Computational Models of Electoral Politics

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Laver & Sergenti (PUP, 2011)

Introduction

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    - Politics is complex. Political outputs today feed back as inputs to the political process tomorrow.
    - Politicians are diverse. In particular, different politicians attack the same problem in different ways.
    - Politics is not random. Systematic patterns in political outcomes invite systematic predictions, making a political "science" possible.

A New Approach

- Goal is to understand the dynamics of party competition in systems with more than two political parties.
- Their interest concerns crucial features of party competition that traditional models assume away as a price to be paid for analytic tractability.

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- In chapter 2 they show that dynamic models of party competition, especially when voters care about a diverse set of issues, are analytically intractable.
- They are not just "difficult" to solve, they cannot be solved using conventional analytic techniques.
- Use a subfield of computational geometry dealing with "Voronoi tessellations" that is directly analogous to the problem of dynamic competition between political parties to show this.
- Specifically, the problem is intractable if the space has more than one dimension, implying that there are no formally provable best-response strategies.

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- Computational results are good only for those parameter settings that have actually been investigated.
- Inferences about parameter settings that have not been investigated are, in effect, interpolations.
- This is one reason why we never use computational methods when analytical results are available.

Benchmark Model

- Goal is to provide a benchmark against which to evaluate results in subsequent chapters.
- Compare results generated by the model to those generated by more traditional tools of party competition.

Benchmark Model

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- All parties use the same decision rule.
- Types of parties: all-Sticker, all-Aggregator, all-Hunter.

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- Voters support the political party that offers the policy package closest to their ideal "package" of policy positions.
- Party leaders adapt the policy packages they offer in light of the revealed pattern of voter support.
- Voters reconsider which party they support in light of the revealed pattern of party policy packages.

Experimental Design: Symmetric Populations

- Party systems of 11 different sizes (ranging from 2 to 12).
- 33 parameter configurations (3 types of parties $\times$ 11 different sizes).
- Do 1000 simulations for each parameter configuration.

Run Design: All-Sticker

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- Each run converges on a single state.

Run Design: All-Aggregator

- All-Aggregator parties set policy on each dimension at the mean preference of all current party supporters.
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- Each run tends toward a single steady state.
- In contrast to All-Sticker systems, all-Aggregator systems do not start out in steady state.
- Aggregator parties adapt away from their initial starting positions, eventually settling into a deterministic steady-state configuration.
- Need to run model until steady state is arrived at.

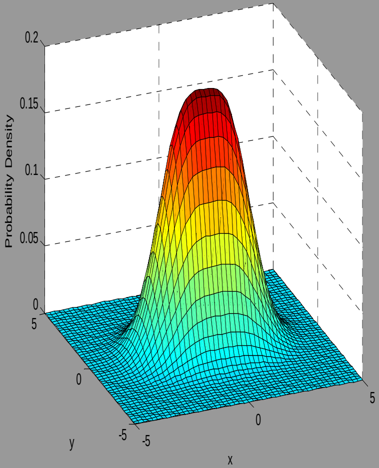
Run Design: All-Hunter

- If the last policy move increased party support, the party should continue heading in the same direction.
- If not, the party should reverse heading and make a unit move in a heading chosen randomly from the 180-degree arc centered on the direction it is currently facing.
- Thus, all-Hunter runs are stochastic and ergodic.
- Use two summary variables, mean eccentricity and ENP, to diagnose when the run is burnt in.
- Then use 1000 post-burn-in iterations to map out the steady-state.

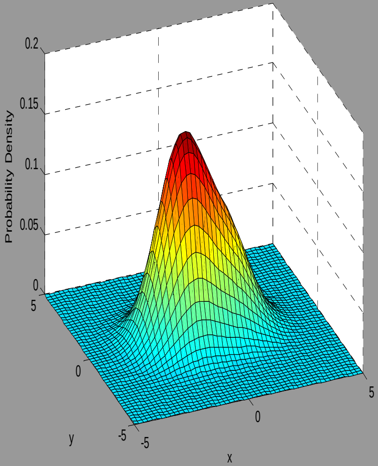
Experimental Design: Asymmetric Populations

- Two new parameters:
  1. relative size of two subpopulations: n_l/n_r
  2. their ideal point means: μ_r $(= -\mu_l)$.
- Sample number of parties from U[2,12].
- Sample the relative size of subpopulations from U[2.0,1.0].
- Sample ideal point means from U[0.0,1.5].
- Do 1000 simulations for a randomly selected configuration.

Experimental Design: Asymmetric Populations



$\mu_r = -\mu_l = 0.5\ ;\ n_l / n_r = 1.0$



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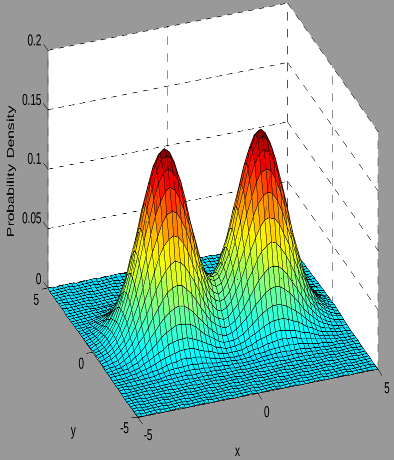

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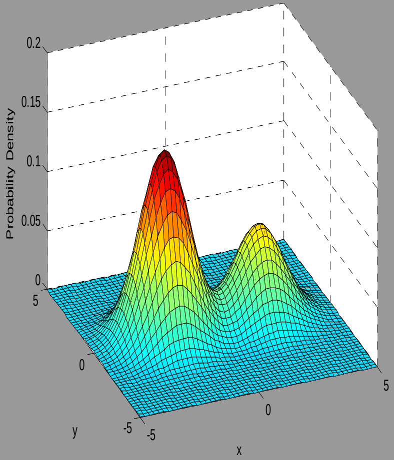

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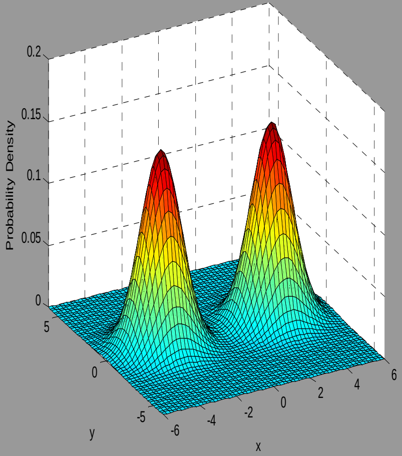

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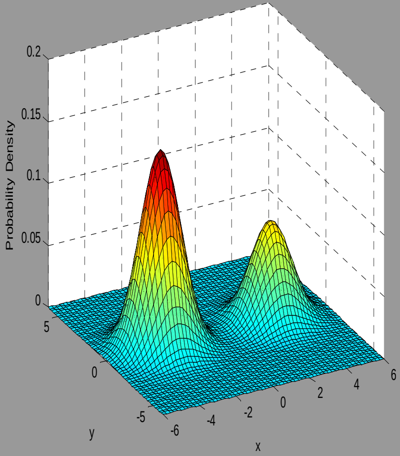

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Results: Symmetric Voter Populations

Evolved Eccentricities of Party Policy Positions

- Distance (in standard deviations) of a party's policy position from the centroid of voter ideal points.

Results: Symmetric Voter Populations

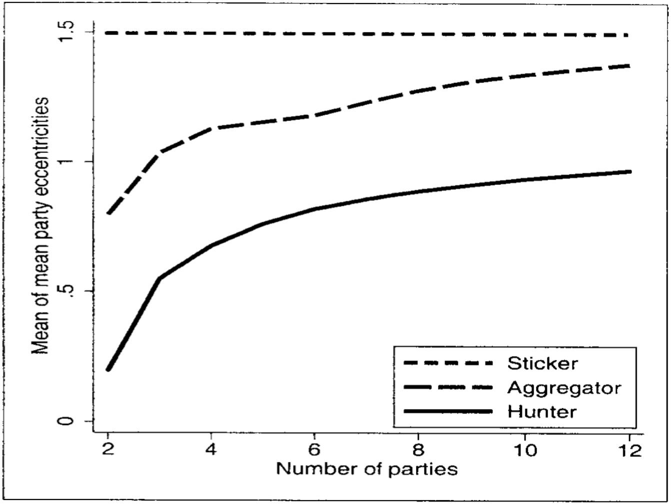

Figure 5.2. Mean party policy eccentricity, by decision rule and number of parties; benchmark runs in symmetric populations.

Results: Symmetric Voter Populations

Evolved Eccentricities of Party Policy Positions

- Distance of a party's policy position from the centroid of voter ideal points.
- Vote-seeking parties in all-Hunter systems systematically chose more central policy positions compared to all-Aggregator party systems.
- Party systems with two vote-seeking Hunters tend to search for votes close to the centroid of voter ideal points.
- Mean party policy eccentricity increases with the number of parties in all-Aggregator or all-Hunter party systems.

Results: Symmetric Voter Populations

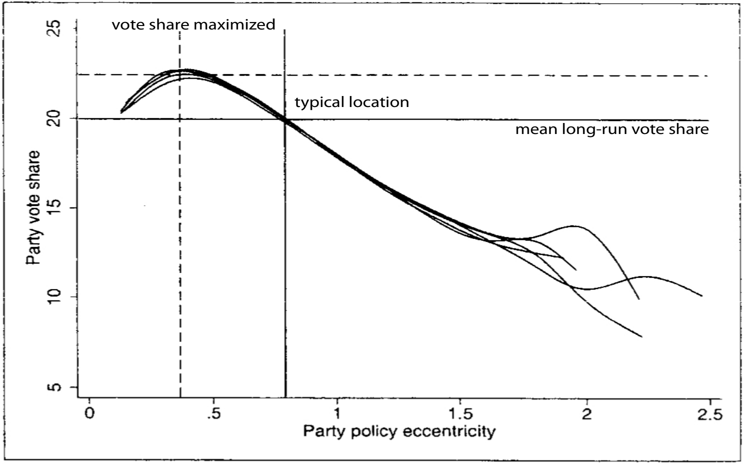

Figure 5.4. Median splines of party vote shares by policy eccentricities, burnt-in five-Hunter benchmark run. Plotted lines are twelve-band median splines and exclude cases where party policy eccentricity > 2.0.

Results: Symmetric Voter Populations

Evolved Eccentricities of Party Policy Positions

- If vote share is maximized at 0.4 standard deviations from the voter centroid, why do parties typically locate at 0.76 standard deviations from the voter centroid? Is the latter location suboptimal?

Results: Symmetric Voter Populations

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- If vote share is maximized at 0.4 standard deviations from the voter centroid, why do parties typically locate at 0.76 standard deviations from the voter centroid? Is the latter location suboptimal?
- No ($22.5\% \times 5 > 100\%$).
- Since all parties use the same rule and expect the same average vote share over the long run (20%), the average long-run positions for each party should be 0.76 standard deviations from the voter centroid.
- If a single hunter moves closer to the center then it will win more votes but this is not dynamically stable because other vote seeking parties will correct this situation in the long run.

Results: Symmetric Voter Populations

Effective Number of Parties

- Absolute number of parties $\neq$ effective number of parties (ENP), which takes into account relative party sizes.
- The more the absolute and ENP diverge, the more unequal the party vote shares.

Results: Symmetric Voter Populations

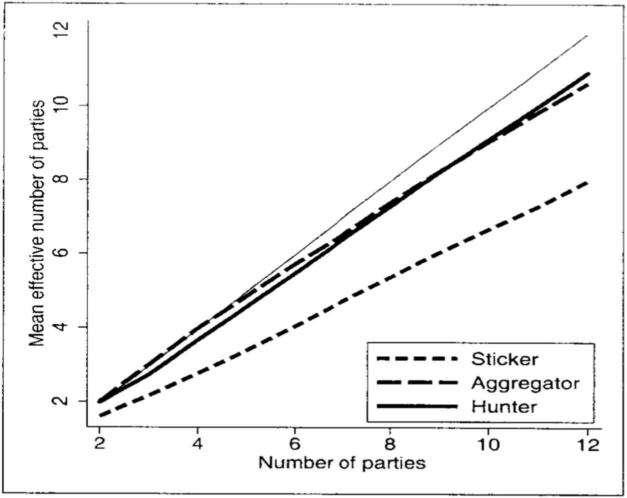

Figure 5.5. Effective and absolute number of parties, benchmark runs in symmetric populations.

Results: Symmetric Voter Populations

Effective Number of Parties

- Absolute number of parties $\neq$ effective number of parties (ENP), which takes into account relative party sizes.
- The more the absolute and ENP diverge, the more unequal the party vote shares.
- In all-Aggregator and all-Hunter party systems, the ENP is always close to the absolute number of parties.
- Over the long run, these party systems tend to generate party configurations in which all parties are of roughly equal size.
- In all-Sticker systems, ENP differs significantly from the absolute number of parties.

Results: Symmetric Voter Populations

Representativeness of the Configuration of Party Positions

- Average closeness of voters' ideal points to the position of their closest party.

Results: Symmetric Voter Populations

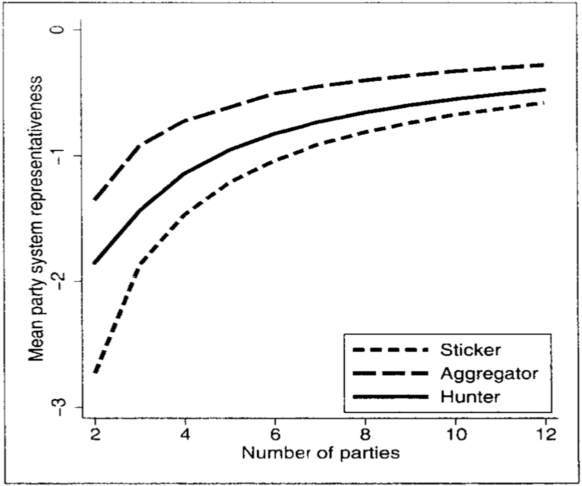

Figure 5.6. Party system representativeness, by decision rule and number of parties in symmetric populations.

Results: Symmetric Voter Populations

Representativeness of the Configuration of Party Positions

- Average closeness of voters' ideal points to the position of their closest party.
- Whatever decision rule party leaders use, representativeness increases with the number of parties in contention. Why?

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- Average closeness of voters' ideal points to the position of their closest party.
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- The more unique party positions there are, the closer any random ideal is likely to be to some party position.

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Representativeness of the Configuration of Party Positions

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- Whatever decision rule party leaders use, representativeness increases with the number of parties in contention. Why?
- The more unique party positions there are, the closer any random ideal is likely to be to some party position.
- For any number of parties, voters are significantly better represented when party leaders use the Aggregator rule than when they use Hunter.
- Importantly, perfectly matches analytic results based on Voronoi geometry.

Results: Symmetric Voter Populations

Representativeness of the Configuration of Party Positions

- Emergence (?): Aggregator parties never seek to increase representativeness of the party system as a whole, only their own party supporters.
- In an all-Aggregator system, the parties evolve to a configuration of policy positions that optimizes representativeness of the system as a whole.
- In a system with all-Hunter parties, the representation will not be optimal.

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- The implication is that policy preferences of the voting population as a whole are not best represented by a set of political parties that compete for voters' support on the basis of trying to find the most popular policy positions.

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- In a system with all-Hunter parties, the representation will not be optimal.
- The implication is that policy preferences of the voting population as a whole are not best represented by a set of political parties that compete for voters' support on the basis of trying to find the most popular policy positions.
- Voters are better served by a set of political parties whose prime concern is to satisfy current supporters rather than search for new supporters.

Results: Asymmetric Voter Populations

Evolved Eccentricities of Party Policy Positions

- Distance (in standard deviations) of a party's policy position from the centroid of voter ideal points.

Results: Asymmetric Voter Populations

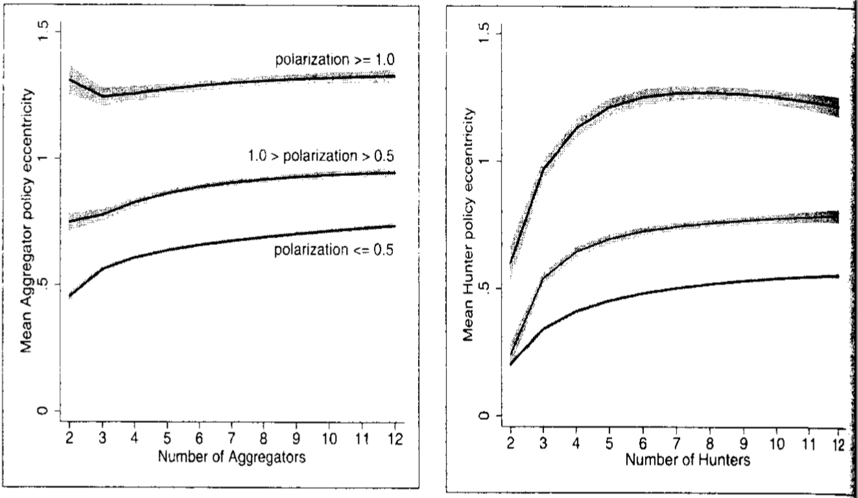

Figure 5.7. Mean party policy eccentricity, by decision rule, number of parties, and subpopulation polarization; asymmetric populations.

Results: Asymmetric Voter Populations

Evolved Eccentricities of Party Policy Positions

- Distance (in standard deviations) of a party's policy position from the centroid of voter ideal points.
- Hunters take more central policy positions than Aggregators (same as symmetric result).
- Party systems with four or more Hunters are very different from those with two or three.
- With four or more Hunter parties in contention, we typically see two or more parties competing for support in each subpopulation.
- As a result, Hunters tend to be punished for moving away from "their" subpopulation toward the center of the space, and thus tend not to do this.

Results: Asymmetric Voter Populations

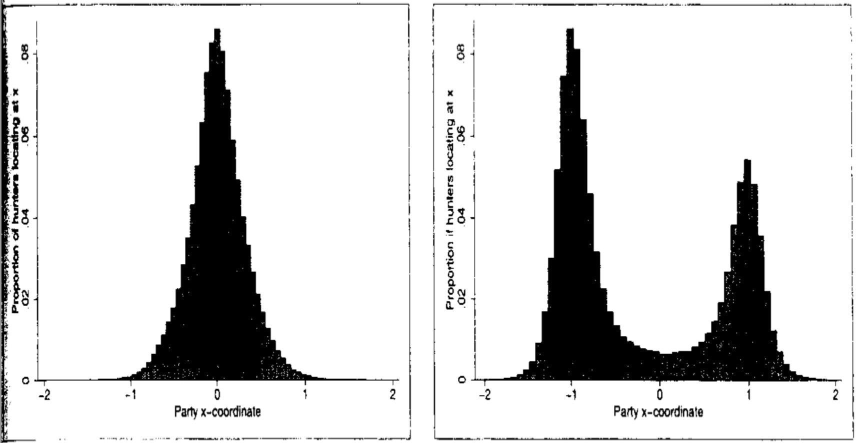

Figure 5.9. Histograms of party x-coordinates, for two- and four-Hunter benchmark runs in asymmetric population.

Results: Asymmetric Voter Populations

Representativeness of the Configuration of Party Positions

- Average closeness of voters' ideal points to the position of their closest party.

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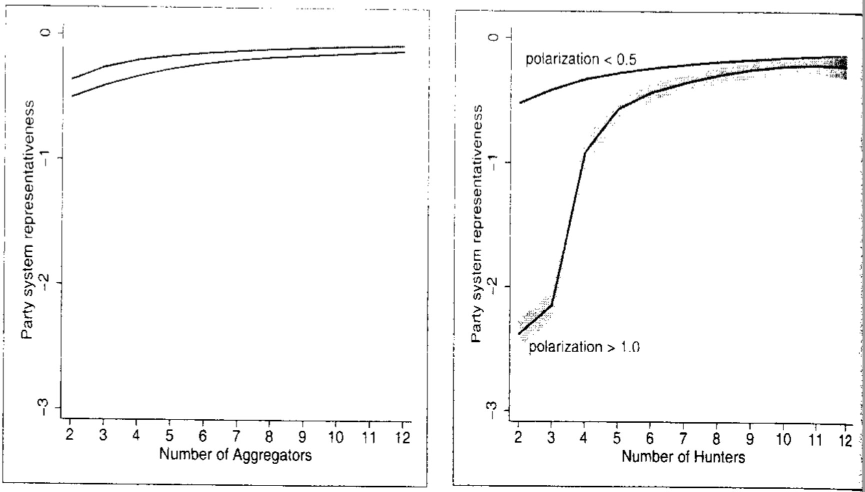

Figure 5.10. Party system representativeness, by decision rule, number of parties, and subpopulation polarization.

Results: Asymmetric Voter Populations

Representativeness of the Configuration of Party Positions

- Average closeness of voters' ideal points to the position of their closest party.
- The representativeness of evolved Hunter policy positions dramatically increase as the number of these vote-seeking parties is 4 or more when subpopulations are highly polarized.
- As the number of parties increases, there is increasingly little difference between the representativeness of all-Aggregator and all-Hunter party systems (in contrast to symmetric voting populations).

Results: Asymmetric Voter Populations

Effective Number of Parties

- Absolute number of parties $\neq$ effective number of parties (ENP), which takes into account relative party sizes.
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- The more the absolute and ENP diverge, the more unequal the party vote shares.
- Results are very similar to symmetric results.

Conclusions

- In symmetric populations, voters are not best represented by a set of (Hunter) parties that compete for their support by trying to find popular policy positions.

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- Voters are better represented by a set of (Aggregator) parties that do not compete with each other on policy but instead seek to represent policy preferences only of their current supporters.
- In asymmetric populations, vote seeking competition between two Hunters results in unrepresentative systems but in systems with four or more Hunters representation is much higher.
- The parties tend to represent one subpopulation or the other and compete for votes with other parties representing the same subpopulation than with parties in the other subpopulation.

Take-Away Points

- Why ABM?
- Building models in pieces.
- Randomly selecting parameter combinations.
- Compare computational results to analytic results.
- Web appendix.
- Replication materials.