

Targeted Advertising in Elections

by

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Motivation

Targeted Advertising was an important part of winning campaigns in recent U.S. Presidential Elections:

- 2016 Trump: used voter data from Cambridge Analytica
- 2008, 2012 Obama: the first social media campaign
- 2000, 2004 Bush: targeting voters by mail

Can Targeted Advertising Swing Elections?

Approach

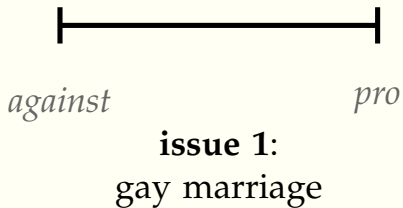
I consider a **communication model**

- ▶ sender: political candidate who **challenges** the status quo
 - privately knows his position on relevant issues
 - sends targeted message about his position to the voters
 - his message must contain a *grain of truth*
- ▶ receivers: voters who expressively vote for the candidate (**incumbent** or **challenger**) whose position is closest to their own

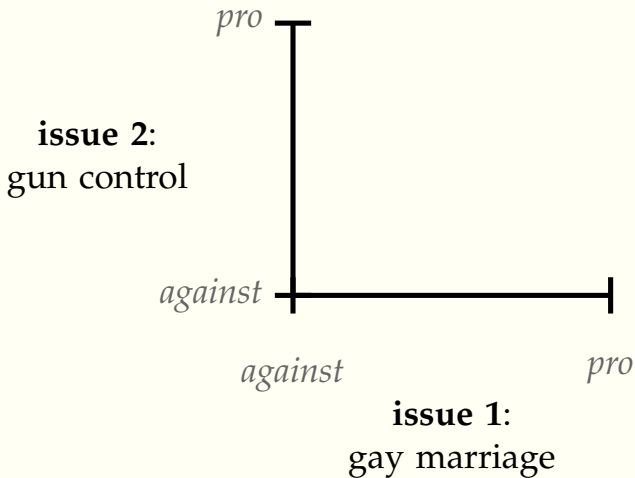
Approach

- ▶ The winner of the election is decided by *majority rule*
- ▶ I compare two cases
 - **Public Disclosure (PD)**: challenger sends the same **public message** to every voter
 - **Targeted Advertising (TA)**: a **private message** is sent to each voter, based on the voter's position

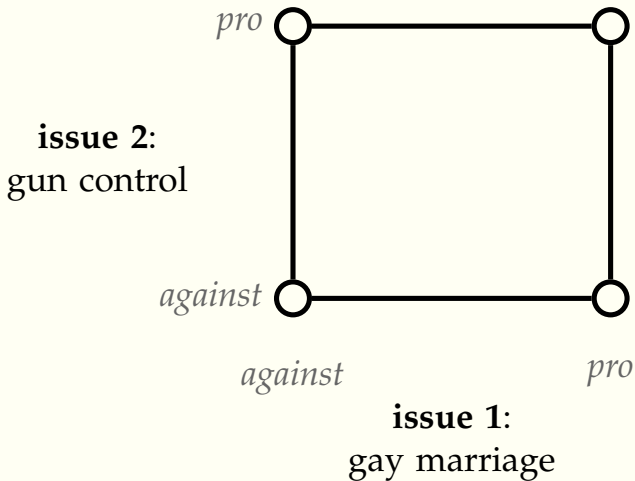
Motivating Example



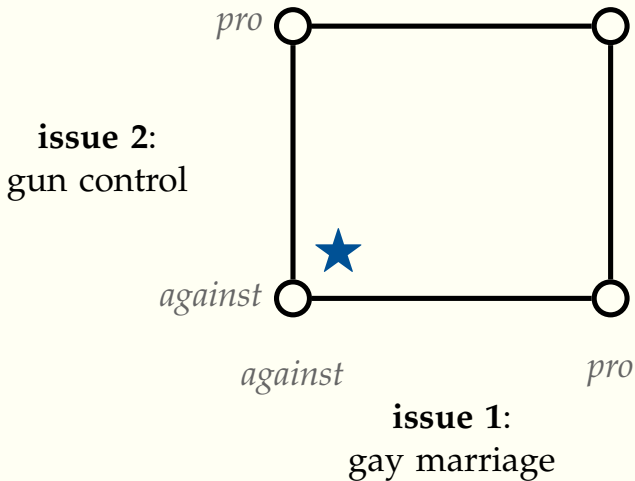
Motivating Example



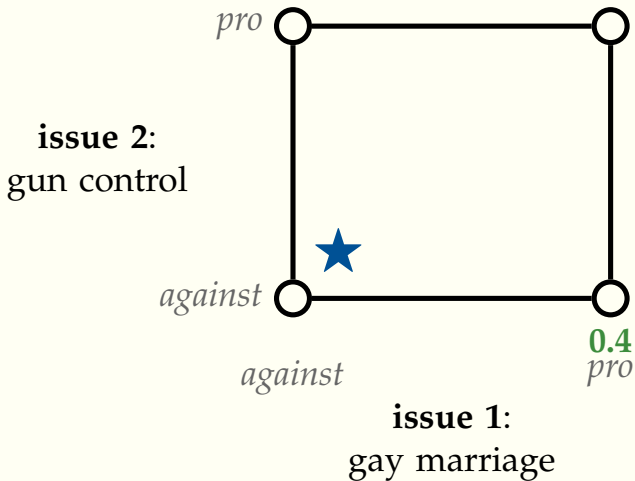
Motivating Example



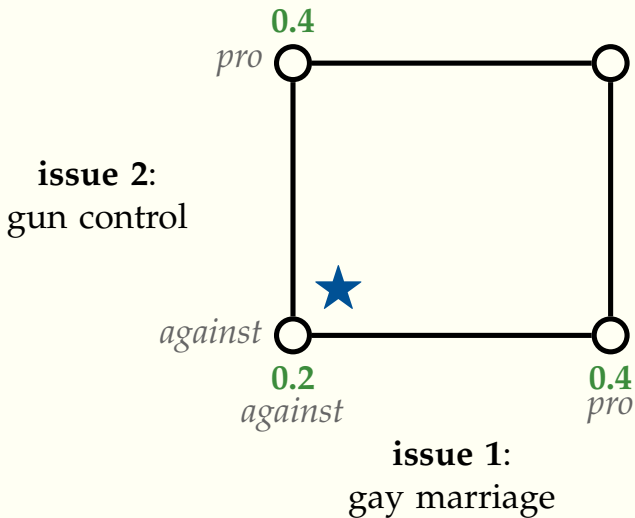
Motivating Example



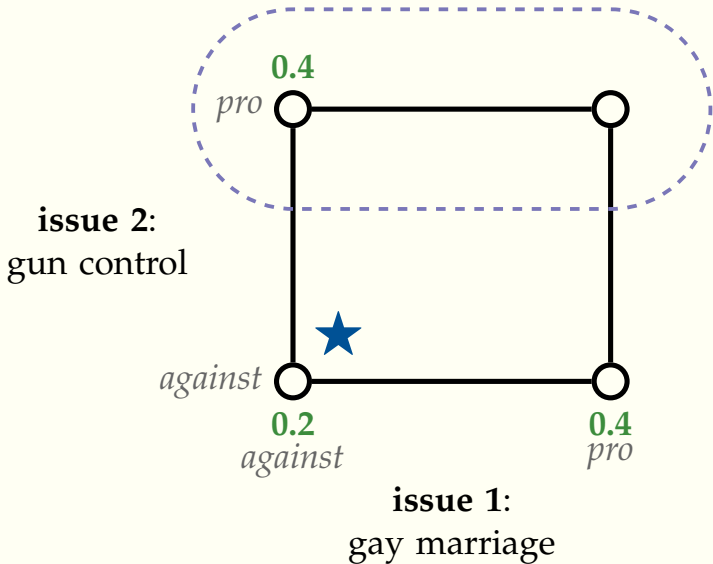
Motivating Example



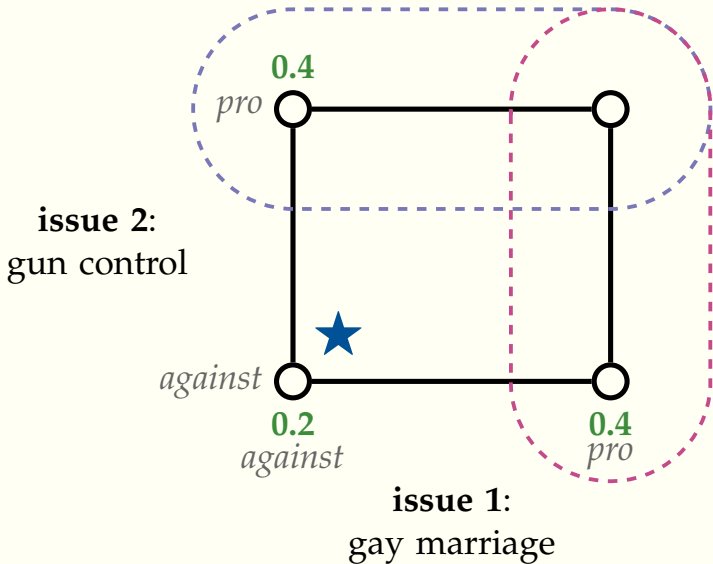
Motivating Example



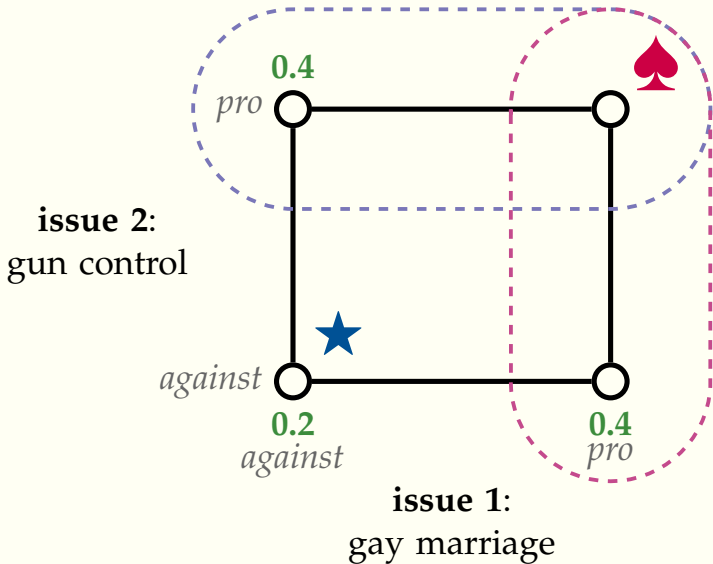
Motivating Example



Motivating Example



Motivating Example



Preview of the Results

- ▶ Under **Public Disclosure**, an election is **unwinnable** for the challenger if and only if it is polarized:
 - no majority of voters agrees on at least one issue
- ▶ Under **Targeted Advertising**, **unwinnable** elections become **winnable**:
 - the challenger only advertises his position on issues that he and the voter agree on

The Model

- ▶ A **communication model**:
 - (one) sender: challenger
 - (multiple) receivers: voters
- ▶ This is **not** a model of **spatial competition**:
 - challenger's position is his private information
 - incumbent's position is known to everyone

Spatial Model: Policy Space

- ▶ The **policy space** is $\Theta \equiv \times_{k=1}^K \{1, \dots, N_k\}$:
 - $\mathbb{K} \equiv \{1, \dots, K\}$ is the set of **issues**:
 - *health care, education, LGBT rights, immigration, race, global warming, gun control, abortion rights, etc*
 - N_k is the number of **positions** on issue $k \in \mathbb{K}$
- ▶ Representative element $\theta = (\theta_1, \dots, \theta_K)$ reflects the **(policy) position** on each of the K issues

Receivers: Expressive Voters

- ▶ Voter v_θ has ideal position (type) $\theta \in \Theta$
 - she votes **expressively** for candidate closest to θ , i.e. challenger is chosen if

$$d(\theta, \theta^{ch}) < d(\theta, \theta^{inc})$$

(ties are broken in favor of the incumbent)

- she measures distance using the **Manhattan metric**:

$$d(\theta, \theta') = \sum_{k=1}^K |\theta_k - \theta'_k|$$

Sender: the Challenger

- ▶ **Simple majority**: challenger gets 1 if he wins the election
- ▶ To convince voter v_θ , challenger sends her message m_θ about his position:
 - **(Grain of Truth)**: each message $m_\theta \in 2^{|\Theta|} \setminus \emptyset$ is
 - truthful: $\theta^{ch} \in m_\theta$
 - not necessarily fully revealing: $m_\theta \subseteq \Theta$

lies of omission but not commission

Analysis

Definition: an **election** is a triple $\mathcal{E} = (\theta^{inc}, g^v(\cdot), p(\cdot))$:

- ▶ θ^{inc} – position of the incumbent
 - ▶ $g^v(\cdot)$ over Θ – distribution of voters' positions
 - ▶ $p(\cdot) > 0$ over Θ – common prior belief about θ^{ch}
-
- ▶ I look for **PBE** that maximize the **challenger's** ex-ante utility (*odds of winning*)
 - ▶ if he loses in every equilibrium, I say the election is **unwinnable** (*for the challenger*)

Special Case: Public Disclosure

- ▶ Under **PD**, the challenger is restricted to sending the same message *publicly* to all voters
 - this makes **PD** a special case of **TA**
 - common prior + public message = common posterior

Public Disclosure: Preliminaries

Definition: voters $v_{\tilde{\theta}}$ and $v_{\hat{\theta}}$ are **compatible** if they **agree on some issue** $\kappa \in \mathbb{K}$, i.e.

$$\theta_{\kappa}^{inc} < \tilde{\theta}_{\kappa}, \hat{\theta}_{\kappa} \text{ to the right} \quad \text{or} \quad \tilde{\theta}_{\kappa}, \hat{\theta}_{\kappa} < \theta_{\kappa}^{inc} \text{ to the left}$$

and **incompatible** otherwise

Lemma: incompatible voters never vote for the challenger at the same time under common belief:

- complete information
- public disclosure

Public Disclosure: Unwinnable Elections

Theorem: election \mathcal{E} is **unwinnable** for the challenger under **PD** if and only if no group of compatible voters constitutes a majority

- ▶ the population of voters is *polarized*
- ▶ if $K = 1$, we get a version of the **median voter theorem**:

challenger cannot win under public disclosure if and only if

the incumbent occupies position of a median voter

Public Disclosure: Winnable Elections

Theorem: type θ^{ch} of challenger wins the election under **PD** if and only if

- ▶ he is elected under complete information
- ▶ he is adjacent to someone who does

As a result:

- the outcome is very close to complete information
- public messages are extremely informative
- each message on the path contains a **winner** + **neighbor**

Targeted Advertising

- ▶ Consider elections that are “decided by” a pair of incompatible voters:
 - challenger wins if and only if he convinces both voters
 - trivially unwinnable under **PD**

challenger can swing such elections by targeting

Targeted Advertising: the Main Result

Theorem: consider elections in which incompatible voters $v_{\tilde{\theta}}$ and $v_{\hat{\theta}}$ are jointly pivotal. Then, any θ^{ch} s.t.

$$d(\tilde{\theta}, \theta^{ch}) = d(\tilde{\theta}, \theta^{inc}) \text{ and } d(\hat{\theta}, \theta^{ch}) = d(\hat{\theta}, \theta^{inc})$$

wins this election by sending

$$\tilde{m} = \text{conv}(\tilde{\theta}, \theta^{ch}) \text{ to } v_{\tilde{\theta}} \text{ and } \hat{m} = \text{conv}(\hat{\theta}, \theta^{ch}) \text{ to } v_{\hat{\theta}}$$

Corollary: the more polarized $v_{\tilde{\theta}}$ and $v_{\hat{\theta}}$

- ▶ the larger the range of positions $|\tilde{\theta}_k - \hat{\theta}_k|$ on all issues $k \in \mathbb{K}$
- ▶ the larger the total number of issues K

the higher the challenger's ex-ante utility

Targeted Advertising: Discussion

- ▶ The proposed equilibrium has desirable properties:
 - equilibrium strategy profiles are robust to changes in prior beliefs
 - the messages on the path are convex:
 - the challenger does not mention the issues that he and the voter disagree on
 - the more they agree, the more specific the message

Conclusion

Some elections are too polarized to be won under PD

- ▶ the positions of pivotal voters are on the opposite sides of the incumbent on *all issues*
- ▶ these voters would never both vote for the challenger after hearing the same public message
- ▶ whatever **public message** the challenger sends, he **loses**

The challenger can swing these elections using **targeted ads**

- ▶ in private messages, the challenger **focuses on issues** that he and the voter have **in common**
- ▶ **the odds** of the challenger swinging these elections **grow** as **voter polarization increases**

Thank You!