Politicians

Political Economics: Week 3

Giacomo A. M. Ponzetto

CREI – UPF – Barcelona GSE

22nd and 25th January 2010

Policy-Seeking Candidates

- In addition to, or instead of, deriving an "ego rent" from holding office, a politician could desire to implement certain policies.
- Politician P' utility function is

$$\mathbb{E}W_P = p_P R + \mathbb{E}W\left(q; \alpha_P\right),$$

- p_P is the probability of winning the election and $R \geq 0$ the exogenous ego rent.
- The expectation is taken with respect to the outcome of the election, considering that different winners may implement different policies.
- Why would candidates hold certain preferences (α_P) rather than others?

Downsian Electoral Competition Again

Timeline:

1. *Two* candidates A and B simultaneously and non-cooperatively choose electoral platforms q_A and q_B.
2. An election is held in which *all citizens vote* for either candidate.
3. The winner implements his electoral platform (*binding commitment*).

Probability of winning:

$$p_A(q_A, q_B) = \begin{cases} 0 & \text{if} \quad W(q_A; \alpha_m) < W(q_B; \alpha_m) \\ \frac{1}{2} & \text{if} \quad W(q_A; \alpha_m) = W(q_B; \alpha_m) \\ 1 & \text{if} \quad W(q_A; \alpha_m) > W(q_B; \alpha_m) \end{cases} .$$

Downsian Convergence with Partisan Politicians

Theorem

Suppose that two politicians A and B with $\alpha_A < \alpha_B$ contest an election by announcing a binding policy proposal, and a set of voters $\mathcal{V}$ vote for either party following a weakly dominant strategy, and voting randomly when the two proposals are identical. If a Condorcet winner $q(\alpha_m)$ exists, then

1. *if $R > 0$ or $\alpha_A \leq \alpha_m \leq \alpha_B$ there is a unique equilibrium in which both parties propose $q(\alpha_m)$;*
2. *if $R = 0$ and $\alpha_A \leq \alpha_B < \alpha_m$ there is a unique equilibrium in which both parties propose $q(\alpha_B)$;*
3. *if $R = 0$ and $\alpha_m < \alpha_A \leq \alpha_B$ there is a unique equilibrium in which both parties propose $q(\alpha_A)$.*

Probabilistic Voting with Partisan Politicians

- When an intensive margin exists, candidates' preferences matter.
- There is a marginal trade-off between decreasing the probability of winning and increasing the utility from winning.
- The equilibrium platform lies between the candidate's bliss point and the vote-maximizing policy.
- Our workhorse model of probabilistic voting is not the most convenient for this application, because its analytical tractability becomes limited.
- The convenient model has a median voter whose identity is not perfectly known ex ante.

A Probabilistic Median Voter Model

- One-dimensional policy q with single-peaked preferences or the single-crossing condition.
- For every pair q_A, q_B there is a unique value

$$\bar{\alpha}(q_A, q_B) : W(q_A; \bar{\alpha}) = W(q_B; \bar{\alpha}),$$

  with $\partial\bar{\alpha}/\partial q_A > 0$ and $\partial\bar{\alpha}/\partial q_B > 0$.
- Politicians perceive α_m as a random variable with distribution $F(\alpha_m)$.
- Ex ante, the probability that A wins the election is

$$p_A(q_A, q_B) = \begin{cases} F(\bar{\alpha}(q_A, q_B)) & \text{if} \quad q_A < q_B \\ \frac{1}{2} & \text{if} \quad q_A = q_B \\ 1 - F(\bar{\alpha}(q_A, q_B)) & \text{if} \quad q_A > q_B \end{cases}.$$

Partisan Platforms

- Politician's objectives:

$$
\begin{aligned}
q_A &= \arg\max_q \left\{ p_A \left[W\left(q;\alpha_A\right) - W\left(q_B;\alpha_A\right) \right] \right\} \\
q_B &= \arg\max_q \left\{ \left(1-p_A\right) \left[W\left(q;\alpha_B\right) - W\left(q_A;\alpha_B\right) \right] \right\}.
\end{aligned}
$$

- Equilibrium conditions:

$$
\begin{aligned}
p_A \frac{\partial W}{\partial q}\left(q_A;\alpha_A\right) + \frac{\partial p_A}{\partial q_A}\left[W\left(q_A;\alpha_A\right) - W\left(q_B;\alpha_A\right) \right] &= 0 \\
\left(1-p_A\right) \frac{\partial W}{\partial q}\left(q_B;\alpha_B\right) - \frac{\partial p_A}{\partial q_B}\left[W\left(q_B;\alpha_B\right) - W\left(q_A;\alpha_B\right) \right] &= 0.
\end{aligned}
$$

- Divergence and compromise:

$$
\alpha_A < \alpha_B \Rightarrow q\left(\alpha_A\right) < q_A < q_B < q\left(\alpha_B\right).
$$

No Commitment

- Suppose that politicians have no ability to commit to implement their platforms.
- Politician P will implement $q(\alpha_P)$ if elected.
- In a Downsian contest between two candidates A and B, the former wins if

$$W(q(\alpha_A); \alpha_m) > W(q(\alpha_B); \alpha_m).$$

- This applies to a single election. With repeated elections, parties could develop a reputation that supports at least partial commitment.
- The median voter still has some influence, but α_A and α_B are the main policy determinants. Where do they come from?

Endogenous Candidacy

Timeline:

1. Each citizen can enter the race as a candidate incurring a sunk cost ε.
2. An election is held and each citizen votes costlessly.
3. The candidate with a plurality of the votes wins the election; or each of the candidates in a tie wins with equal probability.
4. The winner implements his preferred policy. If nobody ran, a default $\bar{q}$ obtains.

The election can feature strategic voting (Besley and Coate 1997) or sincere voting (Osborne and Slivinsky 1996).

Strategic Voting

- Each citizen $i \in \mathcal{V}$ has utility $W_i(q) \equiv W(q; \alpha_i)$ and ideal policy $q_i^* = q(\alpha_i)$.
- Each candidate $c \in \mathcal{C} \subset \mathcal{V}$ would enact policy q_c^*.
- Each citizen i chooses a vote $v_i \in \mathcal{C} \cup \{0\}$, with 0 representing abstention.
- The set of winning candidates is $\Omega(v; \mathcal{C}) \subset \mathcal{C}$
- Candidate c's probability of victory is $p_c(v; \mathcal{C}) = 1/\#\Omega(v; \mathcal{C})$ if $c \in \Omega$ and 0 otherwise.
- The voting decisions $v^* = (v_1^*, ..., v_n^*)$ are a *voting equilibrium* given $\mathcal{C}$ if

$$v_i^* \in \arg \max_{v_i \in \mathcal{C} \cup \{0\}} \left\{ \sum_{c \in \mathcal{C}} p_c(v_i, v_{-i}^*; \mathcal{C}) W_i(q_c^*) \right\} \text{ for all } i \in \mathcal{V},$$

and v_i^* is not a weakly dominated strategy.

Candidate Entry

- Suppose that all citizens anticipate a function $v^*(.)$ that maps each set of candidates $\mathcal{C}$ into a voting equilibrium $v^*(\mathcal{C})$.
- Each citizen i makes an entry decision $s_i \in \{0, 1\}$ that determines the candidate set $\mathcal{C}(s) = \{c \in \mathcal{V} : s_c = 1\}$.
- Given expectations $v^*(.)$ and entry decision s, each citizen i has expected utility

$$\mathbb{E}W_i(s; v^*(.)) = \\ = \sum_{c \in \mathcal{C}(s)} p_c(v^*(\mathcal{C}(s)); \mathcal{C}(s)) W_i(q_c^*) + \mathbf{1}_{\varnothing}(\mathcal{C}(s)) W_i(\bar{q}) - \varepsilon s_i.$$

- The entry decisions $s^* = (s_1^*, ..., s_n^*)$ are an *equilibrium of the entry game* given $v^*(.)$ if

$$s_i^* \in \arg \max_{s_i \in \{0,1\}} \{\mathbb{E}W_i(s_i, s_{-i}^*; v^*(.))\} \text{ for all } i \in \mathcal{V}.$$

Citizen-Candidate Equilibrium

Definition

A pure-strategy *political equilibrium* is a vector of entry decisions s^* and voting behaviour $v^*(.)$ such that:

1. s^* is an equilibrium of the entry game given $v^*(.)$;
2. $v^*(\mathcal{C})$ is a voting equilibrium for all candidate sets $\mathcal{C}$.

- Strategic voting: citizens do not simply vote for their preferred candidate, but choose the best response to other voters' choices.
- Multiple equilibria: there are typically multiple voting equilibria for a candidate set $\mathcal{C}$ with $\#\mathcal{C} \geq 3$; $v^*(.)$ picks one for each $\mathcal{C}$, and s^* is supported by beliefs off the equilibrium path $(v^*(\mathcal{C})$ for $\mathcal{C} \neq \mathcal{C}(s))$. There are multiple entry decisions that can be supported this way.
- A political equilibrium always exists if mixed strategies in the entry game are allowed.

Sincere Partitions

Definition

Given a candidate set $\mathcal{C}$, a partition of the electorate $(N_c)_{c \in \mathcal{C} \cup \{0\}}$ is *sincere* if and only if

1. $i \in N_c$ implies that $W_i(q_c^*) \geq W_i(q_k^*)$ for all $k \in \mathcal{C}$;
2. $i \in N_0$ implies that $W_i(q_c^*) = W_i(q_k^*)$ for all $c, k \in \mathcal{C}$.

- The partition divides the electorates among the candidates so that every voter is associated with his preferred candidate, as if he voted sincerely.
- Multiple partitions if and only if some voters are indifferent between candidates.

One-Candidate Equilibria

Theorem

A political equilibrium in which citizen c runs unopposed exists if and only if:

1. $W_c(q_c^*) - W_c(\bar{q}) \geq \varepsilon$;
2. *for all* $k \in \mathcal{V} \setminus \{c\}$ *such that* $\#N_k \geq \#N_c$ *for all sincere partitions* (N_c, N_k, N_0), *then* $\frac{1}{2}[W_k(q_k^*) - W_k(q_c^*)] \leq \varepsilon$ *if there exists a sincere partition such that* $\#N_c = \#N_k$ *and* $W_k(q_k^*) - W_k(q_c^*) \leq \varepsilon$ *otherwise.*

- The unique candidate must be willing to run unopposed.
- No citizen who can defeat him in a two-candidate contest wants to.
- Having ruled out weakly dominated strategies, all citizens vote sincerely in two-candidate elections.

Condorcet Winners and One-Candidate Equilibria

Theorem

For sufficiently small ε:

1. *if a political equilibrium exists in which citizen c runs unopposed, then q_c^* must be a Condorcet winner in the set of alternatives $\{q_i^* : i \in \mathcal{V}\}$;*
2. *if q_c^* is a Condorcet winner in the set of alternatives $\{q_i^* : i \in \mathcal{V}\}$ and $q_c^* \neq 0$, then a political equilibrium exists in which citizen c runs unopposed.*

- The citizen-candidate model nests the median-voter model.
- The Condorcet requirement is weaker because a feasible policy need not be preferred by any voter.
- A unilateral deviation would lead to entry by a single other candidate, who would be defeated.

Two-Candidate Equilibria

Theorem

Suppose that a political equilibrium exists in which citizens c and k run against each other. Then:

1. *there exists a sincere partition (N_c, N_k, N_0) such that $\#N_c = \#N_k$;*
2. $\frac{1}{2}\left[W_c\left(q_c^*\right) - W_c\left(q_k^*\right)\right] \geq \varepsilon$ *and* $\frac{1}{2}\left[W_k\left(q_k^*\right) - W_k\left(q_c^*\right)\right] \geq \varepsilon$.

If $\#N_0 + 1 < \#N_c = \#N_k$ when $N_0 = \{i \in V : W_i\left(q_c^*\right) = W_i\left(q_k^*\right)\}$, then these conditions are sufficient for existence of such a political equilibrium.

- Sincere partitions matter because citizens vote sincerely in two-candidate elections.
- The two candidates must be tied, and willing to run nonetheless.
- A third candidate will not enter if there is a voting equilibrium in which he certainly loses.

Ruling Out Third-Candidate Entry

- When $N_0 = \{i \in V : W_i(q_c^*) = W_i(q_k^*)\}$, $\#N_c$ voters strictly prefer c to k and $\#N_k$ strictly prefer k to c.
- Then if $\#N_0 + 1 < \#N_c = \#N_k$ there is a voting behaviour $v^*(.)$ such that $\#N_c$ and $\#N_k$ do not change if any third candidate t is added to the race.
- For $\mathcal{C} = \{c, k, t\}$, $v^*(\mathcal{C})$ gives t no more than $\#N_0$ votes.
- If a voter $i \in N_c$ unilaterally switched to voting for t, his vote would make c lose but would not suffice to let t tie k. Hence the unilateral deviation is strictly detrimental to the voter.
- The belief $v^*(.)$ off the equilibrium path deters all candidates other than c and k from entering.
- Sincere voting makes two-candidate equilibria harder to support, and eliminates the most extreme.

More Than Two Candidates

Theorem

Let $\{s^*, v^*(.)\}$ be a political equilibrium in which $\#\mathcal{C}(s^*) \geq 3$ and the set of winning candidates is Ω with $\#\Omega \geq 2$. There must exist a sincere partition of Ω such that

1. $\#N_c = \#N_k$ *for all* $c, k \in \Omega$;
2. *for all* $c \in \Omega$, $\sum_{k \in \Omega} \frac{1}{\#\Omega} W_i(q_k^*) \geq \max_{k \in \Omega \setminus \{c\}} W_i(q_k^*)$ *for all* $i \in N_c$.

In a tied multi-candidate election, each voter is decisive within the set of winners Ω:

1. he must be voting sincerely within Ω, though not necessarily within $\mathcal{C}$;
2. he must prefer the ensuing tie to the certain victory of his second-favourite winner.

Spoilers

- Equilibria with $\#\Omega \geq 3$ can be typically ruled out.
- If $\mathcal{V}$ is large and heterogeneous, there is going to be somebody who has only a small preference for his favourite winner over his second-best alternative in Ω. The second condition then fails.
- Equilibria with $\#\mathcal{C}(s^*) \geq 3$ cannot usually be ruled out.
- Candidates strategically enter as "spoilers": they run to lose, because they want to change other candidates' performance in the election.

This underlines the general problem of the citizen-candidate model: multiple equilibria.

- It is hard to generate clear testable prediction for empirical work.
- It is arbitrary to pick only one equilibrium to use as a building block for a broader theoretical model.

Rent Extraction

- Among the policies a politician might like to implement are some that directly favour him and his associates at the public's expense.
- The government budget constraint is $\tau y = g + r$.
  - $\tau \in [0, 1]$ is the tax rate on national income y;
  - $g \geq 0$ denotes expenditure on public goods;
  - $r \geq 0$ denotes rents appropriated by the politician.
- Politician P' utility function is $\mathbb{E}W_P = p_P (R + \gamma r)$.
  - $p_P \in [0, 1]$ is the endogenous probability of winning the election;
  - $R \geq 0$ is the exogenous ego rent;
  - $\gamma \in [0, 1]$ is an inverse measure of the transaction cost associated with rent extraction.
- Citizen i's utility function is $W(q; \alpha_i) = \alpha_i (1 - \tau) y + H(g)$
  - α_i is the citizen's income relative to the mean;
  - $H(g)$ is a concave benefit function.

Downsian Efficiency

- Voters are assumed to have intermediate preferences, so a Condorcet winner exist.
- The median voter's ideal policy is

$$g_m^* = H'^{-1}(\alpha_m) \text{ and } r^* = 0.$$

- Under the assumptions of the Downsian model

$$p_A = \begin{cases} 0 & \text{if} \quad W(q_A; \alpha_m) < W(q_B; \alpha_m) \\ \frac{1}{2} & \text{if} \quad W(q_A; \alpha_m) = W(q_B; \alpha_m) \\ 1 & \text{if} \quad W(q_A; \alpha_m) > W(q_B; \alpha_m) \end{cases} .$$

- Both parties converge on g_m^* and $r^* = 0$.
- The outcome is Pareto optimal for voters.

Probabilistic Voting and Rent-Seeking

1. Voters are identically motivated by ideology: $\phi_j = \phi$ for all j.
2. Voters are homogeneously informed: $\theta_j^P = \theta$ for all j and P.
3. There is no lobbying activity.

- Utilitarian social welfare is

$$W(g, r) = \sum_{j=1}^{J} \lambda_j W(g, r; \alpha_j).$$

- A wins the election with probability

$$p_A = F\begin{pmatrix} \theta\left[W(g_A, r_A) - W(g_B, r_B)\right] \\ +(1-\theta)\left[W(\bar{g}_A, \bar{r}_A) - W(\bar{g}_B, \bar{r}_B)\right] \end{pmatrix},$$

where $F(.)$ is the distribution of the aggregate shock to relative popularity.

Independent Policy Dimensions

- Public goods are efficiently provided:

$$\frac{\partial \mathbb{E} W_P}{\partial g_P} = (R + \gamma r_P) \frac{\partial p_P}{\partial g_P} = 0 \Leftrightarrow \frac{\partial W}{\partial g_P} = H'(g_P) - 1 = 0.$$

- Inefficiency of g is determined only by asymmetry across voters, and not by candidates' rent-seeking.
- If voters are motivated by ideology we should expect positive rent extraction:

$$\frac{\partial \mathbb{E} W_P}{\partial r_P} = (R + \gamma r_P) \frac{\partial p_P}{\partial r_P} + \gamma p_P.$$

- The standard trade-off between a lower probability of winning and a higher value of victory.

Ideological Voters and Rent-Extraction

- Assume that the density $f(\delta)$ is log-concave.
  - Then both $F(\delta)$ and $1-F(\delta)$ are log-concave.
  - This is often useful; here it guarantees second-order conditions.
  - Many common distributions (N, U, ...) have log-concave density.
- A rational expectations equilibrium is given by $g_A = g_B = g^*$ and

$$\begin{cases} \gamma F(r_B - r_A) - \theta (R + \gamma r_A) f(r_B - r_A) = 0 \\ \gamma [1 - F(r_B - r_A)] - \theta (R + \gamma r_B) f(r_B - r_A) = 0 \end{cases}.$$

- If f is log-concave and symmetric around 0 the unique equilibrium is

$$r_A = r_B = \frac{1}{2\theta f(0)} - \frac{R}{\gamma}.$$

- Rent extraction decreases with transparency (θ), electoral competition ($f(0)$), transaction costs ($1/\gamma$), and the candidates' pure taste for holding office (R).

Policy Platforms as Contracts

Stochastic cost of providing public goods:

- Two states of the world: $S \in \{G, B\}$.
- Government budget constraint: $\tau y = C(g; S) + r$.
- Social optimum is $r^* = 0$ and g_S^*, τ_S^* with $g_G^* > g_B^*$ and $\tau_G^* < \tau_B^*$.

Enforceable and verifiable promises:

- A benevolent judiciary observes r or θ
- Commitment is possible because a politician who reneges on his policy promises is severely punished.
- Downsian electoral competition achieves the social optimum.

Imperfect Contract Enforcement

Enforceable but non-verifiable promises:

- The benevolent judiciary does not observe r nor θ.
- No commitment to state-contingent policies.
- Downsian electoral competition merely achieves $g_S = g_B^*$ and $\tau_S = \tau_B^*$ independent of S.
- In state G the politician pockets $r_G = \tau_B^* y - C\left(g_B^*; G\right) > 0$ by hiding behind state B.

Non-enforceable promises:

- No commitment at all.
- Unbounded rent-seeking: the Leviathan.
- $g_S = 0$, $\tau_S = 1$, and $r_S = y$ independent of S.

Re-election as a Commitment Device

- The judiciary may punish outright embezzlement, but it does not enforce campaign promises.
- Voters themselves can provide enforcement in so far as politicians want to be re-elected.
- A standard principal–agent model with an extremely limited binary incentive mechanism.

1. Constraining rent-seeking politicians.

   Explicit incentives from retrospective voting.

2. Identifying the most able politician.

   Implicit incentives from comparison with potential substitutes.

Political Agency with Rent-Seeking

- A stationary infinite-horizon model.
- Voters are identical and have utility

$$w_t = (1 - \tau_t)\, y + H(g_t)\,.$$

- Politicians are identical and derive value

$$v_t = R + \gamma r_t$$

  from holding office and extracting a rent r_t.
- Balanced-budget constraint:

$$\tau_t y = C(g_t; S_t) + r_t.$$

Objective Functions

- The representative voter has welfare

$$W_t = \mathbb{E}_t \sum_{s=0}^{\infty} \beta^s \left[(1 - \tau_{t+s}) \, y + H \left(g_{t+s} \right) \right].$$

- Let $p_t \left(g_t, r_t \right)$ be the probability that the incumbent at time t is re-elected for time $t + 1$.
- The incumbent politician has the value function

$$V_t = \max_{g_t, r_t} \left\{ R + \gamma r_t + \beta p_t \left(g_t, r_t \right) \mathbb{E}_t V_{t+1} \right\}.$$

- Incumbency is valuable because it entails the power to choose g_t, r_t:

$$V_t \geq R + \gamma y.$$

Voting Strategy

- The state S_t and therefore the policy choices g_t, r_t are observable.
- Voters can coordinate on a retrospective voting strategy.
- The representative voter (principal) can devise a mechanism that induces the politician (agent) to adopt a specific policy $\bar{g}_t, \bar{r}_t$ conditional on S_t and potentially on all past history.
- Voting strategy:

$$p_t\left(g_t, r_t\right) = \begin{cases} 1 & \text{if } g_t = \bar{g}_t \text{ and } r_t \leq \bar{r}_t \\ 0 & \text{otherwise} \end{cases} .$$

- The mechanism must be sustainable considering the politician's outside option of extracting rent y for one period and then being dismissed:

$$\mathbb{E}_t \sum_{s=0}^{\infty} \beta^s \left(R + \gamma \bar{r}_{t+s}\right) \geq R + \gamma y \text{ for all } t.$$

The Optimal Sustainable Mechanism

- The best retrospective voting strategy the voters can coordinate on solves

$$\max \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[y + H\left(\bar{g}_t\right) - C\left(\bar{g}_t ; S_t\right) - \bar{r}_t \right]$$

subject to

$$\mathbb{E}_t \sum_{s=0}^{\infty} \beta^s \bar{r}_{t+s} \geq y - \frac{\beta}{1-\beta} \frac{R}{\gamma} \text{ for all } t$$

- The optimal strategy is stationary: $\bar{g}\left(S_t\right)$ and $\bar{r}\left(S_t\right)$ independent of the period t and of the history up to t.
  - Stationary strategies would not be optimal in a more general model: e.g., with politically induced distortions to capital accumulation.
- Voters prefer coordinating on the same voting strategy at time 0 and at all future periods $t > 0$.
  - Generally true with an infinite horizon and exponential discounting.
  - Coordination on any voting strategy is not microfounded anyway.

Incumbency Rents

- Sustainability requires an incumbency rent:

$$\bar{r} = \max\left\{0, (1-\beta)\, y - \beta \frac{R}{\gamma}\right\}.$$

- The best sustainable mechanisms provides public goods optimally:

$$\bar{g}(S) \text{ such that } H'(\bar{g}) = \frac{\partial C}{\partial \bar{g}}(\bar{g}; S),$$

  assuming that $y - \bar{r}$ always suffices to defray the required expenditure.
- Rent extraction decreases with transaction costs $(1/\gamma)$, the candidates' taste for holding office (R), and their far-sightedness (β).
- It increases with the ability to extract rents in the absence of retrospective voting (y).

Imperfect Information

- A simplified two-period model.
- Every voter has utility

$$w = (1 - \tau)\, y + H\,(g)\,.$$

- The politician has utility:

$$\mathbb{E}v = \gamma r + pR.$$

p is the endogenous probability of re-election.
$R < \gamma y$ is the exogenous value of re-election.

- Government budget constraint:

$$\tau y = \theta g + r$$

θ is the random cost of providing global public goods.

The Perfect-Information Benchmark

- If θ is observable, then $r = \tau y - \theta g$ is.
- A sustainable mechanism satisfies

$$\gamma r + R \geq \gamma y.$$

- The optimal sustainable mechanism has incumbency rent

$$r^* = y - \frac{R}{\gamma}.$$

- Public goods are provided efficiently:

$$g^*(\theta) \text{ such that } H'(g^*) = \theta,$$

provided that

$$\theta g^*(\theta) \leq \frac{R}{\gamma} \text{ for all } \theta.$$

Mechanism Design with a Continuum of Types

- The voters do not observe θ, but know it has distribution $F(\theta)$ with density $f(\theta) > 0$ on $[\underline{\theta}, \bar{\theta}]$.
- The design of an optimal retrospective voting rule is a classic adverse-selection problem: θ is the agent's private information or "type", even if it not a personal characteristic of the politician.
- The *revelation principle* lets us focus on a mechanism that fixes $g(\theta)$ and $\tau(\theta)$ and elicits truthful reporting of θ.
- The *participation constraint* is

$$r(\theta) = y\tau(\theta) - \theta g(\theta) \geq r^* \text{ for all } \theta.$$

- The *incentive-compatibility constraint* is

$$y\tau(\theta) - \theta g(\theta) \geq y\tau(\theta') - \theta g(\theta') \text{ for all } \theta, \theta'.$$

Monotonicity

- Consider any pair of types θ and θ':

$$\begin{cases} y\tau(\theta) - \theta g(\theta) \geq y\tau(\theta') - \theta g(\theta') \\ y\tau(\theta') - \theta' g(\theta') \geq y\tau(\theta) - \theta' g(\theta) \end{cases}$$

- Thus $g(\theta)$ must be monotone (weakly) decreasing:

$$(\theta - \theta')\left[g(\theta') - g(\theta)\right] \geq 0.$$

- Monotone functions are differentiable almost everywhere:

$$g'(\theta) \leq 0.$$

Local Incentive Compatibility

- Incentive-compatibility requires that

$$\theta = \arg\max_{\zeta} \{ y\tau(\zeta) - \theta g(\zeta) \} \text{ for all } \theta.$$

- The first-order condition is

$$y\tau'(\theta) = \theta g'(\theta) \text{ for all } \theta.$$

- Since this holds as an identity

$$y\tau''(\theta) - \theta g''(\theta) = g'(\theta) \text{ for all } \theta,$$

so the optimization problem is globally convex provided that

$$g'(\theta) \leq 0.$$

Optimization: Part 1

- The implementation problem is

$$\max_{g(\theta),\tau(\theta)} \int_{\underline{\theta}}^{\bar{\theta}} \left[H\left(g\left(\theta\right)\right) - y\tau\left(\theta\right)\right] f\left(\theta\right) d\theta$$

subject to

$$\begin{cases} y\tau'\left(\theta\right) = \theta g'\left(\theta\right) \\ g'\left(\theta\right) \leq 0 \\ r\left(\theta\right) = y\tau\left(\theta\right) - \theta g\left(\theta\right) \geq r^* \end{cases}.$$

- Treating $r\left(\theta\right)$ instead of $\tau\left(\theta\right)$ as the choice variable:

$$\max_{g(\theta),r(\theta)} \int_{\underline{\theta}}^{\bar{\theta}} \left[H\left(g\left(\theta\right)\right) - \theta g\left(\theta\right) - r\left(\theta\right)\right] f\left(\theta\right) d\theta$$

subject to

$$\begin{cases} r'\left(\theta\right) = -g\left(\theta\right) \\ g'\left(\theta\right) \leq 0 \\ r\left(\bar{\theta}\right) = r^* \end{cases}.$$

Optimization: Part 2

- A differential equation and a transversality condition suffice to define

$$r(\theta) = r^* + \int_{\theta}^{\theta^*} g(\zeta)\, d\zeta.$$

- Since r^* is an additive constant, the problem reduces to

$$\max_{g(\theta):g'(\theta)\leq 0} \int_{\underline{\theta}}^{\bar{\theta}} \left[H(g(\theta)) - \theta g(\theta) - \int_{\theta}^{\theta^*} g(\zeta)\, d\zeta \right] f(\theta)\, d\theta.$$

- Integration by parts yields the final rewriting:

$$\max_{g(\theta):g'(\theta)\leq 0} \int_{\underline{\theta}}^{\bar{\theta}} \left\{ H(g(\theta)) - \left[\theta + \frac{F(\theta)}{f(\theta)} \right] g(\theta) \right\} f(\theta)\, d\theta.$$

- A pointwise maximization problem with respect to $g(\theta)$.

Optimal Policy with Imperfect Information

- The optimal mechanism is defined by

$$g^*(\theta) \text{ such that } H'(g(\theta)) = \theta + \frac{F(\theta)}{f(\theta)}$$

provided that this defines a monotone (weakly) decreasing function.

- A sufficient condition is log-concavity of $F(\theta)$, which is commonly assumed. Or else there would be some pooling.
- Public goods are efficiently provided in the best case $\underline{\theta}$
- There is almost surely inefficient underprovision of public goods
  - Public goods are efficiently provided only in the best case $\underline{\theta}$.
- The politician almost surely earns a greater rent than under perfect information.
  - The politician is held to the minimum rent r^* only in the worst case $\bar{\theta}$.

Heterogeneous Voter Preferences

- Another source of rents for the politician is the ability to "divide and conquer" voters (Ferejohn 1986).
- There are N voters, each of whom could be the representative of a homogeneous group.
- Voter j wants the politician to provide a specific service w_j.
- Providing services is costly to the politician, whose utility is

$$\mathbb{E}v = pR - \psi\left(\sum_{j=1}^{N} w_j\right).$$

- $\psi(.)$ is a well-behaved increasing and convex cost function.

Common Agency

- If $N = 1$ the representative voter has all the bargaining power. He can demand
$$w_1 = \psi^{-1}(R)$$
to re-elect the politician, internalizing the entire the rent R
- If $N > 1$, the politician only needs a majority to be re-elected.
- Thus he provides services only to the less demanding voters.
- By the logic of Bertrand competition, in equilibrium
$$w_j = 0 \text{ for all } j.$$
- Nonetheless it is an equilibrium to re-elect the politician and let him internalize the entire rent R.

Career Concerns

- With homogeneous politicians, the voters are always indifferent at the time of voting.
- This allows credible commitment to any voting strategy, but it relies on arbitrary coordination and runs counter to common-sense intuition about politics.
- If politicians differ in quality and policy outcomes are informative about their abilities, retrospective voting has an entirely different meaning.
- Politicians try to signal through their actions that they have desirable qualities, whether they actually do or not.
- Voters learn about the incumbent's characteristics from the outcomes of his term in office, and re-elect him if and only if he is inferred to be better than the challenger.

Politicians with Heterogeneous Ability

- Each voter's utility coincides with the supply of public goods g_t.
- In a simplified two-period model, the incumbent's utility is

$$\mathbb{E}v = R + r_1 + \beta p \left(R + r_2 \right),$$

where $\beta \in [0, 1]$ is a discount factor.

- Politicians have varying ability

$$\eta \sim U \left[1 - \frac{1}{2\xi}, 1 + \frac{1}{2\xi} \right].$$

- Provision of public goods equals

$$g_t = \eta \left(\tau - r_t \right),$$

which allows two interpretations:

1. τ denotes public funds to be allocated, and r_t a pecuniary rent.
2. τ denotes time and effort, and r_t measures slacking.

Symmetric Information

- Neither the voters nor the politician initially know η.

1. The incumbent chooses r_1.
2. The incumbent's ability η is realized and the value of g_1 is observed.
3. The incumbent contests an election against a challenger whose ability is drawn randomly from the same distribution.
4. The elected politician chooses r_2.

- The model has only two periods, so there are no incentives for a politician to serve his constituents in the second period.

Final Period

- In the second period, any politician extracts the maximum possible rent
$$r_2 = \bar{r} < \tau$$
and provides public goods
$$g_2 = \eta\left(\tau - \bar{r}\right).$$
- An untested challenger is expected to provide
$$\mathbb{E}\left(g_2 | P_2\right) = \left(\tau - \bar{r}\right)\mathbb{E}\eta_2.$$
- The incumbent is expected to provide
$$\mathbb{E}\left(g_2 | P_1\right) = \left(\tau - \bar{r}\right)\mathbb{E}\left(\eta_1 | g_1\right).$$
- The probability of re-election is
$$p\left(g_1\right) = \begin{cases} 1 & \text{if } \mathbb{E}\left(\eta_1 | g_1\right) \geq \mathbb{E}\eta_2 \\ 0 & \text{if } \mathbb{E}\left(\eta_1 | g_1\right) < \mathbb{E}\eta_2 \end{cases}.$$

Expected Probability of Re-election

- Suppose the voters believe that the politician extracts $\tilde{r}_1$.
- Then when observing g_1 they infer with certainty

$$\eta_1 = \frac{g_1}{\tau - \tilde{r}_1}.$$

- Recalling that $\mathbb{E}\eta_2 = 1$, the incumbent is re-elected if and only if

$$g_1 \geq \tau - \tilde{r}_1.$$

- The incumbent's ignorance of η makes him uncertain about re-election.

$$\mathbb{E}p\left(g_1\right) = \Pr\left(\eta \geq \frac{\tau - \tilde{r}_1}{\tau - r_1}\right) = \frac{1}{2} + \xi - \xi\frac{\tau - \tilde{r}_1}{\tau - r_1}$$

Rational Expectations Equilibrium

- By reducing rent extraction in the first period, the politician increases the likelihood that the voters will consider him sufficiently talented to deserve re-election.
- Given beliefs $\tilde{r}_1$, the optimal rent extraction is

$$\begin{aligned} r_1\left(\tilde{r}_1\right) &= \arg\max_{r\in[0,\hat{r}]} \left\{ R + r + \beta\left(R+\bar{r}\right)\left(\frac{1}{2} + \xi - \xi\frac{\tau - \tilde{r}_1}{\tau - r_1}\right)\right\} \\ &= \tau - \sqrt{\beta\left(R+\bar{r}\right)\xi\left(\tau - \tilde{r}_1\right)}. \end{aligned}$$

- A rational expectations equilibrium is the fixed point

$$r_1\left(\tilde{r}_1\right) = \tilde{r}_1 = \tau - \beta\left(R+\bar{r}\right)\xi.$$

- Rational expectations imply that nobody is fooled: in equilibrium $p = \frac{1}{2}$.

Asymmetric Information

- If the politician knows his type ex ante, the problem becomes one of *signalling*.
- Consider two types of politician: good and bad.

1. Good politicians may try to signal quality by taking actions that bad politicians are not capable of mimicking profitably.
2. Bad politicians may try to pool with good ones to get a chance to be re-elected.

- Models can easily become rather complicated.
- Signalling games typically have multiple perfect Bayesian equilibria.
- Within the same equilibrium type, multiple PBEs can be supported by arbitrary beliefs off the equilibrium path.
- There are various equilibrium refinements that impose further conditions on beliefs.

The Term-Limit Effect

- A politician that cannot be re-elected has no incentive to signal his ability.
- Empirical analysis based on state governors in the U.S.
- Panel data with state and year fixed-effect, and a dummy for binding term limits.

1. State-government spending is higher when the term limit binds.
2. State taxes on personal and corporate income are higher.

- In general, politicians may or may not perform best when they are trying to signal.
  - Signalling can discipline the choices of rent-seeking politicians.
  - Signalling can distort the choices of welfare-maximizing politicians.