

Lecture 16: Voting systems

Economics 336

Introduction

Last lecture we looked at the basic theory of majority voting and the Condorcet paradox.

That theory is based on an idealized model of direct democracy: pairwise majority voting.

In this lecture, we examine the properties of a number of real-world voting systems.

- Is median voter theory a good description of reality?
- Are there other voting systems that would do better than our current system?

Representative democracy

In modern societies, *representative democracy* is more commonly used than *direct democracy*. How is this different?

Consider an electoral competition game (the [Hotelling model](#)). Key assumptions:

- voters have single-peaked preferences on a single issue (ideology)
- parties care only about getting elected, not about policy

The electoral competition game:

- 1 Two parties compete for office by announcing policies.
- 2 Citizens observe promises and vote sincerely.
- 3 Winning party receives payoff one and losing payoff zero. In the event of a tie, both get payoff $\frac{1}{2}$.

What is the Nash equilibrium of this game?

- Let voters' bliss points be $x \in [0, B]$, with distribution function $F(b) = \text{Prob}(x \leq b)$.
- Suppose parties choose any two policies $x_1 \leq x_2$. Then party 1 gets $F((x_1 + x_2)/2)$ percent of votes.
- Is this an equilibrium? A party can always increase its vote share by moving towards its opponent, or towards the median.
- So the unique equilibrium is $x_1^* = x_2^* = F^{-1}(1/2)$.

Conclusion: political parties just implement the preferences of the median voter. Representative democracy “works”.

Problems with the theory

Key simplifying assumptions of the Hotelling model:

- 1 single dimension issue space

A large, empty rectangular box with a thin black border, positioned below the first list item. It is intended for notes or diagrams related to the 'single dimension issue space' assumption.

- 2 two parties

A large, empty rectangular box with a thin black border, positioned below the second list item. It is intended for notes or diagrams related to the 'two parties' assumption.

③ office-seeking candidates

④ no abstentions

⑤ perfect information and perfect commitment to promises

⑥ no other means of influencing policy

Empirical evidence I

Support for the median voter hypothesis is mixed.

- 1 Do democracies behave differently than dictatorships? Median voter model suggests they should tax, spend more.

Mulligan, Gil and Sala-i-Martin (JEP, 2004) examine this with cross-country evidence.

Cross-country regressions show that democracies do not spend more, or tax more progressively, than dictatorships – suggesting that elections are unimportant.

Problems with this methodology?



Alternative approach: Case study methodology.

Compare spending growth in 3 countries that transitioned to democracies in 1970s (Greece, Spain, Portugal) to a similar one (Italy) that was always democratic.

Government share increases. (Implications?)

Figure 2

Government Revenue's Percentage of GDP Minus the Benchmark Percentage for Italy



Empirical evidence II

- ② Husted and Kenny (JPE, 1997) look at effects of repeal of “Jim Crow” laws disenfranchising African Americans, 1964–70.
- ▶ *poll taxes* made it harder for poor, especially blacks, to vote.
 - ▶ *literacy tests* were asymmetrically applied to whites and blacks.

Repealed following 1965, 1970 Voting Rights Acts.

Arguably, this change gives a better estimate of the causal effect of voting, because it was imposed from above. (Why?)

▶

Results:

- ▶ turnout increased most in poor counties of South following repeal;
- ▶ share of state spending on “welfare” spending for poor rose 11.8% (relative to change in other states) following repeal of poll taxes. (Literacy tests insignificant.)

Empirical evidence III

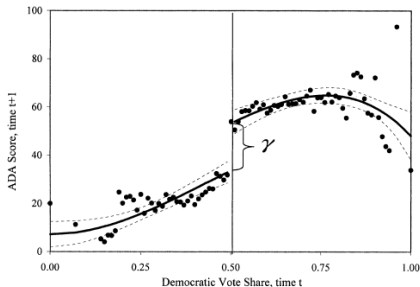
- ③ Do elected representatives really act on behalf of median voter, as in Hotelling model?

Lee, Moretti and Butler (QJE, 2004) compare voting records of Democratic and Republican congressman, 1946-95.

Under median voter hypothesis, representatives of both parties should behave the same if they represent a median voter with the same preferences.

How to test this?

- ▶ can't just compare average Democrat to average Republican
- ▶ more liberal (conservative) districts are more likely to have a Democratic (Republican) congressman – not the same people
- ▶ instead compare districts where Democrat share is 50-52% to those where it is 48-50%
- ▶ this is a *regression discontinuity design*



Interpreting the figure:

- ADA score is a standard measure of “liberal” voting in Congress
- jump in score when Democrat elected is a failure of the median voter model
- possible explanations:
 - ▶ candidates election promises do not converge to the median
 - ▶ incumbents realize they are “safe” after first elected and can ignore election promises and vote how they like

Other voting rules

I. Plurality rule

A single round of voting on all alternatives.

It is reasonable to think we should choose a Condorcet winner when one exists. But:

voter	1	2	3
first choice	<i>A</i>	<i>B</i>	<i>C</i>
second choice	<i>B</i>	<i>A</i>	<i>A</i>
third choice	<i>C</i>	<i>C</i>	<i>B</i>
number	2	3	4

Which is plurality winner? Condorcet winner?



Plurality rule elicits “too little” information: potential for **vote splitting** and **strategic voting**.

Example: Voting for a name

In 1970, the Ontario cities of Fort William and Port Arthur were amalgamated, and voters were asked to choose a new name in a plurality-rule plebiscite.

Three alternatives were on the ballot, and the votes were:

Alternative	votes
The Lakehead	8,477
Lakehead	15,302
Thunder Bay	15,831

If a runoff system had been used, which do you think would have won?

Other voting rules

II. Alternative voting

Under alternative voting (AV) systems, voters submit a ranking of all candidates, not just a first choice. A winner is chosen by sequential counting. (Also called *single transferable vote* or *instant runoff voting*.)

- 1 First place votes are counted.
- 2 If one candidate has a *majority* of votes, it is declared the winner and counting stops.
- 3 If not, the candidate with the fewest votes is eliminated, and these ballots' next preferences are added to totals from step 1.
- 4 Counting continues from step 2.

Many people think we should adopt AV in place of our plurality rule elections. **What advantages can you see to AV?**

Exercise on AV

Consider again the “voting for a name” example:

voter	1	2	3
first choice	A	B	C
second choice	B	A	A
third choice	C	C	B
number	2	3	4

- 1 If voters are sincere, what is the outcome under AV? Is it the Condorcet winner?

- 2 If voters behave strategically, analyze the likely outcomes (equilibria) under plurality rule and under AV.

Other voting rules

III. Borda voting

Borda voting is a weighted voting scheme, where voters allocate “scores” to the alternatives.

For example, let the voter’s score for each alternative be his or her rank for the alternative. The Borda rule winner is then the alternative with the *smallest* overall aggregate score.

Borda voting makes it more likely “compromise” candidates will win, since voters report their ranking of all alternatives, not just their preferred alternative. But it still does not allow people to communicate intensity of preferences.

In our first example, let the distribution of preference types be

voter	1	2	3
first choice	<i>A</i>	<i>B</i>	<i>C</i>
second choice	<i>B</i>	<i>C</i>	<i>A</i>
third choice	<i>C</i>	<i>A</i>	<i>B</i>
number of voters	3	2	2

(Is there a Condorcet winner? When there is, will Borda choose it?)

Borda scores are:

$$S_A = 3 \times 1 + 2 \times 3 + 2 \times 2 = 13$$

$$S_B = 3 \times 2 + 2 \times 1 + 2 \times 3 = 14$$

$$S_C = 3 \times 3 + 2 \times 2 + 2 \times 1 = 15$$

so *A* wins.

Borda rule gives a unique winner, and in this example it seems sensible. But now suppose we add a fourth alternative such that:

voter	1	2	3
first choice	<i>A</i>	<i>B</i>	<i>C</i>
second choice	<i>B</i>	<i>C</i>	<i>A</i>
third choice	<i>C</i>	<i>D</i>	<i>B</i>
fourth choice	<i>D</i>	<i>A</i>	<i>D</i>
number of voters	3	2	2

Borda scores are now:

$$S_A = 3 \times 1 + 2 \times 4 + 2 \times 2 = 15$$

$$S_B = 3 \times 2 + 2 \times 1 + 2 \times 3 = 14$$

$$S_C = 3 \times 3 + 2 \times 2 + 2 \times 1 = 15$$

$$S_D = 3 \times 4 + 2 \times 3 + 2 \times 4 = 26$$

The presence of option *D* on the ballot changes the winner, even though *D* is not chosen. This seems undesirable.

Arrow's impossibility theorem

Ken Arrow (1951) asked whether there was *any* voting scheme (way of aggregating rankings) that leads to consistent, rational social choices, i.e.

- *complete ranking*: it gives a complete social ordering of alternatives, with no Condorcet cycles (e.g. no pairwise voting)
- *unanimity*: it ranks higher any alternative that is preferred by all voters to another (e.g. no non-welfarist rules)
- *independence of irrelevant alternatives*: the ranking of any two alternatives does not depend on whether some third alternative is available or not (e.g. no Borda rule)

Arrow showed that, if there are more than 2 voters and more than 2 alternatives, there the only such voting scheme gives all the votes to a single person – i.e. a dictatorship.

This is probably undesirable! There is no “perfect” voting rule.