Topics on Environment and Institution
Multinational Corporations in Asia

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July 15, 2020

- Cai et al. (2016 JDE): Does environmental regulation drive away inbound FDI?

- Gueorguiev and Malesky (2012 JAE): Foreign investment and bribery

"Does environmental regulation drive away inbound foreign direct investment? Evidence from a quasi-natural experiment in China"

- Question: do environmental regulation affects inbound foreign direct investment?

Motivations

- Governments are toughening their regulations on pollution in the hope that firms will develop greener technologies.

- However, firms may respond by relocating their production to places with less stringent environmental regulations. (Pollution haven hypothesis)

- Empirical studies fail to provide conclusive results on the effects of environmental regulation.

- Challenge: potential endogeneity of environmental regulations due to measurement errors.

Contributions

- Recent studies use data from developed countries while this paper focus on inbound FDI in China.
  - large variations in FDI distribution and environmental quality within the country

- Use the most comprehensive firm data.
  - Two censuses data sets covering all establishments in 1996 and 2001
  - Survey data on foreign invested enterprises (FIEs) covering more than 3/4 of total FIEs in 2001

- Use the Two Control Zones (TCZ) policy initiated by the central government as exogenous shocks.

Environmental Regulations in China

- In 1998, the State Council approved the setup of two control zones (TCZ)
  - Acid Rain Control Areas in south
  - SO2 Pollution Control Areas in north

Criteria
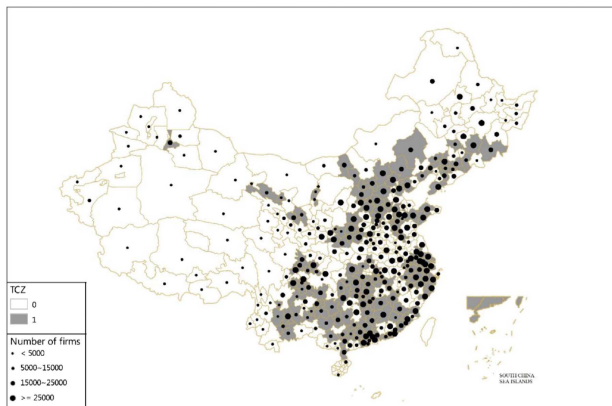
- The National Environmental Protection Bureau (NEPB) began designating cities as TCZ cities in late 1995.

- A city was designated as an SO2 pollution control zone if:
    - its average annual ambient SO2 concentration had been larger than the national Class II standard in recent years;
    - its daily average ambient SO2 concentrations exceeded the national Class III standard; or
    - its SO2 emissions were significant.

- Similar criteria for designated acid rain control zone

New policies and Enforcement

- Once a city was designated as a TCZ city, tougher regulatory policies were implemented.
  - New dirty collieries were prohibited and existing dirty ones had to reduce production or shut down.
  - Location and cleaner standards for new coal-burning thermal power plants.
  - Phase out dirty production technologies and equipments in polluting industries.
  - Local government had to tighten SO2 emission fees.

- In 2010, 94.9% of TCZ cities had achieved the national Class II standard.

Data and Variables

- Compare TCZ and non-TCZ cities (Table 1):
    - For most of these characteristics the differences are small
    - Significant differences lie in TCZ cities being more trade oriented, more likely to be located in Southern China, and more likely to be big cities.

- Measure of annual FDI inflow:
    - the FIE data are only available in 2001
    - use the contractual investment capital at the time of firm establishment to construct FDI inflow in a city and industry

Specification

- DD estimation

$$Y_{ct} = \alpha_c + \gamma TCZ_c \times Post_t + \delta_t + \epsilon_{ct}$$

  - There could be some time-varying city characteristics that correlate with our regressors of interest and hence bias the estimate.
  - e.g., agglomeration effect and attributes of neighboring locations

- Hypothesize that industries having different intrinsic polluting intensity are affected differently. $\rightarrow$ DDD

$$Y_{ict} = \gamma TCZ_c \times Post_t \times SO2_i + \eta_{ct} + \lambda_{ic} + \varphi_{it} + \epsilon_{ict}$$

Main result

Dependent variable	(1) Employment(log)	(2) FDI(log)
TCZ* Post * SO$_2$	-0.504**	-0.526***
	(0.196)	(0.137)
City–year fixed effect	X	X
City–industry fixed effect	X	X
Industry–year fixed effect	X	X
Data source	Census	FIE
Observations	21,238	111,930
R^2	0.788	0.676

- Cities with tougher environmental regulations (i.e., implemented TCZ) attracted less FDI in more polluting industries
- Reason 1: TCZ increases production costs particularly for polluting industries in the TCZ cities
- Reason 2: electricity costs increased due to limits on collieries and power plants

Investment deflection?

- facing the tough environmental regulations in the TCZ cities, FDI may flow into non-TCZ
- i.e., the control group is positively affected
- Investment deflection is consistent with the pollution haven hypothesis so long as it is driven by the changes in environmental regulations.

Robustness: 1997-98 Asian Financial Crisis
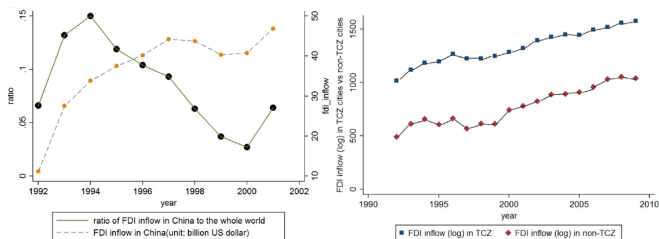
- The policy shock in 1998 coincide with the financial crisis.

- If the crisis hit TCZ cities and more polluting industries more strongly, our estimates could be contaminated.
  - e.g., Japan and Korea used to invest more in cities in Northern China that hosted heavy and polluting industries before 1998. If, during the crisis, Japanese and Korean reduced their investment in China, we would find similar negative estimates.

- Exclude FDI from Japan and Korea to address this concern.

Column 1: exclude FDI from Japan and Korea

Dependent variable	(1)	(2) Random assignment	(3) Random assignment	(4) IV	(5) IV
	FDI(log)	Employment(log)	FDI(log)	Employment(log)	FDI(log)
TCZ * Post * SO_2	−0.545***	0.001	−0.007	−2.243**	−1.582*
	(0.135)	(0.203)	(0.150)	(1.089)	(0.866)
City–year fixed effect	X	X	X	X	X
City–industry fixed effect	X	X	X	X	X
Industry–year fixed effect	X	X	X	X	X
Data source	FIE, Excluding Korea and Japan	census	FIE	census	FIE
Observations	111,930	21,238	111,930	19,388	102,180
R^2	0.663	–	–	0.784	0.674

Similar estimate is found in this reduced sample, in terms of statistical significance and magnitude, implying that our findings are not driven by the 1997-98 Asian financial crisis.

Robustness: Lags, Leads, and Time Trends

- Expectation effect and lagged effect of regulation on FDI flows.
- Follow Laporte and Windmeijer (2005) by estimating all the lags and leads of the environmental regulation effect.
  - replace $Post_t$ with year dummies δ_{1998+j}
- Before 1998, there are ups and downs in the estimates while right after TCZ there is a clear decrease in the estimates.
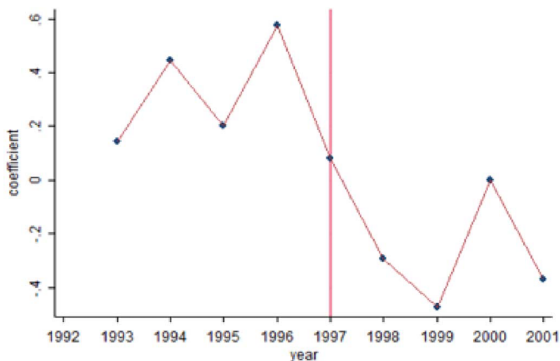
- Check whether the results are biased due to the omitted variable at city-industry-year level. (Columns 2 and 3)

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- Plot the distribution of 500 estimated coefficients and their associated p-values for the two data sets.
- The true estimates are clear outliers in the placebo tests.
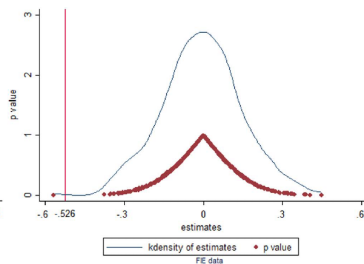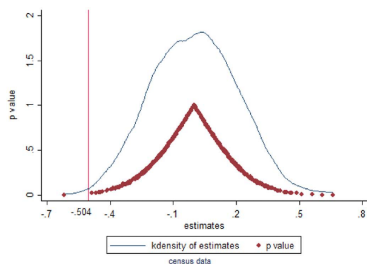
- Following Hering and Poncet (2014) and use the ventilation coefficient as the instrument for the TCZ status.
- Ventilation coefficient is defined as the product of wind speed and mixing height, with the higher values meaning the faster dispersion of pollutants.

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R^2	0.663	–	–	0.784	0.674

Robustness: Domestic production

- Does the effect of environmental regulation on location choice also exists for Chinese domestic firms? No.

- Domestic firms are less mobile due to institutional features in China.

Dependent variable: Employment (log)	(1) All domestic firms	(2) Domestic SOEs	(3) Domestic nonSOEs
TCZ * Post * SO_2	-0.022	-0.262	0.338
	(0.308)	(0.369)	(0.292)
City–year fixed effect	X	X	X
City–industry fixed effect	X	X	X
Industry–year fixed effect	X	X	X
Data source	Census	Census	Census
Observations	21,812	21,812	21,812
R^2	0.884	0.680	0.888

Heterogeneous effects

- Do MNEs from countries with more stringent environmental regulations behave differently from those from countries with less stringent regulations?

- 2 methods to rank countries in terms of their environmental regulations
  1. when each country joined the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty put into effect in 1994.
  2. when each country signed the Kyoto Protocol, which "established legally binding obligations for developed countries to reduce their greenhouse gas emissions in the period 2008-2012"
     - Before vs After China in joining UNFCCC/Kyoto Protocol

Heterogeneous effects

Dependent variable: FDI(log)	(1) Early participant countries (UNFCCC)	(2) Late participant countries (UNFCCC)	(3) Early participant countries (RKP)	(4) Late participant countries (RKP)
TCZ * Post * SO_2	−0.094	−0.435***	−0.071	−0.414***
	(0.084)	(0.116)	(0.071)	(0.123)
City–year fixed effect	X	X	X	X
City–industry fixed effect	X	X	X	X
Industry–year fixed effect	X	X	X	X
Data source	FIE	FIE	FIE	FIE
Observations	111,930	111,930	106,190	111,930
R^2	0.587	0.645	0.554	0.659

- The environmental regulation has effect only on FDI flows from countries that joined the UNFCCC/Protocol later.

- MNEs from countries with good environmental protection are insensitive to the change in environmental regulation in China.

- These findings may help relieve the concern that toughening environmental protection in developed countries would cause a shift of dirty manufacturing production to countries with laxer environmental regulations.

- Cai et al. (2016 JDE): Does environmental regulation drive away inbound FDI?

- Gueorguiev and Malesky (2012 JAE): Foreign investment and bribery

"Foreign investment and bribery: a firm-level analysis of corruption in Vietnam"

- Question: what is the linkage between FDI and corruption?

- Liberalization will reduce the rates of corruption particularly among FIEs.

- because competition will lower monopoly rents and drive down bribe schedules.

$\rightarrow$ How to measure corruption?

Biases in measuring corruption

- perception biases: perceptions (hearsay or rumors) of corruption and measures of actual corruption are only weakly correlated

- anchoring bias: respondents understand the concepts of corruption and bribe are different across socio-cultural contexts

- biases caused by the respondent's confidence that the information they reveal will not be used to punish them

- question wording which invites respondents to answer about others' experience with corruption and not their own, leading to exaggeration of the true bribe schedule.

- Informally known as the LIST question

- a respondent is simply presented with a list of activities and must only answer *how many* of the activities they engaged in

- The 2010 Provincial Competitiveness Index (PCI) Survey includes two such questions, each aimed at evaluating the prevalence of two common forms of corruption:
  - bribing officials during firm registration;
  - bribing officials in order to secure procurement deals

Question 1

Please take a look at the following list of common activities that firms engage in to expedite the steps needed to receive their investment license. How many of the activities did you engage in when fulfilling any of the business registration activities listed previously?

- Followed procedures for business license on website of provincial government.
- Hired a local consulting/law firm to obtain the license the firm for you.
- Paid informal charge to provincial official to expedite procedures (only available on Form B of the survey).
- Looked for a domestic partner who was already registered

Propensity to bribe

Range bars = [95% CI]
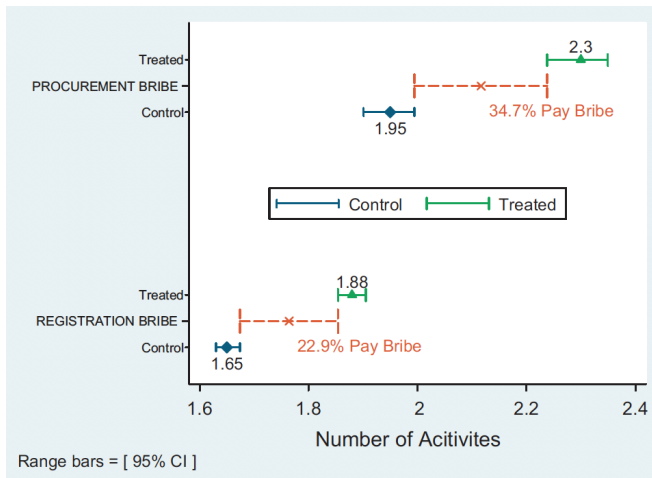
22.9% of businesses pay bribes at registration
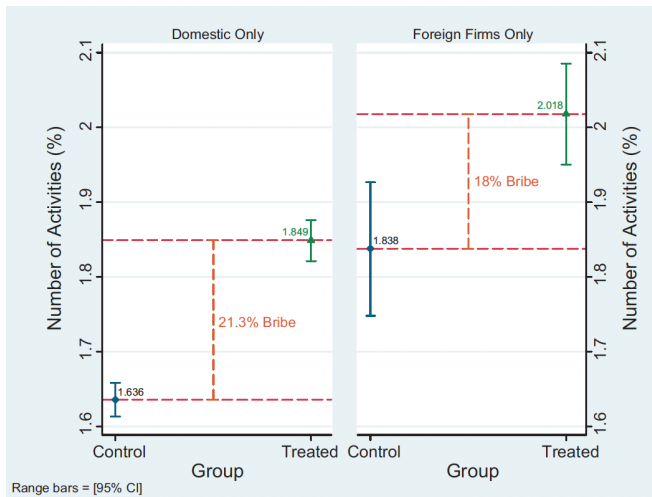
corruption is not statistically different across foreign and domestic firms