

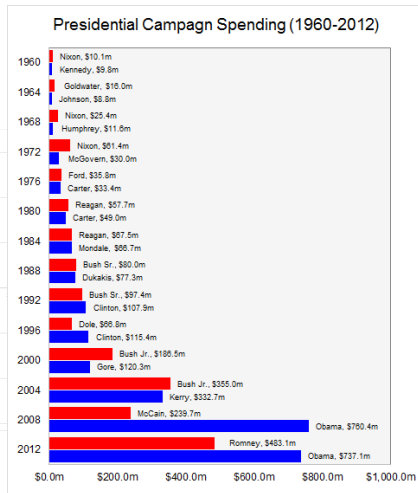
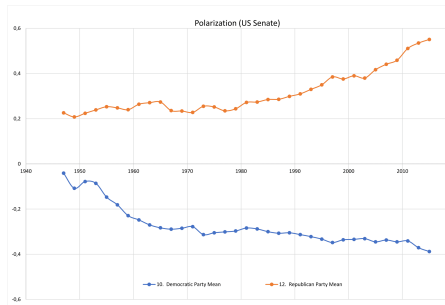
# Technological changes, campaign spending and polarization

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# Motivation: Two well documented facts in US politics

- 1 Increase in polarization.
- 2 Increase in campaign spending.

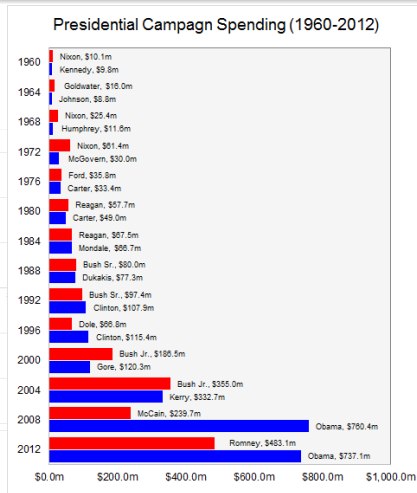
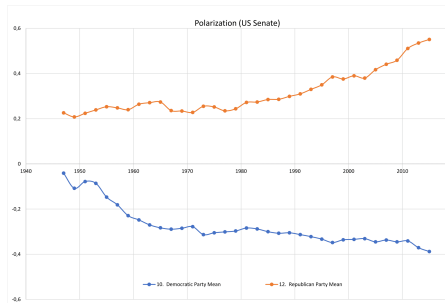


# Motivation: Two well documented facts in US politics

## In this paper

An new explanation focusing on recent technological changes.

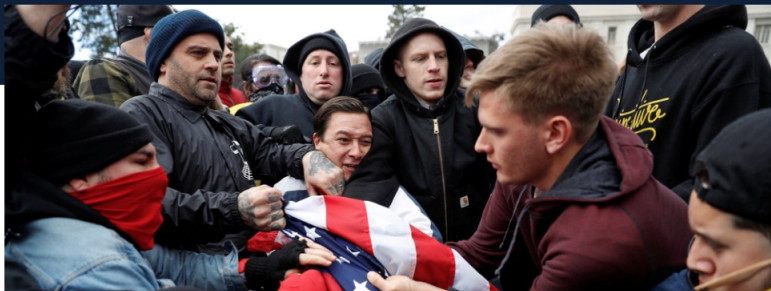
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- 2 Increase in campaign spending.



- Introduction of national TV in the US transformed the campaigning landscape (Hirano & Snyder, 2019).
- Gradual professionalization of campaigning.
- Internet, Social Media, and Big Data just the latest developments.

### How Big Data Broke American Politics

Highly detailed demographic and behavioral data about individual voters revolutionized the way U.S. political campaigns are conducted. But precise targeting by candidates of likely supporters at the expense of courting indie voters has hardened the partisan divide, Todd argues.



## Sketch of the model

- Two office motivated parties that first propose platforms and then exert campaign effort.
- Voters are either (Grossman and Helpman, 1996; Baron, 1994):
  - **Ideological**: vote based on policies (à la Downs)
  - **Impressionable**: vote based on campaign effort (à la Tullock).

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- **Endogenous division of voters into the two categories**
  - The division between ideological and impressionable depends on polarization.
  - The closer the two platforms are, the higher relevance of advertising and campaign effort in the voting decision.

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  - The division between ideological and impressionable depends on polarization.
  - The closer the two platforms are, the higher relevance of advertising and campaign effort in the voting decision.
- Technology may affect:
  - 1 marginal cost of effort,
  - 2 effectiveness of electoral campaigns, and
  - 3 division of voters between ideological and impressionable.

Higher effectiveness, more spending, more polarization to avoid spending.

### Assumption

The closer the two platforms are, the higher relevance of advertising and campaign effort in the voting decision.



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- Semiordelexicographic preferences (or weak lexicographic)
  - Luce (1956, 1978); Tversky (1969); Manzini and Mariotti (2012); Rubinstein (1988); Leland (1994).
- Focusing (decision makers overweight attributes with greater differences)
  - Bordalo, Gennaioli, and Shleifer (2012, 2013a,b, 2015); Bushong et al. (2015); Koszegi and Szeidl (2012).
- PE: Callander and Wilson (2006) & Nunnari and Zapal (2017), focusing/context dependent preferences in electoral competition. Matejka and Tabellini (2017) introduce rational inattention. Denter (2020), parties influence the salience of different issues by exerting costly effort.

- **Technology, Polarization, and Campaign Spending:** Herrera, Martinelli, Levine (2008); Hirsch (2019); Prummer (2020)
- **Endogenous Valence:** Ashworth and Bueno de Mesquita, (2009); Zakharov, (2009); Carrillo and Castanheira (2008); Iaryczower and Mattozzi (2013); and many more...
- **Behavioural Political Economy:** Callander and Wilson (2006); Nunnari and Zapal (2017); Matejka and Tabellini (2017); Denter (2020); in a growing field...
- **Contest Theory:** See Corchon (2007); Konrad (2009); Serena and Corchon (2018) for surveys.

### Parties

- $i \in \{L, R\}$ .
- Platforms  $x_i \in X = [0, 1]$  and advertisements  $e_i \geq 0$ .
- Polarization  $y = |x_R - x_L| \in X$ .
- Parties' payoffs are  $\Pi_i = S_i(x_L, x_R, e_L, e_R) - \mu e_i$ , with  $\mu > 0$ .

### Voters

- Voters have preferred policy  $x$  drawn from  $G(x)$ , with density  $g(x)$  symmetric, log-concave and full support in  $X$ .
- The share of ideological (Downs) voters is  $F(y)$ .
- The share of impressionable (Tullock) voters is  $1 - F(y)$ .
- $F(y)$  a continuous cdf, log-concave, with density  $f(y)$  and full support in  $X$ .

$$\Pi_i(x_L, x_R, e_L, e_R) = F(y)S_{idl}^i(x_L, x_R) + (1 - F(y))S_{imp}^i(e_L, e_R) - \mu e_i$$

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- Downsian Voters: vote sincerely for the closest party

$$S_{idl}^L(x_L, x_R) = G\left(\frac{x_L + x_R}{2}\right) \text{ for } x_L \neq x_R \text{ ow } \frac{1}{2}$$

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- Tullock Voters: e.g.,  $v_x(i) = e_i^\eta \theta_i^x$ 
  - $\eta$  captures targeting technology
  - $\theta_i^x$  a noise term independently and identically distributed across voters and parties, with an exponential distribution.

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- At  $t = 1$ , the parties simultaneously choose the political platforms.
- At  $t = 2$ , having observed the platforms choices and the share of the uninformed determined by polarization, parties choose the advertising levels.
- At  $t = 3$ , the voters vote.
- At any SPNE, each political party plays  $(x_i^*, e_i^*(x_L^*, x_R^*))$ , all the informed voters with  $x \leq \bar{x}^*$  vote for the Left party, and each uninformed votes for the Left party with probability  $\frac{(e_L^*)^\eta}{(e_L^*)^\eta + (e_R^*)^\eta}$ .

### Lemma

For  $\eta \leq 2$ , the unique equilibrium advertising is  $e_i^*(x_L, x_R) = (1 - F(|x_R - x_L|)) \frac{\eta}{4\mu}$ , for all  $i$ .

- 1 For  $\eta > 2$ , we can not obtain effort levels, but we can obtain payoffs and solve 1st stage.
  - Alcalde and Dahm (2010), full dissipation of rents
  - “As if”  $\eta = 2$ . Not very interesting...
- 2 For  $\eta \leq 2$ ,
  - Advertising increasing in  $\eta$ ,
  - Advertising decreasing in platform polarization  $y$ ,
  - Campaign spending ( $\mu e_i^*(x_L, x_R)$ ) is constant in  $\mu$ .

Results also hold under alternative CSF: Alcalde and Dahm (2007), Amegashie (20005) or Bevia and Corchon (2015) under the restrictions proposed by Balart, Chowdhury and Troumpounis (2017)

## Proposition

Let  $\eta \leq 2$  and  $\bar{y}$  implicitly defined by  $\frac{f(\bar{y})}{F(\bar{y})} = \frac{2}{\eta}g(\frac{1}{2})$ . For any  $\mu > 0$  there exists a unique subgame perfect Nash equilibrium.

For  $F(0) > 0$ , the following equilibrium types arise:

- (Convergent equilibrium)  $x_L^* = x_R^* = \frac{1}{2}$ , if  $\frac{f(0)}{F(0)} \leq \frac{2}{\eta}g(\frac{1}{2})$ ,
- (Interior equilibrium)  $x_L^* = \frac{1}{2} - \frac{\bar{y}}{2}$ , and  $x_R^* = \frac{1}{2} + \frac{\bar{y}}{2}$ , if  $\frac{f(1)}{F(1)} < \frac{2}{\eta}g(\frac{1}{2}) < \frac{f(0)}{F(0)}$ .
- (Extremism equilibrium)  $x_L^* = 0$  and  $x_R^* = 1$ , if  $\frac{2}{\eta}g(\frac{1}{2}) \leq \frac{f(1)}{F(1)}$ .

If  $F(0) = 0$ , the convergent equilibrium does not exist. The extremism equilibrium arises if and only if  $\frac{2}{\eta}g(\frac{1}{2}) \leq \frac{f(1)}{F(1)}$  and the interior equilibrium arises otherwise.

Electoral advertising for each of the above SPNE is uniquely characterized in past lemma.

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- 1 Few moderates:
- 2 A large conversion rate:
- 3 High  $\eta$ :

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Incentives to polarize:

- 1 Few moderates:  $g(\frac{1}{2})$
- 2 A large conversion rate:  $\frac{f(y)}{F(y)}$
- 3 High  $\eta$ : Effective ads (large eta), large incentives to spend, hence incentives to polarize.

## Technological change 1: $\eta$ on electoral Spending

- Polarization (weakly) increases with  $\eta$ :  $\frac{\partial \bar{y}}{\partial \eta} \geq 0$ , but **what about spending?**

$$\mu e_i^*(x_L, x_R) = (1 - F(x_R - x_L)) \frac{\eta}{4}$$

$$\frac{\partial \mu e_L^*(x_L^*, x_R^*)}{\partial \eta} =$$



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- An increase in  $\eta$  increases advertising, in proportion to the impressionable. (Direct)

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- At interior equilibria: an increase in  $\eta$  increases polarization, which in turn, decreases the share of impressionable voters and so the advertising. (Indirect)

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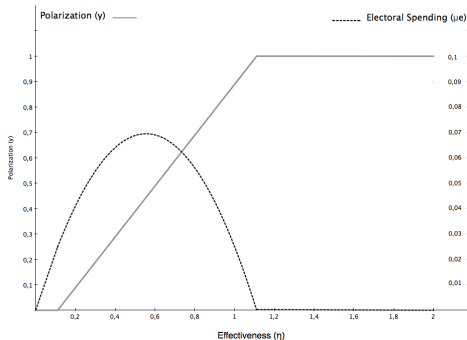
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- At corner equilibria:  $\frac{\partial \bar{y}}{\partial \eta} = 0$  (indirect channel is shut down)

# Technological change 1: $\eta$ on electoral Spending

## Lemma

A technological change that increases advertising effectiveness increases the electoral spending if and only if  $\frac{\partial \bar{y}}{\partial \eta} < \frac{1-F(\bar{y})}{f(\bar{y})\eta}$



Comparative statics on  $\eta$  for campaign spending and polarization. Uniform distribution of  $F(y)$  with  $F(0) = \frac{1}{10}$  and  $g(1/2) = 1/2$ .

## Technological change 2: $\frac{f(y)}{F(y)}$ on electoral spending

The net effect on spending depends on how sensitive is polarization to changes in the conversion rate. Let  $\rho$  parametrize this rate.

### Lemma

Let  $f_\rho(\bar{y})$  satisfy the monotone likelihood ratio property (MLRP) in  $\bar{y}$ , so that for  $\rho_1 > \rho_0$ ,

$$\frac{f_{\rho_1}(\bar{y})}{F_{\rho_1}(\bar{y})} > \frac{f_{\rho_0}(\bar{y})}{F_{\rho_0}(\bar{y})}.$$

Then, a change in the society that makes citizens convert more rapidly from impressionable to ideological voters will increase campaign spending if and only if  $\frac{\partial \bar{y}}{\partial \rho} < -\frac{\partial F(\bar{y})}{\partial \rho} \frac{1}{f(\bar{y})}$ .

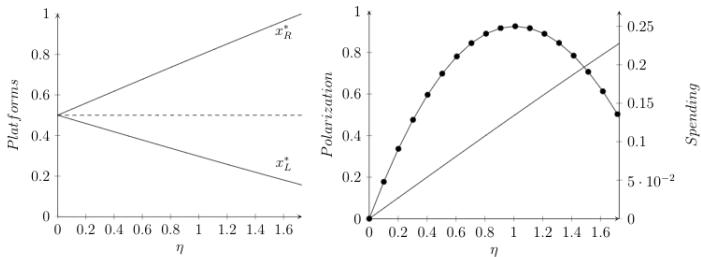
## Technological change 2: $\frac{f(y)}{F(y)}$ on electoral spending

$$\frac{\partial \mu e_L^*(x_L^*, x_R^*)}{\partial \rho} = \underbrace{-\frac{\partial F(\bar{y})}{\partial \rho} \frac{\eta}{4}}_{\text{Direct effect} +} \underbrace{-\frac{\partial F(\bar{y})}{\partial \bar{y}} \frac{\partial \bar{y}}{\partial \rho} \frac{\eta}{4}}_{\text{Indirect effect} -}$$

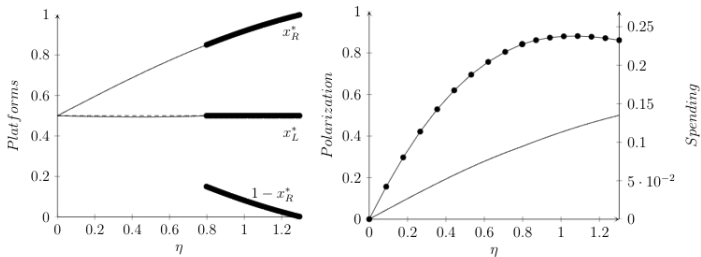
- MLRP implies first order stochastic dominance ( $\downarrow F(y)$ ), hence the direct effect is positive. An increase in  $\rho$ , keeping polarization constant, would increase the number of impressionable and their weight in the party's maximization problem. Thus, the parties would have more incentives to increase their advertising.
- On the other hand, the indirect effect is negative: a larger rate of conversion would imply more polarization, which in turns, would reduce the incentives to spend on ads.

- We can characterize equilibrium with asymmetric costs
  - The equilibrium changes, favoring the party with the lower marginal cost.
  - In equilibrium, parties would have different amount of advertisements, but the same level of campaign spending.
- The party with an advertising advantage has more incentives to locate closer to the rival party's platform to reduce the polarization and incentivize more advertising during the campaign.
  - As a response, the disadvantaged party is more likely to move away from it. How much the disadvantaged party diverges depends on the relative costs  $(\mu_L, \mu_R)$ .

Panel (a): “low” asymmetry:  $\mu_R/\mu_L = 1.2$



Panel (b): “high” asymmetry:  $\mu_R/\mu_L = 2.5$





- Changes in technology provide an explanation for increase in polarization and campaign spending.
- Endogenizing impressionable voters, makes the model tractable: General function for ideology, asymmetric costs, equilibrium in pure strategies (also asymmetric distribution of ideology)...
- Extensions: caps on spending. If binding, they have moderating effect. If binding for advantaged party only, expected policy closer to the median.

Thank you for your attention!

Technology change and polarization:

- 1 Marginal Cost:  
 $\downarrow \mu$ : Does not change anything
- 2 Effectiveness  
 $\uparrow \eta \rightarrow$  Increases polarization
- 3 Information (Distributional changes on  $y$ ):  
MLRP  $\uparrow f(y)/F(y) \rightarrow$  Increases polarization

Luce (1959) , Tversky (1969), Luce (1978).

- $\phi$  minimal distance between the two platforms that a voter considers to be “relevant”
- Voters are identified by the pair  $(x, \phi)$ . Evaluation of party  $i$  is:

$$v_{x,\phi}(i) = - |x - x_i| \Upsilon(\phi \leq x_R - x_L) + t^i(e_R, e_L, \theta^i)[1 - \Upsilon(\phi \leq x_R - x_L)] \quad (1)$$

$t^i(e_R, e_L, \theta^i) = \log(e_i^\eta) + \theta^i$  where  $\theta^i$  to be drawn *i.i.d.* from a type  $I$  extreme-value distribution

Or  $t^i(e_R, e_L, \theta^i) = e_i \theta^i$  where  $\theta^L$  and  $\theta^R$  follow independent inverse exponential distributions with parameter  $\eta > 0$ , the probability also becomes  $Pr(t^L > t^R) = \frac{e_L^\eta}{e_L^\eta + e_R^\eta}$

Bordalo et al. (2012, 2013, 2015), where:

$$v_{x,\phi}(i) = \begin{cases} -(|x - x_i|) + \omega e_i^\eta \theta_i^x & \text{if } \sigma(x_L, x_R) \geq \phi \\ -\omega |x - x_i| + e_i^\eta \theta_i^x & \text{if } \sigma(x_L, x_R) < \phi \end{cases}$$

By assuming the saliency distortion to be  $\omega = 0$  and that individuals are heterogeneous in  $\phi \sim F(\phi)$ . [Back](#)