Voting and Lobbying - 3 Models

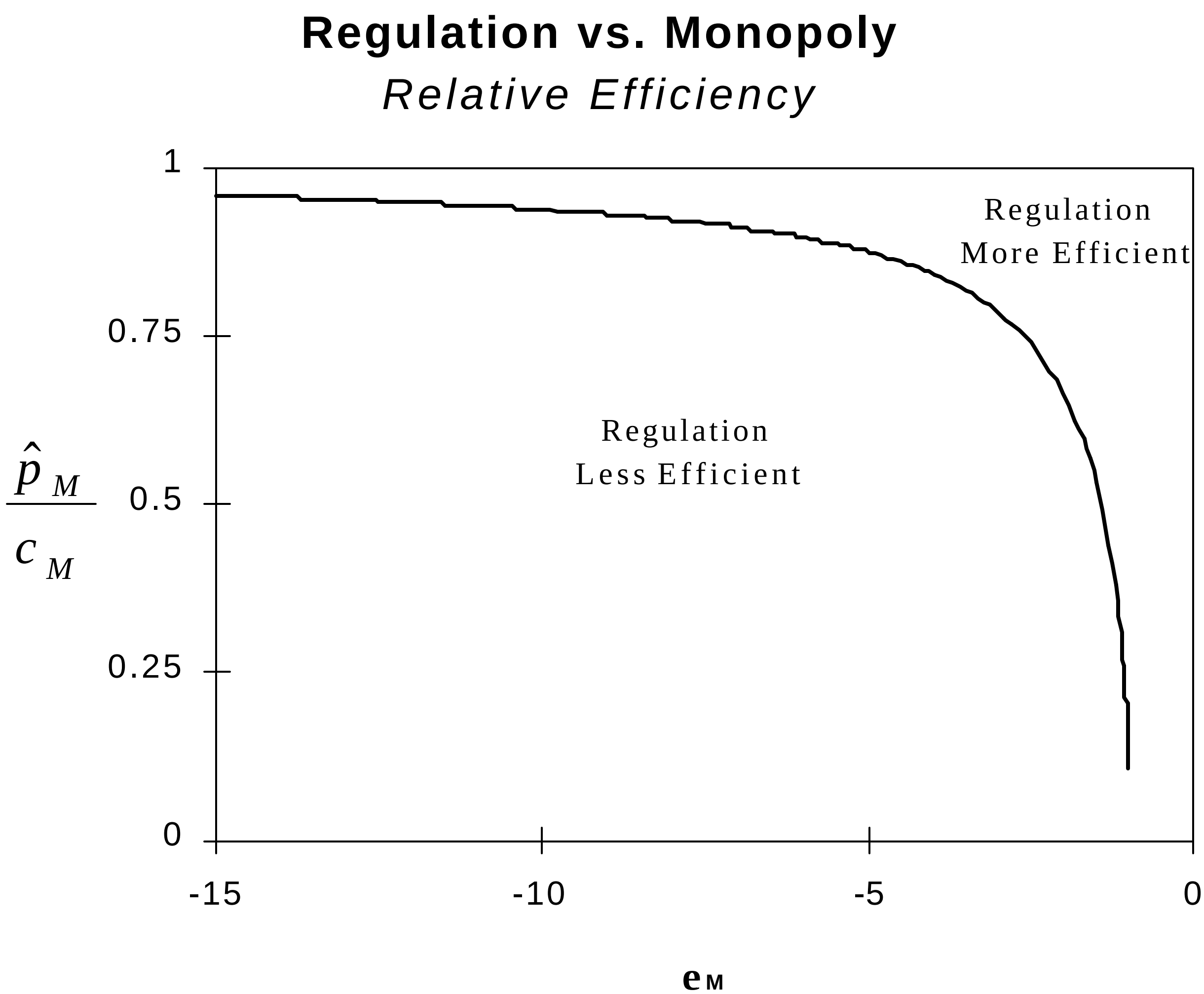
- Series of 3 papers exploring the effects of political actions on market outcomes.
- Current theories of regulation unsatisfying (to me!):
  - *Toulouse School:* Agency Model regulators seeking economic efficiency must deal with information asymmetry.
    - Great mathematics, poor politics. Do real regulators actually care about economic efficiency? *I don't think so!*
  - *Chicago School:* Vote-seeking politicians, rent-seeking firms; demand and supply of regulation
    - Great politics, but no general model. An appealingly jaundiced view of regulators' and firms' behavior, but no unifying analytic engine that brings it together.
- These papers are my attempt to fix the problem

“Voting on Prices…”

- Voters $q \in [0,1]$ have heterogeneous preferences for 2 monopoly services
- 2 candidates run for election for regulator on platform of prices
- Regulation “perfect”: platforms always implemented at no cost; everything is common knowledge
- Prices maximize utility of median voter (Downs, 1957)
- Compare aggregate surplus of median voter prices to unregulated monopoly prices:
- Result: median voter prices can be less efficient than monopoly prices.
- US telecoms data 1960-93 fits model amazingly well!

“Voting on Prices…” - X1

Constant elasticity, linear costs, median voter consumes only one service (M).



“Lobbying and Voting...”

- In the first paper, the voter/consumer is king; non-voting firms have no effect on electoral outcome
- Gary Becker (1983): elections driven by number of votes, markets by number of dollars. Permitting economic (non-voting) agents to have voice via lobbying can make electoral outcomes more efficient.
- Richard Posner (1975) points out that rent-seeking uses resources, which can outweigh any efficiency gains.
- Second paper: build lobbying into voting model, assess which effect predominates.

“Lobbying and Voting...”

- Two firms also consume monopoly services; opposing interests in outcome
- Each can spend resources to affect outcome
- “Get out the vote”; firms spend to increase probability voters vote
  - “Micro-targeting”: send messages to some voters but not all
  - Result: only spend on voters favorable to your cause (specialization)
- Simulation results
  - Posner effect (resource cost of rent-seeking) outweighs Becker effect (greater efficiency of outcome) by a lot
  - Firms spend lots of resources to little effect; they largely offset one another
  - Prisoners’ Dilemma Game (like advertising)

Information and Disinformation

- Today's paper (done at IAE): generalize lobbying
- "Get out the vote" one type of lobbying; how about "Change voters' minds"?
- What does it mean to "change people's minds"?
  - Change their preferences? *A No-no!*
  - Change what they know about candidates? *Yes*
- Candidate announces policy platform; voters perceive actual policy implemented to be a random variable with known distribution.
- This distribution can be modified, at a cost. How would lobbyists behave?

Probabilistic Voting

- Introducing uncertainty into voting models changes the game
  - Coughlin (1992): candidate uncertainty about voters' preferences
  - Alvarez (1997): voter uncertainty about candidates, but no equilibrium model. Primarily empirical: what do voters really knowabout candidates?
  - Early work by Shepsle (1972); unavailable
- Basic results on voting when candidates are random variables need to be established. What's the equilibrium?
  - When candidates choose platforms but not distributions
  - When candidates choose both platforms and distributions (costlessly)
  - When distributions are costly to adjust (lobbying potential)

Probabilistic Voting - The Basics

- Voters θ have heterogeneous preferences over policies $p \in [0,1]$: $V_\theta(p)$ single-peaked
- Candidates A and B announce policy platforms $p_A, p_B \in [0,1]$
- Voters perceive *platform uncertainty*; distribution F_{p_X} with support $[p_X\text{-}\boldsymbol{D},, p_X + \boldsymbol{D}]$, with mean p_X.
  - platforms and distributions common knowledge; *default* distributions identical for both candidates (up to the mean).
- Voters vote for candidate that maximizes expected utility: $\overline{V}_q(f_{p_X}) = \int_{p_X-\Delta}^{p_X+\Delta} V_q(p) f_{p_X}(p)dp$
- Shape of $V_\theta(p)$? Most political science literature *assumes* concave over policies.
  - OK if policies are income-redistributive.
  - But what of more general policies?
  - I assume local concavity only!

The Basics (cont'd)

- *Proposition 1: if* (C) $\equiv \{V_\theta$ *is concave on* $[p_\theta - 2D, p_\theta + 2D]\}$, *then* $\overline{V}_q(f_{p_X})$ *is single-peaked in* p_X *for any distribution.*
  - Single-peak V_θ does <u>not</u> imply single-peak $\overline{V}_q(f_{p_X})$
- *Proposition 2: if (C), then the unique pure strategy equilibrium with endogenous mean and exogenous F is* $p_A = p_B = \overline{p}_{\hat{q}}(f_{\overline{p}})$, *median voter's* $(\hat{q})$ *policy peak of expected utility under F.*
  - follows from Downs + Prop. 1
- But what about endogenous choice of distribution? What if candidates can choose both the platform and the distribution without cost?

But First, A Little Infrastructure...

- Definitions:
  - degenerate distribution at p_X: $$D_{p_X}(p) = \begin{cases} 0 & p < p_X \\ 1 & p \geq p_X \end{cases}$$
  - Bernoulli distribution: at $p_0 < ½ < p_1$ $$B_{p_0, p_1}(p) = \begin{cases} 0 & p < p_0 \\ ½ & p_0 \leq p < p_1 \\ 1 & p_1 \leq p \end{cases}$$
  - the set of all distributions on $[p_X\text{-}D,,p_X+D]$ with mean p_X $\equiv \mathcal{F}_{p_X}$
- *Lemma:If* V_θ *is* $\left\{\begin{matrix} \text{concave} \\ \text{convex} \end{matrix}\right\}$ *on* $[p_X\text{-}2D,p_X+2D]$ *then*

$$\arg\max_{F \in \mathcal{F}_{p_X}} \int_{p_X-\Delta}^{p_X+\Delta} V_q(p) f(p) dp = \left\{\begin{matrix} D_{p_X} \\ B_{p_X-\Delta, p_X+\Delta} \end{matrix}\right\}$$

  - this defines the most certain and the least certain distributions; the first is obvious, the second not

Endogenous Distributions

- *Proposition 3: If V_θ is concave, then the unique pure strategy equilibrium is $p_A=p_B=p_{\hat{q}}$ and $F_{p_X} = D_{p(\hat{q})}$, the certain outcome.*
  - Concavity + median voter competition eliminates all uncertainty, and the classic median voter theorem obtains.
- Definitions:
  $\Theta_{XL}(p)=\{\theta|V'_\theta<0, V''>0 \text{ on } [p-2\Delta, p+2\Delta]\}$
  $\Theta_{XR}(p)=\{\theta|V'_\theta>0, V''>0 \text{ on } [p-2\Delta, p+2\Delta]\}$
  $\Theta_{NR}(p)=\{\theta|V'_\theta>0, \sim V''>0 \text{ on } [p-2\Delta, p+2\Delta]\}$
  $\Theta_{NL}(p)=\{\theta|V'_\theta<0, \sim V''>0 \text{ on } [p-2\Delta, p+2\Delta]\}$
- *Proposition 4: If $|\Theta_{XR}|>|\Theta_{NL}|$ or $|\Theta_{XL}|>|\Theta_{NR}|$, then the unique equilibrium is $p_A=p_B= \overline{p}_{\hat{q}}(B_{\overline{p}_{\hat{q}}-\Delta, \overline{p}_{\hat{q}}+\Delta})$ and $F_{p_x} = B_{\overline{p}_{\hat{q}}-\Delta, \overline{p}_{\hat{q}}+\Delta}$, the most uncertain outcome.*

Why More Uncertainty?

- The Proposition's condition states that A has more convex voters voting for B (who prefer uncertainty) than non-convex voters voting for A (who may not prefer uncertainty), so it pays to defect to the Bernoulli from any other distribution.
- But does convexity make sense? Yes, if the voter believes strongly in her ideal point, and perceives everything else quite poorly.
  - Nature lover vs. environmentalists
  - "Ideological" voters
  - Economists
- *But we now focus on concave preferences*

Impact of Uncertainty on Platforms

- *Proposition 5: The equilibrium strategy* $p_X = \bar{p}_{\hat{q}}(f_{\bar{p}}) \lesseqgtr p_q$ *as* $V''' \lesseqgtr 0$ *on* $[p_X - \Delta, p_X + \Delta]$
  - V_θ''' measures the asymmetry of V_θ around its peak $p(\hat{q})$. If $V_\theta'''<0$, there is more "mass" to the left of the peak; $V_\theta'''>0$, more mass to the right; and $V_\theta'''=0$, symmetry.
- How does the equilibrium strategy behave as uncertainty is changed?
  - Cannot well-order distributions by uncertainty. But a partial order exists: 2nd order stochastic dominance ($\succ_2$)
- *Proposition 6: For any family* $F_{p_X}^{(z)}$ *, with* $z \in [0,1]$*, and* $z_1 > z_2$ *iff* $f_{p_X}^{(z_1)} \succ_2 f_{p_X}^{(z_2)}$,

  then $\frac{dp_X}{dz} \gtrless 0$ as $V_q''' \lesseqgtr 0$
  - Equilibrium monotonic in uncertainty

Costly Distribution Changes

- Changing voter perceptions of candidate platform uncertainty likely to be costly
  - extra campaign time
  - media expenditures to convince voters of the candidate's position
  - encouraging endorsements from others
  - spelling out detailed plans to implement policies
  - commissioning books, articles and television specials to document either the staunchness or the flexibility of the candidate, etc.
- Who pays? We assume 2 groups with a stake in the outcome: a low-p group (L) and high-p group (H), with linear utilities in p: $b_H > 0 > b_L$.

Lobbying Game

- What's the interest (in the distribution) of the interest groups?
  - If $V_\theta''' < 0$, $\overline{p}_{\hat{q}}(f_{\overline{p}}) < p(\hat{q})$, then group H has incentive to reduce uncertainty (provide *information*) to move the equilibrium to a higher *p*; group L has incentive to increase uncertainty (provide *disinformation*) to move the equilibrium to a lower *p*.
- Groups lobby ($\equiv$ spend resources) to increase/decrease uncertainty for candidates A and/or B: $x_L^A, x_L^B, x_H^A, x_H^B$
  - Assume the feasible distributions can be ordered by 2nd-order dominance: $F_{p_X}^{(z)}$ $z \in [0,1]$; with $z_1 > z_2$ iff $f_{p_X}^{(z_1)} \succ_2 f_{p_X}^{(z_2)}$ and $F^{(0)} = B$ $F^{(1)} = D$ $F_{p_X}^{(½)} =$ default distribution
  - Payoff function $Z(x_H^Y, x_L^Y)$, with $Z_1 > 0$, $Z_2 < 0$, $Z_{ii} < 0$, symmetric, same for both candidates.
  - *Z* is the distribution for this candidate that results from the joint expenditures. $Z(0,0) = ½$.

Lobbying Game

- Groups play a lobbying game with strategies...
- Candidates announce platforms...
- Voters vote…
- …in a one-shot game
- Questions:
  - What do equilibria look like?
  - If voters like certainty, can an increase in uncertainty be an equilibrium?
  - Becker vs. Posner: are equilibrium resource expenditures commensurate with changes in the distributions(s)?

Equilibrium Conditions - X3

$$\max_{x_H^a, x_H^B} a_H + b_H \bar{p}_{\hat{q}}\left(F_{\bar{p}}^{(\max(z_A, z_B))}\right) - x_H^A - x_H^B$$

$$\max_{x_L^a, x_L^B} a_L + b_L \bar{p}_{\hat{q}}\left(F_{\bar{p}}^{(\max(z_A, z_B))}\right) - x_L^A - x_L^B$$

First-order conditions:

$$\frac{\partial \mathrm{L}}{\partial x_L^Y} = b_L \frac{d\bar{p}}{dz} \frac{d(\max(z_A, z_B))}{dz_Y} \frac{\partial Z(x_H^Y, x_L^Y)}{\partial x_L} \leq 1, \; x_L^Y \frac{\partial \mathrm{L}}{\partial x_L^Y} = 0, \; Y = A, B$$

$$\frac{\partial \mathrm{L}}{\partial x_H^Y} = b_H \frac{d\bar{p}}{dz} \frac{d(\max(z_A, z_B))}{dz_Y} \frac{\partial Z(x_H^Y, x_L^Y)}{\partial x_H} \leq 1, \; x_H^Y \frac{\partial \mathrm{L}}{\partial x_H^Y} = 0, \; Y = A, B$$

The inequalities result from the max function in the maximands. Under some circumstances, the groups lobby only one candidate, with zero expenditures for the other.

Three Types of Equilibria

- $z_A = z_B < ½$. Occurs is L is more effective at lobbying ($b_H < -b_L$, or $Z_1 < -Z_2$). Both A's and B's distribution must be changed, or the unchanged candidate wins.
- $z_A = z_B > ½$. Occurs if H is more effective than L ($b_H > -b_L$, or $Z_1 > -Z_2$).
  – Both A and B have positive marginal returns to lobbying
- $z_A > z_B = ½$. Occurs if H is much more effective at lobbying.
  – Only A's distribution is changed, and A wins the election.
  – z_B is too far from z_A; marginal benefit of spending on B is zero.
  – She chooses the median voter max as that is a dominant strategy against all inferior distributions
  – Can co-exist with $z_A = z_B > ½$.

Conclusions

- Groups can spend on both candidates, but will not necessarily do so.
- One group supplies disinformation, one supplies information.
- If group L is more effective, then there is more uncertainty with lobbying than without.
- Consider the case in which both groups are equally effective (b_H=-b_L, Z_1=-Z_2). Then they spend the same amount on each candidate and the distributions are unchanged from the default.
  – Resource expenditure, no effect! Posner trumps Becker…again.