Expressive Voting and Soccer Hooliganism

David K. Levine, Andrea Mattozzi and Salvatore Modica

Expressive Voting

in many models expressive voting appears as a constant fraction of "committed" voters

- one expects the desire to vote expressively for President is greater than for dogcatcher

in mixed strategy equilibrium there is a positive probability of turning out only committed voters

- if the number of committed voters is the same for regional as national elections then the lowest turnout observed in national elections should be the same as the lowest in regional elecitons
- in US national elections since 2000 the lowest turnout in presidential election years is 55.3% while in off year elections the highest turnout is 41.8%

Sports Matches

- expressing opinions should be the same whether the subject matter is a candidate for office or something else
- think about sports matches
- expression takes the form of rooting or cheering for one's team to win - much as we cheer on our favorite political candidates
- participation part of cheering: attending or watching a match in the case of sports, voting in the case of politics - putting up signs and banners and expressing views on social media in both cases
- in the case of voting participation affects the outcome
- in the case of live attendance rooting may affect the outcome of a sports match (home field advantage)
- cannot be true for watching a match on television
- enables us to isolate rooting from other things

Expressing Opinions

two aspects of expressing an opinion

- a devoted fan alone in a hotel room may watch a match and cheer and root enjoying the expression of her own opinion
- a social component: we seem to enjoy even more expressing our opinions to others - watching and cheering the match at the pub - and enjoy listening to those whose expressions concur with ours.

we have a greater desire to express our views over more important issues than less important issues - playoff matches rather than regular season

we also seem more interested in expressing our views about outcomes that are more in doubt

- more interested in expressing our opinion about close matches than matches where one team is expected to overwhelm another. Similarly it is rare to see
- more common to express views about the law of abortion than the law of gravity

The Externality

you benefit from other people participating

- you enjoy watching them root for the team
- you enjoy them seeing you participate

we focus on the former which is simpler and seems more fundamental

- do you go to a popular restaurant so that other people can see you eating and conversing? Probably not

The Model

a simple social network: a group k of N_k members organized on the circle

each group member faces a participation decision: to root for the team or not to root for the team

if the team wins each group member wins v_k

rooting has no effect on the outcome

p_k the (exogenous) probability the team will win the match

importance of the match and uncertainty about the outcome matter

utility of expression concave function $h(p_k, v_k)$ of uncertainty and increasing in importance

simple example: utility of expression is proportional to standard error of the result of the match $h(p_{k,}v_k) = \lambda\sqrt{p_k(1-p_k)}v_k$

Externality and Cost

strength is λ_0: reflects number of neighbors whose participation you benefit from and how much you benefit from each.

fraction of group that participates is φ_k

each group member i independently draws a type y_i uniformly distributed on $[0, 1]$ with cost of participation $c(y_i) = c_0 + y_i$

write $h_k = h(p_k, v_k)$

non-participant utility

$p_k v_k + \lambda_0 \varphi_k h_k$

participant utility

$p_k v_k + (1 + \lambda_0 \varphi_k) h_k - (c_0 + y_i).$

benefit of participation

$h_k - (c_0 + y_i)$

Committed Fans

net participation cost $c_0 + y_i - h_k \leq 0$

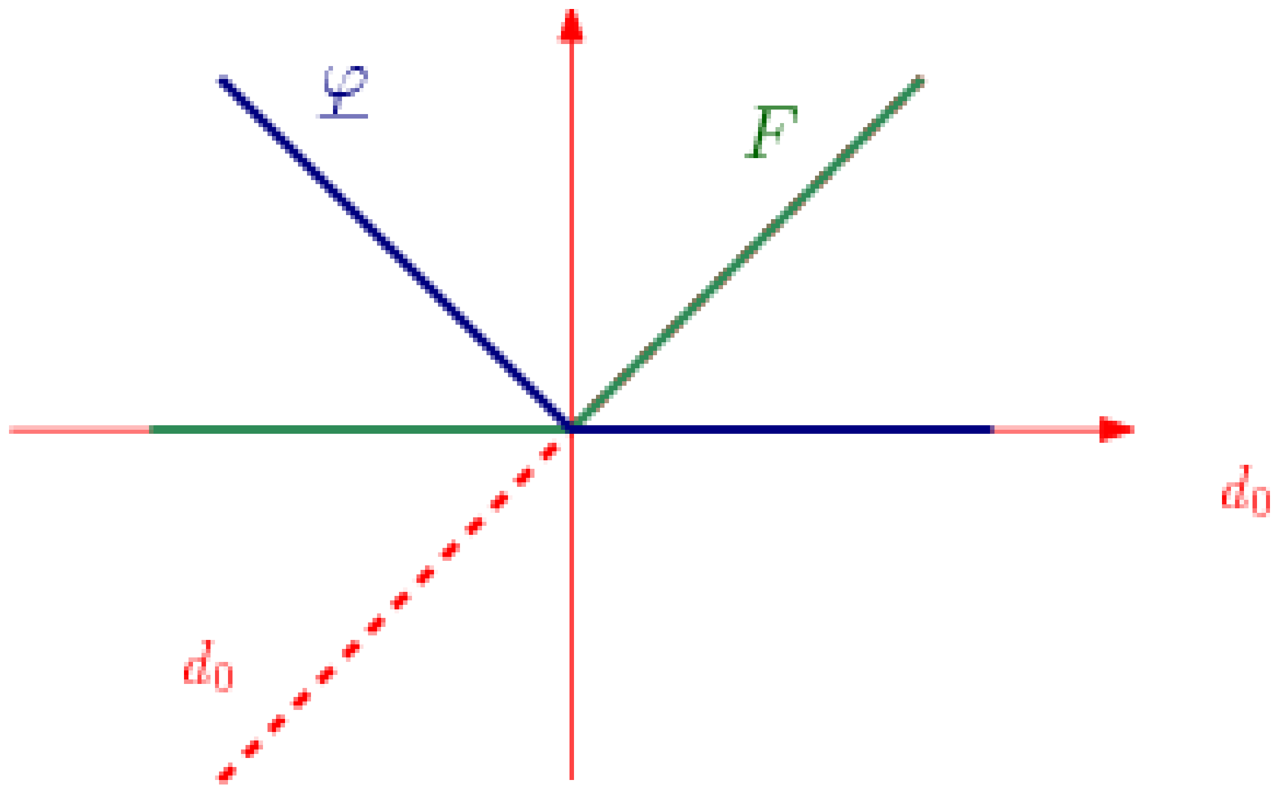
fraction of committed fans is

$$\underline{\varphi} = \begin{cases} 0 & \text{if } h_k - c_0 < 0 \\ h_k - c_0 & \text{if } 0 < h_k - c_0 \leq 1 \\ 1 & \text{if } h_k - c_0 > 1 \end{cases}$$

fixed cost

$$F = \max\{0, c_0 - h_k\}$$

Least Participation Cost versus Fixed and Committed



Incentive Constraint

probability of punishment if you violated the social norm by not participating is 1; if you did not participate but did not violate the social norm it is $\theta = 1/2$

at φ_k the punishment should equal the net participation cost $P_k = c_0 - h_k + \varphi_k$ (called soccer hooliganism)

turnout cost of participation above the committed level $\underline{\varphi}$ is $T(\varphi_k) = \int_{\underline{\varphi}}^{\varphi_k} c(y)dy = (1/2)(\varphi_k - \underline{\varphi})^2 + (c_0 + \underline{\varphi})(\varphi_k - \underline{\varphi})$

monitoring cost is $M(\varphi_k) = \int_{\varphi_k}^{1} \theta P_k dy = \theta(1 - \varphi_k)(c_0 - h_k + \varphi_k)$

expected cost

$$C(\varphi_k) = (1/2)(\varphi_k - \underline{\varphi})^2 + \theta(1 - \varphi_k)(c_0 - h_k + \varphi_k) + (c_0 + \underline{\varphi})(\varphi_k - \underline{\varphi})$$

$$\begin{aligned} C(\varphi_k) &= [1/2 - (c_0 - h_k + \underline{\varphi})/2 + c_0 + \underline{\varphi}/2](\varphi_k - \underline{\varphi}) + (1 - \underline{\varphi})F/2 \\ &= [1/2 + (c_0 + h_k)/2](\varphi_k - \underline{\varphi}) + (1 - \underline{\varphi})F/2 \end{aligned}$$

Utility

Set $U_0 = (1+\lambda_0)h_k\underline{\varphi} - c_0\underline{\varphi} - \underline{\varphi}^2$

group utility per capita is

$$(1-\phi_k)[p_k v_k + \lambda_0 \phi_k h_k] + \phi_k[p_k v_k + (1+\lambda_0\varphi_k)h_k] - C(\varphi_k) + U_0$$

equal to

$$p_k v_k - \left[\left((1+c_0-h_k)/2 - \lambda_0 h_k\right)(\varphi_k - \underline{\varphi})\right] - (1-\underline{\varphi})F/2 + U_0$$

Tipping Theorem

If $h_k - c_0 < 1, \text{ that is, } \underline{\varphi} < 1$, then marginal cost is positive when $\lambda_0 = 0$. Marginal cost is increasing in c_0 and decreasing in h_k and λ_0.

without the externality we have a pretty standard model - self-organization never creates a discontinuity: turnout is a continuous function of parameters.

Ticket Pricing

how much the team should charge $p_a \geq 0$ for admission: $c_0 = \xi_0 + p_a$ where $\xi_0 < 0$.

discontinuity in the team objective function when marginal cost becomes positive since at that point you lose any benefit of the social component of rooting λ_0.

Sell Only to Committed Fans

standard monopoly problem: maximize

$p_a\underline{\varphi} = p_a(h_k - \xi_0 - p_a) = \big((h_k - \xi_0)p_a - p_a^2\big)$

FOC is $p_a = (h_k - \xi_0)/2$ giving $\underline{\varphi} = (h_k - \xi_0)/2$.

If this is less than 1 then this is the solution and profit is

$(h_k - \xi_0)^2/4$.

If it is greater than 1 then p_a chosen so that $(h_k - \xi_0 - p_a) = 1$, that is $p_a = h_k - \xi_0 - 1$ and monopoly profit would be the same as the price

Sell to All Fans

when is it feasible to sell to all fans and impose a fixed cost?

when is marginal cost negative when $\underline{\varphi} = F = 0$ equivalently $h_k - \xi_0 - p_a = h_k - c_0 = 0$?

Marginal cost is then $(1 - (h_k - c_0))/2 - \lambda_o h_k = 1/2 - \lambda_o h_k$

so the condition is $\lambda_o h_k > 1/2$.

Case 1: $\lambda_o h_k \leq 1/2.$

so to sell to everyone you must not impose a fixed cost

sell to just committed fans, or to sell to everyone and set marginal cost to zero: $(1-(h_k-\xi_0-p_a))/2-\lambda_o h_k=0$ or

$p_a=(1+2\lambda_o)h_k-\xi_0-1$

$h_k-\xi_0 \geq 2$ the standard monopoly solution is to sell to all committed fans at $p_a=h_k-\xi_0-1$,

better to charge the higher price above **soccer hooliganism in equilibrium**

$h_k-\xi_0<2$ choice between $(1+2\lambda_o)h_k-\xi_0-1$ and $(h_k-\xi_0)^2/4$

standard monopoly best if

$\left(\frac{h_k-\xi_0}{2}-1\right)^2>2\lambda_0 h_k$

Case 2: $\lambda_o h_k > 1/2$.

sell to just the committed fans

sell to everyone and make the group indifferent between full participation and paying the fixed cost and staying out

$$-\left((1-(h_k-\xi_0-p_a))/2-\lambda_o h_k\right)-F/2=0$$

$$p_a=(1+\lambda_o)h_k-\xi_0-1/2$$

do this, or sell just to committed fans?

$h_k-\xi_0 \geq 2$ Standard monopoly solution is $p_a=h_k-\xi_0-1$, so better to charge the higher price above **soccer hooliganism equilibrium**

$h_k-\xi_0 < 2$ choice between $(1+\lambda_o)h_k-\xi_0-1/2$ and $(h_k-\xi_0)^2/4$

standard monopoly best if

$$\left(\frac{h_k-\xi_0}{2}-1\right)^2 > \lambda_o h_k+1/2$$

Key Thing:

- unless $h_k - \xi_0 < 2$ and $\left(\frac{h_k - \xi_0}{2} - 1\right)^2 > \lambda_o h_k$ optimum is to sell to everyone at such a high price that if it is raised slightly demand will drop catastrophically
- so with a bit of uncertainty you should price below the optimum with certainty
- in other words: ration tickets

Voting

relative size of the two parties is $\eta_L > \eta_S > 0$ with $\eta_L + \eta_S = 1$.

turnout by party $k \in \{L, S\}$ fraction of its members sent to polls $0 \le \varphi_k \le 1$.

most voters to the polls wins a prize of size V

split in case of tie

$h_k = hV$ the same for both parties

$c_0 < 0$ so some committed voters $\underline{\varphi} = \min\{1, hV - c_0\}$

marginal cost $\xi = (1 - (hV - c_0))/2 - \lambda_0 hV$

desire to bid from $\xi(B_k/\eta_k - \underline{\varphi}) = V/\eta_k$ is $B_k = (V/\xi) + \eta_k \underline{\varphi}$.

High Stakes Elections

without tipping to good approximation the large party turnout is η_S and small party turnout out is $\underline{\varphi}\eta_S$

assume that h small and λ_0 large.

specifically the limit $h \to 0$ and $\lambda_0 h \to \kappa$.

$\underline{\varphi} = -c_0$ and marginal cost $\xi = (1 + c_0)/2 - \kappa V$.

tipping when $V = \overline{V} = (1{+}c_0)/(2\kappa)$

and for larger V all voters turn out

- for $V < \overline{V}$ turnout is $\eta_S(1 + \underline{\varphi})$
- for $V > \overline{V}$ turnout is 1

bimodality??

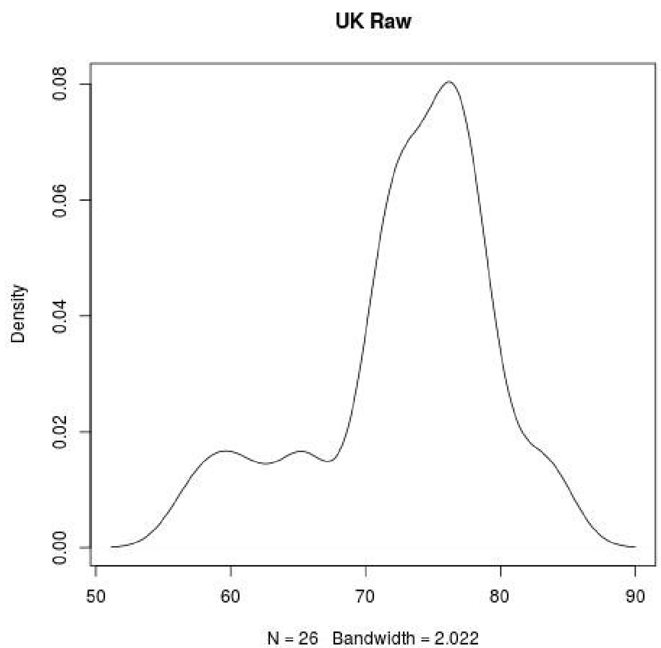
Data

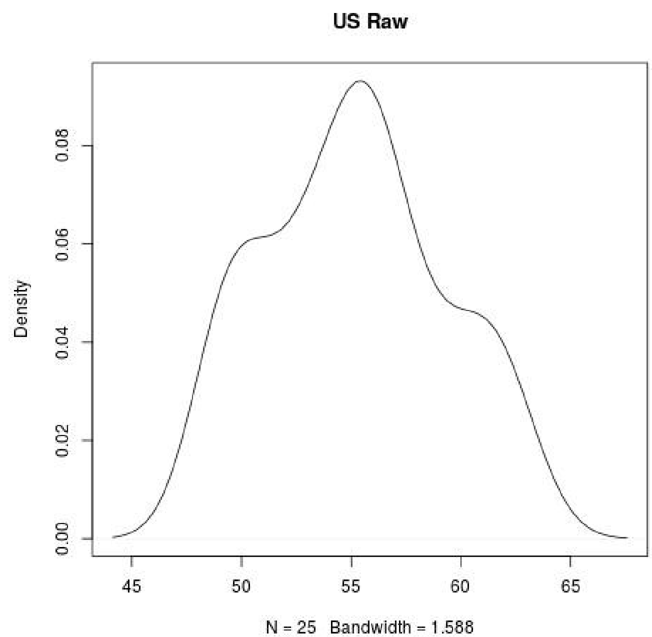
US Presidential elections and UK general elections

beginning with the first election in women were permitted to vote.

Kernel Estimate of Densities

using the default setting in R





bimodality not crazy

Two Issues

- the voting data certainly does not take on only two values
- turnout has high serial correlation

Continuous Turnout and Civic Voters

- third group of η_c civic voters split equally between two parties
- strategic aspect of voting unchanged
- not part of a social network vote only for expressive reasons

same participation cost distribution as other voters $c_c + y_i$ although benefit c_c may be different

expressive utility $h_c V$

do not assume h_c is negligible

turnout of civic voters is committed turnout $\underline{\varphi}_c = h_c V - c_c$

stakes V are drawn iid from a normal distribution

The Gap Normal Distribution

- $V < \overline{V}$ turnout is $h_c V - c_c + \eta_S(1 + \underline{\varphi})$
- $V > \overline{V}$ turnout is $h_c V - c_c + 1$

corresponding density

- normal up to $\underline{b} = h_c \overline{V} - c_c + \eta_S(1 + \underline{\varphi})$
- zero between $\underline{b}$ and $\overline{b} = h_c \overline{V} - c_c + 1$
- normal again above $\overline{b}$.

$\underline{b}$ the *cutpoint*

$\overline{b} - \underline{b} = 1 - \eta_S(1 + \underline{\varphi})$ the *gap*.

Serial Correlation

put all time dependency in c_c

assume $\eta_c c_c$ a weighted average of turnout in the previous two periods

- some evidence that there is a persistent component of turnout
- main point is to have a simple model that enables us to extract iid shocks

do not expect a great deal of serial correlation in the stakes

expect dynamics from slower moving demographic variables such as overall political involvement.

estimate using method of moments

weight on previous period

US: 0.5787613

UK: 0.8487046

More Kernel Estimation

density should have two modes

should be a substantial gap where tipping takes place

overall turnout considerably higher in UK than US: 73% versus 55%

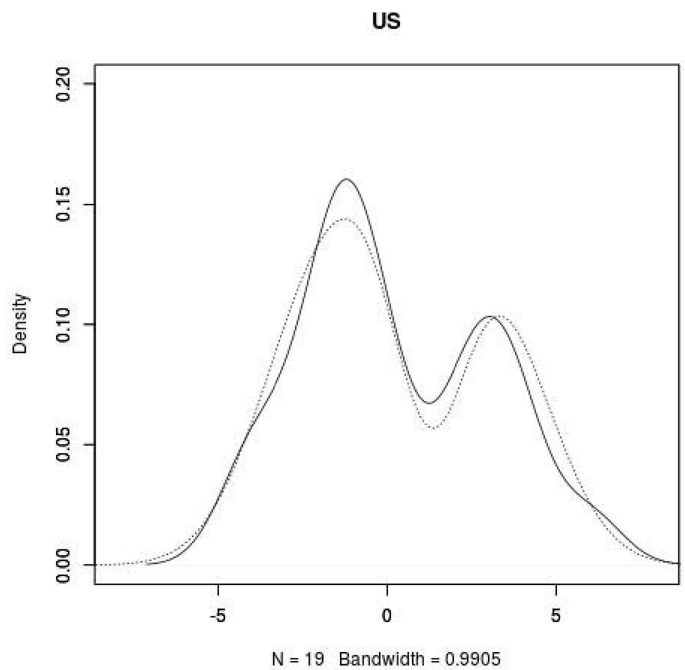
suggests that elections are higher stake in the UK

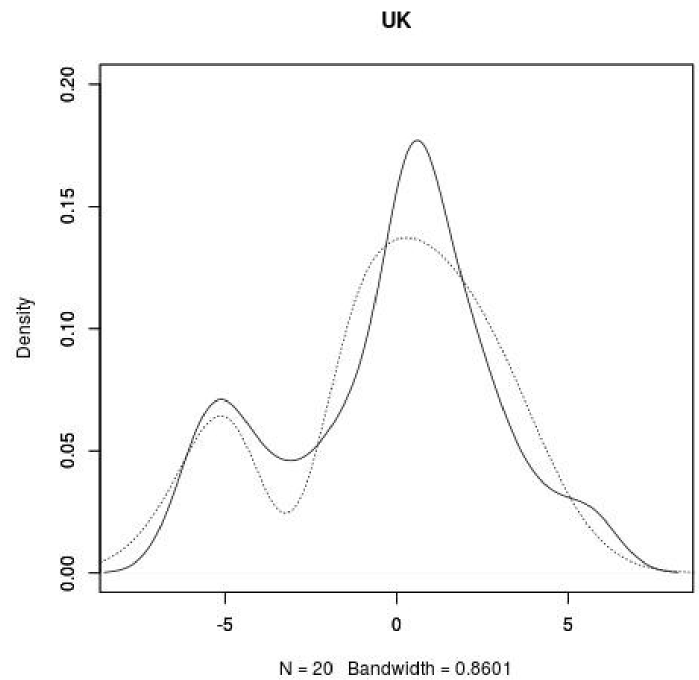
hence weight on the upper mode larger in the UK than the US

larger mode to the right for UK and to the left for US?

filter then trim the data (not interested in the tails)

Minimum Bandwidth Yielding Two Modes





Note: things like the Hartigan dip test are useless, have no power

Swing State Estimation of the Gap

- 16 states listed by the Washington Post as swing in 2008
- compare turnout with 2010 when the is no presidential election
- 2008 swing 0.62 non-swing 0.54
- 2010 swing 0.40 non-swing 0.36
- vote differential increased by 0.04 in Presidential year
- raised overall turnout by 0.0167

cutpoint taken by examining the data for gaps

- the largest gap if bigger than 1.5 the next largest gap
- otherwise the largest combination of two adjacent gaps (allow one stray data point)