The Politics of Environmental Regulatory Actions in China: Does Fixed Asset Intensity Affect Pollution Levies, Punitive Actions and Firm Environmental Ratings?

Qing Deng, Penn State University
Zijie Shao, Sun Yat-sen University
Xiaojun Li, University of British Columbia
Xun Cao, Penn State University

Motivations

- Theoretical efforts: regulatory politics much better understood in the developed world; e.g., Konisky & Teodoro 2016 ⇒ what about authoritarian states? ⇒ China?
Motivations

- Theoretical efforts: regulatory politics much better understood in the developed world; e.g., Konisky & Teodoro 2016 ⇒ what about authoritarian states? ⇒ China?

  What affects governments’ decision to regulate and to target firms?
Motivations

- Theoretical efforts: regulatory politics much better understood in the developed world; e.g., Konisky & Teodoro 2016 ⇒ what about authoritarian states? ⇒ China?

What affects governments’ decision to regulate and to target firms?

Whether and how do firms lobby and pressure the government to affect regulation?
Motivations

Theoretical efforts: regulatory politics much better understood in the developed world; e.g., Konisky & Teodoro 2016 ⇒ what about authoritarian states? ⇒ China?

What affects governments’ decision to regulate and to target firms?

Whether and how do firms lobby and pressure the government to affect regulation?

Regulations/regulatory instruments (command & control, market-incentive based, information-based): effectiveness and scope conditions.
Motivations

- Data efforts: a database on firm-level regulatory actions for China ⇒ Chinese equivalent of EPA’s Enforcement and Compliance Data;
Motivations

Data efforts: a database on firm-level regulatory actions for China ⇒ Chinese equivalent of EPA’s Enforcement and Compliance Data;

Also link this to firm characteristics (e.g., Chinese Industrial Enterprise Surveys) and local characteristics ...
All credit goes to the IPE
Motivations

Policy Implications:

China’s contribution to climate change (the largest emitting country of carbon dioxide);

China’s own severe environmental problems:
Chinese prefectures, 2001

The Larger Project
Theory
Sample and Regulatory Actions
Coded
Empirical Analysis
Conclusion and Discussion

China prefectures

pm25

- 4.56 - 10.00
- 10.01 - 12.00
- 12.01 - 30.00
- 30.01 - 40.00
- 40.01 - 68.42

Miles
An “Environmentalist” US Embassy in Beijing ...
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.

But what explains government regulation or the *enforcement* of regulations?
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.

But what explains government regulation or the enforcement of regulations?

Past literatures:

- American politics and environmental regulations: many theories and empirical results, e.g., characteristics of local community (African American? Latino? Poverty levels?), ownership of the facility ...
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.

But what explains government regulation or the enforcement of regulations?

Past literatures:

- American politics and environmental regulations: many theories and empirical results, e.g., characteristics of local community (African American? Latino? Poverty levels?), ownership of the facility ...

- China: much, much fewer studies ...
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.

But what explains government regulation or the *enforcement* of regulations?

Past literatures:

- American politics and environmental regulations: many theories and empirical results, e.g., characteristics of local community (African American? Latino? Poverty levels?), ownership of the facility ...

- China: much, much fewer studies ...

  almost exclusively focus on the impact of firm ownership and firm financial situation;
What do we know?

Effective enforcement of environmental regulations greatly affects environmental quality.

But what explains government regulation or the *enforcement* of regulations?

Past literatures:

- American politics and environmental regulations: many theories and empirical results, e.g., characteristics of local community (African American? Latino? Poverty levels?), ownership of the facility ...

- China: much, much fewer studies ...

  almost exclusively focus on the impact of firm ownership and firm financial situation;

  often, if not always, focus on pollution fees/levies.
We focus on something else: the share of fixed assets (e.g. buildings and equipment).
Fixed Asset Intensity: two stories ... 

We focus on something else: the share of fixed assets (e.g. buildings and equipment).

One assumptions here: a strategic (local) government that is under pressure to reduce pollution ...
Fixed Asset Intensity: two stories ...

We focus on something else: the share of fixed assets (e.g. buildings and equipment).

One assumptions here: a strategic (local) government that is under pressure to reduce pollution ...

- The mobility mechanism: higher fixed asset intensity $\Rightarrow$ less (spatial) mobility $\Rightarrow$ less credible exit-threat $\Rightarrow$ MORE likely to be targeted by the government.

- The market entry barrier mechanism: higher fixed asset intensity $\Rightarrow$ high natural barriers to entry & more opportunities for monopoly rent extraction $\Rightarrow$ more market power $\Rightarrow$ more political influence $\Rightarrow$ LESS likely to be targeted by the government.
Fixed Asset Intensity: two stories ...

We focus on something else: the share of fixed assets (e.g. buildings and equipment).

One assumptions here: a strategic (local) government that is under pressure to reduce pollution ...

- The mobility mechanism: higher fixed asset intensity ⇒ less (spatial) mobility ⇒ less credible exit-threat ⇒ MORE likely to be targeted by the government.

- The market entry barrier mechanism: higher fixed asset intensity ⇒ high natural barriers to entry & more opportunities for monopoly rent extraction ⇒ more market power ⇒ more political influence ⇒ LESS likely to be targeted by the government.
We focus on something else: the share of fixed assets (e.g. buildings and equipment).

One assumptions here: a strategic (local) government that is under pressure to reduce pollution ...

- The mobility mechanism: higher fixed asset intensity $\Rightarrow$ less (spatial) mobility $\Rightarrow$ less credible exit-threat $\Rightarrow$ MORE likely to be targeted by the government.

- The market entry barrier mechanism: higher fixed asset intensity $\Rightarrow$ high natural barriers to entry & more opportunities for monopoly rent extraction $\Rightarrow$ more market power $\Rightarrow$ more political influence $\Rightarrow$ LESS likely to be targeted by the government.

$\iff$ large initial capital investment

$\iff$ high sunk cost
Sample of Firms

- Online sources for government regulatory actions towards firms: e.g., Institute of Public & Environmental Affairs (IPE), which has over a million records collected from various government websites and new reports;
Online sources for government regulatory actions towards firms: e.g., Institute of Public & Environmental Affairs (IPE), which has over a million records collected from various government websites and new reports;

(machine-) coding Chinese texts of various formats (e.g., txt, PDF, and various image formats) is time-consuming and difficult;
Sample of Firms

- Online sources for government regulatory actions towards firms: e.g., Institute of Public & Environmental Affairs (IPE), which has over a million records collected from various government websites and new reports;

  (machine-) coding Chinese texts of various formats (e.g., txt, PDF, and various image formats) is time-consuming and difficult;

- Choosing a smaller sample: 1,143 major/key-monitored polluting firm-years in the Jiangsu province for 2012, 2013, and 2014.
Online sources for government regulatory actions towards firms: e.g., Institute of Public & Environmental Affairs (IPE), which has over a million records collected from various government websites and new reports;

(machine-) coding Chinese texts of various formats (e.g., txt, PDF, and various image formats) is time-consuming and difficult;

Choosing a smaller sample: 1,143 major/key-monitored polluting firm-years in the Jiangsu province for 2012, 2013, and 2014.

⇒ 65% of the total industrial water and air pollution;
Sample of Firms

- Online sources for government regulatory actions towards firms: e.g., Institute of Public & Environmental Affairs (IPE), which has over a million records collected from various government websites and new reports;

  (machine-) coding Chinese texts of various formats (e.g., txt, PDF, and various image formats) is time-consuming and difficult;

- Choosing a smaller sample: 1,143 major/key-monitored polluting firm-years in the Jiangsu province for 2012, 2013, and 2014.

  ⇒ 65% of the total industrial water and air pollution;

  ⇒ we choose not to include water treatment plants.
Firms’ spatial distribution, 2014
Many potential instruments for firm environmental regulations:

- pollution fees/levies: this is the focus of past studies ...
- punitive actions: e.g., suspension of production, fines, and rectification;
- environmental ratings: a color rating of black, red, yellow, blue, and green ⇒ links to firm borrowing.
Many potential instruments for firm environmental regulations:

- pollution fees/levies: this is the focus of past studies ...
- punitive actions: e.g., suspension of production, fines, and rectification;
- environmental ratings: a color rating of black, red, yellow, blue, and green ⇒ links to firm borrowing.
Pollution fees/levies, 2012-2014

The Larger Project
Theory
Sample and Regulatory Actions
Coded
Empirical Analysis
Conclusion and Discussion
Punitive actions, 2012-2014

The Larger Project

Theory

Sample and Regulatory Actions Coded

Empirical Analysis

Conclusion and Discussion
Environmental ratings, 2012-2014
Variables

Explain:

- pollution fees/levies: thousand RMB, in logarithm;
- punitive action: 1/0;
- environmental rating: 1, 2, 3, 4, 5
Variables

Explain:

- pollution fees/levies: thousand RMB, in logarithm;
- punitive action: 1/0;
- environmental rating: 1, 2, 3, 4, 5

Using fixed asset intensity: industry-level measures to address an endogeneity concern ⇒ firm adjustment asset component in response to government regulations;

- fixed asset to output ratios \( \frac{\text{fixed assets}}{\text{output}} \), fixed asset to sale ratios \( \frac{\text{fixed assets}}{\text{sale}} \), and fixed asset to total asset ratios \( \frac{\text{fixed assets}}{\text{total assets}} \);
- take median (and mean) measures of all firms’ in the same industry in China (not just Jiangsu).
Variables

Explain:

- pollution fees/levies: thousand RMB, in logarithm;
- punitive action: 1/0;
- environmental rating: 1, 2, 3, 4, 5

Using fixed asset intensity: industry-level measures to address an endogeneity concern ⇒ firm adjustment asset component in response to government regulations;

- fixed asset to output ratios ($\frac{\text{fixed assets}}{\text{output}}$), fixed asset to sale ratios ($\frac{\text{fixed assets}}{\text{sale}}$), and fixed asset to total asset ratios ($\frac{\text{fixed assets}}{\text{total assets}}$);
- take median (and mean) measures of all firms’ in the same industry in China (not just Jiangsu).

Jiangsu, 3 time periods: 2012, 2013, and 2014;
## Empirical Results

<table>
<thead>
<tr>
<th></th>
<th>Pollution Levies</th>
<th>Punitive Action</th>
<th>Environmental Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed asset intensity</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>State-owned (SOE):</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collectively owned:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMT owned:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign owned:</td>
<td>−</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Total output:</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Business income tax:</td>
<td></td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>Firm age:</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profit:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any violation:</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
</tbody>
</table>
What do we find?

A higher level of fixed asset intensity increases a firm’s environmental rating by the government;

At the same time also increases its chances of receiving a government punitive action (e.g., fines, suspension, and rectification) + the amount of pollution levies paid.
A higher level of fixed asset intensity increases a firm’s environmental rating by the government;

At the same time also increases its chances of receiving a government punitive action (e.g., fines, suspension, and rectification) + the amount of pollution levies paid.

Interpretation?
What do we find?

A higher level of fixed asset intensity increases a firm’s environmental rating by the government;

At the same time also increases its chances of receiving a government punitive action (e.g., fines, suspension, and rectification) + the amount of pollution levies paid.

Interpretation?

A strategic local government?

- facing severe environmental issues and pressures from the central government to clean up the environment, more likely to target firms with high fixed asset intensity, knowing that these firms are much less likely to relocate;

- high fixed intensity firms also enjoy strong market power ⇒ compensate them by offering better environmental ratings ⇒ a good publicity; linked to preferential government treatments (e.g., in financing from state-owned banks).
Next steps

- more qualitative evidence is needed to verify the aforementioned “strategic local governments” story;

- does a good environmental rating increase a firm’s future chances of financing from state-owned banks?

- omitted variables: e.g., firm’s political connection with the government?

- increase the sample size ...