

Advanced Public Economics
Professor Panu Poutvaara

9. POLITICAL ECONOMICS

9.1. Introduction

- Political economics uses economic tools to analyze decision-making in various groups
- Group could be state, local jurisdiction, a committee, or a club, but similar tools can be applied also to understand decision-making in informal groups, like a family or a group of friends
- Most common decision-making tool is voting. However, it is not the only choice. In some cases, there is a decision-maker who makes the choice, and can be influenced by lobbying / various interest groups.
- In this course, focus is on voting. For lobbying models, see chapter 11 in the text book

- Various voting rules: majority rule, qualified majority, plurality voting, approval voting, unanimity, Borda rule, runoff voting
- When there are more than two alternatives and none is the preferred choice of the majority, the outcome of voting may depend on both the voting rule and on whether voters vote sincerely or strategically
- Additional recommended reading: Torsten Persson ja Guido Tabellini: Political Economics. Explaining Economic Policy. MIT Press 2002.

9.2. Majority rule

- Assume sincere voting and that everyone votes

Example 1. Condorcet winner

- Three persons $N=\{1,2,3\}$ choose between three alternatives x , y and z . Preferences are given by:

$$x \succ_1 y \succ_1 z$$

$$y \succ_2 x \succ_2 z$$

$$z \succ_3 y \succ_3 x$$

- Voting first between x and y . Alternative y wins as $x \succ_1 y$, $y \succ_2 x$ and $y \succ_3 x$. As y wins, vote next between y and z .
- Alternative y wins again as $y \succ_1 z$, $y \succ_2 z$ and $z \succ_3 y$. Thus, y wins all alternatives in pairwise voting. It is said that y is a Condorcet winner. Note that y wins independently of the order in which alternatives are put to the vote.

Example 2. Voting cycle

- Three persons $N=\{1,2,3\}$ choose between alternatives x , y and z . Preferences are given by:

$$x \succ_1 z \succ_1 y$$

$$y \succ_2 x \succ_2 z$$

$$z \succ_3 y \succ_3 x$$

- Assume that voting takes place first between x and y . Alternative y wins as $x \succ_1 y$, $y \succ_2 x$ and $y \succ_3 x$. Next, vote between y and z . Now z wins as $z \succ_1 y$, $y \succ_2 z$ and $z \succ_3 y$. But if z is not put to vote against x , x wins. We have a voting cycle.

9.3. Arrow's Impossibility Theorem

- Says that it is not possible to devise a collective decision-making process that satisfied all of the following six criteria:

Condition I: Independence of irrelevant alternatives: adding new options should not change the ordering between old options

Condition N: Nondictatorship: The collective preference is not decided by the preferences of any single individual

Condition P: Pareto criterion: If everyone agrees on a certain ranking, the decision-making process should reproduce the same ranking.

Condition U: Unrestricted domain: The collective choice mechanism must be able to any possible individual ranking of options.

Condition T: Transitivity: If the group prefers A to B and B to C, then the group cannot prefer C to A.

Arrow's Impossibility Theorem: When choosing among more than two options, there exists no collective decision-making process that satisfies the conditions I, N, P, U and T.

- As a consequence, all decision-making rules are imperfect
- When choosing between different decision-making rules, a society faces a tradeoff in which of the conditions listed above is less important, and which are more important
- The fact that there is no perfect decision-making process does not imply that decision-making would generally fail, just that there are circumstances in which not all of the conditions listed are satisfied.

9.4. Single-peaked preferences and the Median Voter Theorem

- This term relates to situations in which choices can be ordered in the one dimension in which they differ.
- Preferences are single-peaked if the individual has an optimal value and the utility declines monotonically the further one goes from the optimum.
- If the range of possible choice is a closed interval (for example, if tax rates are restricted to be between zero and one) the preferred rate could be either in one end or between the two ends.

- If citizens have single-peaked preferences, then the winner in majority voting can be found by ordering citizens according to their ideal points. If the number of citizens is uneven, then the citizen in the middle is the median voter. His or her preferred choice would win any alternative in majority voting.

Example 3.

- n persons decide how many resources are allocated to produce a public good q . Citizens receive utility from the public good and from private consumption y . Citizen i has preferences $U^i(y, q) = y + v^i(q)$, where $v_q^i(q) > 0, v_{qq}^i(q) < 0$. The cost of producing the public good $c(q)$ is convex so that $c_q(q) > 0$ and $c_{qq}(q) > 0$. The public good is financed by collecting a lump-sum tax from all n citizens: $c(q)/n$. Everybody has an equal initial wealth e , so that the individual budget constraint is $e = y + (c(q))/n$.

- Citizen i has an indirect utility function

$$W^i(q) = e - \frac{c(q)}{n} + v^i(q)$$

- From the perspective of citizen i , the first-order condition is

$$(1) \quad \frac{\partial W^i(q)}{\partial q} = v_q^i(q) - \frac{c_q(q)}{n} = 0$$

The second-order condition is $\frac{\partial^2 W^i(q)}{\partial q^2} = v_{qq}^i(q) - \frac{c_{qq}(q)}{n}$.

With optimal policy choice, the second-order condition is negative.

- Equation (1) defines the tax rate that is optimal for i . As $\frac{\partial^2 W^i(q)}{\partial q^2} < 0$ with all values of q , the policy preferences of citizen i are single-peaked.
- If n is an odd number and citizens are indexed from 1 to n , the median voter's index is $(n+1)/2$
- Single-peakedness is a sufficient but not a necessary condition for there to be a uniquely defined median voter

9.5. Single-crossing preferences

- Let α^i be a characteristic of voter i (for example, income or preference parameter) and q a one-dimensional policy parameter.
- Definition of single-crossing property, according to Persson and Tabellini, page 23:

Single-crossing property: The preferences of voter i have a single-crossing property if $(q > q'$ and $\alpha^{i'} > \alpha^i$) or $(q < q'$ and $\alpha^{i'} < \alpha^i$) implies that $W(q; \alpha^i) \geq W(q'; \alpha^i) \Rightarrow W(q; \alpha^{i'}) \geq W(q'; \alpha^{i'})$

- In words: single-crossing property is satisfied if the fact that a voter with a given value of α prefers q to q' implies that either all voters with a larger α or all voters with a smaller α also prefer q to q' .
- Single-crossing property is related to the marginal rate of substitution and, thus, to the gradients of indifference curves and how they cross each other. It implies that voters can be ordered from largest to smallest or from smallest to largest marginal rate of substitution so that the order corresponds to the order of their type parameters.
- Hindriks and Myles definition: For any two voters i and j such that $i < j$ and for any two options x and y such that $x < y$, it holds that if $u^j(x) > u^j(y)$ then $u^i(x) > u^i(y)$ and if $u^i(y) > u^i(x)$ then $u^j(y) > u^j(x)$
- In Hindriks and Myles definition, voters on the left (x to the left of y) prefer left options (i to the left of j) more than voters on the right. Therefore, if the median voter prefers x to y then all voters to the left of the median voter also prefer x , and if the median voter prefers y to x then all voters to the right of the median voter also prefer y
- If the number of voters is odd, the policy space in one-dimensional, and the preferences of citizens have a single-crossing property, the preferred option by the median voter is a Condorcet winner.

- *Example 4. Income redistribution with a distorting tax*
- Society decides on the income tax rate q . Tax revenue is returned to consumers as a lump-sum transfer, denoted by f . Citizen i has the utility function

$$u^i = c^i + \ln(x^i),$$
 where c is private consumption and x is leisure.
- Citizen i maximizes his or her utility, taking the tax rate and the lump-sum transfer as given, subject to the constraints

$$c^i \leq (1 - q)l^i + f,$$

$$\alpha^i \geq x^i + l^i,$$
 where l is labor supply, real wage is 1 and α^i tells the efficient time available. The first constraint is the budget constraint. The second constraint is the time constraint where the left-hand side denotes "effective time". This is a rather unusual but convenient way of modelling productivity differences. A higher value of α^i implies a higher productivity, in the sense that the time endowment is larger. Time is divided between labor supply and leisure.
- Citizens differ in their effective time endowment. The mean effective time endowment is α and the median effective time endowment is α^m .

- The optimal labor supply as a function of the individual productivity and the tax rate is found by solving

$$\max_{l^i} \{(1-q)l^i + f + \ln(\alpha^i - l^i)\}$$

- The first-order conditions (written for the case in which there is an interior solution) and second-order conditions of the welfare maximization are:

$$(1-q) - \frac{1}{\alpha^i - l^i} = 0$$

$$(2) \quad -\frac{1}{(\alpha^i - l^i)^2} < 0.$$

- The first-order condition yields:

$$l^i(\alpha^i, q) = \alpha^i - \frac{1}{1-q}.$$

- Therefore, the labor supply of citizen i is increasing in productivity and decreasing in the wage tax rate. Note that the labor supply is positive only if the right-hand side is positive. If it is negative, then the citizen is constrained to choose zero labor supply. In that case, the differential cannot be set equal to zero as was done in equation (2).
- With the chosen quasilinear utility function, the opportunity cost of leisure is independent of productivity. High-productivity citizens have more effective working time.

As the utility function is quasilinear, the choice of leisure is independent of productivity. This result would differ if the wage rates per time unit would differ.

- Inserting labor supply into the individual utility function we obtain an indirect utility function:

$$(3) \quad \begin{aligned} W(q, f, \alpha^i) &= (1 - q)l^i(\alpha^i, q) + f \\ &+ \ln(\alpha^i - l^i(\alpha^i, q)) \end{aligned}$$

- Draw next the indifference curve of a person whose productivity is α^i into a (q, f) space.

The slope of the indifference curve is: $\frac{df}{dq} = -\frac{\frac{\partial W(q, f, \alpha^i)}{\partial q}}{\frac{\partial W(q, f, \alpha^i)}{\partial f}}$.

- Differentiating equation (3) gives

$$\frac{\partial W(q, f, \alpha^i)}{\partial f} = 1$$

$$\frac{\partial W(q, f, \alpha^i)}{\partial q} = -l^i(\alpha^i, q).$$

The second equation follows using the envelope theorem.

- The slope is thus: $\frac{df}{dq} = -\frac{\frac{\partial W(q, f, \alpha^i)}{\partial q}}{\frac{\partial W(q, f, \alpha^i)}{\partial f}} = l^i(\alpha^i, q)$.
- As $\frac{\partial l^i(\alpha^i, q)}{\partial \alpha^i} > 0$, the indifference curves of any two persons cross only once. Citizens with a higher value of α work more. Thus, they have a steeper indifference curve than citizens with a lower value of α .
- In example 4, the winning tax rate can be deduced in the following way.
 - 1) First, demonstrate that preferences are such that the indifference curves of any two voters cross only once.
 - 2) Denote the preferred tax rate for each citizen i by $q(\alpha^i)$.
 - 3) Order citizens according to their productivity.
 - 4) As preferences have a single-crossing property, the Condorcet winner exists and is the preferred choice of the median voter. The median voter has effective time endowment α^m . Thus, the chosen tax rate is $q(\alpha^m)$.
 - 5) Insert $f=q(\alpha, q)l(\alpha, q)$, where $l(\alpha, q)$ is the average labor supply, into equation (3).
- Note that the problem that the voters face is one-dimensional. Once tax rate is chosen, the lump-sum transfer is determined by the government budget constraint.

9.6. Multidimensional voting

- If voting takes place in more than one dimension, for example of two different tax rates that have different tax bases to finance a single transfer, the median voter theorem need not apply

Example 5. Dividing a cake

- Three voters $i=1,2,3$ have to decide how to divide one euro. Citizen i has preferences $W(q)=U(q^i)$, where q^i is the fraction that voter i obtains and $\sum q^i=1$.
- Problem is two-dimensional: once q^1 is chosen, it remains to choose q^2 and q^3 . For voter 1, the ideal situation is $q^1=1$ and $q^2=q^3=0$. Correspondingly for the rest. Analyze three choices: $A=(0.5,0.1,0.4)$, $B=(0.4,0.5,0.1)$ and $C=(0.2,0.3,0.5)$. If the vote takes place between A and B, A wins. If vote takes place between A and C, C wins. If vote takes place between C and B, B wins. Thus, we have a Condorcet cycle.

9.7. Restricting choices and strategic voting

- If preferences are such that a voting cycle arises, the political equilibrium can arise by restricting the number of voting rounds. In that case, agenda setting power (deciding in which order voting takes place) may turn out to be very valuable
- Committees and representative democracy as a way to put structure into a decision-making problem and guarantee a choice where direct democracy would result in cycles
- Take example 5 and assume that the status quo default option that is adopted if the agenda setter's proposal is defeated is $\bar{q} = (\bar{q}^1, \bar{q}^2, \bar{q}^3)$. The agenda setter is chosen by a lottery and proposes a division $q = (q^1, q^2, q^3)$ subject to $\sum q^i = 1$. After that, voting only once between the agenda setter's proposal and $\bar{q} = (\bar{q}^1, \bar{q}^2, \bar{q}^3)$.
- Two insights: 1) the agenda setter chooses q to obtain the minimum winning coalition. If the agenda setter is 1, it suffices to convince either 2 or 3. 2) It is attractive to choose q so that obtaining the needed vote(s) is as cheap as possible. Therefore, mobile groups that are easy to convince have the best chances of being included in the winning coalition.

9.8. Strategic voting with two rounds

- In Finnish and French presidential elections (and in many other elections to fill political positions) voting takes place in two rounds. If none of the candidates receives more than 50 % of votes in the first round, there is a run-off between the two candidates who obtained most votes.
- With only two candidates, everyone has an incentive to vote sincerely. But already with three candidates, some voters may have an incentive to vote strategically
- Strategic voting takes place when a voter votes for a candidate who is not his or her preferred choice, with an aim of changing the final electoral outcome.
- It is quite easy to analyze strategic voting by one voter if other voters are assumed to vote for their preferred choice. But as also other voters may vote strategically, the analysis gets easily complicated.
- Strategic voting typical in primaries: party activists may need to choose between candidates with preferred electoral platform and best electoral choices. In primaries, strategic voting pushes for selecting more centrist candidates.

9.9. Extensions

- Analysis above was, apart from subsection 9.6, on decision-making when politics is one-dimensional. In reality, politics has often several dimensions.
- With multidimensional politics, one can analyze either sequential or simultaneous voting. Outcomes may differ.
- A key concept with multidimensional politics is structure-induced equilibrium. This can be applied to voting in committees (agenda-setting power), to sequential voting (order of voting may be important; possibility of coalitions) or to simultaneous voting.
- Kenneth A. Shepsle, 1979. Institutional arrangements and equilibrium in multidimensional voting models. *American Journal of Political Science* 23, 27-59.
- If voting takes place simultaneously on more than one type of expenditure or tax, voters form expectations about the outcome in other issues when voting on each issue. In equilibrium without uncertainty, such expectations turn out to be correct.
- Additional complications arise when voting is repeated. For example, public pensions may depend on an intergenerational contract in which middle-aged workers support

pensions for the elderly in expectations that they are going to receive pensions themselves when retiring.

- Example of application to repeated voting on two programs: Panu Poutvaara, 2006. On the political economy of social security and public education. *Journal of Population Economics* 19, 345-365.
- In addition to voting, decision-making may rely on lobbying.
- Example related to trade policy: Gene M. Grossman and Elhanan Helpman, 1994. Protection for sale. *American Economic Review* 84, 833-850.
- Whether using voting or lobbying models gives a better description on the political process likely to depend on stakes and political salience of the issue. Both give complementary insights. If predictions differ, possibility for empirical testing.
- Interesting questions: What is the role of altruism and fairness considerations? Do voters have expressive motivations to vote? More generally, why people vote even when the likelihood of being decisive is tiny? The role of voting in information aggregation and rational abstention by the uninformed? What motivates politicians and how voters and politicians interact?