Gov 2006: Formal Political Theory II
Section 7

Sophie Hill

April 2, 2019

Today

Citizen candidate model

- Review the model
- Empirical application 1: Chattopadhyay & Duflo (2004)
- Empirical application 2: Großer & Palfrey (2019)

Citizen-candidate model

- Very influential set of models: "a conceptualization of a pure form of representative democracy in which government is *by*, as well as *of*, the people."

Citizen-candidate model

- Very influential set of models: “a conceptualization of a pure form of representative democracy in which government is *by*, as well as *of*, the people.”
- Good stuff:
    - Relaxes assumption of commitment and fixed parties
    - Generates policy divergence, 3+ candidate equilibria possible

Citizen-candidate model

- Very influential set of models: "a conceptualization of a pure form of representative democracy in which government is *by*, as well as *of*, the people."
- Good stuff:
    - Relaxes assumption of commitment and fixed parties
    - Generates policy divergence, 3+ candidate equilibria possible
- However, only one election.

Citizen-candidate model

- Very influential set of models: "a conceptualization of a pure form of representative democracy in which government is *by*, as well as *of*, the people."
- Good stuff:
  - Relaxes assumption of commitment and fixed parties
  - Generates policy divergence, 3+ candidate equilibria possible
- However, only one election.
- Osborne & Slivinski (1996) came first with a simpler model (unidimensional, sincere voting) but Besley & Coate (1997) is more widely-cited. ¯_(ツ)_/¯

Setup: citizens

- N citizens denoted $i \in \mathcal{N} = \{1, ..., N\}$.
- Citizen i, if elected, implements a policy vector $x \in \mathcal{A}^i$, where $\mathcal{A} = \cup_{i=1}^{N} \mathcal{A}^i$.
- i receives utility $V^i(x, j)$ from candidate $j \in \mathcal{N} \cup \{0\}$ implementing $x \in \mathcal{A}$.
- Anyone can choose to run for office, at cost $\delta > 0$
- Only citizens who choose to run for office can be elected

Setup: institutions

- Election decided by plurality vote, with equal probability of each candidate winning where the election is tied: *i.e.* only one candidate elected.
- Voting is costless.
- If no candidate stands, default option $x_0 \in \cap_i \mathcal{A}^i$ is implemented.

Setup: institutions

- Election decided by plurality vote, with equal probability of each candidate winning where the election is tied: *i.e.* only one candidate elected.
- Voting is costless.
- If no candidate stands, default option $x_0 \in \cap_i \mathcal{A}^i$ is implemented.

What does the model assume about commitment?

Setup: institutions

- Election decided by plurality vote, with equal probability of each candidate winning where the election is tied: *i.e.* only one candidate elected.
- Voting is costless.
- If no candidate stands, default option $x_0 \in \cap_i \mathcal{A}^i$ is implemented.

What does the model assume about commitment?

- One-shot election game with full information $=$ no candidate can credibly commit to a policy other than her ideal point in $\mathcal{A}^i$.

Game structure

Timing:

1. All citizens decide whether to stand for office, $s^i \in \{0, 1\}$.
2. All citizens j vote simultaneously by choosing one candidate i from the set of available candidates $\mathcal{C}$, or abstaining: $\alpha_j = i$ or $\alpha_j = 0$.
3. The winning candidate i implements her preferred policy $x_i^* \in \mathcal{A}^i$.

...so a pure strategy for each i is:

$$y^i \equiv (s^i, \alpha^i, x^i) \in \{0, 1\} \times \mathcal{C} \cup \{0\} \times \mathcal{A}^i.$$

Solving backward

Dynamic game of complete information: we look for an SPE by backward induction.

1. Once a citizen is elected, find the **policy implemented**.
2. Given a set of candidates (and knowing their bliss points), find the best **voting choice** for each citizen.
3. Foreseeing what will happen next, citizens decide **whether to run** or not.

Equilibrium: *set of entry decisions* such that each citizen's decision is optimal given decisions of others and expected voting.

Working backwards: (1) Policy implementation

After being elected, i maximizes her own utility by choosing her preferred available policy:

$$x_i^* = \arg\max_x \{V^i(x, i) | x \in \mathcal{A}^i\}.$$

Assume x_i^* is unique.

Every citizen j receives utility $V^j(x_i^*, i) \equiv V_{ji}$ from i's policy choice (or $V^j(x_0, 0) \equiv V_{j0}$ if no candidate was elected).

Working backwards: (2) Voting

Denote the combined vector of votes as $\alpha = (\alpha_1, ..., \alpha_N)$. Candidate i receives $\#\mathcal{N}_i$ votes.

The set of "winning" candidates following α is $W(\mathcal{C}, \alpha)$.

The probability of a winning candidate $i \in W(\mathcal{C}, \alpha)$ winning the election is therefore:

$$P^i(\mathcal{C}, \alpha) = \frac{1}{\#W(\mathcal{C}, \alpha)}.$$

This probability is zero for everyone else.

Working backwards: (1) Decision to stand

Vector of decisions to stand $s = (s^1, ..., s^N)$. This defines the candidate set $\mathcal{C}(s) = \{i | s^i = 1\}$; and thus $\alpha(\mathcal{C}(s))$.

Working backwards: (1) Decision to stand

Vector of decisions to stand $s = (s^1, ..., s^N)$. This defines the candidate set $\mathcal{C}(s) = \{i | s^i = 1\}$; and thus $\alpha(\mathcal{C}(s))$.

In this model, would a citizen ever run for office if they have no chance of winning?

Working backwards: (1) Decision to stand

Vector of decisions to stand $s = (s^1, ..., s^N)$. This defines the candidate set $\mathcal{C}(s) = \{i | s^i = 1\}$; and thus $\alpha(\mathcal{C}(s))$.

> In this model, would a citizen ever run for office if they have no chance of winning?

Yes! Citizens may run in order to win office, but also to prevent someone else from winning to obtain a better outcome (i.e., run as a spoiler).

Working backwards: (1) Decision to stand

Citizen j thus receives expected utility of

$$U^j\Big(s;\alpha(\mathcal{C})\Big) = \sum_{i\in\mathcal{C}(s)} P^i\Big(\mathcal{C}(s),\alpha(\mathcal{C}(s))\Big)V_{ji} + P^0\Big(\mathcal{C}(s)\Big)V_{j0} - \delta s^j,$$

where the terms represent

1. the weighted policy outcome payoff
2. default payoff (if no candidate stands)
3. the cost of running

Voting equilibria

We focus on pure strategy SPNEs. These are defined by:

1. Optimal (strategic) voting α^* such that α_j^* is a best response to α_{-j}^* for all j:

$$\alpha_j^* \in \arg\max_{\alpha_j} \left\{ \sum_{i \in \mathcal{C}(s)} P^i \left(\mathcal{C}(s), \alpha_j, \alpha_{-j}^* \right) V_{ji} \middle| \alpha_j \in \mathcal{C}(s) \cup \{0\} \right\}$$

   and α_j^* is not weakly dominated.

2. Each citizen i chooses s_i^* anticipating $\alpha^*(\mathcal{C}(s_i, s_{-i}^*))$.

Conditions for equilibria

Two central incentives/conditions for standing:

Conditions for equilibria

Two central incentives/conditions for standing:

1. **Participation**: $i \in \mathcal{C}(s)$ must **want** to stand:

$$\sum_{j \in \mathcal{C}(s)} P^j \Big(\mathcal{C}(s), \alpha(\mathcal{C}(s)) \Big) V_{ij} - \delta \geq$$

$$\sum_{j \in \mathcal{C}(s)/\{i\}} P^j \Big(\mathcal{C}(s)/\{i\}, \alpha(\mathcal{C}(s)/\{i\}) \Big) V_{ij} + P^0 \Big(\mathcal{C}(s)/\{i\} \Big) V_{i0}.$$

Conditions for equilibria

Two central incentives/conditions for standing:

1. **Participation**: $i \in \mathcal{C}(s)$ must **want** to stand:

$$\sum_{j \in \mathcal{C}(s)} P^j\Big(\mathcal{C}(s), \alpha(\mathcal{C}(s))\Big) V_{ij} - \delta \geq$$

$$\sum_{j \in \mathcal{C}(s)/\{i\}} P^j\Big(\mathcal{C}(s)/\{i\}, \alpha(\mathcal{C}(s)/\{i\})\Big) V_{ij} + P^0\Big(\mathcal{C}(s)/\{i\}\Big) V_{i0}.$$

2. **Entry proofness**: **no other citizen** $i \notin \mathcal{C}(s)$ wants to become a candidate (to either win or spoil):

$$\sum_{j \in \mathcal{C}(s)} P^j\Big(\mathcal{C}(s), \alpha(\mathcal{C}(s))\Big) V_{ij} + P^0\Big(\mathcal{C}(s)\Big) V_{i0} \geq$$

$$\sum_{j \in \mathcal{C}(s) \cup \{i\}} P^j\Big(\mathcal{C}(s) \cup \{i\}, \alpha(\mathcal{C}(s) \cup \{i\})\Big) V_{ij} - \delta.$$

Sincere partitions

Before (finally) characterizing equilibria, let's define a **sincere partition**. A given partition $\{\mathcal{N}_i\}_{i \in \mathcal{C} \cup \{0\}}$ is sincere iff:

1. $k \in \mathcal{N}_i$ implies $V_{ki} \geq V_{kj}, \forall j \in \mathcal{C}$.
2. $k \in \mathcal{N}_0$ implies $V_{ki} = V_{kj}, \forall i, j \in \mathcal{C}$.

In human words: this divides the electorate among the candidates, so that each k is associated with her preferred candidate j, or the status quo if indifferent between all candidates.

Sincere partitions

Before (finally) characterizing equilibria, let's define a **sincere partition**. A given partition $\{\mathcal{N}_i\}_{i \in \mathcal{C} \cup \{0\}}$ is sincere iff:

1. $k \in \mathcal{N}_i$ implies $V_{ki} \geq V_{kj}, \forall j \in \mathcal{C}$.
2. $k \in \mathcal{N}_0$ implies $V_{ki} = V_{kj}, \forall i, j \in \mathcal{C}$.

In human words: this divides the electorate among the candidates, so that each k is associated with her preferred candidate j, or the status quo if indifferent between all candidates.

Is a sincere partition unique for a given set of voters & candidates?

Sincere partitions

Before (finally) characterizing equilibria, let's define a **sincere partition**. A given partition $\{\mathcal{N}_i\}_{i \in \mathcal{C} \cup \{0\}}$ is sincere iff:

1. $k \in \mathcal{N}_i$ implies $V_{ki} \geq V_{kj}, \forall j \in \mathcal{C}$.
2. $k \in \mathcal{N}_0$ implies $V_{ki} = V_{kj}, \forall i, j \in \mathcal{C}$.

In human words: this divides the electorate among the candidates, so that each k is associated with her preferred candidate j, or the status quo if indifferent between all candidates.

Is a sincere partition unique for a given set of voters & candidates?

No! Since voters may be indifferent, they can be many possible sincere partitions.

One candidate equilibrium

i runs unopposed iff:

1. **Participation**: $V_{ii} - V_{i0} \geq \delta$.
2. **Entry proofness**: for all $k \in \mathcal{N}/\{i\}$ such that $\#\mathcal{N}_k \geq \#\mathcal{N}_i$ for all sincere partitions $(\mathcal{N}_i, \mathcal{N}_k, \mathcal{N}_0)$, we have

$$\frac{1}{2}(V_{kk} - V_{ki}) \leq \delta$$

if there exists a sincere partition such that $\#\mathcal{N}_k = \#\mathcal{N}_i$, and

$$V_{kk} - V_{ki} \leq \delta$$

if $\#\mathcal{N}_k > \#\mathcal{N}_i$.

So, i must want to stand unopposed, and any k who could at least tie finds it too costly.

What does this mean?

δ high: entry proofness easy to satisfy, but participation constraint means that the candidate running is an extremist (relative to the status quo).

What does this mean?

δ high: entry proofness easy to satisfy, but participation constraint means that the candidate running is an extremist (relative to the status quo).

δ low: participation condition easy to satisfy, and entry proofness guaranteed by a centrist candidate attracting a lot of support. As $\delta \to 0$, for i to run unopposed she must be a Condorcet winner.

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why?

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why? Citizens always vote sincerely in a 2-candidate race, so no point in running as a spoiler.

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why? Citizens always vote sincerely in a 2-candidate race, so no point in running as a spoiler.
- When is (2) satisfied?

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why? Citizens always vote sincerely in a 2-candidate race, so no point in running as a spoiler.
- When is (2) satisfied? Distinct candidates or high office rents.

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why? Citizens always vote sincerely in a 2-candidate race, so no point in running as a spoiler.
- When is (2) satisfied? Distinct candidates or high office rents.
- What if a third candidate enters?

Two candidate equilibrium

Only candidates i and j compete iff:

1. Both can win (so are tied): there exists a sincere partition $(\mathcal{N}_i, \mathcal{N}_j, \mathcal{N}_0)$ such that $\#\mathcal{N}_i = \#\mathcal{N}_j$.
2. **Participation**: $\frac{1}{2}(V_{ii} - V_{ij}) \geq \delta$ and $\frac{1}{2}(V_{jj} - V_{ji}) \geq \delta$.
3. **Entry proofness**: $\#\mathcal{N}_0 + 1 < \#\mathcal{N}_i = \#\mathcal{N}_j$.

- In the two candidate equilibrium, both candidates must have a chance of winning. Why? Citizens always vote sincerely in a 2-candidate race, so no point in running as a spoiler.
- When is (2) satisfied? Distinct candidates or high office rents.
- What if a third candidate enters? i's voters would not defect to a third candidate k even if they preferred her, for fear of allowing j to win (and vice versa).

Three or more candidate equilibrium

Take a SPNE $(s^*, \alpha^*(\mathcal{C}(s^*)))$ where $\#\mathcal{C}(s^*) \geq 3$, with associated winning set $\hat{W}(s^*) \geq 2$. Given a sincere voting partition over $\hat{W}(s^*)$, for any winning candidate $i, j \in \hat{W}(s^*)$:

1. All winning candidates tie: $\#\mathcal{N}_i = \#\mathcal{N}_j, \forall i, j \in \hat{W}(s^*)$.
2. Voters (including candidates) prefer the lottery over winners to their next most preferred candidate: for all $i \in \hat{W}(s^*)$,
$$\sum_{j \in \hat{W}(s^*)} \left(\frac{1}{\#\hat{W}(s^*)} \right) V_{\ell j} \geq \max \left\{ V_{\ell j} \middle| j \in \hat{W}(s^*)/\{i\} \right\}, \forall \ell \in \mathcal{N}_i.$$

For every losing candidate $k \in \mathcal{C}(s^*)/\hat{W}(s^*)$:

1. k's candidacy affects outcome: $\hat{W}(\mathcal{C}(s^*)/\{k\}, \alpha(\mathcal{C}(s^*)/\{k\})) \neq \hat{W}(s^*)$.
2. Participation (of k): there exists an $h \in \mathcal{C}(s^*)$ such that:
$$\sum_{i \in \hat{W}(s^*)} \left(\frac{1}{\#\hat{W}(s^*)} \right) V_{ki} - \delta > V_{kh}.$$

Costs and benefits of this approach

Benefits:

1. Realism in terms of entry and commitment.
2. Rationalizes median divergence.
3. Political equilibria directly derived from the primitives: the set of possible policies that are given by the available policy technology, and citizens' preferences over these policies.

Costs:

1. Many equilibria, so hard to make predictions about number of candidates and especially policy outcomes.
2. Some assumptions seem stringent: complete information and a one-shot game.

Chattopadhyay & Duflo (2004)

- Empirical application of the citizen candidate model
- Village councils in India which have authority over local public goods decisions.
- Government mandated that one-third of council heads be women, and randomly allocated which ones were women.
- Key question: how do reservations affect policy equilibria?
    - MVT: political decisions reflect median voter
    - C-C: identity of candidate matters for outcomes
- Find that reservations substantively affect public goods allocation decisions "in ways that seem to better reflect women's preferences"

Setup

- Unidimensional competition: $\mathcal{A}_i = [0, 1], \forall i \in \mathcal{N}$. Default μ'.
- Euclidean preferences, no office motivation: $V^i(x, j) = -|\omega_i - x|$. Denote median by m.
- For women, $\omega_i \in [0, W]$; for men, $\omega_i \in [M, 1]$. And $\delta_M < \delta_W$.
  - Think of this as social costs of candidacy being higher for women.
- Local powers also matter: $x_j = \alpha\omega_j + (1 - \alpha)\mu'$.
  - C&D motivate this as elite capture or lobbying by village assembly.
  - Justifies the assumption that $\mu' > m$.

- Parameters may be such that *no equilibrium* exists where a woman is a candidate without reservations $\rightarrow$ outcome will be greater than M.
- Reservations $\rightarrow$ shift policy outcomes to the left – improves women's utility, often median utility.

Equilibrium with no female candidates

Proposition 1. No women ever runs for office (without a reservation) when:

1. No woman would run unopposed: $\delta_W - \frac{\delta_M}{2} > \mu' - m$.
2. No woman would run against a man: $\delta_W > m - (1 - \alpha)\mu'$.

Proof of Condition 1:

1. Woman runs if $\mu' - x_j \geq \delta_W$.
2. Woman most likely to defeat man is $x_j^W = \mu' - \delta_W$.
3. A man runs against this woman if $x_j^M \geq \delta_M + x_j^W = \delta_M + \mu' - \delta_W$, and wins if $x_j^M - m < m - x_j^W$.
4. Substituting in for x_j^M and x_j^W yields the condition.

Equilibrium with no female candidates

Proposition 1. No women ever runs for office (without a reservation) when:

1. No woman would run unopposed: $\delta_W - \frac{\delta_M}{2} > \mu' - m$.
2. No woman would run against a man: $\delta_W > m - (1 - \alpha)\mu'$.

Proof of Condition 2:

1. Need symmetry around median for a tie.
2. Most extreme woman at 0 would implement $x_j^0 = (1 - \alpha)\mu'$.
3. Therefore largest possible distance is $2(m - x_j^0)$.
4. The most extreme woman would never run if $\frac{1}{2}2(m - x_j^0) > \delta_W$.
5. Substituting in x_j^0 yields the result.

Empirical results

Under these conditions, no woman stands, so policy is male-biased. Reservations help by restricting the set of candidates.

Go on to test whether reservations move policy toward female preferences (defined empirically by types of complaints: women care more about welfare and drinking water, men care more about public works) in West Bengal and Rajasthan.

Comparing reserved to non-reserved, find number of drinking water facilities increased while road quality increased/declined depending on district.

Großer & Palfrey (2019)

- Lab experiment to test some of the core predictions of the citizen candidate model
- Model with incomplete information: citizen ideal points are i.i.d. but each citizen only knows their own with certainty
- In another version, citizens receive ideological "party cues" informing them of the general position of the candidates (left vs right) but not their exact ideal points.

Großer & Palfrey (2019)

Use the model to generate lots of precise testable implications... for example:

- More extreme citizens (vs the median) are more likely to run as candidates
- Entry rates are decreasing in electorate size
- Entry rates are decreasing in cost of running

Lab experiment finds empirical support for all hypotheses!

Großer & Palfrey (2019)

Figure 2: Entry rates per ideal point (data averaged in blocks of ten) – Predictions and data