to reduce cycling over issues. On the other hand, it may encourage strategic behaviour. Moreover, it may not increase aggregate welfare. In our example, total utility increases with more expenditure on the environment, but falls with higher expenditure on defence. It is easy to produce other examples showing vote trading resulting in good or bad projects as judged by overall net benefit. Thus, there can be no unequivocal judgement on vote trading.

Rank-order voting or point scoring

Rank-order and point voting are two other common methods for making collective decisions. Both allow for intensity of preferences, albeit crudely. With rank-order voting, each voter ranks the options, for example 1 for the best option, 2 for the next best and so on. The option with the lowest total score is the preferred option. With point scoring, voters may be given a number of points, say 100, to allocate to the options. In this case the option with the highest number of points would win.

Suppose that Anne, Bruce and Cathy rank four options (*W*, *X*, *Y* and *Z*) as in Table 9.5 overleaf. Option *X* has the lowest score and wins. However, if a choice were made between

Table 9.5 Rank-order voting

Voter	Rank given to the four options			
	W	X	Y	Z
Anne	1 (1)	2 (2)	3	4
Bruce	2 (1)	3 (2)	4	1
Cathy	4 (2)	1 (1)	2	3
Total	7 (4)	6 (5)	9	8

Note: Figures in brackets are ranks when *Y* and *Z* are not considered.

only the two best options (*W* and *X*), with the irrelevant alternatives (*Y* and *Z*) eliminated, *W* has a lower total score than *X* and would win (see figures in brackets).

There are several concerns about rank-order voting. First, the choice between the two most preferred options may depend, as in this example, on how options are ranked relative to options that are irrelevant to the main choice. The outcome depends on the alternatives included. Second, voters do not have an equal say in the outcome. Cathy's strong dislike of *W* causes *X* to be preferred when all options are included. This is of course the consequence of allowing for intensity of preference. Third, rank-order voting is vulnerable to strategic behaviour. For example, if Anne strongly wants *W* to win, she could rank *X* equal to four instead of two and so ensure that *W* wins even with all four alternatives. Similar disadvantages apply to point scoring voting methods.

Arrow's General Impossibility Theorem

Given the problems with each of these voting methods, is there any acceptable way to rank social states or make collective decisions based on individual preferences over these social states? In other words, is it possible to determine a social ordering of states based on the preferences of individuals over these states rather than on the utilities of individuals in these states?

In an attempt to answer these questions, in a famous book entitled *Social Choice and Individual Values*, Kenneth Arrow (1951) proposed that an acceptable social choice process should satisfy six ethical criteria.⁹

1. *Decisiveness*. The decision rule should be able to rank all possible alternatives or outcomes.
2. *Unrestricted domain*. The decision rule must produce a social ordering over all outcomes whatever the nature of individual preferences towards these outcomes, including, for example, multi-peaked preferences.
3. *Transitivity*. The rule should provide a consistent ranking of all possible alternatives. If *A* is preferred to *B* and *B* is preferred to *C*, then *A* should be preferred to *C*.
4. *Independence of irrelevant alternatives*. Society's ordering over any two alternatives *A* and *B* should depend only on its ranking of these two alternatives. It should not depend on how these alternatives are ranked relative to any other (irrelevant) alternatives.
5. *Responsiveness* (the Pareto postulate). The decision rule must respond to individuals' preferences. If one individual prefers *A* to *B* and no one prefers *B* to *A*, then society prefers *A* to *B*.
6. *Non-dictatorship*. The social ordering of alternatives must not reflect the preferences of only one individual when others have opposing preferences.

⁹ These criteria are sometimes called axioms of collective choice.

Arrow's Impossibility Theorem shows that no collective decision rule satisfies all these criteria. The proof runs broadly as follows.¹⁰ The unrestricted domain criterion allows all possible individual preferences. When preferences differ, as they often do, no unanimous choice emerges. It is necessary to choose between alternatives that are opposed by some voters. To satisfy the axiom of independence from irrelevant alternatives, society must choose between only two alternatives at a time. However, procedures such as majority voting that yield social choices between two alternatives can produce inconsistent ranking when three successive pair-wise choices are made. A choice must be made between the various options or the result is indecisive. But there is no way to produce consistent choice that is not imposed or dictatorial.

Arrow's approach attempts to aggregate the ordinal preferences of individuals. These preferences are simply individual orderings of alternatives. The approach precludes interpersonal utility comparisons. It is difficult to obtain consistent and acceptable decisions using only ordinal preferences.

By contrast, cardinal preferences would imply that individual utilities could be measured. If the preferences of individuals could be quantified and if a social welfare function could be agreed, a consistent social ordering over outcomes could be obtained. A social welfare function allows preferences (utilities) to be weighted in some way. But this is inconsistent with the criterion of non-dictatorship. Preferences could also be weighted indirectly by restricting the preference domain or by adopting a point scoring system. However, these approaches are ruled out by the criteria of unrestricted domain and responsiveness or independence of irrelevant alternatives respectively

The criteria and their implications. Arrow's theorem depends on the choice of criteria. These criteria are normative. Accordingly, opinions as to their desirability may differ. Although Arrow's criteria are generally regarded as ethically mild, there is an extensive literature on whether any of the criteria may reasonably be modified and, if so, what the implications would be. There is little support for relaxing the responsiveness and non-dictatorship criteria (5 and 6 above). However, the importance and applicability of the other criteria have been questioned.

Consider first the criteria of decisiveness and unrestricted domain. Limiting the range of alternatives to be determined or the range of permissible preferences can improve the chances of reaching agreed and consistent collective decisions. For example, limiting preference orderings over uni-dimensional choices to single peaks produces a stable result based on the preferences of the median voter. For many such choices, preferences are indeed single-peaked. Also, the more homogeneous are preferences over the choice set, the more easily are consistent decisions achieved. For example, as discussed in Chapter 33, the process of "voting-with-the-feet" whereby individuals choose the local government area where they live and the associated public goods/taxpackage encourages homogeneous local communities and consequently improves the allocation of resources to local public goods. It follows that the range of preferences is often compatible with consistent collective decisions. The range of issues may also be restricted by placing legal constraints on issues that are subject to collective decision making, for example by protecting freedom of religious association. However, stringent restrictions on issues for collective decisions or on preferences would not be acceptable in most democracies.

Some commentators (such as Buchanan and Tullock, 1962) argue that transitivity is not critical. Intransitivity is not common when choices involve uni-dimensional issues or few alternatives. More fundamentally, it may be argued that although intransitivity is irrational for an individual, it is not critical for society. For example, it may be argued that the lack of a

**Arrow's
Impossibility
Theorem**

No collective decision-making rule complies with six generally accepted ethical criteria for voting situations

¹⁰ The explanation here draws on Mueller (2003).

stable majority for expenditure on tertiary education, health care or Olympic athletes does not matter. Society can be regarded as indifferent between the alternatives. What is needed is a practical choice process that produces an acceptable alternative when social deadlock exists. So long as the process of choosing between alternatives is fair, the outcome may be regarded as acceptable. Suppose that three leading tennis players (*A*, *B* and *C*), are playing in a tournament and that because of their varying styles *A* would defeat *B*, *B* would defeat *C* and *C* would beat *A*. The winner depends on the draw. Providing the draw is fair, the result is considered fair.

Possibly the most contentious criterion is independence of irrelevant alternatives (IIA). In a simple pair-wise choice, ordinal preferences are sufficient. The introduction of other alternatives allows for intensity of voter preferences and implicitly for interpersonal comparison of utilities. Thus relaxing the IIA criterion has potential advantages. Many decision procedures employ some form of point scoring to rank many alternatives. On the other hand, it is not clear how, or by what criteria, additional alternatives should be included. Also, when additional alternatives are included there is the possibility of strategic behaviour.

In conclusion, no collective decision rule fully satisfies the mild ethical criteria and the process proposed by Arrow. Nor have subsequent studies been able to show that any single collective decision rule would satisfy other ethical criteria that might be generally acceptable. However as Sen (1985) pointed out, social justice requires that society collectively makes interpersonal comparisons and Arrow's approach was avowedly designed to avoid interpersonal comparisons. As a practical matter we must be willing to make interpersonal judgments. This implicitly or explicitly involves agreeing a social welfare function of some kind.

Conclusions

All methods of making collective decisions produce unsatisfactory results in some circumstances. Even weak unanimity is generally impractical. The most common collective choice procedure (simple majority voting) may produce inconsistent or unstable results, tends to reflect the preferences of the median voter and may disadvantage minorities. Larger majority requirements protect minorities but are costly in decision time and biased against change. Vote trading enables strong preferences to be allowed for and reduces intransitive voting, but it does not prevent strategic behaviour or coercion of minorities.

Inevitably government decisions suffer from the inherent difficulties of collective choice. Many decisions are inconsistent or involve log-rolling or strategic behaviour. Many decisions fail to reflect individual values. Even a well-intentioned public agency may not always produce efficient outcomes. Also, outcomes may not be stable. For any policy package that a majority supports, another majority may be found for a package that overturns some of the provisions of the original package.

However, the technical difficulties of public choice should not be over-rated. The technical difficulties associated with making collective decisions do not mean that most collective decisions are unsatisfactory any more than the existence of some market failures means that most markets are inefficient. The lack of a perfect collective choice rule is not a critical practical issue. The issue is whether reasonable decision rules can be found. The criteria of decisiveness, domain, transitivity and independence of irrelevant alternatives can each be relaxed in some circumstances without significant social cost.

However, the most important social choice problem is the problem of interpersonal comparisons. Ultimately interpersonal comparisons are unavoidable and collective decision methods designed to avoid them cannot produce a socially just society.

It is also important to distinguish between procedural (constitutional) rules and methods for deciding particular outcomes. It may be easier to achieve unanimous (Pareto-efficient)

decision procedures than unanimity on outcomes. Individuals may agree unanimously that certain decisions should be made by a simple majority vote, even though they may not vote unanimously for the outcomes that follow. Suppose that a group of people wishes to choose a restaurant. The group may agree unanimously to a less-than-unanimous decision rule such as a majority vote. If the majority can agree on a restaurant, all other members of the group will agree to it. A group can agree unanimously to accept a less-than-unanimous decision and be better off than without the rule (when no decision might be reached). We enter games willingly and accept that there will be winners and losers providing that the game is fair. It is rational and consistent with self-interest to accept a constitutional rule that may produce some outcomes counter to our preferences.

Finally, our analysis of the difficulties associated with making collective choices has some significant implications for the design of government. Most of the difficulties arise from differences in individual values. Groups with similar values can reach agreed collective decisions more easily. Thus, private clubs, locally empowered groups and local government units are often efficient instruments for the delivery of public goods. This reduces the coercion that individuals feel when they are part of a larger public authority which has to satisfy a wide variety of individual preferences.

Summary

- Economic analysis usually assumes that the aim of public policy is to maximise social welfare where welfare is a function of individuals' utilities. However, most public decisions are based on voting. Thus, the question arises as to whether voting methods produce outcomes that reflect individual values. The core issue is again one of aggregation: how to move from individual to social preferences.
- Voting methods include unanimous agreement, qualified and simple majority voting, rank-order voting and point scoring methods.
- Unanimous agreement is possible if public goods are financed by personalised taxes. However, determining individuals' preferences is difficult because individuals may gain by concealing their preferences. Also, unanimous agreement often requires time-consuming decision processes.
- More common collective decision-making methods also have problems. Simple majority voting may produce inconsistent or unstable results. The outcomes may reflect the preferences of the median voter, may be inefficient and may disadvantage minorities. Larger majority requirements may protect minorities but are costly in decision time and biased against change.
- No voting method satisfies quite mild ethical criteria that ensure satisfactory processes and decisions in all situations. All voting methods have some unsatisfactory features, such as coercion, intransitivity or instability, or dependence on irrelevant alternatives, in some circumstances.
- Nevertheless, reasonable collective decision rules can often be found. In some cases, individuals may agree unanimously on a decision process and accept the outcome. In other cases, public goods may be delivered in smaller, more homogeneous groups which reduce the conflicts of values that arise in larger groups.

Questions

1. What are the limitations of unanimous voting as a method of public choice? Would unanimous voting be in conflict with any of Arrow's axioms for collective choice?
2. Is free riding likely to lead to under- or over-statement of demands for public goods? Give reasons for your answer.
3. According to Buchanan and Tullock, an optimal majority is one that minimises the sum of coercion costs and decision-making costs. If this is an optimal majority, why may it still fail to meet one or more of Arrow's axioms for an acceptable collective choice rule?
4. What problems arise with the use of point scoring as a method of collective choice?
5. Given that collective choice methods often fail to reflect individual values, what are the implications for the role and design of government?
6. Under what conditions will simple majority voting produce a determinate ranking? When does the outcome of simple majority voting depend on the order in which alternatives are presented?
7. Suppose that government is considering a proposal to increase expenditure on public education. If voter preferences for government funding on education are inversely proportional to their income, what is likely to determine the level of expenditure?
8. Anne, Bruce and Cathy each value publicly provided child care hours differently. Anne's demand for child care hours per week is $Q^d = 80 - 10P$; Bruce's demand is $Q^d = 150 - 25P$; and Cathy's demand is $Q^d = 200 - 20P$. If the marginal cost of providing an hour of child care is \$20, what is the efficient number of child care hours per week? And what would be the share of the tax burden for each of them under Lindahl pricing?
9. Two families (*A* and *B*) live on a street without lights. The local council will provide street lights if the families are willing to pay for the running costs, which are \$30 per month per street light. The demand of the two families for street lights is estimated to be $P_A = 40 - 2Q_A$ and $P_B = 30 - 2Q_B$, where P is the price the family is willing to pay for a street light per month.
 - i. Express the total demand function for street lights.
 - ii. How many street lights should be provided?
 - iii. If the council charges each family \$15 per street light per month, could unanimity be achieved?
 - iv. What would be the share of expenses between family *A* and *B* if unanimity is to be achieved?
10. Should different voting rules be applied to different public decisions such as changes to constitutions?

Further Reading

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