14.770-Fall 2017
Recitation 9 Notes

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(based on slides by M. Lowe)

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Media Matters

Today:

- IO and Media:
  - Theory: Mullainathan and Shleifer (AER, 2005)
  - Empirics: Gentzkow and Shapiro (QJE, 2011)
  - Cool stuff you can do via text analysis
- Conflict and Media:
  - Yanagizawa-Drott (QJE, 2014)

Mullainathan and Shleifer (AER, 2005)

"The Market For News

A demand-side model of media bias

- Investigate effects of
  - Reader beliefs,
  - Reader heterogeneity, and,
  - Competition (monopoly vs. duopoly)

  on equilibrium media bias.
- Builds on Hotelling model of product placement.

Surprising finding: "With biased readers, competition may even increase media bias."

The Model

- Readers want to learn $t \sim N(0, \nu_t)$
- Belief about t may be biased: $N(b, \nu_t)$
- Newspapers receive data $d = t + \epsilon$ where $\epsilon \sim N(0, \nu_\epsilon)$
- They then report data with slant s so reported news is $n = d + s$

Reader Utility

- Unbiased reader has utility $U_r = \bar{u} - \chi s^2 - P$ where P is price, s is slant
- Biased reader: $U_b = \bar{u} - \chi s^2 - \phi (n - b)^2 - P$
  - $\phi > 0 \Rightarrow$ like to hear confirming news
  - A behavioral assumption, and a driving force

Timing

1. Newspapers announce slanting strategy $s(d)$
2. Newspapers announce price P
3. Readers buy paper if $P < \mathbb{E}_d[U(s(d))]$
4. Paper observes signal d and reports $n = d + s(d)$
5. If individual buys paper, read news and receive utility.

Cases

The cases considered:

- Homogeneous: all readers hold same beliefs b with precision p
- Heterogeneous: distributed uniformly between b_1 and b_2 with $b_1 < b_2, b_2 > 0$
- Monopoly vs. Duopoly

Bias is $\mathbb{E}_d\left[(n-d)^2\right]$ or $\int_i \mathbb{E}_d\left[(n_i-d)^2\right]$ in heterogeneous case

Results: Rational Readers

Just to fix ideas.

Proposition 1: Suppose readers are rational. Then, whether readers are homogeneous or heterogeneous, the monopolist does not slant and charges the same price:

$$s^*_{hom} = s^*_{het} = 0,\ P^*_{hom} = P^*_{het} = \bar{u}$$

In the duopolist case, papers do not slant and once again charge the same price:

$$s^*_{j,hom} = s^*_{j,het} = 0,\ P^*_{j,hom} = P^*_{j,het} = 0$$

The only effect of competition is to lower prices.

Results: Homogeneous Biased Readers with Monopoly

Proposition 2: A monopolist facing a homogeneous audience chooses

$$s^*_{hom}(d) = \frac{\phi}{\chi+\phi}(b-d),\ P^*_{hom} = \bar{u} - \frac{\chi\phi}{\chi+\phi}\left[b^2+\nu_d\right]$$

given a condition on $\bar{u}$ (needs to be large enough otherwise no news read). News reported is then

$$n = \frac{\phi}{\chi+\phi}b + \frac{\chi}{\chi+\phi}d$$

which is a convex combination of bias and data.

Results: Homogeneous Biased Readers with Duopoly

Proposition 3: There is an equilibrium with

$$s^*_{hom}(d) = \frac{\phi}{\chi + \phi}(b - d),\ P^*_{hom} = 0$$

i.e. with a homogeneous audience, competition is Bertrand-like – drives prices to zero, but slant unchanged. **Competition has no effect on slant** in this case.

Results: Heterogeneous Biased Readers

- **Proposition 4:** Monopolist will cover whole market only if reader beliefs are not too dispersed.
- **Proposition 5:** Suppose duopolists choose linear slant strategies. All readers read the newspaper and each duopolist positions himself as far away from the other as possible. Reported news in this case is

$$n_j = d + s^*_{j,het}(d) = \frac{\phi}{\chi + \phi}\frac{3}{2}b_j + \frac{\chi}{\chi + \phi}d_j$$

Duopolists slant towards $\frac{3}{2}b_j$, points that are *more extreme* than the most extreme readers in the population!

- Why? Product differentiation allows them to charge higher prices.

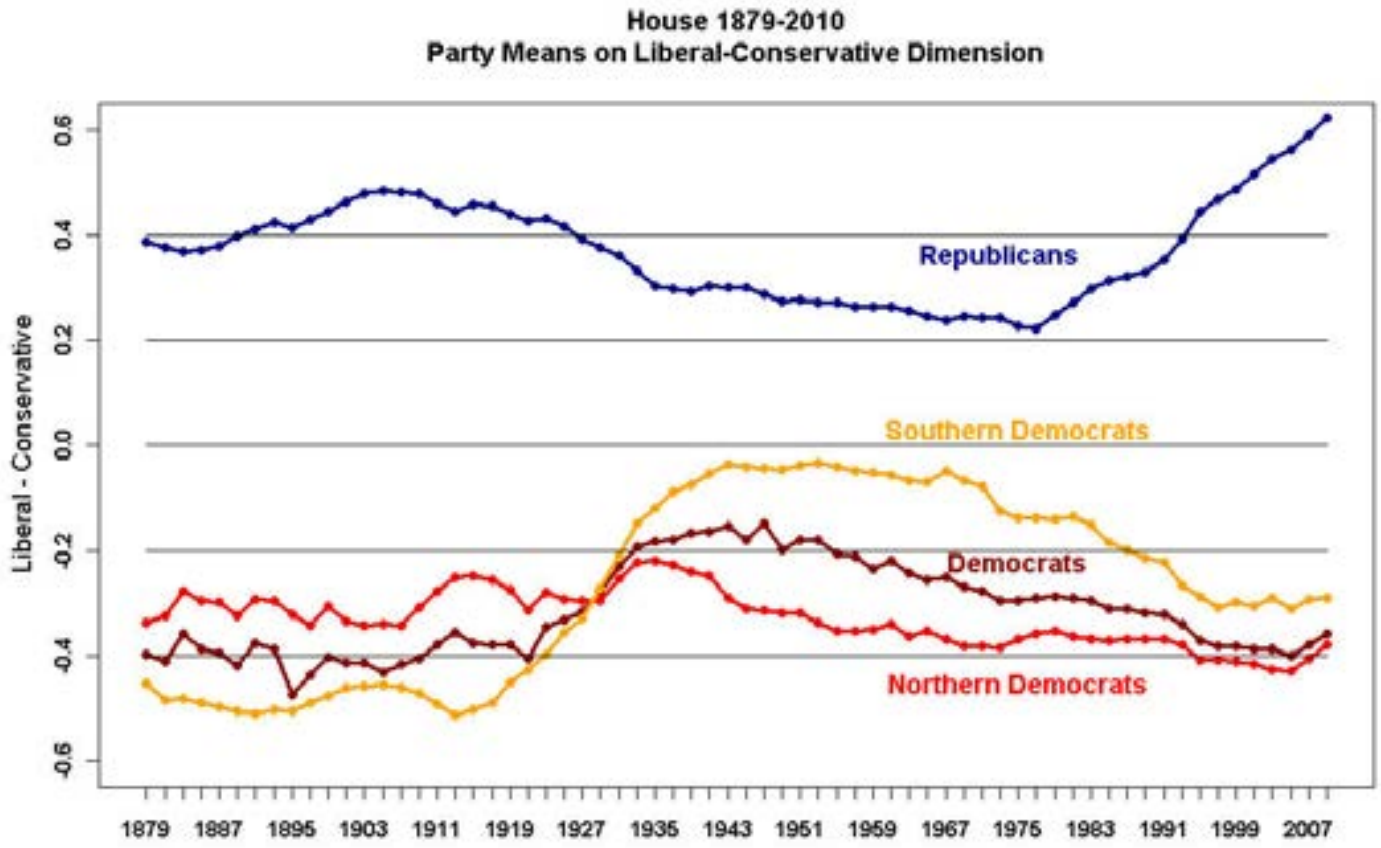
Summary

- Analogous to standard Hotelling result.
  - Monopolist caters to both audiences unless they are too far apart, while duopolists maximally differentiate.
  - But in standard model, constrained to choose within preference distribution. Here, can choose positions outside distribution of reader bias – and in equilibrium choose very extreme positions.
- Key reason: the more differentiated the duopolists, the higher prices can be charged.

Gentzkow and Shapiro (QJE, 2001)

"Idological Segregation Online and Offline"

Big Picture Question: What Drives Political Polarization?



One Story

- Ideological Segregation in Media
  - Media is slanted (as we've seen)
  - Only consume media that confirms prior biases (as we've seen)
  - Prior bias becomes stronger and stronger
- Could be that new media technology leads to more segregation?

Basic Question

Is online news consumption more ideologically segregated than offline?

- Internet reduces cost of acquiring information from multiple sources
- ... but increasing number of sources makes it easier to segregate ideologically
    - So effect is ambiguous.

Measurement

- Measure segregation of an outlet using "isolation index" (taken from racial segregation literature)
- This equals average conservative exposure of conservatives minus average conservative exposure of liberals
  - If everyone reads/visits same newspaper/website, this will be zero
  - If conservatives only visit foxnews.com and liberals only visit nytimes.com this will be 100 p.p.

Measurement: Details

- $m \in M$ media types (e.g. internet) and $j \in J$ outlets (e.g. cnn.com), J_m is set of outlets j in medium m
- $i \in I$ individuals, I_{lib} and I_{cons} are set of liberals and conservatives
- $cons_j$ and lib_j are number of conservative and liberal visits to outlet j (for internet/newspapers etc. can visit multiple outlets)
  - $visits_j = cons_j + lib_j$
- Isolation index is then

$$S_m = \Sigma_{j \in J_m} \left(\frac{cons_j}{cons_m} \cdot \frac{cons_j}{visits_j} \right) - \Sigma_{j \in J_m} \left(\frac{lib_j}{lib_m} \cdot \frac{cons_j}{visits_j} \right)$$

- [First/second] term is visit-weighted average exposure of [conservatives/liberals] ($cons_m$ is number of conservative visits on medium m)

Data

- Use aggregate data for 2009 on website audiences by comScore plus micro-data on browsing for 2004-2008
- Also have offline consumption data of newspapers, TV, magazines
- For face-to-face interactions use data on political views of acquaintances in GSS and National Election Study

Punchline

- Isolation index = 7.5 p.p. for the internet
  - Average conservative's exposure is 60.6%, liberal's is 53.1% (similar to if get all news from cnn.com)
- News consumers with extremely high or low exposure are rare
  - Consumer who gets news only from foxnews has more conservative news diet than 99% of Internet users
- Other isolation indices: broadcast TV news (1.8), cable TV news (3.3), magazines (4.7), local newspapers (4.8), national newspapers (10.4)

More Punchline

- Comparison to social segregation:
  - Individuals matched randomly within counties (5.9)
  - Individuals matched randomly within ZIP codes (9.4)
  - Voluntary associations (14.5) and Work (16.8)
  - Neighbourhoods (18.7) and Family (24.3)
  - Trusted friends (30.3) and political discussants (39.4)
- No evidence that internet is becoming more segregated over time

Why So Little Online Segregation?

- Most online news consumption is concentrated in a small number of relatively centrist sites
- Significant share of consumers get information from multiple sites
  - *Especially* true of visitors to extreme conservative or liberal sites

Yanagizawa-Drott (QJE, 2014)

"Propaganda and Conflict: Evidence from the Rwandan Genocide"

Shifting gears now...

- Can media act as a coordination device?
  - We've covered the Barbera and Jackson (2017) model
  - Here's another approach
- The theoretical model in Yanagizawa-Drott's online appendix
  - We've covered empirics in the "Conflict" lectures
  - The effects on radio broadcasting on violence in Rwanda

Global Games

Technically a global games model

- Really popular among theorists nowadays, probably will be more popular
- A simple, tractable way of analyzing coordination games.
  - General problem with coordination games: multiple equilibria, hard to make predictions
  - Global games: model this situation as an incomplete information game
  - Unique equilibrium, testable predictions
  - Carlson and van Damme (ECMA, 1993), Morris and Shin (AER, 1998)

The Model

- One village, continuum of citizens
- Two ethnic groups: H (size 1) and T (size t)
- An individual in H decides whether to attack or not

$$u = \begin{cases} \theta + \alpha \frac{h}{t} & \text{if attack} \\ 0 & \text{if not} \end{cases}$$

θ: punishment cost, h: no. of people attacking, $\alpha \geq 0$: strategic complementarity

Information and beliefs

There is incomplete info. about θ

- i observes $x_i = \theta + \varepsilon_i$
  - $\varepsilon_i \sim N(0, \sigma_x^2)$
- If access to radio (w.p. r), i also observes $p = \theta + b$
  - $b \sim N(0, \sigma_p^2)$

There is "diffuse prior" on θ (i.e. prior has negligible effect on posterior).
Posterior:

- If only observe x_i,

$$\bar{\theta}_i^N \sim N(x_i, \sigma_x^2)$$

- If observe x_i and p,

$$\bar{\theta}_i^R \sim N(\frac{\sigma_x^2 x_i + \sigma_p^2 p}{\sigma_x^2 + \sigma_p^2}, \frac{\sigma_x^2 \sigma_p^2}{\sigma_x^2 + \sigma_p^2})$$

Media as a public signal

Key assumption: p is **public signal** (access to radio is common knowledge).

- i knows exactly r people have heard the radio, and knows that everybody knows this, etc...

Equilibrium

As in a global games model, unique equilibrium: attack iff

$$\bar{\theta}_i^{\kappa} \geq \kappa^j \quad \text{for } j \in \{N, R\}$$

Because p is a public signal, κ^R depends on r: $\kappa^R(r)$.

- Heuristically, you don't only infer θ from p, but also learn how many people have inferred θ.

Comparative Statics

Here's an intro:

Lemma 1

When the propaganda transmits the signal that violence against the minority group is state-sponsored (i.e., the cost θ is sufficiently low), participation in violence increases in the population with access to the media broadcasts (If $p > -\frac{\alpha}{2t}$, then $\frac{\partial h}{\partial r} > 0$).

Comparative Statics

But more importantly:

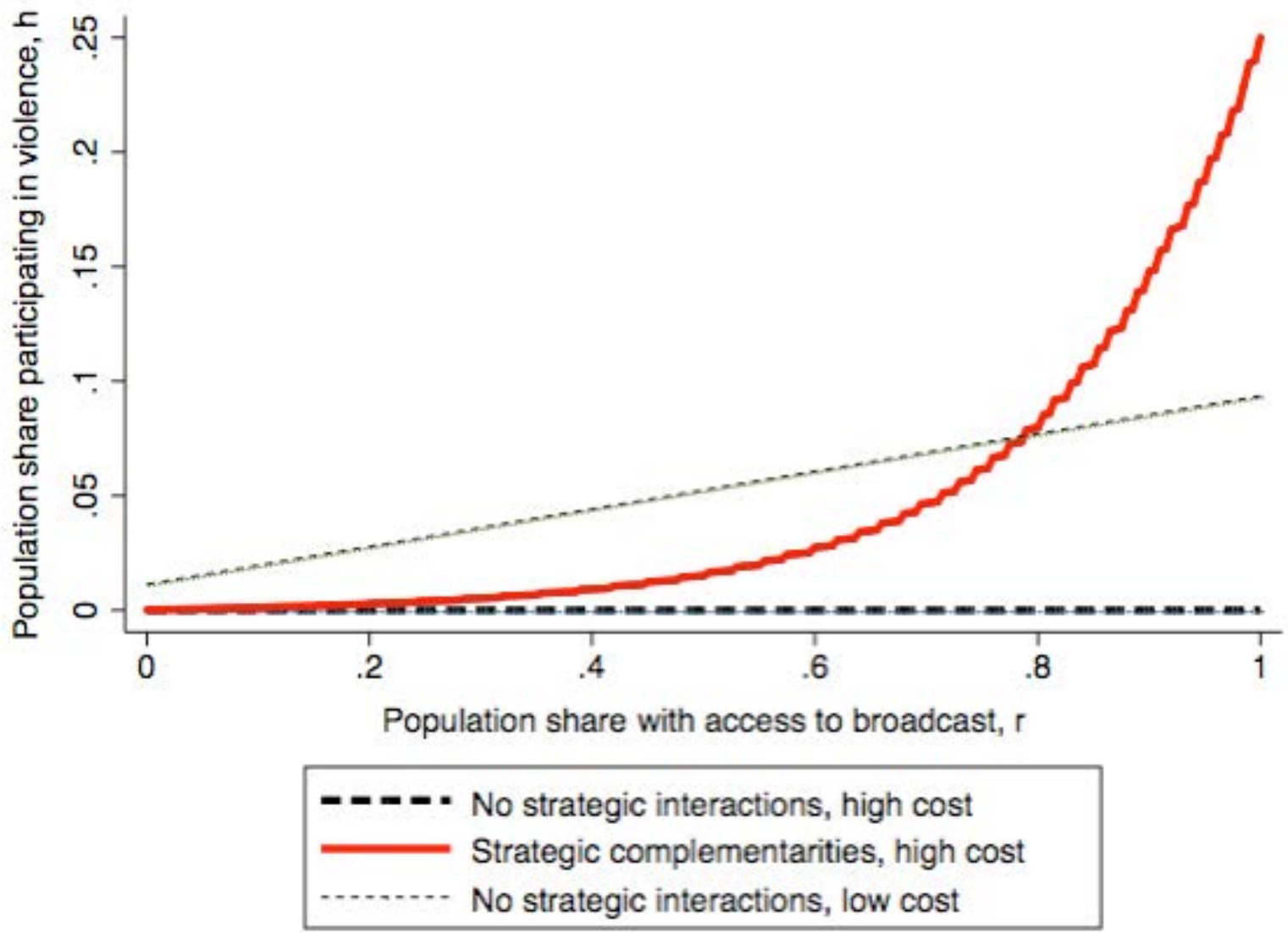
Proposition 1

If the condition in Lemma 1 is satisfied, then there are increasing scale effects for militia violence (h_c), but not individual violence (h_i): $\frac{\partial^2 h_c}{\partial r^2} \geq 0$, $\frac{\partial^2 h_i}{\partial r^2} = 0$, $\frac{\partial h_i}{\partial r} \geq 0$.

Heuristically, radio coordinates facilitation $\Rightarrow$ Second-order effects as well.

Comparative Statics

In a picture:



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