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 $\theta \in [0,1]$ 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).

Regulation vs. Monopoly

Relative Efficiency

\[
\frac{\hat{p}_M}{c_M}
\]

\[\varepsilon_M\]

Regulation More Efficient

Regulation Less Efficient
“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 know about 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 $\theta$ 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 $[p_x-\Delta, p_x+\Delta]$, 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: $\overline{V}_\theta(f_{p_x}) = \int_{p_x-\Delta}^{p_x+\Delta} V_\theta(p) f_{p_x}(p)\,dp$
- 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) \( \equiv \{ V_\theta \text{ is concave on } [p_\theta - 2\Delta, p_\theta + 2\Delta] \} \), then \( \bar{V}_\theta(f_{p_X}) \) is single-peaked in \( p_X \) for any distribution.
  
  – Single-peak \( V_\theta \) does not imply single-peak \( \bar{V}_\theta(f_{p_X}) \)

• Proposition 2: if (C), then the unique pure strategy equilibrium with endogenous mean and exogenous \( F \) is \( p_A = p_B = \bar{p}_\theta(f_{\bar{p}}) \), median voter’s (\( \hat{\theta} \)) 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:
    $$B_{p_o, p_1}(p) = \begin{cases} 
    0 & p < p_0 \\
    \frac{1}{2} & p_0 \leq p < p_1 \\
    1 & p_1 \leq p 
    \end{cases}$$

    at $p_0 < \frac{1}{2} < p_1$

  – the set of all distributions on $[p_x-\Delta, p_x+\Delta]$ with mean $p_x$
    $$\equiv F_{p_x}$$

• Lemma: If $V_\theta$ is \(\left\{\text{concave} \right\}$ on $[p_x-2\Delta, p_x+2\Delta]$ then

  $$\arg \max_{F \in F_{p_x}} \int_{p_x-\Delta}^{p_x+\Delta} V_\theta(p)f(p)dp = \begin{cases} 
    D_{p_x} & \\
    B_{p_x-\Delta, p_x+\Delta} 
    \end{cases}$$

  – this defines the most certain and the least certain distributions; the first is obvious, the second not
Endogenous Distributions

- **Proposition 3:** If $V_\theta$ is concave, then the unique pure strategy equilibrium is $p_A = p_B = p_\hat{\theta}$ and $F_{p_x} = D_{p(\hat{\theta})}$, 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 $p_A = p_B = \bar{p}_\hat{\theta}(B_{\bar{\theta} - \Delta, \bar{\theta} + \Delta})$ and $F_{p_x} = B_{\bar{\theta} - \Delta, \bar{\theta} + \Delta}$, 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

\[ p_X = \bar{p}_\theta (f_{\bar{p}}) \leq p_\theta \text{ as } V''' \leq 0 \text{ on } [p_X - \Delta, p_X + \Delta] \]

- \( V''' \) measures the asymmetry of \( V_\theta \) around its peak \( p(\hat{\theta}) \). If \( V''' < 0 \), there is more “mass” to the left of the peak; \( V''' > 0 \), more mass to the right; and \( V''' = 0 \), 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 (\( \succcurlyeq_2 \))

• **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

\[ \frac{dp_X}{dz} \leq 0 \text{ as } V''' \leq 0 \]

- 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 $V_\theta''<0$, $\bar{p}_\theta (f_{\bar{p}}) < p(\hat{\theta})$, 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 (≡ spend resources) to increase/decrease uncertainty for candidates A and/or B: $x^A_L, x^B_L, x^A_H, x^B_H$
  – Assume the feasible distributions can be ordered by 2nd-order dominance: $F^{(z)}_{p_x} \in [0,1]$; with $z_1 > z_2$ iff $f_{p_x}^{(z_1)} > f_{p_x}^{(z_2)}$ and $F^{(0)} = B, F^{(1)} = D$
  – Payoff function $Z(x^H_L, x^Y_L)$, 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. $Z(0,0)=\frac{1}{2}$. 
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

\[
\begin{align*}
\max_{x_H^a, x_H^b} & \quad a_H + b_H \, \underline{p_\theta} \left( F_{\frac{\max}{\bar{p}}}(\max(z_A, z_B)) \right) - x_H^A - x_H^B \\
\max_{x_L^a, x_L^b} & \quad a_L + b_L \, \underline{p_\theta} \left( F_{\frac{\max}{\bar{p}}}(\max(z_A, z_B)) \right) - x_L^A - x_L^B
\end{align*}
\]

First-order conditions:

\[
\begin{align*}
\frac{\partial L}{\partial x_L^Y} & = b_L \frac{dp}{dz} \frac{d(\max(z_A, z_B))}{dz} \frac{\partial Z(x_H^Y, x_L^Y)}{\partial x_L} \leq 1, \quad x_L^Y \frac{\partial L}{\partial x_L^Y} = 0, \quad Y = A, B \\
\frac{\partial L}{\partial x_H^Y} & = b_H \frac{dp}{dz} \frac{d(\max(z_A, z_B))}{dz} \frac{\partial Z(x_H^Y, x_L^Y)}{\partial x_H} \leq 1, \quad x_H^Y \frac{\partial L}{\partial x_H^Y} = 0, \quad Y = A, B
\end{align*}
\]

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

- $z_A = z_B < \frac{1}{2}$. Occurs if 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.

- $z_A = z_B > \frac{1}{2}$. 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

- $z_A > z_B = \frac{1}{2}$. 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 $z_A = z_B > \frac{1}{2}$.
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.