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Government-Firm Bargaining over Environmental Regulation: Evidence from the EU Emissions Trading Scheme

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Research Question in Perspective

**Research Question**

Which “firms” get what in bargaining over the allocation of valuable emission permits?

- Research on the EU emissions trading scheme (EU ETS) so far:
  - Economic research on allocation rules, market efficiency, effects on competitiveness (Ellerman et al. 2007, 2010).
  - No research on **distributive politics** of the EU ETS.

- “The implementation of an emissions trading scheme is essentially a political process.” (Pinske, 2008, 195).
What Is the EU ETS?

- The EU ETS was created as a policy response in the aftermath of the Kyoto Protocol and is operated since 2005.
- Single largest ETS worldwide, with more than 11,000 installations, 10 (aggregated) sectors in 31 countries.
- Annual regulated CO2 emissions: 2 billion tons (market value of more than 10 billion euro).
- Permits are the currency of an emissions trading scheme.
Sketching an (Informal) Argument

- **Claim 1**: Multinationals (=foreign) firms are more productive.
- **Claim 2**: Large multinationals face higher relocation costs.
- In a bargaining model, claim 1 strengthens and claim 2 weakens a multinational’s outside option.

**Main Argument**

On the margin, foreign firms obtain more permits, but this effect decreases with size.
Simple Model of Relocation Risk

- Assume a firm $i$ relocates if $\pi_i(q_i) < \bar{\pi}_i + C_i$ where $C_i = \kappa_i(s_i) + \epsilon_i$.
- If $\epsilon_i \sim F_i$, expected relocation risk is

\[ r_i = F_i\left(\bar{\pi} - \pi_i(q_i) - \kappa_i(s_i)\right) \cdot H_i \]

- Minimization problem

\[
\min_{q_i} \sum_{i}^{n} r_i \quad \text{s.t.} \quad \sum_{i}^{n} q_i = Q
\]

\[
f_i\left(\bar{\pi}_i - \pi_i(q_i) - \kappa_i(s_i)\right) \cdot \pi_i'(q_i) \cdot H_i = \lambda \quad \forall i \quad \text{FOC}
\]

- With concavity of $\pi_i$ and a negative cross-partial of $F_i$, comparative statics rationalize the bargaining logic from the informal argument.
Novel Firm-Level Data

- Allocation and emissions data at **installation level** from EU ETS:
  - Coverage for up to 12,536 plants.
  - Installations across 11 sectors in 28 European countries.
  - Largest sectors: Combustion (32%), Power (30%), and Ceramics (11%).

- Match emissions data with **firm level** information:
  - Installations are owned by 3,567 firms.
  - Largest firms: E.ON (Germany, N=207), Veolia (France, N=202), Wienerberger AG (Austria, N=173), Suez (France, N=137), and Vattenfall (Sweden, N=113).
  - Median firm size is just one plant, with a mean of only 2.81 installations.

- Hierarchies at the installation, firm, sector, and country level.
Model Specification

▶ **Varying intercept, varying slope** model at firm-level with firm size as group-level predictor (3,222 firms).

▶ Two additional, **non-nested** hierarchies at country (28 countries) and sector level (11 sectors).

▶ Considerable variance at hierarchies.

<table>
<thead>
<tr>
<th>Level</th>
<th>Variance</th>
<th>SE</th>
<th>% Total</th>
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<tbody>
<tr>
<td>Firm-level</td>
<td>10.219</td>
<td>3.734</td>
<td>37%</td>
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<tr>
<td>Intercept</td>
<td>5.734</td>
<td>2.395</td>
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<tr>
<td>Slope</td>
<td>4.485</td>
<td>2.118</td>
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<tr>
<td>Country-level</td>
<td>4.431</td>
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<td>15%</td>
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<tr>
<td>Sector-level</td>
<td>2.014</td>
<td>1.419</td>
<td>8%</td>
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<tr>
<td>Plant-level</td>
<td>11.315</td>
<td>3.364</td>
<td>40%</td>
</tr>
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</table>
Estimation Results: Substantive Effects

First Difference in Allocated Permits
Multilevel Model with Three Hierarchies
Estimation Results: Varying Slope Coefficients

Varying Slope Coefficients as a Function of Firm Size Group Level Predictor

Vattenfall
Wienerberger
Veolia
Suez
E.ON
Conclusion & Contribution

- Theoretical argument about conditional relationship between foreign ownership and firm size.
- Advances understanding of distributive politics in new market-based regulation between governments and firms.
- Introduces a novel data set to test firm-level arguments with (verifiable) firm-level data.
- Ways forward:
  - Examine market structure more carefully (sectoral hierarchy).
  - Leverage country differences in allocation rules (country hierarchy).