Clean Competition
How Competitive Elections Clean-up the Air in Mexican Municipalities?

Anthony Pezzola
Pontificia Universidad Catolica de Chile

Amanda Fidalgo
Penn State University

Xun Cao
Penn State University

Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies;
Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies; not only democracy, but also state capacity and long time horizons;
Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies; not only democracy, but also state capacity and long time horizons;
- electoral rules matter: e.g., malapportionment associated with lower energy tax;
- corporatist institutions being greener ...
Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies; not only democracy, but also state capacity and long time horizons;
- electoral rules matter: e.g., malapportionment associated with lower energy tax;
- corporatist institutions being greener ... 
- state capacity is associated with more pollution in authoritarian states.
Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies; not only democracy, but also state capacity and long time horizons;
- electoral rules matter: e.g., malapportionment associated with lower energy tax;
- corporatist institutions being greener ...
- state capacity is associated with more pollution in authoritarian states.

⇒ What about sub-national level, especially when we see significant sub-national level variation?
Figure 1: PM2.5 Levels in Mexican Municipals (using 2010 municipal boundaries), 1999, 2004, 2009, and 2014.
Motivations

Explaining environmental outcomes, but moving from cross-country to within country variation:
⇒ need new theories; existing theories in IR and CP often focus on country level political institutions:

- political regime types: democracy vs. non-democracies; not only democracy, but also state capacity and long time horizons;
- electoral rules matter: e.g., malapportionment associated with lower energy tax;
- corporatist institutions being greener ... 
- state capacity is associated with more pollution in authoritarian states.

⇒ What about sub-national level, especially when we see significant sub-national level variation?

We focus on local political dynamics ⇒ the role of electoral competition in very local setting: municipalities in Mexico (> 2400);
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
  - overall government performances, spending, and services;
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
   - overall government performances, spending, and services;
   - education;
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
  - overall government performances, spending, and services;
  - education;
  - infrastructure;
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:

- overall government performances, spending, and services;
- education;
- infrastructure;

Mixed empirical findings, depending on the types of public goods, level of analysis, measures of electoral competition, and country of focus ...
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
- overall government performances, spending, and services;
- education;
- infrastructure;

Mixed empirical findings, depending on the types of public goods, level of analysis, measures of electoral competition, and country of focus ...

- environmental quality: rarely tested, yet pure(r/st) public good; trade-off with economic growth.
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
  - overall government performances, spending, and services;
  - education;
  - infrastructure;

Mixed empirical findings, depending on the types of public goods, level of analysis, measures of electoral competition, and country of focus …

  - environmental quality: rarely tested, yet pure(r/st) public good; trade-off with economic growth.

H1: More competitive elections associated with better environmental outcomes.
Electoral democratic theory: competitive elections offer citizens the opportunity to influence government representatives by threatening to remove the incumbent for poor performance and by selecting representatives who are competent and share the public’s preferences.

⇒ More competitive elections associated with more public goods provisions:
  - overall government performances, spending, and services;
  - education;
  - infrastructure;

Mixed empirical findings, depending on the types of public goods, level of analysis, measures of electoral competition, and country of focus ...

  - environmental quality: rarely tested, yet pure(r/st) public good; trade-off with economic growth.

H1: More competitive elections associated with better environmental outcomes.

H2: More competitive elections associated with better environmental outcomes when the public demands environmental public goods.
Electoral competition: how to measure?

Margin of victory between the first and second place party (coalition) ⇒ intuitive, but might be problematic:
Electoral competition: how to measure?

Margin of victory between the first and second place party (coalition) ⇒ intuitive, but might be problematic:

- Municipality A: two parties split the vote 55% - 45%
- Municipality B: three parties split the vote 41% - 30% - 29%
Electoral competition: how to measure?

Margin of victory between the first and second place party (coalition) ⇒ intuitive, but might be problematic:

- Municipality A: two parties split the vote 55% - 45%
- Municipality B: three parties split the vote 41% - 30% - 29%

Effective number of parties (Golosov 2009): \( N = \sum_{i=1}^{n} \frac{1}{1+(p_1^2/p_i)-p_i} \)
Electoral competition: how to measure?

Margin of victory between the first and second place party (coalition) ⇒ intuitive, but might be problematic:

- Municipality A: two parties split the vote 55% - 45%
- Municipality B: three parties split the vote 41% - 30% - 29%

Effective number of parties (Golosov 2009): \( N = \sum_{i=1}^{n} \frac{1}{1+\left(\frac{p_1^2}{p_i}\right)-p_i} \)

- electoral competition measures based on the latest previous election outcome;
- temporally lagged spatial lag (for spatial diffusion); AR1; time trends; fixed state-effects, random municipal effects …
empirical results

Margin of victory: no effect;
empirical results

Margin of victory: no effect;

Effective number of parties: reduces pollution (−);
empirical results

Margin of victory: no effect;

Effective number of parties: reduces pollution (−);

No interactive effect with GDP per cap for either measure;
empirical results

Margin of victory: no effect;

Effective number of parties: reduces pollution (−);

No interactive effect with GDP per cap for either measure;

<table>
<thead>
<tr>
<th>Density of Economic Activity:</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita:</td>
<td>−</td>
</tr>
<tr>
<td>Literacy (%):</td>
<td>−</td>
</tr>
<tr>
<td>Forested Surface Area (%):</td>
<td>−</td>
</tr>
<tr>
<td>Urban Area (%):</td>
<td>−</td>
</tr>
<tr>
<td>Density of High Pollution Production:</td>
<td>−</td>
</tr>
<tr>
<td>Municipal Resources:</td>
<td>×</td>
</tr>
<tr>
<td>Population:</td>
<td>×</td>
</tr>
<tr>
<td>Elevation:</td>
<td>×</td>
</tr>
<tr>
<td>Density of Federally Regulated Industries:</td>
<td>×</td>
</tr>
</tbody>
</table>
empirical results

Margin of victory: no effect;

Effective number of parties: reduces pollution (−);

No interactive effect with GDP per cap for either measure;

Density of Economic Activity: +

GDP per capita: −
Literacy (%): −
Forest ed Surface Area (%): −
Urban Area (%): −
Density of High Pollution Production: −

Municipal Resources: ×
Population: ×
Elevation: ×
Density of Federally Regulated Industries: ×

Spatial diffusion: very strong
empirical results

Margin of victory: no effect;

Effective number of parties: reduces pollution \((-0.006)\);

No interactive effect with GDP per cap for either measure;

Density of Economic Activity: \(+0.012\)

GDP per capita: \(-0.013\)
Literacy (%): \(-0.001\)
Forested Surface Area (%): \(-0.122\)
Urban Area (%): \(-0.058\)
Density of High Pollution Production: \(-0.002\)

Municipal Resources: \(\times\)
Population: \(\times\)
Elevation: \(\times\)
Density of Federally Regulated Industries: \(\times\)

Spatial diffusion: 0.921