Candidate Payoffs and Electoral Equilibrium: An Experimental Study

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- We assume that the payoffs of the candidates depend on a number of votes they receive in a general way.
- We find that candidate strategies depend on the vote-payoff relationship.

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- 1970-1973: Initiated broad leftist reforms.
- 1973: Lost his life in a coup.

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- Russian anti-corruption activist and opposition leader.
- Is now a candidate in Moscow mayoral election.
- Was convicted in a politically motivated trial and is to serve a 5-year prison sentence.
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Winning is not all that matters: why a large margin of victory is desirable

Aberto Simpser (2013): In semidemocratic regimes, large victory margins

- Affect the behavior of political elites in the ruler's coalitions.
- Increase the ruler's bargaining powers vis-a-vis business interests and trade unions.
- Deter potential opposition from coordinating.
- Mitigate the pressure to share rents with other groups.

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- 2008 primaries: Mitt Romney is runner-up.
- 2000 primaries: John McCain is runner-up.
- 1988 primaries: Bob Dole is runner-up.
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- Communist party, LDPR, and Fair Russia party lost seats due to electoral fraud.
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Payoffs are nonlinear in parliamentary systems

- Finally, floor requirement, quotent formula, and district magnitude all affect the translation of votes into seats even in proportional representation electoral systems: Lijphart (1990), Gallagher (1992).
- Coalition-building concerns further complicate the payoff functions of political parties: Snyder, Ting, and Ansolabehere (2005), Laver and Shepsle (1996), Schofield and Sened (2006).

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The model outline

- Two Downsian candidates and two probabilistic voters.
- Voter 1 is leftist and thinks that Candidate 1 is high quality.
- Voter 2 is rightist and thinks that Candidate 2 is high quality.
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Theoretic predictions

- If winning by a large margin matters, and losing by a small margin does not, then a candidate will pander to the voters partisan to the opposing candidate.
- If winning by a large margin does not matter, and losing by a small margin does, then a candidate will pander to his own partisan voters.

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Case study: Navalny's options.

- Low-risk strategy: Campaign on liberal issues. That will secure a small minority of core followers.
- High-risk strategy: Campaign on the more popular issues of immigration and public utilities. That gives a chance of winning over a part of the *a priori* hostile audience. There is also a risk of losing support of the core audience.

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Candidate objective function equivalence in PVM.

1. Equilibrium equivalence vs. best-response equivalence
2. Voteshare maximizers vs. probability of win maximizers
3. Hinich (1977), Ledyard (1984) — equilibrium equivalence shown for some probability of voter functions
4. Patty (2001), Duggan (2000), Patty (2005), Patty (2007) — conditions for both best-response equivalence and equilibrium equivalence are very strict
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The 2-candidate model: Zakharov (2012)

- There are 2 candidates who compete in an election by choosing policy platforms $y_1, y_2 \in [0, 1]$.
- There are two voters, 1 and 2.
- Let $P_i(y_1, y_2)$ be the probability that voter $i = 1, 2$ votes for Candidate 1, and $1 - P_i(y_1, y_2)$ the probability that he votes for Candidate 2.
- Assume that the voters behave according to the utility-difference model:

$$P_i(y_1, y_2) = P(u_{i1} - u_{i2}), \tag{1}$$

where u_{ij} is the utility that voter i attributes to Candidate $j = 1, 2$, and $P(\cdot)$ is a continuous, differentiable, strictly increasing function.

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$$u_{ij} = e_{ij} - \psi(y_j - v_i), \tag{2}$$

where e_{ij} is the nonpolicy preference of voter i for Candidate j, $v_i \in [0, 1]$ is the best policy of voter i, and $\psi(\cdot)$ is a twice-differentiable disutility function that is symmetric around 0, with $\psi'(0) = 0$, $\psi'(d) > 0$ for $d > 0$, and $\psi''(d) > 0$. Let $v_1 = 0$ and $v_1 = 1$.

Without loss of generality, let $e_{12} = e_{21} = 0$.

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Candidate payoffs

There are 3 possible election results:

1. Candidate 1 — 0 votes, Candidate 2 — 2 votes
2. Candidate 1 — 1 vote, Candidate 2 — 1 vote
3. Candidate 1 — 2 votes, Candidate 2 — 0 votes

Let the utility of 0 votes be 0, the utility of 2 votes be 1, and the utility of 1 vote be $x \in [0, 1]$.

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Candidate payoffs

The expected utility functions for both candidates will be

$$U_1 = x((1-P_1)P_2 + P_1(1-P_2)) + P_1 P_2, \quad (3)$$
$$U_2 = x((1-P_1)P_2 + P_1(1-P_2)) + (1-P_1)(1-P_2). \quad (4)$$

For $x = \frac{1}{2}$ the utilities are equal to the expected share of the total vote: $U_1 = \frac{1}{2}P_1 + \frac{1}{2}P_2$, $U_2 = 1 - \frac{1}{2}P_1 - \frac{1}{2}P_2$. This special case was analyzed in most of the previous literature.

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Main result

Proposition

Suppose that $e_{11} = e_{22} = e$*. Let* $P(x) = 1 - P(-x)$*. Then there exists a local equilibrium in the electoral competition game with* $y_1 = 1 - y_2$*.*

Main result

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The comparative statics

Proposition

Suppose that $(y, 1-y)$ is a symmetric equilibrium in the electoral competition game. Then y decreases with x for $x \leq \frac{1}{2}$ and y increases with e for $x < \frac{1}{2}$. Suppose also that

$$P'(e - \psi(y) + \psi(1-y))(\psi'(y) + \psi'(1-y))^3 < \psi'(y)\psi''(1-y) + \psi'(1-y)\psi''(y) \quad (5)$$

for all $y < \frac{1}{2}$. Then y decreases with x for all $x \in [0,1]$. Also, y increases with e for $x < \frac{1}{2}$ and decreases with e for $x > \frac{1}{2}$.

Comparative statics

In this stylized example, there are 2 voters:

- Voter 1 — partisan of Candidate 1
- Voter 2 — partisan of Candidate 2

If value of getting 1 vote increases, candidates should choose positions closer to those of their partisan voters.

This effect should be stronger if the strength of partisanship — e — is greater.

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Corollary:

- For $x = \frac{1}{2}$, $y_1 = y_2$ — mean voter theorem,
- For $x > \frac{1}{2}$, $y_1 < y_2$,
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Numeric examples — two voters

Suppose that the probability of voting function is logistic:

$$P(u_1 - u_2) = \frac{e^{u_1}}{e^{u_1} + e^{u_2}}, \qquad (6)$$

and the disutility functions are taken to be quadratic:

$$u_{ij} = e_{ij} - \beta(v_i - y_j)^2, \qquad (7)$$

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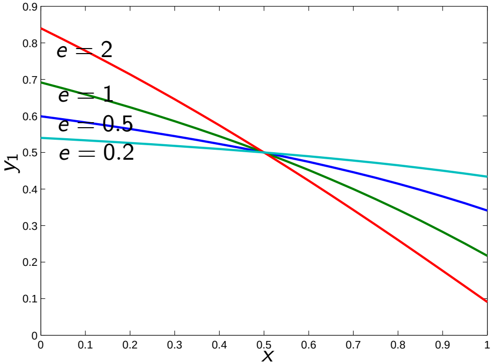

Figure : The equilibrium position of Candidate 1 for different values of x and e, with $\beta = 0.5$

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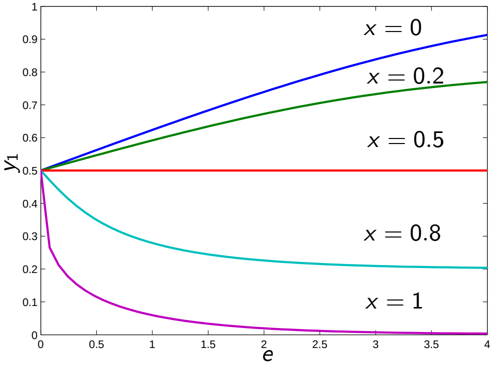

Figure : The equilibrium position of Candidate 1 for different values of x and e, with $\beta = 0.5$.

Numeric examples — more than two voters

Let the candidates have the Cobb-Douglas utility function over the number of votes:

$$U_j = V_j^{\gamma_j}, \tag{8}$$

where V_j is the number of votes in favor of Candidate j, and $\gamma_j \geq 0$ is the parameter that determines the risk preference of the candidate.

If $\gamma_j \in [0, 1)$, then the candidate are risk-averse; if $\gamma_j = 1$, he is risk-neutral; finally, if $\gamma_j > 1$, then the candidate is a risk-lover.

- Suppose that there are two groups of voters of size $N_1 + N_2 = N$.
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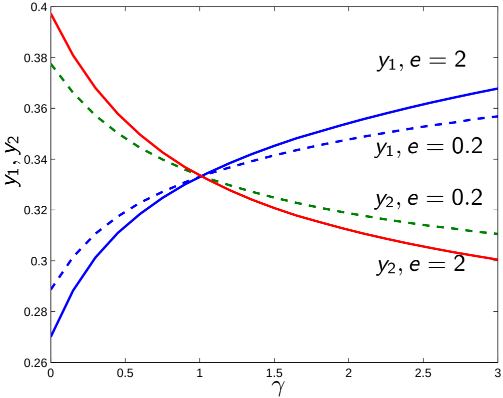
Comparative statics

Let $N = 3$ and $N_1 = 2$. The candidates had identical utility functions: $\gamma_1 = \gamma_2 = \gamma$.



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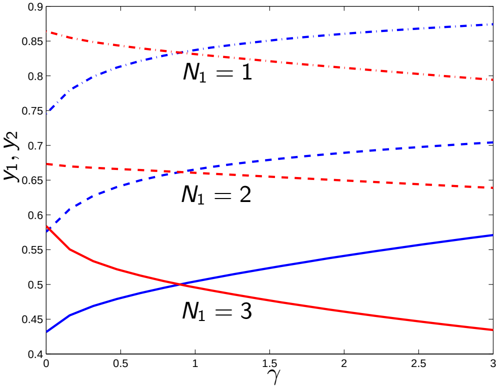

As the size of one group increases, the equilibrium is located closer to the other group's voters.

Design outline

- Experiments were conducted at the FEELE lab at Exeter, using z-Tree.
- We ran 3 treatments. Each treatment had 2 sessions. item Each session had 20 subjects, divided into pairs.
- 120 subjects overall.
- Each pair, played each other for 60 rounds+5 practice rounds.
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Subject pool and payment scheme

- Subjects: first-year students in the business school plus all years from law, psychology, biology, physics, etc.
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Red-Blue Treatments

- Subjects in Fixed Pairs. Each round, each subject chose a number 1, 2 or 3.
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- Rounds alternated every 10 rounds between Red and Blue (half the time we started with Red).
- Winning both events (wins) worth 10 ECUs (50 pence). Losing both (Losses) worth 0. In Blue Rounds winning just one (a tie) equals 1. In Red Rounds, a tie equals 9.

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A's Choice	1	83, 17	85, 15	98, 2
	2	82, 18	83, 17	85, 15
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- The new payoff table is as follows:

First Event		B's	Choice	
		1	2	3
A's Choice	1	94, 6	95, 5	98, 2
	2	93, 7	94, 6	96, 4
	3	50, 50	81, 19	94, 6
Second Event		B's	Choice	
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	2	19, 81	6, 94	5, 95
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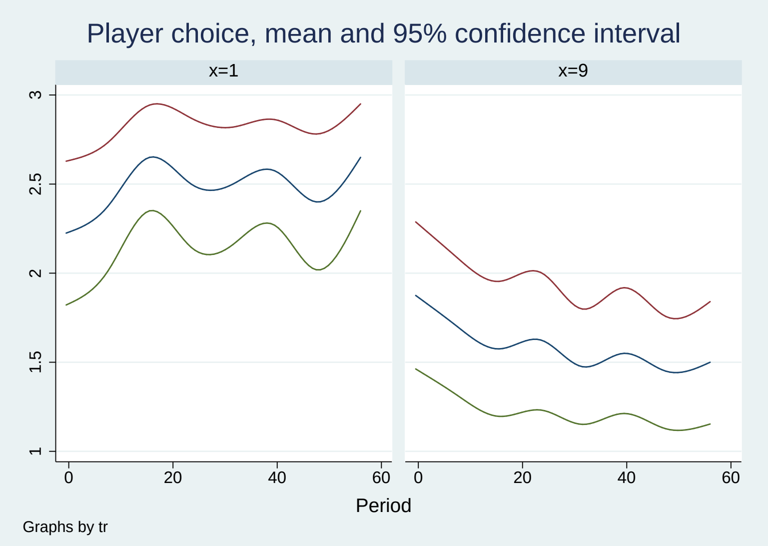
The constant x experiment: Expected payoff matrices.

x = 1				
		B's choice		
		1	2	3
A's choice	1	0.21,0.21	0.20,0.20	0.11,0.11
	2	0.22,0.22	0.21,0.21	0.80,0.80
	3	**0.30,0.30**	0.22,0.22	0.21,0.21
x = 9				
		B's choice		
		1	2	3
A's choice	1	0.79,0.79	0.80,0.80	**0.88,0.88**
	2	0.78,0.78	0.79,0.79	0.80,0.80
	3	0.70,0.70	0.78,0.79	0.79,0.79

The constant x experiment



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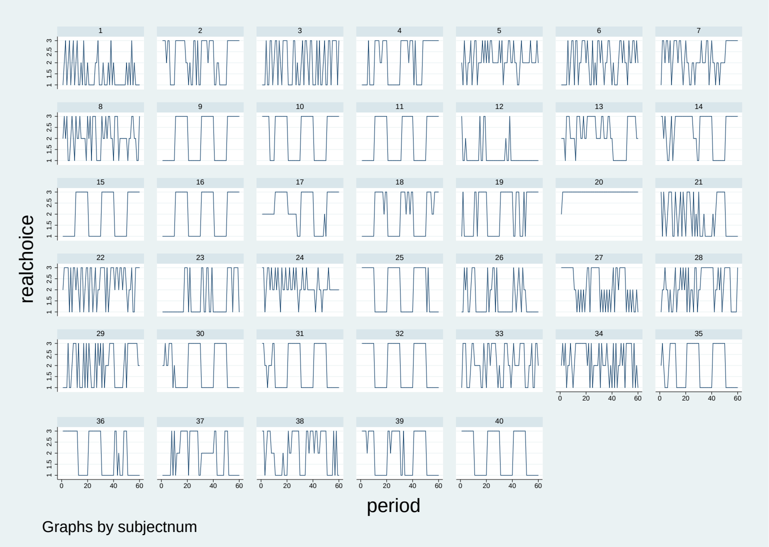
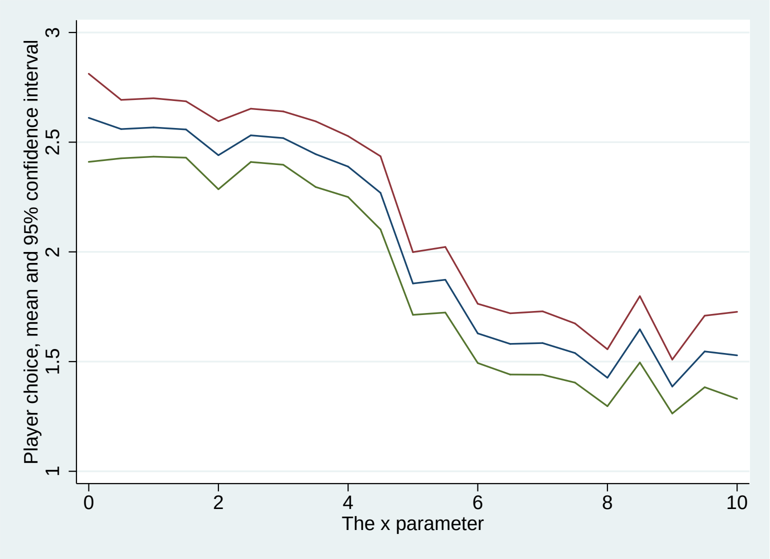


The constant x experiment

Dependent variable is subject's choice (1-3)

Treatment (1 if $x = 1$)	.76 (0.000)	.801 (0.000)	.95 (0.000)	.85 (0.000)
Period (1-60)	-.0040 (0.002)	-.0034 (0.006)		
Treatment×Period	.0073 (0.000)	.0061 (0.001)		
Player (1 or 2)	-.098 (0.029)			
Treatment×Player	-.0266 (0.675)	-.0266 (0.657)		
Opponent's prev. choice				.10 (0.000)
Subject FE	No	Yes	Yes	Yes
Period FE	No	No	Yes	Yes
N	2400	2400	2400	2160
Adjusted R^2	0.275	0.354	0.354	0.368

The random x experiment



The random x experiment: Two equilibria for different x

Dependent variable is subject's choice (1-3)

Value of x (0-10)	-.1119 (0.000)	-.1061 (0.000)	-.16 (0.000)
Period (1-60)	.0053 (0.003)	.0056 (0.002)	
$x \times$Period	-.0011 (0.000)	-.0012 (0.000)	
Player (1 or 2)	-.163 (0.268)	.0304 (0.636)	
$x \times$Player	-.0073 (0.498)	-.0093 (0.404)	
Subject FE	Yes	No	Yes
Period FE	No	No	Yes
N	2400	2400	2400
Adjusted R^2	0.3172	0.2526	.0.314

The random x experiment: Three equilibria for different x

Dependent variable is subject's choice (1-3)

Value of x (0-10)	.0338 (0.044)	.0385 (0.033)	-.0019 (0.895)
Period (1-60)	.0035 (0.020)	.0035 (0.033)	
$x \times$Period	-.0012 (0.000)	-.0012 (0.000)	
Player (1 or 2)	-.441 (0.000)	.4586 (0.000)	
$x \times$Player	-.093 (0.000)	-.0958 (0.000)	-.0939 (0.000)
Subject FE	Yes	No	Yes
Period FE	No	No	Yes
N	2400	2400	2400
Adjusted R^2	0.390	0.275	0.388

The random x experiment: Combined dataset

Dependent variable is subject's choice (1-3)

Value of x (0-10)	-.1069 (0.000)	-.15 (0.000)
Treatment (0 - 2 equilibria)	-.8550 (0.000)	-.21 (0.000)
Tratment$\times x$	.1465 (0.000)	.017 (0.023)
Player (1 or 2)	.0304 (0.615)	
Player $\times x$	-.0093 (0.376)	
Player$\times$treatment	.4282 (0.000)	
Player$\times$treatment$\times x$	-.0864 (0.000)	
Period	.0045 (0.000)	
Period $\times x$	-.0012 (0.000)	
Subject FE	No	Yes
Period FE	No	Yes
N	4800	4800
Adjusted R^2	0.266	0.250

- The experiment confirms the theoretical prediction.
- The predicted effect is stronger later in the experiment.

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Thank you!