Split-Ticket Voting: An Implicit Incentive Approach

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Motivation I
Current State of the Art

- **Split-ticket voting** – citizens vote for candidates of different parties in simultaneous elections
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- **Literature on Split-Ticket Voting in the US elections**:
  - **Strategic Voting**: Alesina and Rosenthal (1995, 1996); Chari, Jones and Marimon (1997)
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- To our knowledge, no literature on split-ticket voting in municipal and regional elections

Here we study this problem
Motivation II
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Evidence from Madrid Region. 2 parties: PP, PSOE

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  - once in 10 cities (Alcorcón, Aranjuez, Arganda del Rey, Coslada, Móstoles, Pinto, Las Rozas de Madrid, San Sebastián de los Reyes, Torrejón de Ardoz, Tres Cantos)
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  - three times in 1 city (Alcobendas)
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  - **three times in 1 city** (Alcobendas)
  - **four times in 1 city** (Rivas-Vaciadmadrid)
  - **never in 9 cities** (Alcalá de Henares, Colmenar Viejo, Fuenlabrada, Getafe, Madrid, Majadahonda, Parla, Pozuelo de Alarcón, Valdemoro)
We apply implicit incentive approach in principal-agent framework to explain split-ticket voting in simultaneous elections for mayor and governor offices.
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Retrospective Voting:
Principals (voters), in each period of an infinite horizon, reward agents (mayor and governor) with reelection based on their observed performance but through implicit reward rule.
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Principals (voters), in each period of an infinite horizon, reward agents (mayor and governor) with reelection based on their observed performance but through implicit reward rule.

Voters can influence agents’ performance only through the choice of an evaluation rule.
We show:

1. If voters vote split-tickets and if politicians are committed to their political parties, then comparative performance evaluation rule is used in next period.
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Otherwise, absolute performance evaluation rule is used in next period.

2. Principals vote split-tickets less frequently than no split-tickets.
Related Literature

- **Retrospective Voting**: Barro (1973); Ferejohn (1986); Persson, Roland and Tabellini (1997); Banks and Sundaram (1993, 1996)

- **Career Concerns**: Holmström (1982); Dewatripont, Jewitt and Tirole (1999); Persson and Tabellini (2000)


- **Yardstick Competition – electoral accountability under decentralization**: Salmon (1987); Besley and Case (1995); Bordignon, Cerniglia and Revelli (2004); Belleflamme and Hindriks (2005); Besley and Smart (2007)
Model

Outline

- Big representative city in the region
- Continuum of individuals; Infinite horizon
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Continuum of individuals; Infinite horizon

**Mayor** $M$ (for city) and **Governor** $G$ (for region) are elected in simultaneous elections at the beginning of each period. Majority rule ($M$ at city level, $G$ at region level)
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- 2 political parties: $L$ and $R$
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- Politicians’ participation constraints are always satisfied. No term limit
- In office politician $i \in \{M, G\}$ implements policy $p_i$

$$p_i = a_i + \varepsilon_i$$

where $a_i \in [0, \bar{a}]$ – politician $i$’s unobservable effort,
$\varepsilon_i \sim N \left(0, \sigma^2\right)$ – independent and unobservable noise
Politician $i \in \{M, G\}$ chooses effort $a_i$ to maximize $\Pi_i (a_i) - C_i (a_i)$, where $\Pi_i (\cdot)$ – politician $i$’s reward, $C_i (\cdot)$ – cost
Politicians/Agents

- Politician $i \in \{M, G\}$ chooses effort $a_i$ to maximize $\Pi_i (a_i) - C_i (a_i)$, where $\Pi_i (\cdot)$ – politician $i$’s reward, $C_i (\cdot)$ – cost

- Politician $i$ is **office-motivated** and **committed to her political party**

$$\Pi_i (a_i, a_j) = \begin{cases} 
\Pr_i (a_i, a_j) + \lambda_i \Pr_j (a_i, a_j) & \text{if } S \\
\Pr_i (a_i, a_j) + \lambda_i (1 - \Pr_j (a_i, a_j)) & \text{if } D 
\end{cases}$$

where $\Pr_i (\cdot)$ – Pr of being reelected for office $i$ in the coming election

$\lambda_i \in [0, 1]$ – degree of politician $i$’s commitment to her party

State $S$ (resp. $D$) – $M$ and $G$ are members of the same (different) party(ies)
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State $S$ (resp. $D$) – $M$ and $G$ are members of the same (different) party(ies)

Effort is costly

$$
C_i(a_i) = \begin{cases} 
\frac{a_i^2}{2c_i} & \text{if } S \\
\frac{a_i^2}{2} & \text{if } D
\end{cases}
$$

where $c_i > 0$
Some individuals always vote for candidates of the same party for mayor $M$ and governor $G$
Model

Voters/Principals I

- Some individuals always vote for candidates of the same party for mayor $M$ and governor $G$
- A large group of individuals is indifferent between political parties. They care about policy outcomes

$$p_M + p_G$$

where $p_M$ and $p_G$ – observable but not contractible at the end of each period
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These individuals are decisive for outcome of both elections. We call them the voters.
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Voters coordinate on the same retrospective reappointment rules to reelect $M$ and $G$ – they condition reappointment decision on politicians’ performance $p_M$ and $p_G$ in the current period and not in any previous period
Voters can influence politicians’ performance only through the choice of an evaluation rule.
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Functional space of performance evaluation rules – linear performance evaluation rules \((\beta_i, b_i)\) determined by slope \(\beta_i \geq 0\) and intercept \(b_i \in \mathbb{R}\) such that \(\beta_M \beta_G \leq 1\)
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Pr of being reelected for office \(i\)

\[
Pr_i (a_i, a_j) = P \left( \{ p_i (a_i) \geq \beta_i p_j (a_j) + b_i \} \right)
\]
Model

Voters/Principals II

- Voters can influence politicians’ performance only through the choice of an evaluation rule
- Functional space of performance evaluation rules – linear performance evaluation rules \((\beta_i, b_i)\)
determined by slope \(\beta_i \geq 0\) and intercept \(b_i \in \mathbb{R}\) such that \(\beta_M \beta_G \leq 1\)
- Pr of being reelected for office \(i\)
  \[ Pr_i (a_i, a_j) = P \{ p_i (a_i) \geq \beta_i p_j (a_j) + b_i \} \]
- Rules \((\beta_i, b_i)\) are required to be sequentially rational
Model

Voters/Principals III

\[ P_G = \beta_G P_M + b_G \]
\[ P_M = \beta_M P_G + b_M \]
Model
Timing I

At each period

- Elections take place.
  Voters reelect incumbents or not (following reappointment rules chosen in the previous period).
State $S$ or $D$ is realized
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- Voters choose reappointment rules $(\beta_i, b_i)$ to reward politicians in the coming elections
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- Elected politicians exert efforts $a_M$ and $a_G$

- Politicians’ performance $p_M$ and $p_G$ is observed
Model
Timing II

\[ p_M^{t-1}, \quad p_G^{t-1}, \quad t, \quad t+1 \]
Model

Timing II

t elections:
Voters use rules
\((\beta_i^{t-1}, b_i^{t-1})\)

\(p_{M}^{t-1}\)          \(t\)  State \(S\) or \(D\)

\(p_{G}^{t-1}\)
Model
Timing II

$t$ elections:
Voters use rules $(\beta_{i,t-1}^t, b_{i,t-1}^t)$
t to use at $t+1$
elections

$p_{M,t-1}^t$
$p_{G,t-1}^t$
$t$
State $S$ or $D$
t $+1$
Model
Timing II

\[ t \text{ elections:} \quad \text{Voters use rules } (\beta_i^{t-1}, b_i^{t-1}) \]  
\[ \text{to use at } t+1 \text{ elections} \]

\[ t \]
\[ p_M^{t-1} \]
\[ p_G^{t-1} \]

\[ \text{State } S \text{ or } D \]

\[ t+1 \]

\[ a_M^t \quad \text{and} \quad a_G^t \]

\[ \text{Politicians exert efforts} \]

\[ \text{Voters choose rules } (\beta_i^t, b_i^t) \]
Model

Timing II

$t$ elections:

Voters use rules $(\beta_i^{t-1}, b_i^{t-1})$

to use at $t+1$
elections

Voters choose rules $(\beta_i^t, b_i^t)$

Politicians exert efforts $a_M^t$ and $a_G^t$

$p_M^{t-1}$

$t$

State $S$ or $D$

$p_M^t$

$p_G^{t-1}$

$p_G^t$

$t + 1$
Model

Timing II

$t$ elections: Voters use rules \((\beta_i^{t-1}, b_i^{t-1})\) to use at $t+1$ elections

Politicians exert efforts $a_M^t$ and $a_G^t$

$t+1$ elections: Voters use rules \((\beta_i^t, b_i^t)\)

$t$ State $S$ or $D$

$\frac{p_M^{t-1}}{p_G^{t-1}}$

$\frac{p_M^t}{p_G^t}$

Galina Zudenkova

Split-Ticket Voting: An Implicit Incentive Approach
Equilibrium concept – Subgame perfect equilibrium
Equilibrium concept – Subgame perfect equilibrium

We solve the game backwards

1. Politicians’ efforts $a_M$ and $a_G$ for rules $(\beta_M, b_M)$ and $(\beta_G, b_G)$

2. Voters’ choice of evaluation rules $(\beta_M, b_M)$ and $(\beta_G, b_G)$
Politicians’ Efforts I
Politicians’ Reward

Assume voters use rules $(\beta_i, b_i)$
Assume voters use rules \((\beta_i, b_i)\)

Politician \(i\)'s reward is

\[
\Pi_i (a_i, a_j) = \begin{cases} 
P (\{p_i (a_i) \geq \beta_i p_j (a_j) + b_i\}) + \\
\lambda_i P (\{p_j (a_j) \geq \beta_j p_i (a_i) + b_j\}) & \text{if } S \\
\lambda_i (1 - P (\{p_j (a_j) \geq \beta_j p_i (a_i) + b_j\})) + \\
P (\{p_i (a_i) \geq \beta_i p_j (a_j) + b_i\}) + \\
\lambda_i P (\{p_j (a_j) \geq \beta_j p_i (a_i) + b_j\}) & \text{if } D
\end{cases}
\]
Theorem

Under linear performance evaluation rules $(\beta_M, b_M)$ and $(\beta_G, b_G)$, there exists an equilibrium in effort strategies $(a_M, a_G)$. Furthermore, this equilibrium is defined implicitly by

$$f_{\varepsilon_i - \beta_i \varepsilon_j} (\beta_i a_j - a_i + b_i) = \begin{cases} \frac{a_i c_j + a_j c_i \lambda_i \beta_j}{c_i c_j (1 - \lambda_i \lambda_j \beta_i \beta_j)} & \text{if } S \\ \frac{a_i - a_j \lambda_i \beta_j}{1 - \lambda_i \lambda_j \beta_i \beta_j} & \text{if } D \end{cases}$$

where $f_{\varepsilon_i - \beta_i \varepsilon_j} (\cdot)$ is the probability density function of $\varepsilon_i - \beta_i \varepsilon_j \sim N \left(0, \left(1 + \beta_i^2\right) \sigma^2\right)$. 
Voters’ Choice of Evaluation Rules I

Voters choose rules \((\beta_i, b_i)\) to maximize their expected utility:

\[
\max_{(\beta_M, b_M), (\beta_G, b_G)} E(p_M + p_G)
\]
Voters’ Choice of Evaluation Rules I

Voters choose rules \((\beta_i, b_i)\) to maximize their expected utility:

\[
\max_{(\beta_M, b_M), (\beta_G, b_G)} E(p_M + p_G) \iff \max_{(\beta_M, b_M), (\beta_G, b_G)} a_M + a_G
\]
Voters’ Choice of Evaluation Rules I

Voters choose rules \((\beta_i, b_i)\) to maximize their expected utility:

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\max_{(\beta_M, b_M), (\beta_G, b_G)} E(p_M + p_G) \Leftrightarrow \max_{(\beta_M, b_M), (\beta_G, b_G)} a_M + a_G
\]

Theorem

There exists a unique equilibrium in rule strategies \((\beta_i^*, b_i^*)\) given by

\[
(\beta_i^*, b_i^*) = \begin{cases} 
(0, a_i^*) & \text{if } S \\
(\lambda_j, a_i^* - \lambda_j a_j^*) & \text{if } D
\end{cases}
\]

where politicians’ equilibrium efforts \(a_i^*\) are equal to

\[
a_i^* = \begin{cases} 
\frac{c_i}{\sqrt{2\pi}\sigma^2} & \text{if } S \\
\frac{1}{\sqrt{2\pi}\sigma^2} \left( \frac{1}{\sqrt{1+\lambda_j^2}} + \frac{\lambda_i^2}{\sqrt{1+\lambda_i^2}} \right) & \text{if } D
\end{cases}
\]
If state $S$, voters use **absolute** performance evaluation rule

$$Pr_i(a_i) = P \{p_i(a_i) \geq a_i^* \}$$
Voters’ Choice of Evaluation Rules II

Intuition

- If state $S$, voters use **absolute** performance evaluation rule

\[ Pr_i(a_i) = P \left( \{ p_i(a_i) \geq a^*_i \} \right) \]

- If state $D$, voters use **comparative** performance evaluation rule

\[ Pr_i(a_i, a_j) = P \left( \{ p_i(a_i) - a^*_i \geq \lambda_j (p_j(a_j) - a^*_j) \} \right) \]
Dynamics I
Equilibrium Transition Probabilities

There is a fixed probability $P_{kl}$ that the city in state $k$ will be next in state $l$, where $k, l \in \{S, D\}$
Dynamics I
Equilibrium Transition Probabilities

There is a fixed probability \( P_{kl} \) that the city in state \( k \) will be next in state \( l \), where \( k, l \in \{S, D\} \)

**Lemma**

*The matrix of the equilibrium one-step transition probabilities, \( \mathbf{P} \), is equal to*

\[
\mathbf{P} \equiv \begin{bmatrix} P_{SS} & P_{SD} \\ P_{DS} & P_{DD} \end{bmatrix} = \\
\begin{bmatrix}
\frac{1}{2} \\
1 - \frac{1}{\pi} \left( \arctan \left( \frac{1}{\lambda_G} \right) - \arctan (\lambda_M) \right) \quad \frac{1}{\pi} \left( \arctan \left( \frac{1}{\lambda_G} \right) - \arctan (\lambda_M) \right)
\end{bmatrix}
\]

*where \( \arctan (\cdot) \) is an arctangent function.*
Dynamics II
Stationary Probabilities

- State $S$ – voters do not split tickets
- State $D$ – voters split tickets

Theorem
The stationary probability that the voters split tickets is independent of the initial state, and is equal to

$$
\pi_3 = \frac{1}{3} + \frac{2}{\lambda G} + \frac{2 \arctan(\lambda M)}{\lambda G} \in \left[\frac{1}{3}, \frac{1}{2}\right].
$$
Dynamics II
Stationary Probabilities

- State $S$ – voters **do not split tickets**
- State $D$ – voters **split tickets**

**Theorem**

The stationary probability that the voters split tickets is independent of the initial state, and is equal to

$$\frac{\pi}{3\pi - 2 \arctan\left(\frac{1}{\lambda_G}\right) + 2 \arctan(\lambda_M)} \in \left[\frac{1}{3}, \frac{1}{2}\right].$$
Null hypothesis. In large municipalities with decisive voters caring about politicians’ performance rather than parties’ ideology, the transitions between the split-ticket and non split-ticket states follow matrix $P$

$$P ≡ \begin{bmatrix} P_{SS} & P_{SD} \\ P_{DS} & P_{DD} \end{bmatrix} = \begin{bmatrix} \frac{1}{2} \\ 1 - \frac{1}{\pi} \left( \arctan \left( \frac{1}{\lambda_G} \right) - \arctan \left( \lambda_M \right) \right) \end{bmatrix} \begin{bmatrix} \frac{1}{2} \\ \frac{1}{\pi} \left( \arctan \left( \frac{1}{\lambda_G} \right) - \arctan \left( \lambda_M \right) \right) \end{bmatrix}$$
Panel Data on simultaneous municipal and regional elections in six Spanish regions – Castilla-La Mancha, Comunidad de Madrid, Comunitat Valenciana, Islas Baleares, Principado de Asturias and Región de Murcia
Empirics II
Data Description

- Panel Data on simultaneous municipal and regional elections in six Spanish regions – Castilla-La Mancha, Comunidad de Madrid, Comunitat Valenciana, Islas Baleares, Principado de Asturias and Región de Murcia

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- Census, number of abstainers, votes to PP, votes to PSOE, votes to other parties for both municipal and regional elections
Maximum likelihood estimate of the matrix of one-step transition probabilities

\[
\hat{P} = \begin{bmatrix} \hat{P}_{SS} & 1 - \hat{P}_{SS} \\ \hat{P}_{DS} & 1 - \hat{P}_{DS} \end{bmatrix} = \begin{bmatrix} 0.5774 & 0.4226 \\ 0.6591 & 0.3409 \end{bmatrix}
\]
Empirics III
Empirical Analysis

- **Maximum likelihood estimate** of the matrix of one-step transition probabilities

\[
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\end{bmatrix} = \begin{bmatrix}
0.5774 & 0.4226 \\
0.6591 & 0.3409
\end{bmatrix}
\]

- **Likelihood ratio test** (two degrees of freedom, 0.05 percentile)

\[
H_0 \text{ is not rejected for } (\lambda_M, \lambda_G) \text{ such that }
0.2185 \leq \frac{1}{\pi} \left( \arctan \left( \frac{1}{\lambda_G} \right) - \arctan \left( \lambda_M \right) \right) \leq 0.4546
\]
Range of \((\lambda_M, \lambda_G)\) for which the null hypothesis is not rejected:
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Summary and Results

1. We apply implicit incentive approach to split-ticket voting in local simultaneous elections. Principals (voters) influence agents’ (politicians’) performance through the choice of evaluation rules.

2. If voters split tickets and if politicians are committed to their political parties, then comparative performance evaluation rule is used in next period.
We apply **implicit incentive approach** to **split-ticket voting in local simultaneous elections**. Principals (voters) influence agents’ (politicians’) performance through the choice of evaluation rules.

If voters split tickets and if politicians are committed to their political parties, then **comparative performance evaluation rule** is used in next period. Otherwise, **absolute performance evaluation rule** is used in next period.

Stationary probability that in the long run the principals split tickets is independent on the initial state, and is lower than stationary probability that they do not split tickets.

We find empirical support for model prediction on the equilibrium transition probabilities between split-ticket and non split-ticket states for moderate levels of politicians’ commitment to their political parties.
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- **Politicians are committed to their political parties**, i.e., they care about overall representation of their party in governing bodies rather than their own reelection prospects