

# Environmental Political Business Cycles

## The Case of PM2.5 Air Pollution in Chinese Prefectures

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# Motivations

## Motivation and Intuitions

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## Data and Empirical Analysis

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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  $\Rightarrow$  e.g., political regime types, electoral rules, and corporatist institutions;
- need better, spatially disaggregated data: exceptions in IR and CP  $\Rightarrow$  Zeng and Eastin 2007; Bernauer and Koubi 2009.

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We focus on political business cycles:

- in authoritarian states;
- at sub-national level;
- looking at environmental impacts;

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We use China as an example here.

# Chinese prefectures, 2001

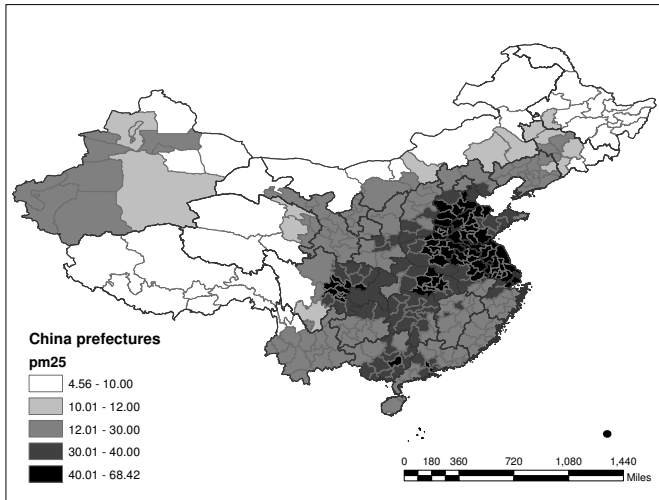
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# Intuitions

Why political business cycles in local Chinese politics?

Political business cycles are often driven by popular elections in democratic regimes as office-seeking governments are expected to pursue expansionary *monetary* and *fiscal* policies before and during election years in order to win elections (Alt and Lassen 2006).

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Do we observe political business cycles without elections?

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E.g., Guo 2009:

- Chinese county level party secretaries accelerate government spending at the crucial point in the career path when upper level officials are about to make personnel decisions;
- $\Rightarrow$  an inverted U-shaped relationship between local government expenditure growth and cadre's year in office;
- $\Rightarrow$  expenditure growth peaks at the third or fourth year given a five term.

# incentive structure

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Political tournaments theory: oversimplified version ...

- local officials motivated to maximize their chances of promotion;
- central/upper-level government decides promotion by evaluating the performance of local officials based on the relative economic growth of the jurisdictions;

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⇒ Local official: just grow your local economy!

# political tournaments theory modified

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an unrealistic assumption?  $\Rightarrow$  central/upper government able to identify local leaders' true ability despite a considerable amount of noises associated with GDP growth rates, e.g., exogenous shocks, differences in factor endowments, historical legacies ...

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In reality, officials from an upper level government:

- do not have sufficient time and resources to fully investigate;
- face information asymmetries;
- discount past performances;

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Local official: be strategic and “shine” at the right moment.

# shine at the right moment

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Local leaders should rationally produce political business cycles to signal competence when upper level party committee members are looking for signals of competence.

Not too early not too late: the years leading to the turnover year.

# environmental impacts

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Direct impacts:

- GDP growth and scale effect;
- infrastructure investments and pollution;

More hidden policy instruments:

- lessening implementation of environmental regulations  $\Rightarrow$  lower production costs of local firms  $\Rightarrow$  increases local GDP;
- if firms are mobile, jurisdictions with lower environmental regulations should attract pollution intensive firms;



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# theoretical expectation

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Hypothesis: we expect to see an environmental political business cycle in which years leading to the formal turnover year of prefecture party secretaries are associated with higher level of PM2.5 pollution.

# Chinese grid-cells, 2001

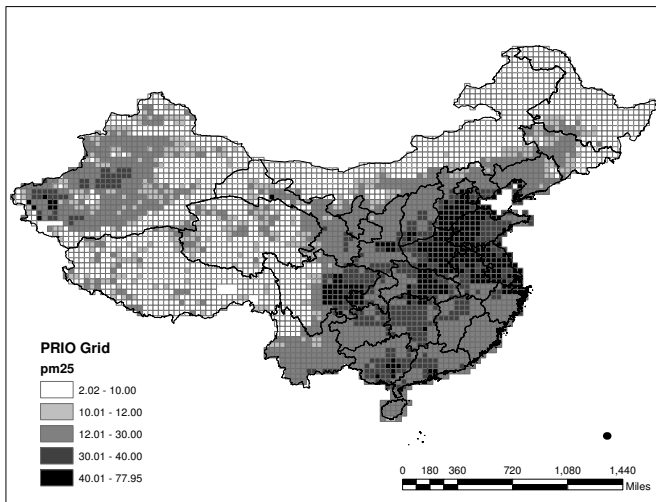
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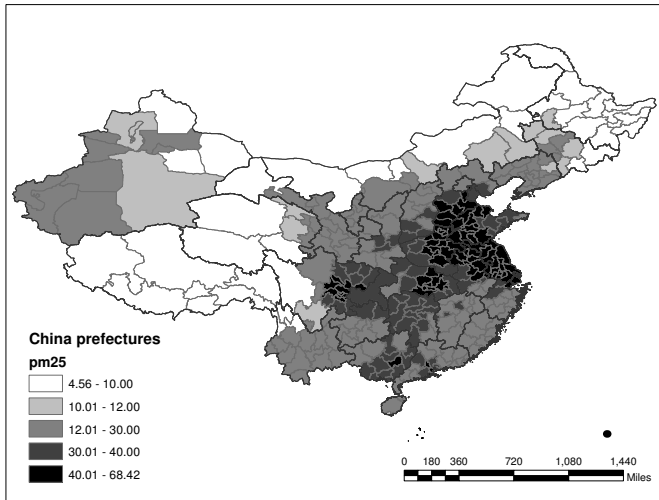
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# Chinese prefectures, 2001



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# model specifications

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Unit of analysis: about 333 prefecture-level divisions, 2002-2010;

key explanatory variables: for a party secretary

- year before turnover
- year in office and its square term
- *second term*

Many control variables:

- time variant: GDP per cap (its square term), GDP growth, road density, ...
- time invariant: distance to Beijing and to provincial capital, elevation, ...

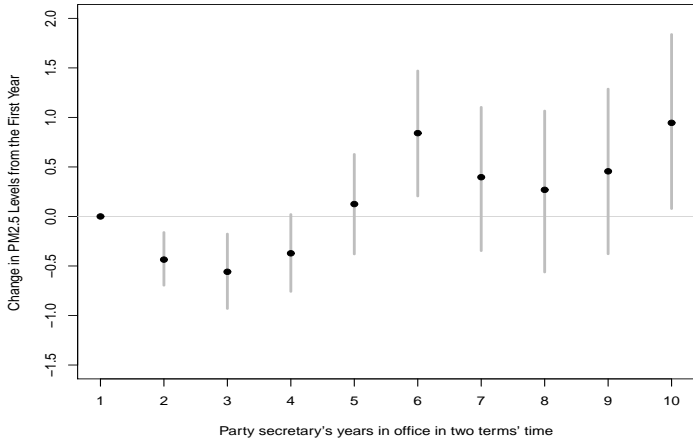
random and fixed effects models, year fixed effects, clustered standard error or AR1 ...

# empirical results

	random effect models				fixed effect models			
	(1) clus. se.	(2) AR1	(3) clus. se.	(4) AR1	(5) clus. se.	(6) AR1	(7) clus. se.	(8) AR1
year before turnover	+	+	/	/	+	+	/	/
year in office	/	/	-	-	/	/	-	-
year in office <sup>2</sup>	/	/	+	+	/	/	+	+
second term	+	+	+	+	+	+	+	+
Local secretary								
SOE experience								
GDP per cap								
GDP per cap <sup>2</sup>								
GDP growth								
Road density								
FDI								
Population density					-	-	-	-
Urbanization	+		+		+	+	+	
Taxi usage	-	-	-	-	-	-		-
Dist. to Beijing	-	-	-	-	/	/	/	/
Dist. to prov. cap.	-	-	-	-	/	/	/	/
Elevation	-	-	-	-	/	/	/	/
Top 10 coal sale	+	+	+	+	/	/	/	/
No. of power plants					/	/	/	/

/: variable not included in the model specification

# effects of year in office and second term



# Conclusions and Discussions

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Key empirical finding: a U-shaped relationship between a leader's years in office and air pollution.

Also:

- year before turnover associated with higher pollution;
- second term “dirtier” than first term;

Future/ongoing efforts:

- local industrial interest groups: working on firm-level data;
- local government extractive capacity;
- control spatial spill-over effects: prevailing wind directions ...



# other empirical findings

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- no Environmental Kuznets Curve (EKC)
- FDI has no effect
- the further away from Beijing and/or from provincial capital, the better the air quality
- elevation matters
- top 10 coal sale cities almost 30% higher PM levels than other cities
- better to use more taxi

# PM2.5

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Data before spatial overlay: Global Annual PM2.5 Grids data set by the NASA: a continuous surface of concentrations in micrograms per cubic meter of particulate matter of 2.5 micrometers or smaller (PM2.5).

- PM: a relatively complex mixture with extremely small particles and liquid droplets that float around in the air (e.g., combustion particles, organic compounds, and metals);
- much smaller than inhalable coarse particles (PM10)  $\Rightarrow$  can reach the deepest regions of our lungs;
- linked to variety of significant health problems, ranging from aggravated asthma to pre-mature death in people with heart disease;
- The WHO guideline for PM2.5 average annual exposure is  $\leq 10.0$  micrograms per cubic meter, whereas the US EPA primary standard  $\leq 12.0$ .