

## Lecture 16: Voting systems

Economics 336/337

## Content Quiz

1. According to difference-in-difference evidence in Mulligan et al. (2004), replacing dictatorship with democracy in Greece, Spain, and Portugal caused government revenue to:
  - 1.a rise
  - 1.b fall
  - 1.c no significant effect

# Introduction

Last lecture we looked at the basic theory of majority voting:

- instability in voting: Condorcet paradox
- single peaked preferences and median voter equilibrium
- representative democracy and Hotelling equilibrium

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?

# Problems with the median voter model

Key simplifying assumptions of the Hotelling model:

1. single dimension issue space
  - proof requires single-peaked preferences
  - voters care about many issues
  - median voter equilibrium fails in multiple dimensions
  - most elections fought on a small number of issues – but which?
2. two parties
  - In reality, often three or more viable candidates
  - no Nash equilibrium with more than two candidates. (Why not?)

### 3. office-seeking candidates

- Hotelling assumes parties only want to win
- leads to convergence
- what if parties care about policy/ideology?

### 4. no abstentions

- in Canada, only 40-60% voter turnout
- how does “turnout game” affect politics?

### 5. perfect information and perfect commitment to promises

- another role for elections: evaluating past performance

### 6. no other means of influencing policy

- legislative bargaining
- lobbying activities
- role of campaign contributions

## 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?

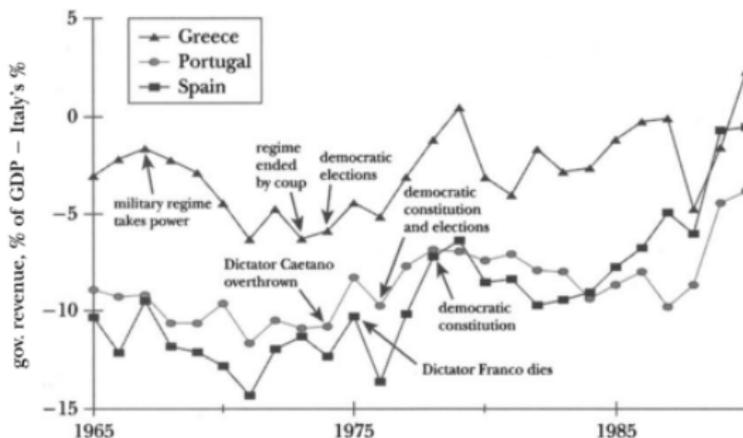
- Democracies and dictatorships are likely different in many ways – *omitted variable bias*
- Changes in government spending or GDP may cause transition between democracy and dictatorship – *reverse causality*

## 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. A case study in democracy: end of “Jim Crow” laws disenfranchising black voters in US South
  - *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.

Compare changes in Jim Crow states to others with no sharp change in Black enfranchisement.

Results:

- turnout increased most in poor counties of South following repeal: voters were increasingly poor and Black;
- Husted and Kenny (JPE, 1997): share of state spending on pro-poor policies (“welfare” spending) rose 11.8% (relative to change in other states) following repeal of poll taxes
- Cascio and Washington (QJE, 2014): government spending rose in predominantly Black counties, relative to control states

Identity of median voter matters: Democracy works!

## Empirical evidence III

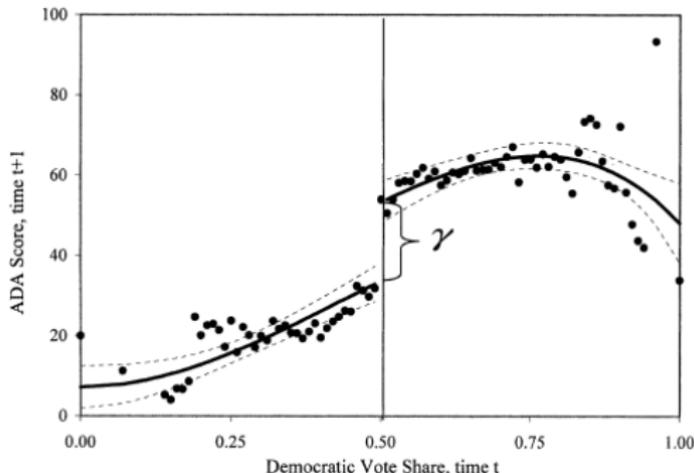
3. Do elected representatives really act on behalf of median voter, as in Hotelling model?

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	A	B	C
second choice	B	A	A
third choice	C	C	B
number	2	3	4

Which is plurality winner? Condorcet winner?

- C wins a plurality (though a majority consider it worst).
- A is the 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?

- under plurality rule, potential for vote splitting
- evidence that strategic voting is hard in large populations...
- a role for “spoiler” candidates: can’t win but do change outcome

# 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?

A (Condorcet winner) eliminated in first round; B wins runoff

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

AV helps solve the vote splitting problem of plurality rule  
But if types 1 and 2 are sincere, what should 3 do 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.

## Other voting rules

### III. Score voting

One problem with all these systems is they ask voters about rankings, but not about how much they care. This leaves out important information, and it leads to some of these paradoxes. (Think of the “voting for a name” example.)

Other voting systems would ask voters about intensity of preference, e.g.:

- score voting: each voter can allocate 100 points among candidates in any way – highest score is winner
- approval voting: each voter can vote yes or no on all candidates – most yes votes is winner (a special case of score voting)
- negative plurality: each voter can name candidate that is *least* preferred – lowest score is winner (a special case of approval voting)

How would these systems work in the “voting for a name” example?

## 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*: rank all alternatives, no Condorcet cycles (e.g. no pairwise voting)
- *unanimity*: rank  $A$  over  $B$  if all voters agree (e.g. no non-welfarist rules)
- *independence of irrelevant alternatives*: ranking of  $A$  and  $B$  does not depend on whether some other  $C$  is available (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.

