NEW PERSPECTIVES ON THE LAW & ECONOMICS OF ELECTIONS

ASSA EARLY CAREER RESEARCH AWARD: PANEL B

Richard Holden
School of Economics
UNSW Business School

BACKDROP

- Long history of political actors seeking to maximize their own advantage

- Both explains and shapes democratic institutions

- Explosion of "electoral IT"

  - Census data, TIGER Line files, GIS

  - Individual voter data (browser history, social networks, …)

- Largely in the US? Or coming soon to a democracy near you?

OVERVIEW OF TALK

- Gerrymandering
- Political geography and "compactness"
- Incumbent reelection rate
- Future directions

GERRYMANDERING

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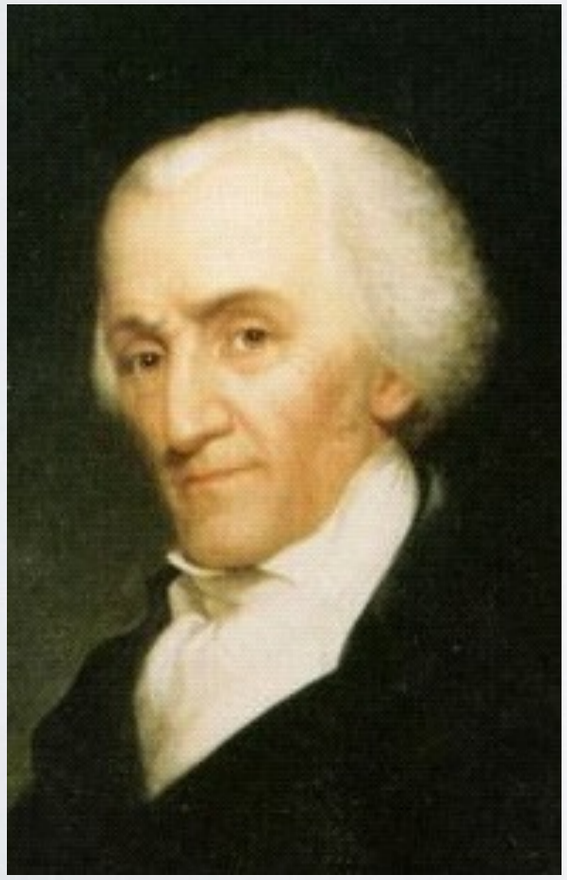
Gerrymander: *noun and verb*. The action of manipulating the boundaries of a constituency etc. so as to give advantage at an election to a party or class. (Oxford English Dictionary)



OPTIMAL STRATEGY FOR GERRYMANDERER

- What is the optimal strategy?
- What are the implications for representation of different groups (party, race, gender,…)?
- How can or do regulations/constraints interact?
- You cannot regulate what you don't understand

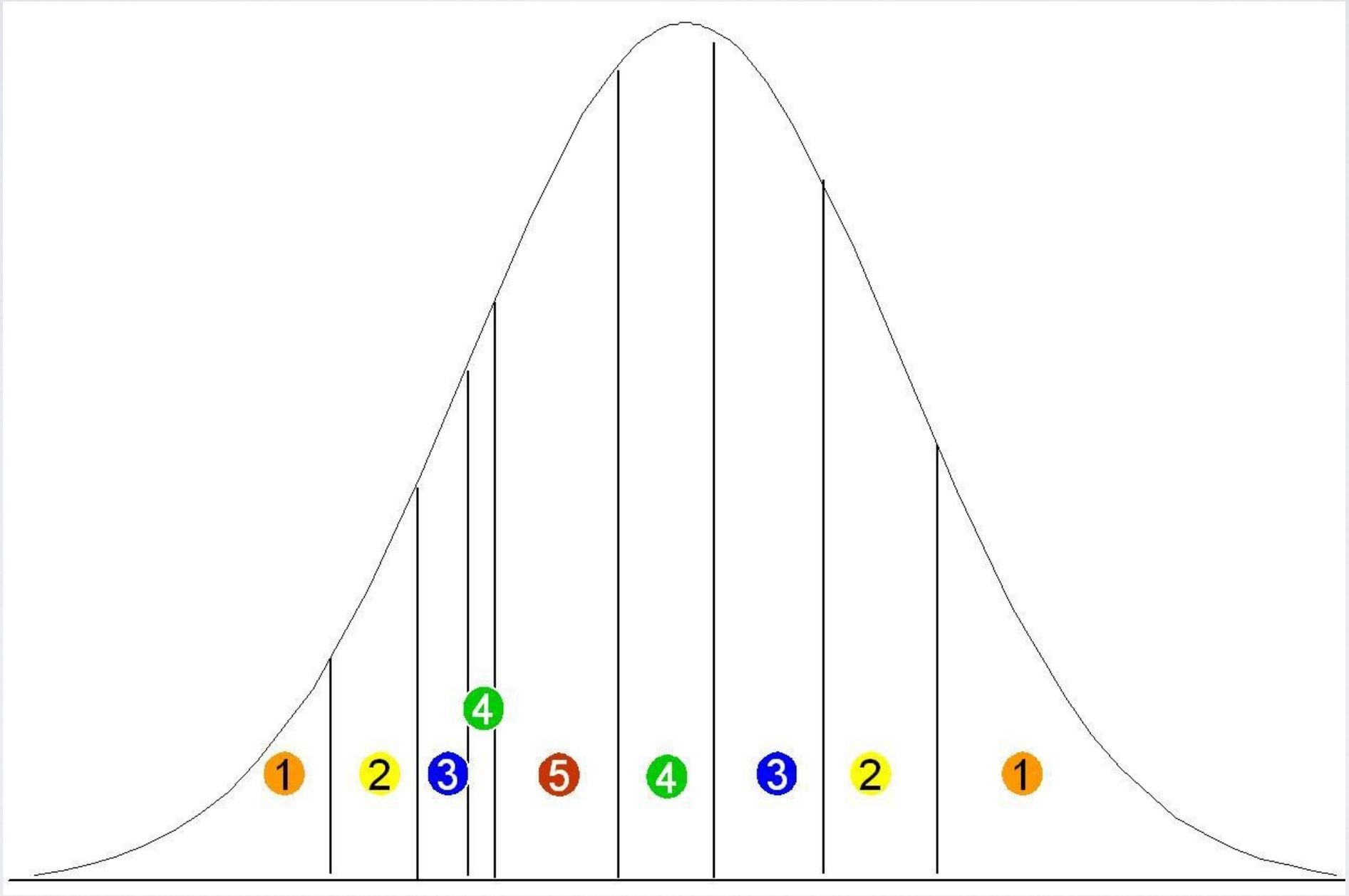
OPTIMAL STRATEGY

- Widely-held view: *pack and crack*
  - **Pack:** group lots of your opponents into a "few" districts
  - **Crack**: spread the remaining voters evenly over the remaining districts
- Throw away a few districts to win the majority
- Under what conditions/in what settings is this optimal?
- Friedman and Holden (*American Economic Review*, 2008)

THE PROBLEM

- Voters don't walk around with D's and R's on their foreheads
- A continuum of voter types
- Observe a noisy signal of voting intention
- Form *n* districts of equal size (Baker v Carr, 1962) to maximize the expected number of districts won
- Assume that signals satisfy a version of MLRP—higher and higher signals more and more likely to come from more "right-wing" voters (see Karlin on *Total Positivity* and *Polya Frequency Functions*)

MATCHING SLICES



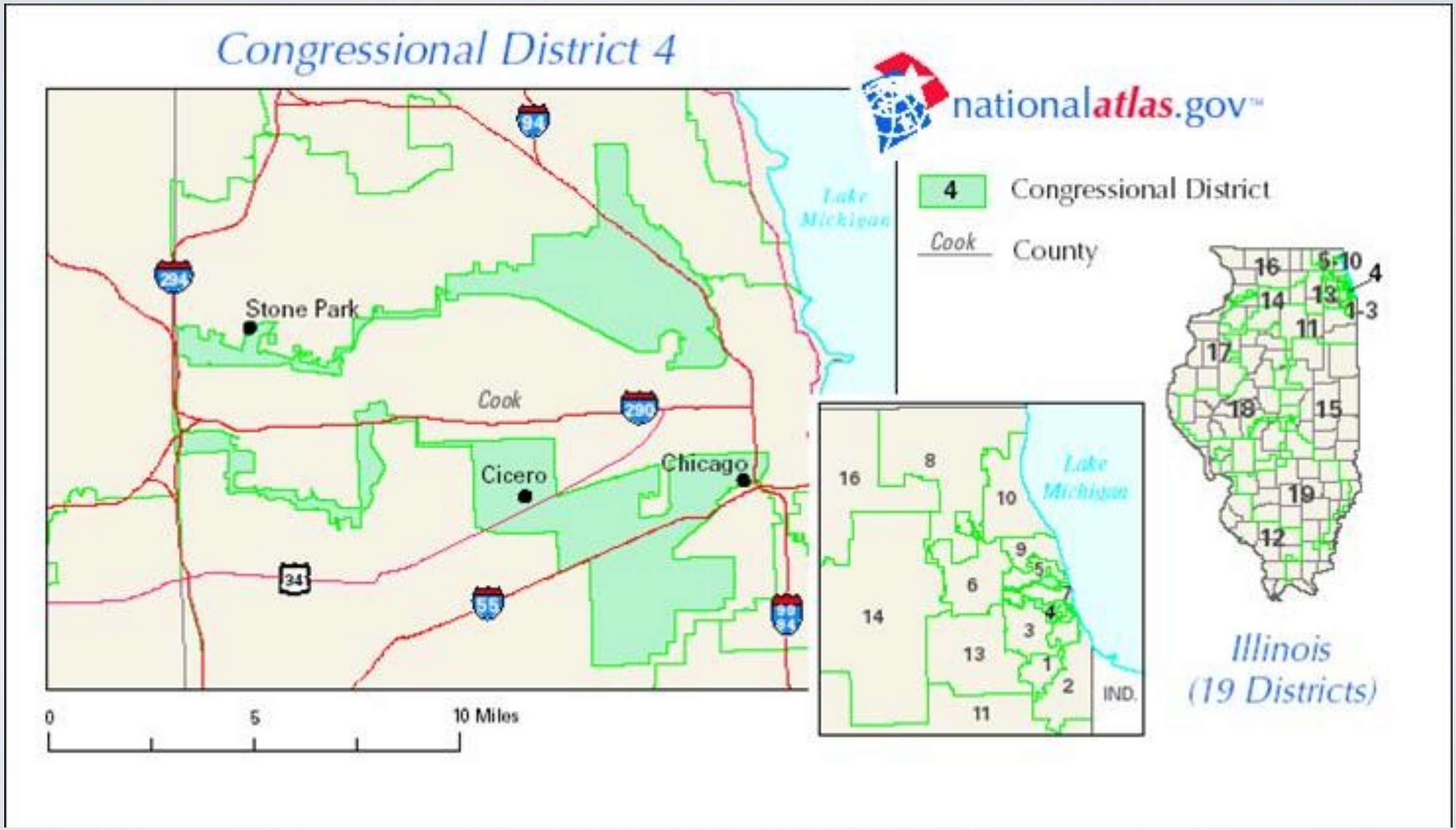
MATCHING SLICES INTUITION

- Voters in the tails of the distribution v likely to vote one way or the other

- Best way to use your strongest supporters is to neutralize your strongest opponents

- Use them as the pivotal voter in some district, not right/left of the median in many districts

DOES IT ACTUALLY HAPPEN?



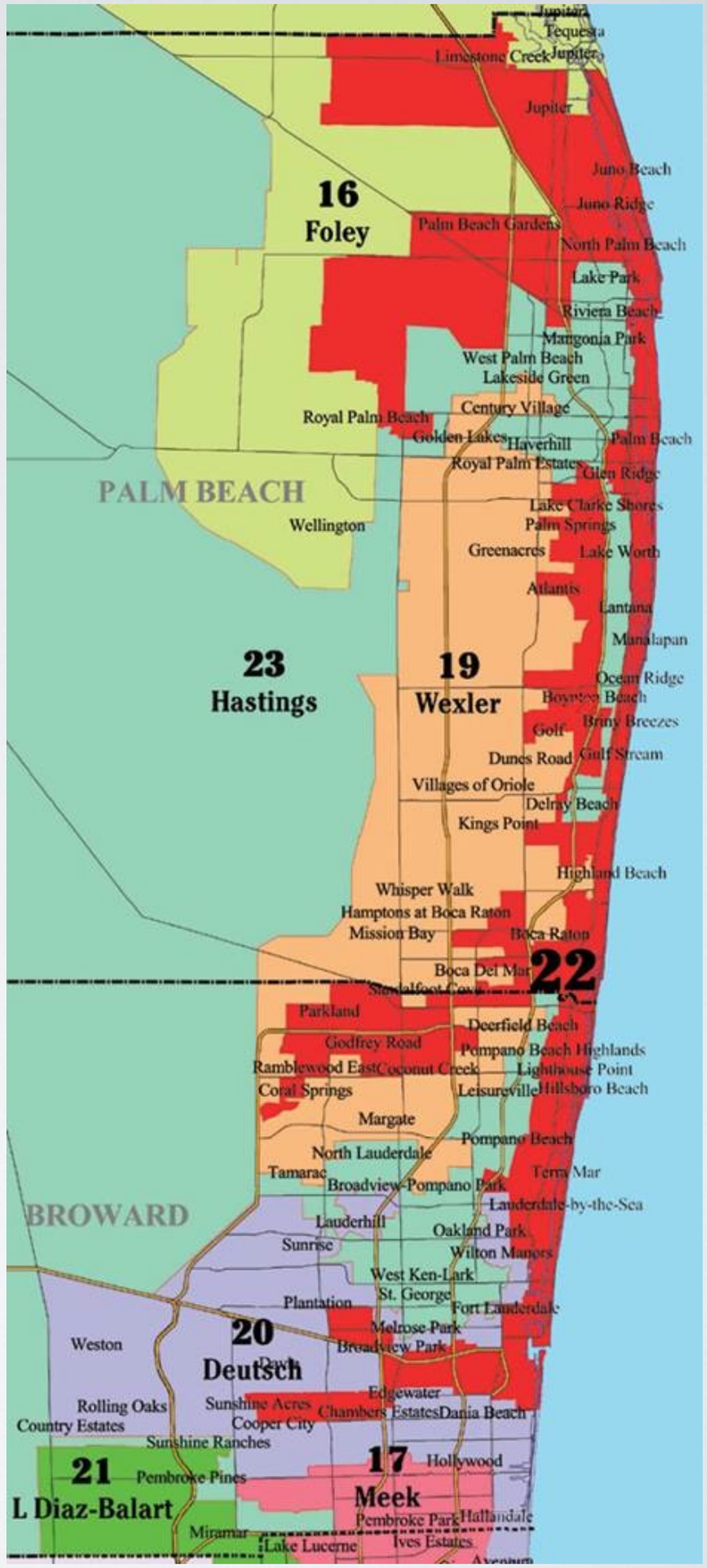
IMPLICATIONS

- Suppose Republican redistricter
- If you believe pack-and-crack left tail do "ok"
- Matching slices: they are the worst off
- Which voters are in the left tail?
- Can one ever disentangle partisan and racial motives in redistricting?!
- Cox and Holden (*Chicago Law Review*, 2011)

COMPACTNESS

SHAPE OF DISTRICTS

- Lots of oddly-shaped districts
- But how does one measure that?
- SCOTUS cares: "uncouth 28-sided figure" (Justice O'Connor)
- Fryer and Holden (*Journal of Law and Economics*, 2011)



LOTS OF EXISTING MEASURES

- Area of circumscribing figures (rectangle, circle, hexagon,)
- Perimeter length
- Ratio of perimeter length to area of circumscribing figure--call this *
- One minus square root of (*)
- One divided by square root of (*)
- 100 times (*)
- Ratio of district population to area of convex hull of a district
- Ratio of reflexive to non-reflexive interior angles in a district
- Median price of petrol divided by age of oldest citizen in a district…

EXISTING MEASURES

- *ad hoc*
- Not invariant to
  - geographic size
  - population and population density
- Want to be able to compare Vermont and Texas
- Also: compactness inherently a property of a *districting plan* not a *district*—can't change one district without changing at least on other

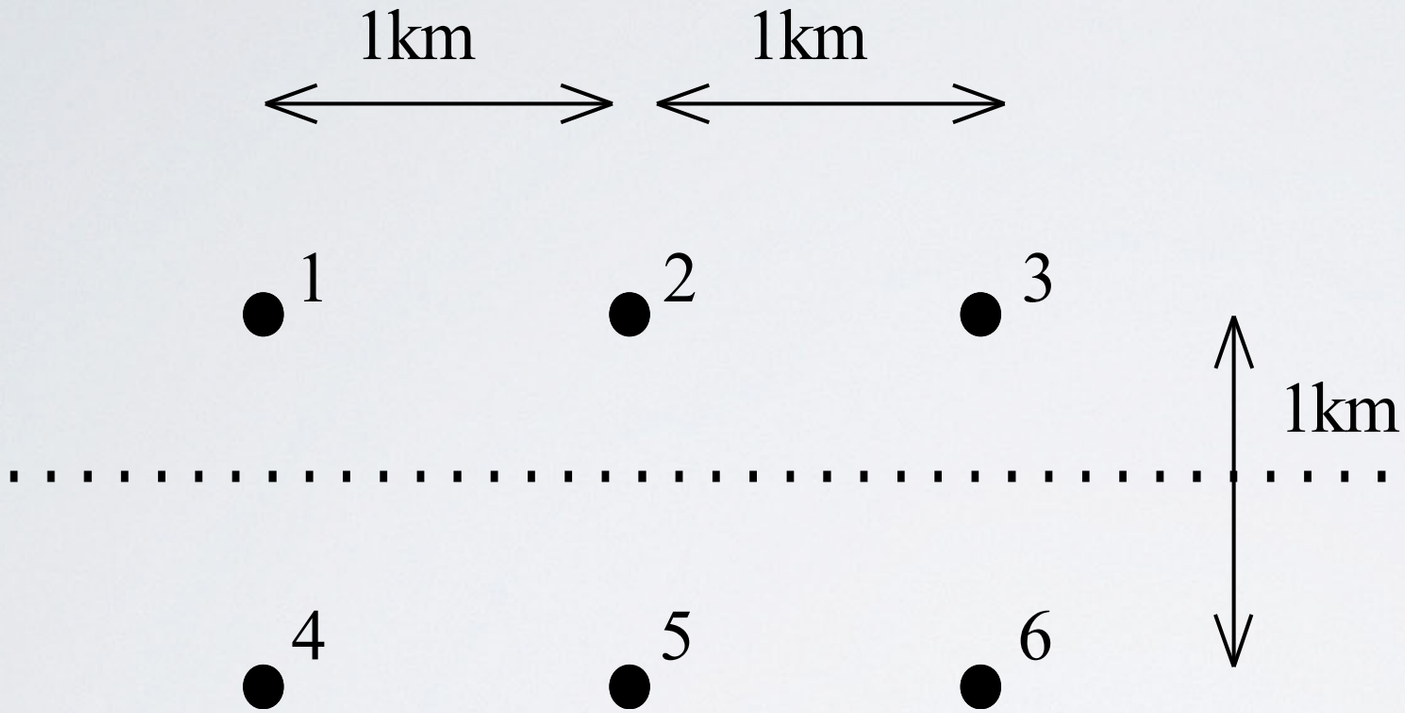
OUR APPROACH

- 3 axioms a reasonable districting plan should satisfy
  - **Anonymity**: treat all voters equally
  - **Invariance**: not depend on number of districts, size, or population density
  - **Clustering**: all else equal, greater total intradistrict distances means less compactness
- Propose an index satisfying these properties: the *Relative Proximity Index*

THE RPI

- Numerator: sum over pairwise squared distance b/w all voters in a given district, then sum over all districts
- Denominator: the same sum but in the partition that minimizes the sum
- **Theorem:** any index that satisfies the 3 axioms ranks districting plans identically to the RPI

A SIMPLE EXAMPLE



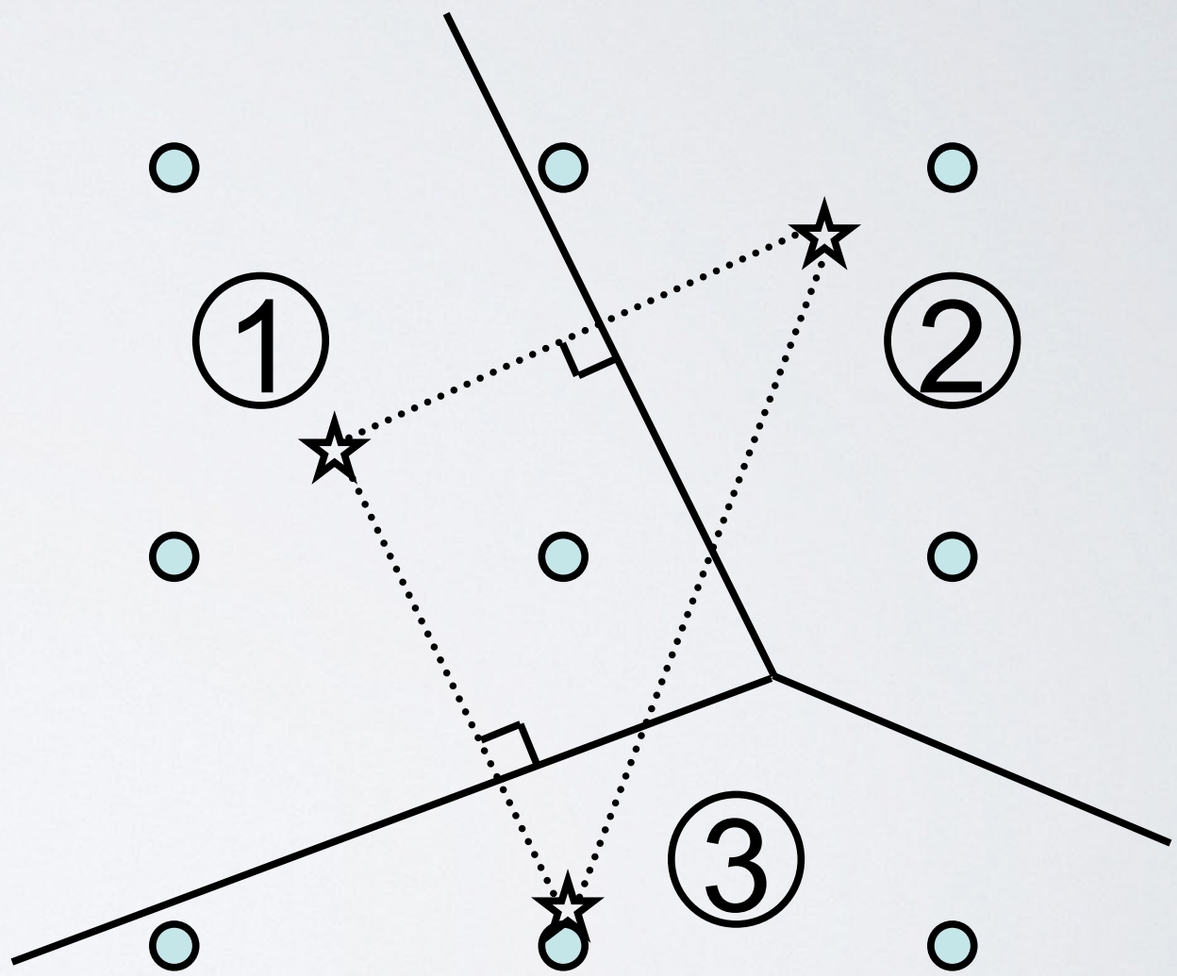
- Numerator=24
- Min partition = {{1,2,5},{3,5,6}}
- Denominator=16
- RPI=24/16=3/2

COMPUTING THE MIN

- Minimum partition problem is NP-Hard
- CA: n=53, census tracts=6,800
- Number of possible districting plans CA=$78.4 \times 10^{59,351}$
- Even in a small state number of plans great than number of atoms in the visible universe

POWER DIAGRAMS

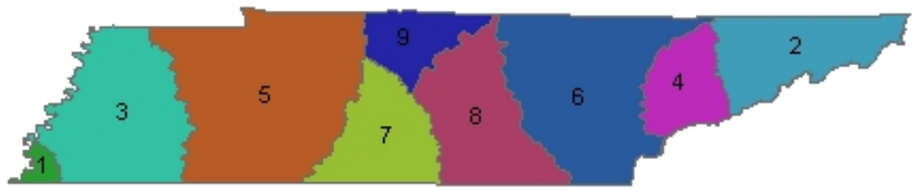
- Optimally compact districts are power diagrams
- Power diagrams used in tropical geometry, string theory, image processing
- Kind of a generalization of Voronoi diagrams
- Develop an efficient algorithm to find them using US census-tract-level data



COMPACT DISTRICTS

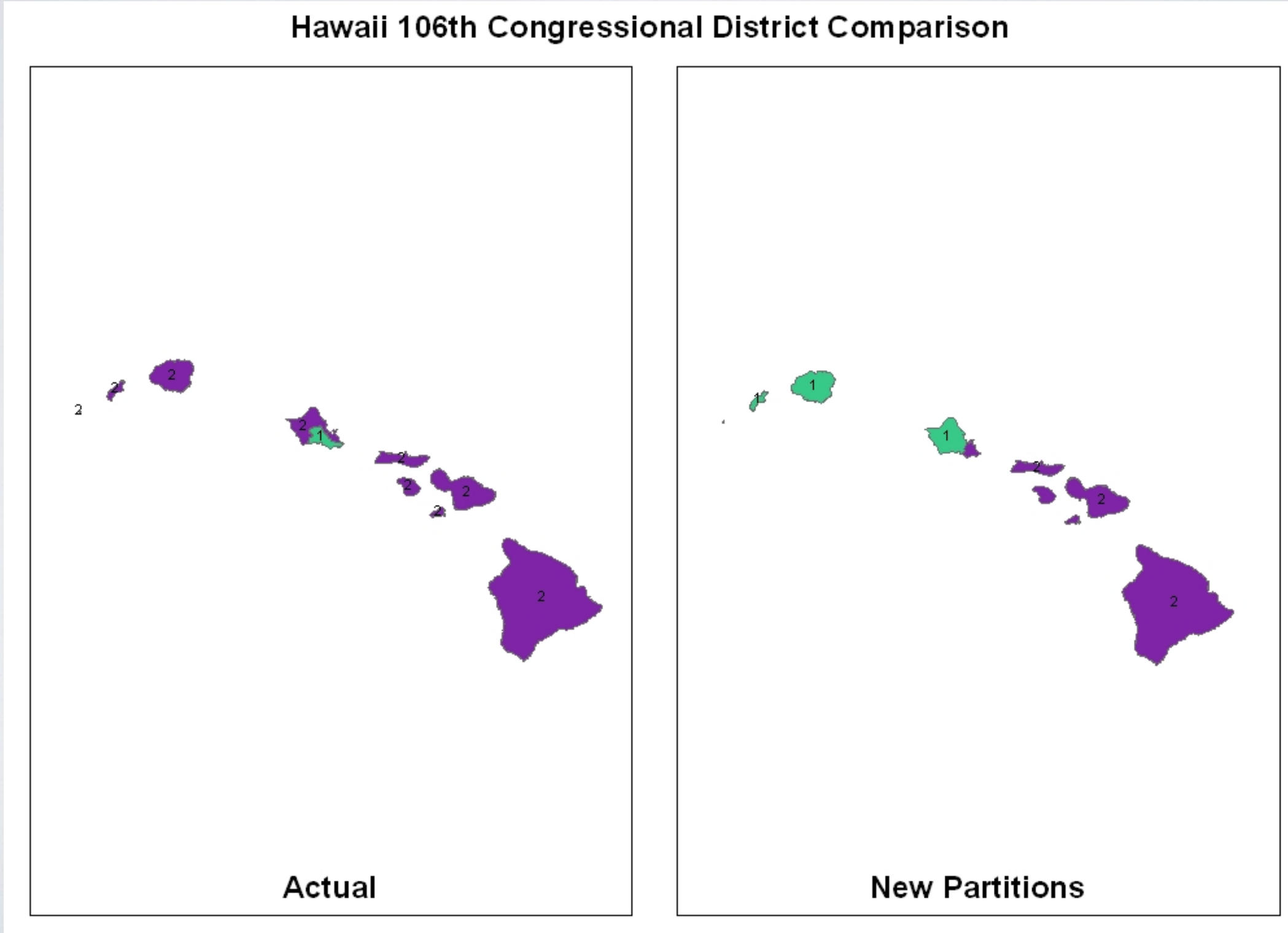
Tennessee 106th Congressional District Comparison

Actual



New Partitions

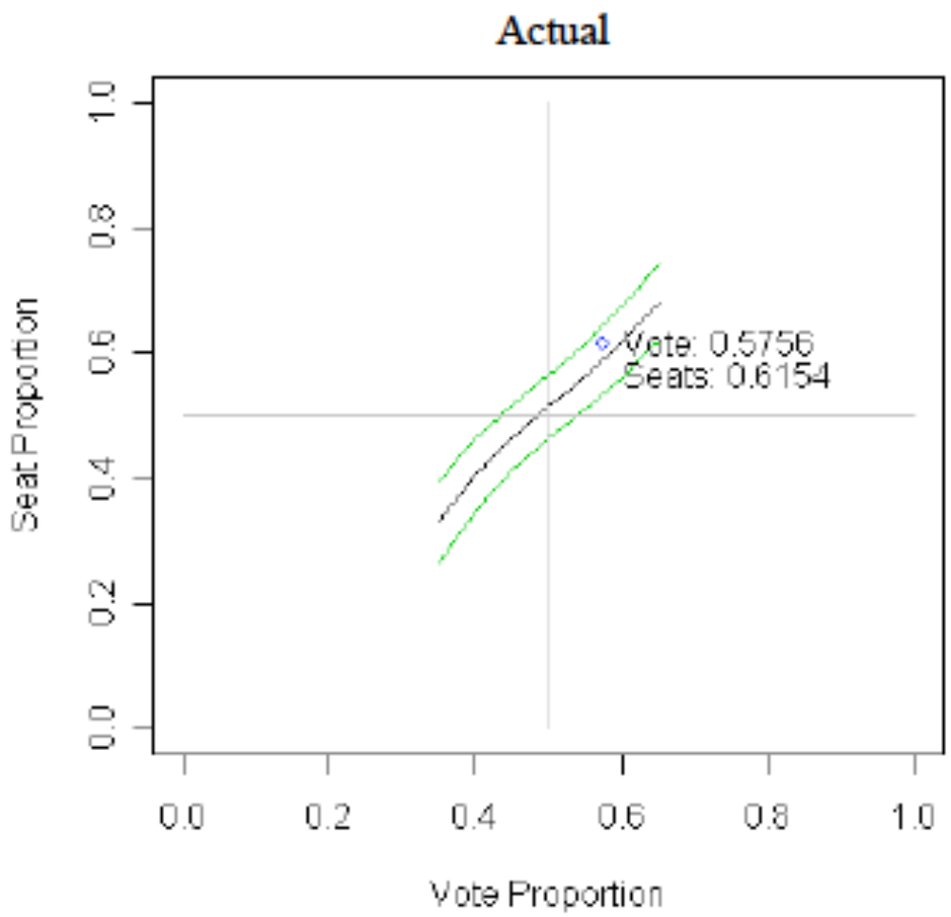
COMPACT DISTRICTS

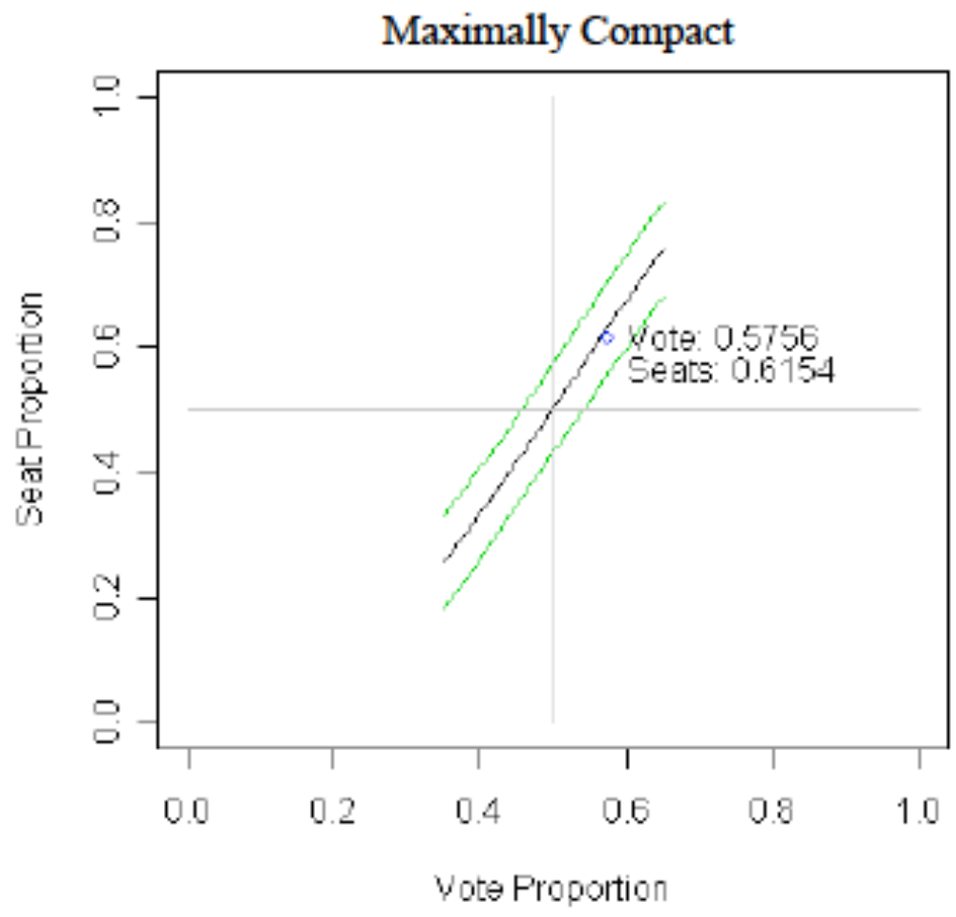


ELECTION COUNTERFACTUALS

- Would also be nice to say something about what elections would look like under the alternative districts
- Estimate the seats-votes curve
    - A mapping from proportion of votes to number of seats in legislature
    - *Biasdness*: How many seats does party A win if they get half the votes
    - *Responsiveness*: derivative of the SV curve (at a point, eg. 50 percent)—majoritarian v. pro v. counter
- Use Gelman-King (1994) method
    - Bayesian approach
    - Linear model with idiosyncratic and systematic error components

CA ELECTION COUNTERFACTUALS





ELECTION COUNTERFACTUALS

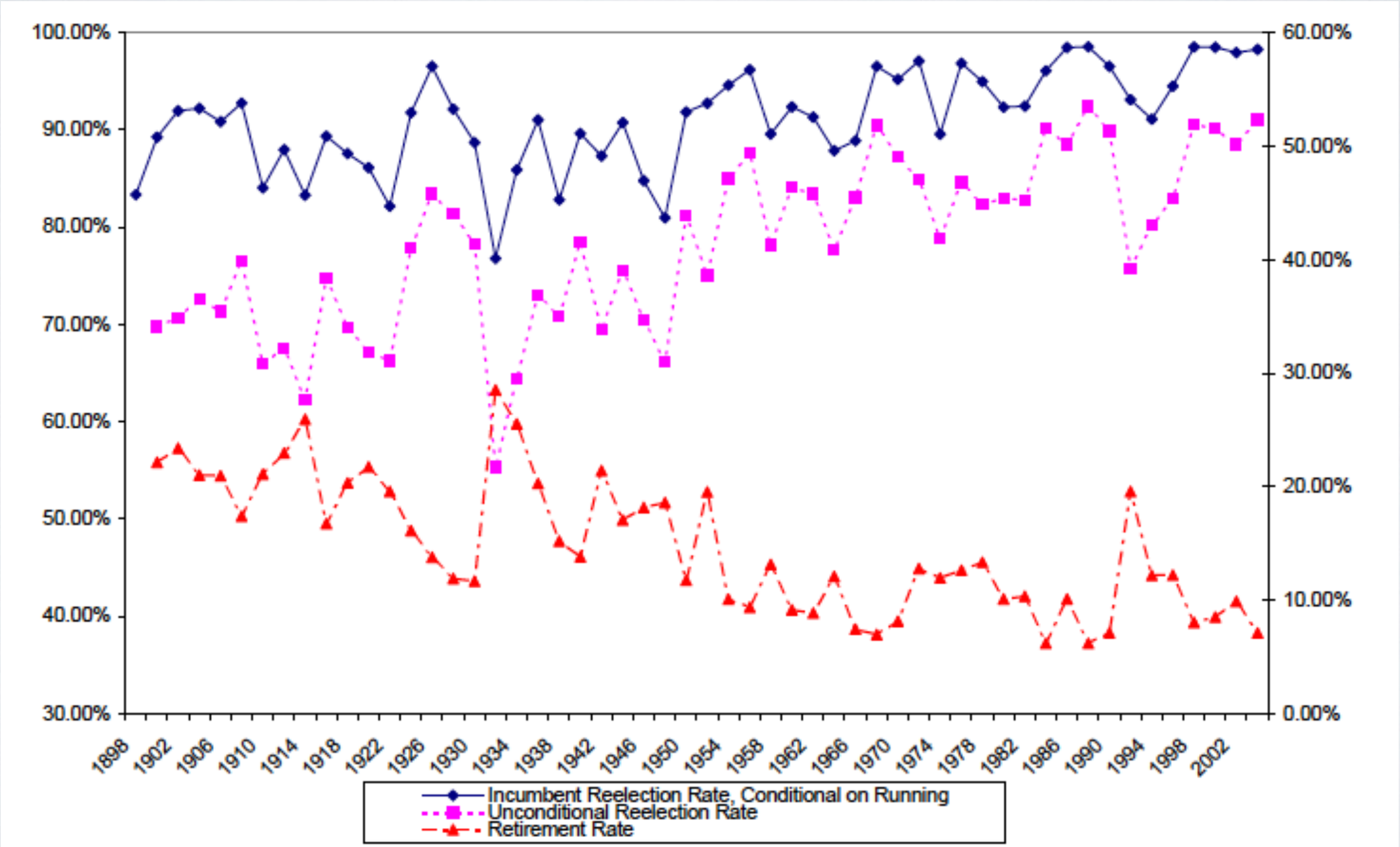
Table 2: Partisan Bias and Responsiveness, Actual versus Maximally Compact Districtings

State	Bias (Actual)	Bias (Algorithm)	t-statistic on Difference	Responsiveness (Actual)	Responsiveness (Algorithm)	t-statistic on Difference
California	.028	.007	.469	1.086	1.731	-4.327**
	(.010)	(.045)		(.069)	(.132)	
New York	.103	.018	1.051	0.482	2.51	-6.540**
	(.014)	(.080)		(.036)	(.308)	
Pennsylvania	-0.0027	.031	-.363	1.138	1.562	-1.800*
	(.021)	(.076)		(.128)	(.198)	
Texas	.062	.039	.334	0.8872	1.305	-1.717*
	(.024)	(.064)		(.103)	(.221)	

Notes: Estimates are based on voter tabulation district level election return data for the 105th and 106th congress.

INCUMBENT REELECTION

US HOUSE OF REPS REELECTION RATE



GERRYMANDERING DID IT?

- "Bipartisan gerrymandering is emerging as a new, equally serious but different kind of threat to American democracy. Congressional elections in the wake of the 2000 round of redistricting were the least competitive of any general elections in United States history, with redistricting a central reason...Bipartisan gerrymanders increasingly make election day for representative bodies an empty ritual." *Pildes (2002)*

- "And it is the yawning gap between the huge problems our country faces today -- Social Security reform, health care, education, climate change, energy -- and the tiny, fragile mandates that our democracy seems able to generate to address these problems that is really worrying. Why is this happening? Clearly, the way voting districts have been gerrymandered in America...is a big part of the problem." *Thomas L. Friedman, Thou Shalt Not Destroy the Center, New York Times, November 11, 2005*.

A USEFUL FACT

- Redistricting happens (essentially) every 10 years and only every 10 years—after the decennial census

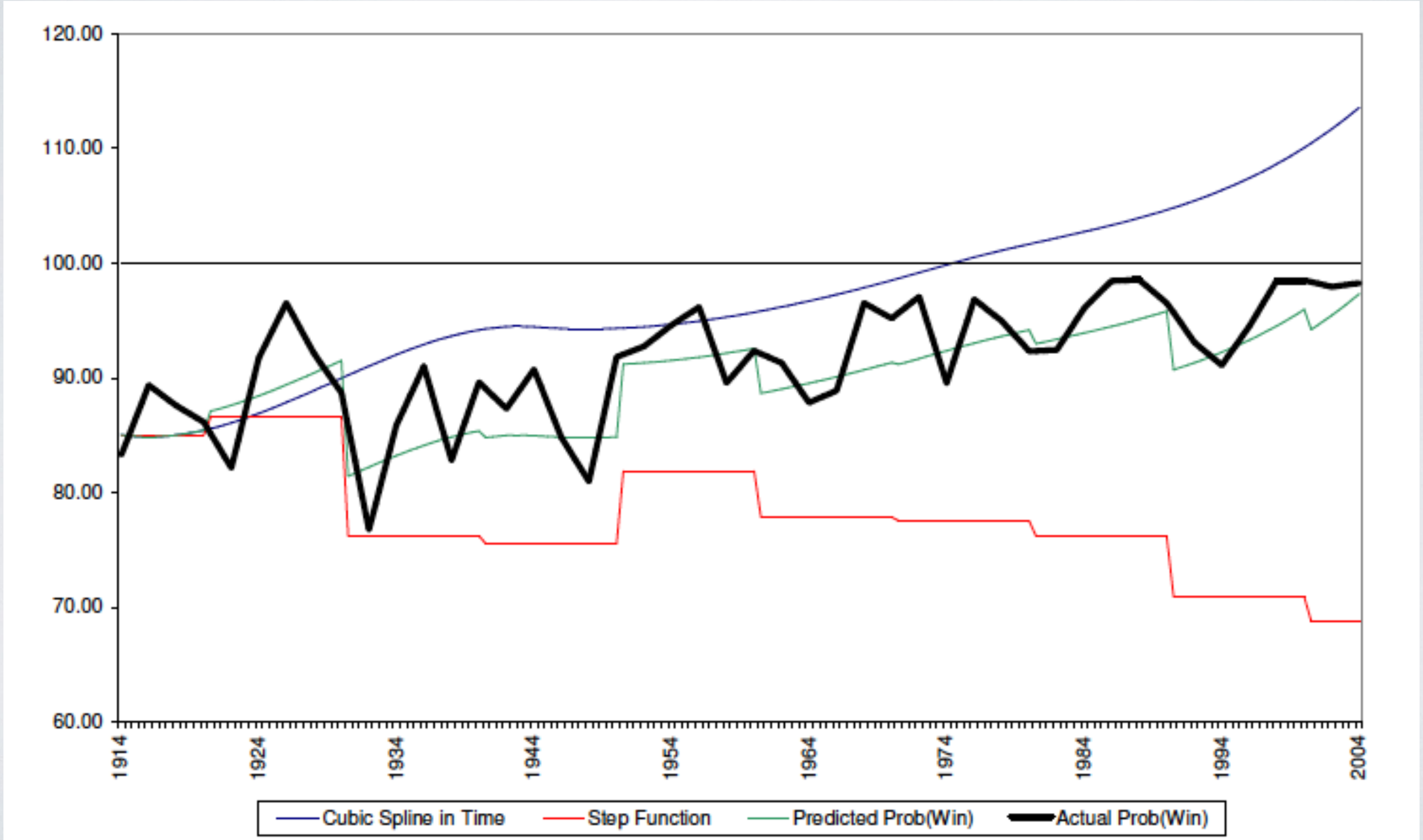
- Money, media, etc happen all the time

- So, fit a flexible smooth function to the data (cubic spline or high-order polynomial) and leave a step function behind that can only move at 1952, 1962,…,2002,…

- If gerrymandering did it, then expect steps up

- Friedman and Holden (Journal of Politics, 2009)

THE EVIDENCE



LEVELS VERSUS CHANGES

- Changes in incumbent reelection rate not due to redistricting

- But ingoing level was pretty high

- Timing of downward steps in our analysis suggest constraints of VRA important

IF NOT THAT THEN WHAT?

- Polarization? (McCarty-Poole-Rosenthal say no)
- Political geography? (Glaeser)
- Money in politics?
- Media?
- Two-sided matching?

CURRENT AND FUTURE DIRECTIONS

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- Political geography meets redistricting (e.g. Chen-Rodden)
- Algorithmic redistricting (e.g. Fifield-Higgins-Imai)
- Voter turnout
- Term limits—or fancier versions thereof
- Partially orthogonal: primaries and parties (e.g. Holden-Hummel, *Journal of Public Economics* 2014)

JUST THE US? OR COMING SOON TO A DEMOCRACY NEAR YOU?

- Geography-free fact: politicians are self-interested actors
- Lots of the stuff I've talked about doesn't happen in Australia
- Institutions (and conventions) matter
- US: states determine election law; remedies largely under Equal Protection Clause of 14th Amendment
- Aus: different federal structure, but…
  - Might change?
  - Different constitutional structure *vis a vis* these issues