Split-Ticket Voting: An Implicit Incentive Approach

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January 2010
Motivation

Split-ticket voting – citizens vote for candidates from different parties in simultaneous elections
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Why do voters split tickets? What are the economic consequences of ticket splitting?
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  - **Effective oversight of Executive** – voters reinforce opposition in Legislature to monitor Executive (Bugarin, *Soc Choice Welfare* 2003; Fox and Van Weelden 2009).

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- This paper offers an alternative explanation for ticket splitting: ticket splitting – outcome of optimal reward scheme voters use to motivate politicians’ efforts.
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- This paper offers an alternative explanation for ticket splitting: ticket splitting – outcome of optimal reward scheme voters use to motivate politicians’ efforts.

- This paper studies dynamics of ticket splitting.
Roadmap

- **Political agency model** of Split-Ticket Voting
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- **Ticket Splitting** – outcome of optimal implicit reward scheme voters use to motivate politicians’ efforts
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- Model generates **dynamics of split-ticket voting**
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- **Ticket Splitting** – outcome of optimal implicit reward scheme voters use to motivate politicians’ efforts

- Model generates **dynamics of split-ticket voting**

- Model is consistent with patterns of ticket splitting observed in Spanish simultaneous elections
Related Literature


- **Intergovernmental Competition**:
  - **Horizontal; Yardstick Competition**: Tiebout 1956; Salmon 1987; Besley and Case 1995; Bordignon, Cerniglia and Revelli 2004; Belleflamme and Hindriks 2005; Besley and Smart 2007
  - **Vertical**: Breton 1996; Breton and Fraschini 2003; Breton and Salmon 2001; Volden 2005; Volden 2007
Repeated game with an infinite horizon
Model
Outline: Stage Game

- Repeated game with an infinite horizon

- Stage game – sequential political agency game between politicians (mayor and governor) and voters
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- Large city in region
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Mayor $M$ (for city) and Governor $G$ (for region) are elected in simultaneous elections
Model
Outline: Stage Game

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- Large city in region

- **Mayor** $M$ (for city) and **Governor** $G$ (for region) are elected in simultaneous elections

- 2 political parties
Model

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- **Mayor** $M$ (for city) and **Governor** $G$ (for region) are elected in simultaneous elections

- 2 political parties

- 2 candidates from opposite parties at each elections: incumbent and opponent
In office, politician \( i \in \{M, G\} \) implements a policy determined by her unobservable effort \( a_i \)
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\( p_i \) (performance of politician \( i \)) is observed with independent and unobservable noise \( \varepsilon_i \sim N (0, \sigma^2) \).

\[
p_i = a_i + \varepsilon_i
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In office, politician $i \in \{M, G\}$ implements a policy determined by her unobservable effort $a_i$

$p_i$ (performance of politician $i$) is observed with independent and unobservable noise $\varepsilon_i \sim N(0, \sigma^2)$

$$p_i = a_i + \varepsilon_i$$

Politician $i \in \{M, G\}$ chooses $a_i$ to maximize

$$\Pi_i(a_i) - \frac{a_i^2}{2}$$
Office-motivated politician \((M/G)\) prefers her counterpart \((G/M)\) to be affiliated with the same political party.
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\[
\Pi_i (a_i, a_j) = \begin{cases} 
\Pr_i (a_i, a_j) + \lambda_i^S \Pr_j (a_i, a_j) & \text{if } S \\
\Pr_i (a_i, a_j) + \lambda_i^D (1 - \Pr_j (a_i, a_j)) & \text{if } D
\end{cases}
\]

where

- \(\Pr_i (\cdot)\) – Pr of being reelected for office \(i\)
- \(\lambda_i \in [0, 1]\) – strength of party alignment of politician \(i\)
- \(\lambda_i^S \geq \lambda_i^D\) – politicians’ preference for incumbents
- State \(S\) – \(M\) and \(G\) are affiliated with the same party
- State \(D\) – \(M\) and \(G\) are affiliated with different parties
Voters care about politicians’ performances

\[ p_M + p_G \]
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Voters coordinate on retrospective reappointment rules to reelect mayor \( M \) and governor \( G \)
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Voters coordinate on retrospective reappointment rules to reelect mayor \( M \) and governor \( G \)

Voters condition reappointment decision on politicians’ performances in the current period and not in any previous period (as in Persson, Roland and Tabellini, *Quart J Econ* 1997)
Model
Timing of the Stage Game
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Voters choose reappointment rules to use in the coming elections

State $S$ or $D$ is realized
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Politicians exert efforts $a_M$ and $a_G$
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Timing of the Stage Game

Voters choose reappointment rules to use in the coming elections.

Politicians exert efforts $a_M$ and $a_G$.

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$P_M$ and $P_G$ are observed.
Model
Timing of the Stage Game

Voters choose reappointment rules to use in the coming elections
Politicians exert efforts $a_M$ and $a_G$

Elections:
Voters use the chosen rules

State $S$ or $D$ is realized
$p_M$ and $p_G$ are observed
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Model
Timing of the Stage Game


State $S$ or $D$ is realized. $p_M$ and $p_G$ are observed. State $S$ or $D$ is realized.

one stage game
Joint Performance Evaluation: voters condition reelection of politician $i$ on her own performance $p_i$ and on $j$’s performance $p_j$
Model
Details: Voters

- **Joint Performance Evaluation**: voters condition reelection of politician $i$ on her own performance $p_i$ and on $j$’s performance $p_j$

- Functional space of performance evaluation rules – **linear performance evaluation rules** $(\beta_i, b_i)$ determined by slope $\beta_i$ and intercept $b_i$
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- Reelection probabilities

\[
Pr_M = P(p_M + \beta_M p_G \geq b_M) \\
Pr_G = P(p_G + \beta_G p_M \geq b_G)
\]
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  - positively correlated if $\beta_M, \beta_G > 0$
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  - negatively correlated if $\beta_M, \beta_G < 0$
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**Model**

Details: Voters

\[ p_M + \beta_M p_G = b_M \]

\[ p_G + \beta_G p_M = b_G \]

- \( G \) is reelected
- \( M \) is not reelected
- both \( M \) and \( G \) are reelected
- \( M \) is reelected
- \( G \) is not reelected
- neither \( M \) nor \( G \) is reelected
Model
Equilibrium Concept

- Each stage game – sequential political agency game
  - Equilibrium concept – Subgame perfect equilibrium
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  - I solve game backwards
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- Infinitely repeated game
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  - Voters condition reappointment decision on politicians’ performances in the current period and not in any previous period (as in Persson, Roland and Tabellini, *Quart J Econ* 1997)
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  - Politicians are myopic – they care about reelection only in the coming elections and not in any other subsequent elections (as in Alesina and Tabellini, J Public Econ 2008)
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  - I consider a particular Markov Perfect Equilibrium where a stage game equilibrium is replicated infinitely often. The payoff-relevant states are $S$ and $D$
Politicians are members of the same party, $S$

$M$’s problem \[ \max_{a_M} \Pr_M (a_M, a_G) + \lambda^S_M \Pr_G (a_M, a_G) - \frac{a_M^2}{2} \]

$G$’s problem \[ \max_{a_G} \Pr_G (a_M, a_G) + \lambda^S_G \Pr_M (a_M, a_G) - \frac{a_G^2}{2} \]

$M$’s and $G$’s reelections are independent: $\beta_M, \beta_G = 0$
Equilibrium
Politicians’ Problem and Best Response Functions

Politicians are members of the same party, $S$

\[ M's \text{ problem } \max_{a_M} \Pr_M (a_M, a_G) + \lambda^S_M \Pr_G (a_M, a_G) - \frac{a_M^2}{2} \]

\[ G's \text{ problem } \max_{a_G} \Pr_G (a_M, a_G) + \lambda^S_G \Pr_M (a_M, a_G) - \frac{a_G^2}{2} \]

$M$’s and $G$’s reelections are negatively correlated: $\beta_M, \beta_G < 0$
Politicians are members of the same party, $S$

\[
\begin{align*}
M\text{'s problem} & \quad \max_{a_M} \Pr_M (a_M, a_G) + \lambda_M^S \Pr_G (a_M, a_G) - \frac{a_M^2}{2} \\
G\text{'s problem} & \quad \max_{a_G} \Pr_G (a_M, a_G) + \lambda_G^S \Pr_M (a_M, a_G) - \frac{a_G^2}{2}
\end{align*}
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$M$’s and $G$’s reelections are positively correlated: $\beta_M, \beta_G > 0$
Equilibrium

Politicians’ Problem and Best Response Functions

Politicians are members of different parties, $D$

$M$’s problem: $\max_{a_M} Pr_M (a_M, a_G) + \lambda_M^D (1 - Pr_G (a_M, a_G)) - \frac{a_M^2}{2}$

$G$’s problem: $\max_{a_G} Pr_G (a_M, a_G) + \lambda_G^D (1 - Pr_M (a_M, a_G)) - \frac{a_G^2}{2}$

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Equilibrium
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\[ M\text{'s problem } \max_{a_M} \Pr_M (a_M, a_G) + \lambda^D_M (1 - \Pr_G (a_M, a_G)) - \frac{a_M^2}{2} \]

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$M$’s and $G$’s reelections are negatively correlated: $\beta_M, \beta_G < 0$
Theorem

There exists an equilibrium in rule strategies \((\beta^*_i, b^*_i)\) given by

\[
(\beta^*_i, b^*_i) = \begin{cases} 
  \left( \lambda^S_j, a^*_i + \lambda^S_j a^*_j \right) & \text{if } S \\
  \left( -\lambda^D_j, a^*_i - \lambda^D_j a^*_j \right) & \text{if } D 
\end{cases}
\]

where \(a^*_i\) is politician i’s equilibrium effort

\[
a^*_i = \begin{cases} 
  \frac{1}{\sqrt{2\pi}\sigma} \left( \frac{1}{\sqrt{1+(\lambda^S_j)^2}} + \frac{(\lambda^S_i)^2}{\sqrt{1+(\lambda^S_i)^2}} \right) & \text{if } S \\
  \frac{1}{\sqrt{2\pi}\sigma} \left( \frac{1}{\sqrt{1+(\lambda^D_j)^2}} + \frac{(\lambda^D_i)^2}{\sqrt{1+(\lambda^D_i)^2}} \right) & \text{if } D
\end{cases}
\]
In $S$ voters use **joint** performance evaluation rules, under which politicians’ reelections are **positively correlated**

$$Pr_i = P \left( p_i + \lambda^S_j p_j \geq a^*_i + \lambda^S_j a^*_j \right)$$
In $S$ voters use joint performance evaluation rules, under which politicians’ reelections are positively correlated

$$Pr_i = P (p_i + \lambda^S_j p_j \geq a_i^* + \lambda^S_j a_j^*)$$

In $D$ voters use joint performance evaluation rules, under which politicians’ reelections are negatively correlated

$$Pr_i = P (p_i - \lambda^D_j p_j \geq a_i^* - \lambda^D_j a_j^*)$$
Equilibrium

In $S$ voters use **joint** performance evaluation rules, under which politicians’ reelections are **positively correlated**

$$Pr_i = P \left( p_i + \lambda_j^S p_j \geq a_i^* + \lambda_j^S a_j^* \right)$$

In $D$ voters use **joint** performance evaluation rules, under which politicians’ reelections are **negatively correlated**

$$Pr_i = P \left( p_i - \lambda_j^D p_j \geq a_i^* - \lambda_j^D a_j^* \right)$$

If politicians are not loyal to their political parties ($\lambda_i = 0$) voters use **cut-off** rules, under which politicians’ reelections are **independent**

$$Pr_i = P \left( p_i \geq a_i^* \right)$$
Dynamics

Transition Probabilities between states $S$ and $D$

State $S$ – voters do not split tickets

State $D$ – voters split tickets
Dynamics

Transition Probabilities between states $S$ and $D$

State $S$ – voters **do not split tickets**
- positively correlated reelections

State $D$ – voters **split tickets**
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Dynamics
Transition Probabilities between states $S$ and $D$

State $S$ – voters do not split tickets
positively correlated reelections

State $D$ – voters split tickets
negatively correlated reelections

\[
G \text{ is reelected } \Rightarrow D \\
M, G \text{ are reelected } \Rightarrow S \\
one \text{ is reelected } \Rightarrow S \\
M \text{ is reelected } \Rightarrow D
\]

\[
p_G + \lambda^S_M p_M = a^*_G + \lambda^S_M a^*_M \\
(p_G, a^*_G)
\]

\[
p_M + \lambda^S_G p_G = a^*_M + \lambda^S_G a^*_G \\
(p_M)
\]
**Dynamics**
Transition Probabilities between states $S$ and $D$

**State $S$** – voters **do not split tickets**  
positively correlated relections

- $G$ is reelected $\Rightarrow D$  
- $p_G + \lambda_M p_M = a_G^* + \lambda_M a_M^*$  
- none is reelected $\Rightarrow S$  
- $p_M + \lambda_S p_G = a_M^* + \lambda_S a_G^*$

**State $D$** – voters **split tickets**  
negatively correlated relections

- $M$, $G$ are reelected $\Rightarrow S$  
- $p_G - \lambda_M p_M = a_G^* - \lambda_M a_M^*$  
- $M$ is reelected $\Rightarrow S$  
- $p_M - \lambda_S p_G = a_M^* - \lambda_S a_G^*$
Ticket splitting is less likely than electing candidates from the same party,

不利的选举是让人难以接受的。
Dynamics

Transition Probabilities between states $S$ and $D$

State $S$ – voters do not split tickets

positively correlated reelects

State $D$ – voters split tickets

negatively correlated reelects

Ticket splitting is less likely than electing candidates from the same party, but somewhat more probable when the voters split tickets in the previous period (due to the politicians’ preference for incumbents)
Results

- **Ticket Splitting** – outcome of optimal implicit reward scheme voters use to motivate politicians’ efforts
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- Since politicians’ incentives are correlated, *voters adopt joint performance evaluation rules*, conditioned on the incumbents’ being members of the same party or different parties
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- Model generates a certain **dynamics of split-ticket voting**
**Results**

- **Ticket Splitting** – outcome of optimal implicit reward scheme voters use to motivate politicians’ efforts

- Since politicians’ incentives are correlated, voters adopt joint performance evaluation rules, conditioned on the incumbents’ being members of the same party or different parties

- Model generates a certain **dynamics of split-ticket voting**:

  Ticket Splitting is less likely than voting for candidates from the same party,

  but somewhat more probable when the voters split tickets in the previous period
Region consists of $n$ municipalities.
Extension
Ticket Splitting in Small Municipalities

- Region consists of $n$ municipalities.
- Mayor $M_i$ is office-motivated and loyal to her political party (same as before).
Region consists of $n$ municipalities.

Mayor $M_i$ is office-motivated and loyal to her political party (same as before).

Governor $G$ is office-motivated and loyal to her political party: she prefers members of her own party in all offices $M_1, \ldots, M_n$. 

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Ticket Splitting in Small Municipalities

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Region consists of $n$ municipalities.

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Probability of governor $G$’s reelection:
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Probability of governor $G$’s reelection: each municipality $i$ is pivotal with probability proportional to its population share.
**Findings: Dynamics**

**Novel:** Split-ticket voting is more likely in small municipalities than in large ones

**Intuition:**
- Governor cares less about party affiliation of mayors in small municipalities
- Politicians' incentives are less correlated
- Voters adopt less correlated joint performance evaluation rules
- This increases the probability of ticket splitting
Findings: Dynamics

**Novel**: Split-ticket voting is more likely in small municipalities than in large ones.

**Intuition**: Governor cares less about party affiliation of mayors in small municipalities ⇒
Findings: Dynamics

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governor cares less about party affiliation of mayors in small municipalities ⇒

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**Findings: Dynamics**

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- governor cares less about party affiliation of mayors in small municipalities ⇒
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Findings: Dynamics

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governor cares less about party affiliation of mayors in small municipalities ⇒

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Empirical Analysis

- **Goal**: to estimate probability of ticket splitting
Empirical Analysis

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- Probit Model
In Spain, mayor and governor elections are held simultaneously in 13 out of 17 regions.
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Two leading parties: Partido Popular (PP) and Partido Socialista Obrero Español (PSOE)
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Two leading parties: Partido Popular (PP) and Partido Socialista Obrero Español (PSOE).

I use data on aggregate electoral results for 10 Spanish regions:

Aragon, Principality of Asturias, Balearic Islands, Cantabria, Castile-La Mancha, Extremadura, La Rioja, Community of Madrid, Region of Murcia and Valencian Community.
Data Description

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- In final sample:
  - same turnout in municipal and regional elections (maximal turnout difference 5%)
  - PP and PSOE are two leading parties
- Ticket Splitting = different parties get the majority of votes in municipal and regional elections
Data Description
Empirical Model

Variables:

\[ y_{it} = \begin{cases} 
1 & \text{ST in municipality } i \\
0 & \text{nST in municipality } i 
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- **Probit Regression:**

  \[
  P\left( y_{it} = 1 | \rho_i, y_{it-1}, x_{it}, \xi_r, \xi_t \right) = \\
  \Phi \left( \mu_0 + \mu_1 \rho_i + \mu_2 y_{it-1} + \mu_3 x_{it} + \xi_r + \xi_t \right)
  \]

  region effects and year effects are included as regional and year dummies
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- **No time invariant municipality effects \( \Rightarrow \) I estimate the model by pooling all cross sections**
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- Hypotheses:
  - \( \mu_1 < 0 \) – ticket splitting is more likely in small municipalities
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- No time invariant municipality effects \(\Rightarrow\) I estimate the model by pooling all cross sections.

- **Hypotheses:**
  - \(\mu_{1} < 0\) – ticket splitting is more likely in small municipalities
  - \(\mu_{2} > 0\) – ticket splitting at \(t\) is more likely if ticket splitting at \(t - 1\)
Results
Probability of Ticket Splitting

Hypotheses: $\mu_1 < 0, \mu_2 > 0$
Results

Probability of Ticket Splitting

Hypotheses: $\mu_1 < 0$, $\mu_2 > 0$

\[
P(\text{ticket splitting in } i \text{ at } t) = P(y_{it} = 1)
\]

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop. share, $\mu_1$</td>
<td>-2.544*</td>
<td>-2.616**</td>
<td>-2.793*</td>
</tr>
<tr>
<td></td>
<td>(1.332)</td>
<td>(1.309)</td>
<td>(1.456)</td>
</tr>
<tr>
<td>TS in $t - 1$, $\mu_2$</td>
<td>0.734***</td>
<td>0.734***</td>
<td>0.741***</td>
</tr>
<tr>
<td></td>
<td>(0.043)</td>
<td>(0.043)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Observations</td>
<td>4183</td>
<td>4183</td>
<td>4177</td>
</tr>
</tbody>
</table>

Significant at 10% – *; 5% – **; 1% – ***

(1) – only region dummies
(2) – region dummies and year dummies
(3) – region-year dummies
Results

Probability of Ticket Splitting

![Graph showing probability of ticket splitting against size_i]

- Predicted Pr $P_{y_i}$ of ticket splitting
- Upper bound of $P_{y_i}$: $1/2$
Summary and Results

Political Agency model of Split-Ticket Voting
Summary and Results

**Political Agency model of Split-Ticket Voting**

- Politicians’ incentives are correlated $\Rightarrow$ voters use joint performance evaluation to reward politicians
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Dynamics of Ticket Splitting
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Dynamics of Ticket Splitting

- Ticket Splitting is less likely than voting for candidates from same party
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- Ticket Splitting is less likely than voting for candidates from same party, but somewhat more probable when the voters split tickets in the previous period
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Empirical Analysis
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- I estimate probability of ticket splitting using panel data on Spanish simultaneous elections
- My theoretical model is consistent with patterns of ticket splitting observed in Spanish data