To Vote or Not to Vote: That is the Question

"The Merits and Limits of Rational Choice Theory and the Paradox of Turnout"

Feddersen (2004), *JEP*; Funk (2010), *JEEA*; Levine & Palfrey (2007), *APSR*.

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ECON 4402 01 (SP26): Elections: Preference and Information Aggregation

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Before We Dive In…

So far in the course, we've focused a lot on understanding the behavior of **voters as rational agents… once they are in the booth! But why did they decide to show up and vote in the first place?**

"Quick show of hands: did you vote in the last election?"

Now, can you explain WHY?

By the end of today's class, you'll understand why that question is trickier than you might think — and why rational choice theory says you maybe **shouldn't have bothered**.

Paper #1: Anisia Hassan

1. Feddersen, T. J. (2004). "Rational Choice Theory and the Paradox of Not Voting." *JEP*, 18(1), 99–112. ←

2. Levine, D. K. & Palfrey, T. R. (2007). "The Paradox of Voter Participation? A Laboratory Study." *APSR*, 101(1), 143–158.

3. Funk, P. (2010). "Social Incentives and Voter Turnout: Evidence from the Swiss Mail Ballot System." *JEEA*, 8(5), 1077–1103.

The Paradox of Not Voting: Why Rational Agents "Shouldn't" Vote (Feddersen 2004)

The Core Problem (Downs, 1957)

- In a large election, the probability that **one vote changes the outcome** is vanishingly small.
- Even a **small cost** (bad weather, time off work) should rationally dissuade anyone from voting.

The Calculus of Voting (Riker & Ordeshook, 1968)

- A voter prefers candidate ***j***. Should vote for ***j*** rather than abstain if and only if:

$$p_j \cdot B - C > 0 \quad \Longrightarrow \quad p_j > C / B$$

- Where: p_j = probability vote is **pivotal**, B = benefit of preferred candidate winning, C = cost to vote

Some Complicated Numbers (Myerson, 2000)

- Election: **5 million voters**, expected vote share 50.1% vs. 49.9%. Using Poisson model:

$$p_j \approx 8.1 \times 10^{-9}$$

- If voting costs **$0.01**, the expected benefit of electing your candidate must exceed **$80 million**!

The "D" Term Fix: Civic Duty and Why It's Not Enough

Riker & Ordeshook's (1968) Modification

- They add a **consumption benefit D ≥ 0** from the act of voting itself (civic duty, social norm, "I Voted" sticker satisfaction).
- The modified calculus of voting becomes:

$$p_j \cdot B - C + D > 0$$

- Since $p_j \approx 0$ in large elections, voting occurs **if and only if D > C**.

The Problem (Ferejohn & Fiorina, 1975)

- The D term **assumes away** the paradox rather than solving it. It's a tautology: "people vote because they like voting."
- The D term does not predict **when or why** civic duty varies. It cannot explain strategic behavior (e.g., turnout ↑ when elections are close).
- The research agenda shifts: can we **endogenize** the consumption benefit within a strategic model?

Game Theory to the Rescue? Endogenizing Pivot Probabilities

Ledyard (1981, 1984): Voting as a Game

- Key insight: if **nobody votes**, then pivot probability is **very high** → everyone has incentive to vote → positive turnout in equilibrium.
- But in **large elections**: candidates converge to the median voter → **B → 0** (platforms identical, nothing at stake) → turnout → **zero**.

Palfrey & Rosenthal (1983, 1985): Building on Ledyard

- Ledyard showed turnout can exist, but didn't characterize **how much**. P&R fix this: fix candidate positions (so $B > 0$), add **private voting costs**.
- Each voter has type (c, j): $c \in [0,1]$ = cost to vote, $j \in \{1,2\}$ = preferred candidate. Costs are private info.
- **Cost cutpoints** c^*_1, c^*_2: in equilibrium, each side's supporters ask "is my expected benefit from being pivotal worth the cost?" Voters with $c < c^*_j$ vote; those above abstain.

Why $c^*_1, c^*_2 \to 0$ as $n \to \infty$

- P&R (1985) add **uncertainty**: the actual number of voters for each side is random. Even if expected totals are nearly equal, as n grows, the probability of an **exact tie** vanishes.
- Pivot probability → 0 → the expected benefit $p \cdot B$ of casting a ballot shrinks → only voters with **vanishingly low costs** still find it worthwhile → $c^*_1, c^*_2 \to 0$.
- **Bottom line:** Game theory alone cannot rescue the paradox. Only **low-turnout equilibria** survive in large populations.

The Swing Voter's Curse: Rational Abstention Without Costs

Feddersen & Pesendorfer (1996, 1999): A Different Approach

- Every model so far assumes voting is costly and asks "why bother?" F&P flip the question: assume voting is **costless** (C = 0). Can voters with strict preferences still rationally **abstain**? **Yes!**

The Setup: 4 Voters, Asymmetric Information

- Two possible **states of the world**, each with a "correct candidate." Ties broken by coin flip.
- 4 voters with **different information**:
  1. v_1 — **Partisan** for candidate 1 (always votes cand. 1)
  2. v_2 — **Partisan** for candidate 2 (always votes cand. 2)
  3. v_i — **Informed** independent (knows which state occurred)
  4. v_a — **Uninformed** swing voter (doesn't know the state — **what should she do?**)

THINK: If you were v_a, would you vote or abstain? Let's walk through it…

The 4-Voter Example (Feddersen & Pesendorfer, 1996)

Partisan (C1)
Always votes C1

Partisan (C2)
Always votes C2

Informed
Knows the state

Uninformed
The swing voter

STATE 1 C1 is better for independents

Voter	Action
v_1 Partisan	Votes C1
v_2 Partisan	Votes C2
v_i Informed	Votes C1 ✓
v_a Swing	ABSTAINS

C1 wins 2–1 ✓ Correct outcome

STATE 2 C2 is better for independents

Voter	Action
v_1 Partisan	Votes C1
v_2 Partisan	Votes C2
v_i Informed	Votes C2 ✓
v_a Swing	ABSTAINS

C2 wins 2–1 ✓ Correct outcome

The Curse: If v_a votes instead of abstaining, they could cause a **tie in the wrong state** — hurting everyone.

Rational abstention: By stepping aside, the uninformed v_a lets the informed v_i be decisive → correct candidate wins with probability 1.

Implication: Doesn't solve the paradox (adding costs → low turnout), but links closeness, turnout, & information — and explains **selective abstention** on a ballot, which cost-based models cannot.

The Crew Leaders Game

Two rival crews. A leader who calls the shots. Loyalists who obey. And the rest of you… will you follow or betray?

The Roles

- Class splits: Left = **Crew Blue** Right = **Crew Orange**
- Each crew picks 1 **Leader** + 2 **Loyalists** (ethical agents — they ***must*** follow the leader)
- Everyone else = **Free Agents** — you can follow **or abstain**

How It Works

1. Leaders **call their crew to vote**.
2. Leader + 2 Loyalists **automatically vote** and pay the -5pts cost. No choice.
3. Free Agents **write their** name + **V** (follow — pay cost) or **A** (abstain — pay nothing). Fold. Pass forward.
4. Votes will be publicly announced. Crew with **more total votes wins**. ***Everyone*** on the winning crew gets the prize, even the abstain.

Payoffs

- Winning crew: **+7 pts** each on final grade + Leader's Promise Losing crew: **0 pts**
- Voting costs **-5 pts** (win or lose) each on final grade Abstaining costs **nothing**

Your leader is counting on you. The loyalists are doing their part. But you can betray and still win…

Group-Based Models I: Mobilization by Leaders

The Core Idea

- Voters belong to **groups** of like-minded people (unions, churches, environmental orgs).
- **Leaders** coordinate turnout by allocating costly resources to voters — essentially "buying" votes from followers (Uhlaner, 1989; Morton, 1991).
- Shachar & Nalebuff (1999): model U.S. presidential elections with **two party leaders per state** across 50 states.

Why It Works (Mathematically)

- Each leader controls a **significant fraction** of the electorate → changing effort can **shift outcomes**.
- Unlike individual models, this is a game among a **small number of leaders** → pivot probabilities stay high.

Limitations

- Social pressure is costly → followers face same **free-rider problem**. Requires monitoring of voting behavior — unlikely to be widespread.

Group-Based Models II: Ethical Agents & Kantian Duty

Harsanyi (1977, 1992): Rule Utilitarians

- Some agents are **rule utilitarians**: they get extra payoff from acting according to the strategy that maximizes **social welfare** if everyone follows the same rule.

$$\sigma^* = \text{argmax} \sum U_i(\sigma)$$

- Limitation: relies on one candidate being **objectively inferior** — why would anyone vote for the "wrong" candidate?

Feddersen & Sandroni (2002): The Full Model

- Introduces **preference diversity**: continuum of voters partitioned into two types — those who believe candidate 1 is better and those who believe candidate 2 is better.
- Each voter has cost $c \in [0, \bar{c}]$. Ethical agents follow **Kantian calculus**: "I act as if everyone like me will do the same."

Key Comparative Statics

- Turnout ↑ as groups become more **equal in size**. Turnout ↓ as **costs increase**. Turnout & margin of victory are **positively correlated** — not because of pivot probabilities, but because of group composition.

Our Take: Where Does Feddersen Leave Us?

What we find most compelling

- The **ethical agent model** is the most intellectually elegant: it generates turnout **without** needing a leader, social pressure, or monitoring.
- It also produces the **right comparative statics**: closer elections → higher turnout, higher costs → lower turnout.

But honestly — is this really "solved"?

- Feddersen's paper is a **map of failed attempts** as much as a survey of progress. Each model "solves" the paradox by assuming something we can't independently verify (civic duty, group ethics, coordinating leaders).
- Identity, social norms, and moral intuitions clearly drive participation — but these **can** be modeled mathematically (as the ethical agent models show). The question is whether those models give us real predictive power or just formalize the intuition.

A question for discussion...

- Just because **Newtonian mechanics** is wrong at high velocity doesn't mean it isn't useful at low velocity. Is rational choice theory **broken**, or just operating outside its domain?

Paper #2: Mór Szepesi

1. Feddersen, T. J. (2004). "Rational Choice Theory and the Paradox of Not Voting." *JEP*, 18(1), 99–112. ✓

2. Levine, D. K. & Palfrey, T. R. (2007). "The Paradox of Voter Participation? A Laboratory Study." *APSR*, 101(1), 143–158. ←

3. Funk, P. (2010). "Social Incentives and Voter Turnout: Evidence from the Swiss Mail Ballot System." *JEEA*, 8(5), 1077–1103.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

The study's mechanism (Slide 1 of 2):

1. Create a controlled environment where subjects are split into two groups (majority vs. minority) and repeatedly face a vote-or-abstain decision.

2. Assign each participant a private voting cost each round, randomly drawn from a known distribution but observed only by the individual.

3. Have participants simultaneously choose whether to vote or abstain, balancing the cost of voting against the chance of influencing the outcome.

4. Determine election outcomes based on vote quantity, with higher rewards for being in the winning group and costs incurred if voting.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

The study's mechanism (Slide 2 of 2):

5. Repeat the process over many rounds with random reassignment of groups and costs to generate variation and allow learning.

6. Systematically vary key parameters of the election, especially electorate size and how close the race is (toss-up vs. landslide).

7. Collect data on behavior and outcomes, including turnout rates, differences between majority and minority voters, and election results.

8. Compare observed behavior to theoretical predictions, particularly Nash equilibrium and its comparative statics (size, competition, underdog effects).

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Reasons for the study

1. The paper addresses the "paradox of voter turnout": standard rational choice theory predicts near-zero turnout because voting is costly and the chance of being pivotal is tiny - the story of the Yale Hungarians.

2. Previous empirical studies struggled to test the theory cleanly because real-world data cannot control for key factors like preferences, costs, and information.

3. This study uses a laboratory experiment to directly test the theory under controlled conditions, allowing for precise evaluation of its predictions.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Empirical set-up of the model:

- N voters divided into two groups: N_A and N_B where $N_A<N_B$.
- Group A: majority, group B: minority.
- Candidate A: the underdog, candidate B: the frontrunner.
- Simple plurality.
- Voters in the group of the winning candidate receive a reward of H, losing voters L where L<H.
- Cost of voting for a voter: c_i (c_i is known by voter i before voting).

Question: What could decide the costs of voting? Can you think of two (positive) extremes?

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Properties of the model:

- Equilibrium concept: A quasi-symmetric equilibrium means all voters within the same group use the same voting strategy (based on their cost).
- Cutoff (cutpoint) strategy: Each voter follows a simple rule: vote if their cost is below a threshold $c*$ and abstain if it is above.
- Group behavior: This leads to a pair of cutoffs (cA, cB) for the two groups, which determines overall turnout rates (pA, pB).
- Equilibrium condition: The cutoff is set so that a voter with cost exactly equal to $c*$ is indifferent between voting and abstaining.
- Key intuition: This indifference depends on the probability of being pivotal.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Turnout formulas:

$$p_A^* = \int_{-\infty}^{\infty} \tau(c) f(c)\, dc = \int_{-\infty}^{c_A^*} f(c)\, dc = F(c_A^*) \quad \textbf{(1)}$$

$$p_B^* = \int_{-\infty}^{\infty} \tau_B(c) f(c)\, dc = \int_{-\infty}^{c_B^*} f(c)\, dc = F(c_B^*) \quad \textbf{(2)}$$

- Turnout equals the probability a voter's cost is below the cutoff.
- This is given by the CDF of the cost distribution.
- $pA*$, $pB*$ represent the fraction of each group that votes.
- Comes directly from the cutoff strategy: vote if $c \leq c*$.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Cut-off formulas:

$$c_A^* = \frac{H - L}{2} \pi_A^*$$

$$c_B^* = \frac{H - L}{2} \pi_B^*$$

- The cutoff equals the expected benefit of voting
- Benefit = (H−L) × probability of being pivotal ($\pi*$)
- A voter is indifferent at the cutoff: cost = expected benefit
- Higher pivotal probability → higher cutoff → more turnout

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Specific experimental design:

- N_A and N_B where N is either 2, 9, 27, or 51
- $L = 5$, $H = 105$
- Toss-up race: $N_B = N_A + 1$
- Land-slide race: $N_B = 2N_A$
- The unform distribution of costs was 0-55

Question: The cut-off is 50. What does this imply for the dominant voting strategy?

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Predictions:

Minority Majority

TABLE 1. Experimental Design and Predictions

N	N_A	N_B	No. of Subjects	No. of Sessions	No. of Elections	No. of Observations	p_A^*	p_B^*	π^*
3	1	2	51	4	850	2550	.537	.640	.810
9	3	6	81	9	450	4050	.413	.375	.599
9	4	5	81	9	450	4050	.460	.452	.666
27	9	18	108	4	200	5400	.270	.228	.409
27	13	14	108	4	200	5400	.302	.297	.466
51	17	34	102	2	100	5100	.206	.171	.309
51	25	24	102	2	100	5100	.238	.235	.375

Question: What are the larger trends? Do these predictions surprise you?

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Before we look at the **models predications**: A **thought experiment**

Premise: There are two candidates. You can vote at a cost of $15. If your preferred candidate wins, you gain $50.

On a piece of paper, write down "yes" or "no" to each of these questions. Would you vote if:

1. There are only 3 voters?
2. There are 1,000,000 voters?
3. Polls show a 50/50 split before the election?
4. Polls show a 75/25 split favoring your preferred candidate?
5. Polls show a 75/25 split against your preferred candidate?

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Hypotheses the authors have:

- H1 (Size Effect): Turnout decreases as the electorate grows → e.g., turnout in a small election like N=3 is much higher than in larger elections like N=27 or N=51.
  - Pivotal outcomes become less likely as size increases.

- H2 (Competition Effect): Turnout is higher in closer elections → e.g., with N=9, turnout is higher in a 4–5 split (toss-up) than in a 3–6 split (landslide).
  - Pivotal events are more likely in close elections.

- H3 (Underdog Effect): The minority votes more than the majority → e.g., with N=9, turnout of the smaller group (4 voters) exceeds that of the larger group (5 voters).
  - Exception: In very small elections, the majority votes more.

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Actual data:

Minority (D) Minority (T) Majority (D) Majority (T)

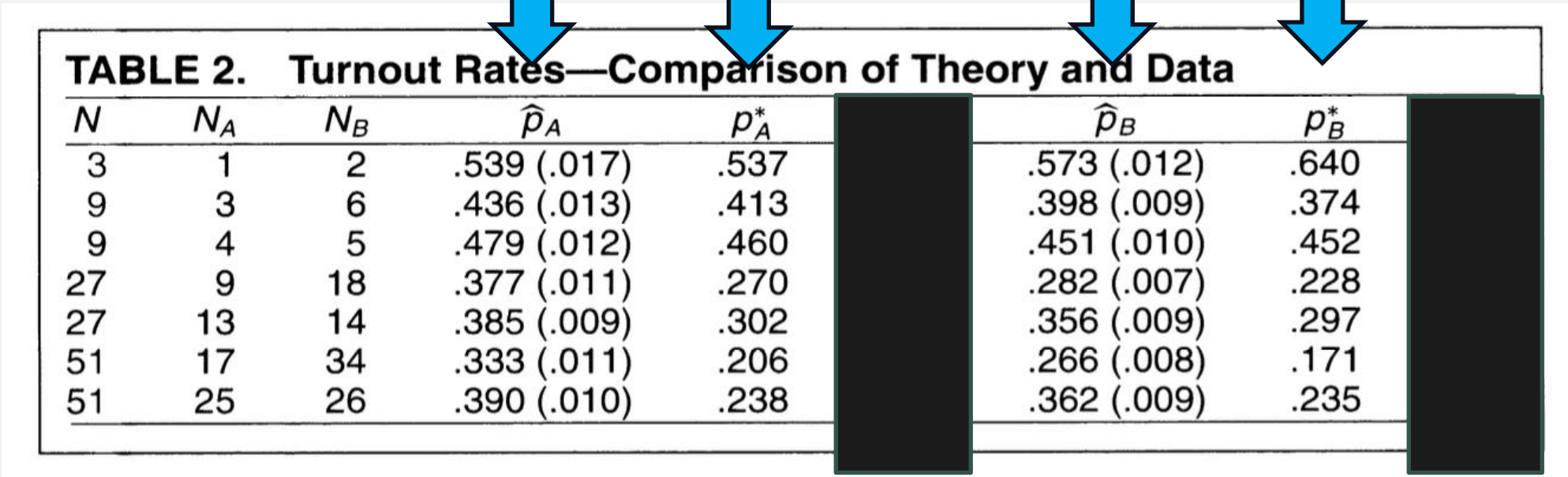

TABLE 2. Turnout Rates—Comparison of Theory and Data

N	N_A	N_B	$\hat{p}_A$	p^*_A	$\hat{p}_B$	p^*_B
3	1	2	.539 (.017)	.537	.573 (.012)	.640
9	3	6	.436 (.013)	.413	.398 (.009)	.374
9	4	5	.479 (.012)	.460	.451 (.010)	.452
27	9	18	.377 (.011)	.270	.282 (.007)	.228
27	13	14	.385 (.009)	.302	.356 (.009)	.297
51	17	34	.333 (.011)	.206	.266 (.008)	.171
51	25	26	.390 (.010)	.238	.362 (.009)	.235

- Hypotheses (size, competition, underdog) seem very well supported.
- However, with the size effect, there is little difference between N=27 and N=51 (effect flattens at large sizes).

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Differences in individual cutoff estimates:

TABLE 6. Fraction of Positive Paired Cutoff Differences

N	Minority Toss-up–Landslide	Majority Toss-up–Landslide	Toss-up Minority–Majority	Landslide Minority–Majority
51	0.60 (3.2)	0.75 (4.4)	0.52 (1.8)	0.65 (3.1)
27	0.56 (1.1)	0.68 (4.6)	0.56 (1.2)	0.68 (4.7)
9	0.54 (3.0)	0.59 (2.4)	0.65 (3.2)	0.60 (2.6)
3			0.43 (−0.10)	

Note: Average difference in parentheses.

- Supports both key effects at the individual level: people are more likely to vote in toss-ups (competition effect) and when in the minority (underdog effect).
- *How to interpret: Each entry shows the fraction of individuals whose estimated cutoff increases in the predicted comparison, with the number in parentheses giving the average size of that cutoff difference.*

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Nash Equilibrium connections:

- The model predicts a unique Nash equilibrium with cutoff strategies, where each voter is exactly indifferent at the threshold cost.
  - Critically, Nash predicts that as elections get large, turnout should converge to 0%.
- Data provides strong support at the aggregate level: Nash equilibrium accurately predicts the comparative statics (size, competition, underdog effects).
- But mixed quantitative fit as turnout is too low in small elections and turnout is too high in large elections relative to Nash predictions.
  - e.g., for N=3, majority turnout is ~0.57 vs. Nash prediction ~0.64 (undervoting).
  - e.g., for N=51, majority turnout is ~0.36 vs. Nash prediction ~0.24 (overvoting).

Question: What could explain the under and overvoting?

Paper 2: A Laboratory Study - Levine and Palfrey (2007)

Extra slide: Brief glimpse at a potential solution - the Logit quantal response equilibrium model

- Instead of strict cutoffs, voters choose probabilistically: they are more likely to vote when it's beneficial – the probability of voting is a smooth function of payoff differences, governed by a parameter λ (higher λ = more rational behavior).
- The authors estimate the QRE parameter λ by maximum likelihood using pooled experimental data, solving the equilibrium for different λ values and choosing the one that best fits observed voting decisions.
- Better fit to the data than Nash as QRE matches observed turnout levels more closely across all election sizes.
- Fixes undervoting in small elections and overvoting in large elections

Paper #3: Sukriti Ojha

1. Feddersen, T. J. (2004). "Rational Choice Theory and the Paradox of Not Voting." *JEP*, 18(1), 99–112. ✓
2. Levine, D. K. & Palfrey, T. R. (2007). "The Paradox of Voter Participation? A Laboratory Study." *APSR*, 101(1), 143–158. ✓
3. **Funk, P. (2010). "Social Incentives and Voter Turnout: Evidence from the Swiss Mail Ballot System." *JEEA*, 8(5), 1077–1103. ←**

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Big Picture Question: Voter turnouts despite the costs and the time commitment is a strange phenomenon ~ what explains it?

The paper focuses on the **social aspect** of this mechanism.

Traditional reasons for voting:

1. Civic Duty
2. Expressive Benefits ~ often influenced by the candidate/ party
3. Personal Satisfaction

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Central Social Theories

1. Group size and group cohesion matter for social pressure
2. Voting as an observable activity which can allow for pressure

Voting Features in Focus:

- Size of the community
- Type of Voting (ballot vs. mail-in voting)

~analogous to the game theory idea that cooperation is more likely with punishment or public defection

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Unique features of the Swiss mail-ballot system

1. Introduced at different points in time in the Cantons

2. The Voting subject stays constant over time
   - Only supply side effect is party activity, accounted for with fixed effects

3. Automatic registration
   - No intermediate steps to prepare to vote

4. Mail-in voting significantly reduced costs

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Research Set-Up

Period: 1971 to 2003

Type: The Nationalratswahlen (one of thelegislative bodies) held after every four years

Control Variables: Cantons' population size, its communal structure, age structure, education, unemployment, income, and for whether Cantons had symbolic fines for non-voting

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Hypotheses

Hypotheses 1: In a situation where poll-voting is the only option, social incentives create a negative relationship between turnout and community size.

Hypotheses 2: If postal voting is allowed next to poll-voting, the effect on turnout differs with respect to community size. The larger the community, the more positive the effect of postal voting on turnout.

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Regressions

$$VT_{st} = \alpha_s + \gamma_t + b_1 \cdot Postal_{st} + b \cdot Z_{st} + u_{st}$$

Turnout = Postal Voting + Controls + Fixed Effects

$$VT_{st} = \alpha_s + \gamma_t + b_1 \cdot Postal_{st} + b_2 \cdot Small \cdot Postal_{st} + b_3 \cdot Small + b \cdot Z_{st} + u_{st}$$

Turnout = Postal + (Postal × Small Communities) + Controls

$$VT_{ct} = \alpha_c + \gamma_t + b_1 \cdot Postal_{ct} + b_2 \cdot Small_c \cdot Postal_{ct} + b_3 \cdot Small_c + b \cdot Z_{ct} + u_{ct}$$

Turnout= Postal + (Postal × Small Community Dummy) + Controls

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Results

1. Introduction of postal voting did not significantly increase voter turnout
   - *An insignificant 2% change was observed overall*

2. Structure of the Canton matters for overall effect of (optional) vote by mail on turnout
   - *Cantons with no citizens in small-sized communities saw a 6.5% increase in turnout, as opposed to a –7% drop for ones with majority small communities*

3. The total effect of postal voting on turnout is larger in Non-German Speaking Cantons
   - *The turnout difference between small and large communities within these Cantons was consequently also smaller*

Paper 3: Social Incentives and the Swiss Ballot System: Funk (2010)

Robustness Checks

1. Omitted Variables
   - Direct democracy and early adoption
     - Accounted for in Canton fixed effects
2. Controls on income
   - Average wealth does not affect voting behavior
3. Endogeneity Bias
   - No difference in early and late introducers before the turnout
4. Controlling for Polling Station Hours
   - Significant difference for polling stations with limited open hours

Discussion: Final Questions for the Class

1. ***Think about the last time you voted.*** Were you a "rule utilitarian" (civic duty), responding to "mobilization" (social pressure, party outreach), or something else entirely? **(Feddersen 2004)**
2. ***Feddersen says social pressure requires monitoring.*** In the age of social media "I Voted" posts, has this constraint changed? → **(Funk 2010)**
3. The Nash model correctly predicts how turnout changes with size, competitiveness, and group status, but fails to match the actual levels of turnout—should we consider this a success or a failure of the theory? → **(Levine & Palfrey 2007)**