Department of Geography and Environment and Grantham Research Institute public lecture

The Rise of China's Green Cities: economic growth and the environment

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LSE events

Suggested hashtag for Twitter users: **#LSEKahn**

The Rise of China's Green Cities: Economic Growth and the Environment

Matthew E. Kahn
UCLA and NBER and IZA
(LSE GC 1987!)

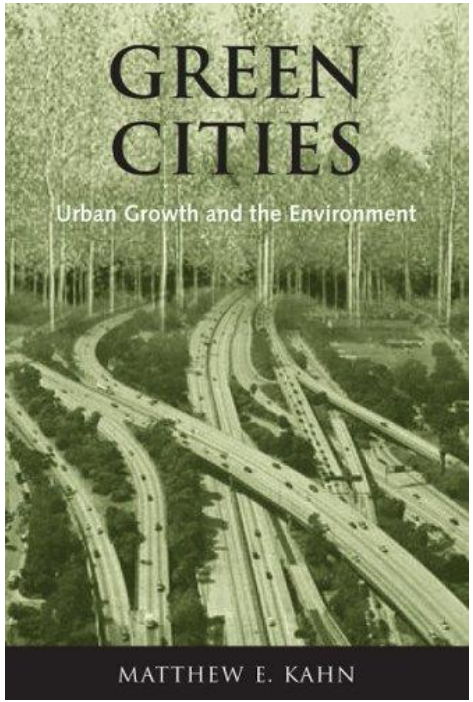
My Year at LSE in 1986-87

- International friendship
- Political debate (Thatcher re-election)
- Exposure to leading scholars such as;
- E.H Hunt and Dudley Baines in Econ History
- Kurt Klappholz, JJ Thomas, and Richard Layard in Economics
- Prepared me for the rigor and competition at the University of Chicago

London in 1986 vs. 2015

- My research focuses on environmental and urban issues
- Cross-city comparisons at a point in time
- The causes and consequences of a city's quality of life dynamics
- Cities with a great quality of life ➔high real estate prices but robust to shocks to the current "golden goose" industry
- Could London's dynamics foreshadow Shanghai's and Beijing's Future?

Green Cities: Urban Growth and the Environment (Brookings 2006)



My China Work

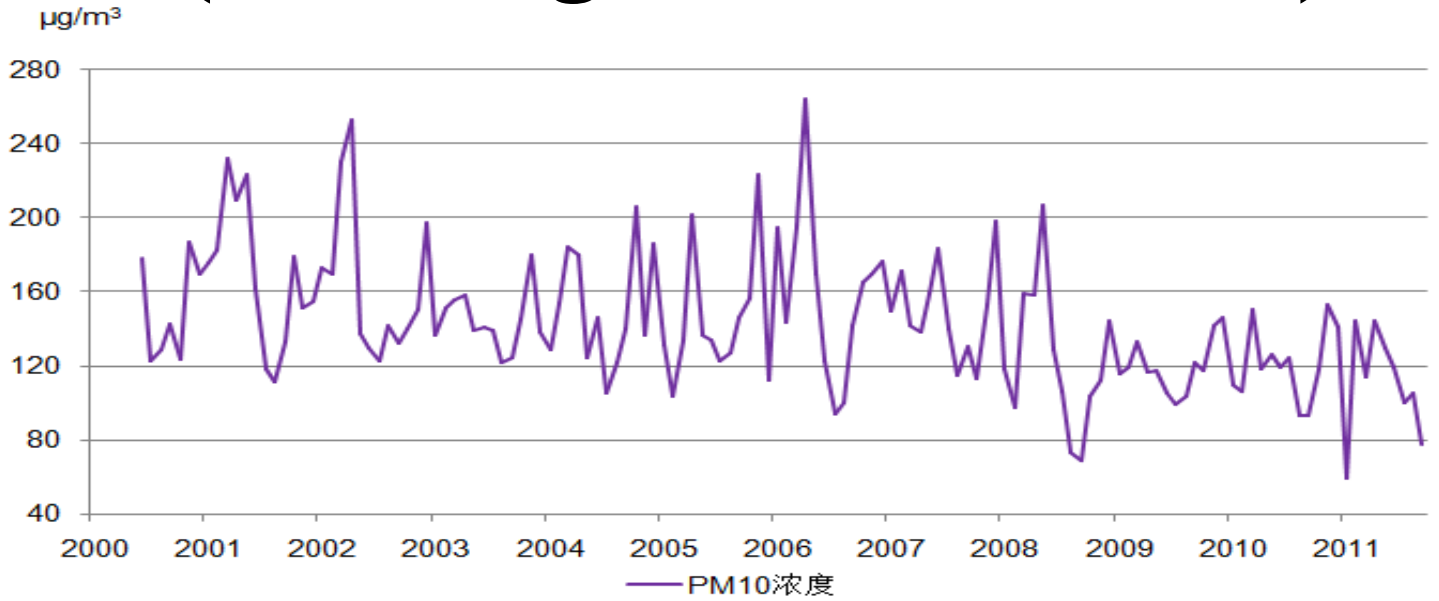
- All joint with Professor Siqi Zheng of Tsinghua University
- Until I met Siqi, I focused on U.S cities
- Starting in 2006, a growing share of my work focuses on the causes and consequences of pollution in urban China.
- Tonight a preview of our 2016 Book!

Can China Clean Up Fast Enough?

China’s Local Pollution Challenge

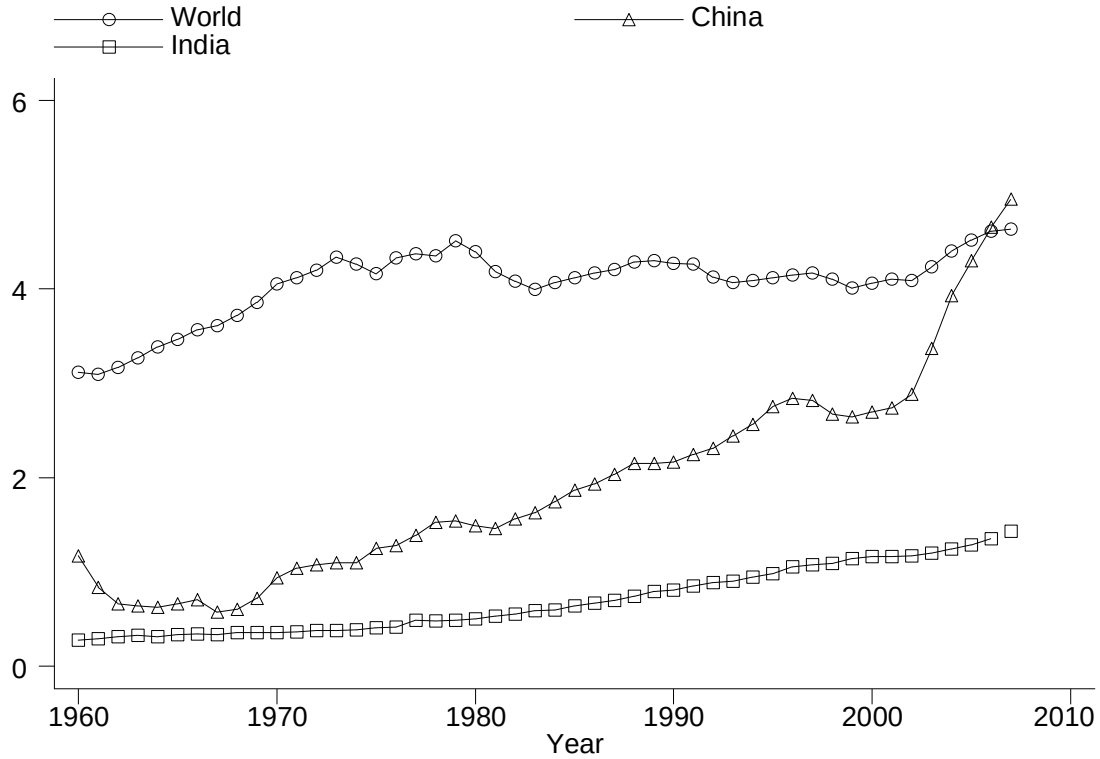
- Based on an ambient particulate concentration criteria of PM_{10}, twelve of the twenty most polluted cities in the world are located in China

PM_{10} concentration in Beijing (Los Angeles is about 40)



Although air quality is improving, PM_{10} concentration is still at a high level.

The Global Challenge of Climate Change



Time Trends in Per-Capita Carbon Dioxide Emissions

Our 2016 Book's Three Pieces

- 1. **Supply Side:** pollution production caused by China's consumption of coal, and cars and industrial production
- 2. **Demand Side:** Measuring the rising demand for "blue skies" among Chinese urbanites
- 3. **Government --** The political economy of implementing and enforcing local and global pollution mitigation policies

The Fundamental Urban Externality Challenge

- Coal is a cheap and dirty fuel
- Cheap energy “fuels” economic development
- But burning it has unintended consequences
- Implications for Urban China’s Standard of living and green accounting

The Basis for Our "Blue Skies" Optimism

- Richer, educated people demand "Blue Skies"
- City quality of life evolves over time (examples of NYC, Chicago, London)
- The rise of consumer cities and the recognition of the central role of human capital as the "golden goose" of urban economic growth (Glaeser 2011, Moretti 2012)

China’s Demand for “Green Cities”

- 4-2-1 Demography

- Low pollution is an investment fostering child development --- Jim Heckman’s research agenda

More on the Demand for Non-Market Quality of Life

- Richer people demand less risk in their life (Costa and Kahn 2004)
- Implications for food quality (milk), road safety, air pollution regulation
- The environmental “J-Curve’ Hypothesis

Empirical Evidence on Demand for Non-Market Local Public Goods

- Within Beijing, real estate hedonic pricing (Zheng and Kahn 2008 JUE).
- Compensating differentials estimates
- All else equal apartments closer to public transit, closer to green space, in lower air pollution parts of the city sell for a price premium
- GIS geo-coded real estate analysis

Land and Residential Property Markets in a Booming Economy: New Evidence from Beijing

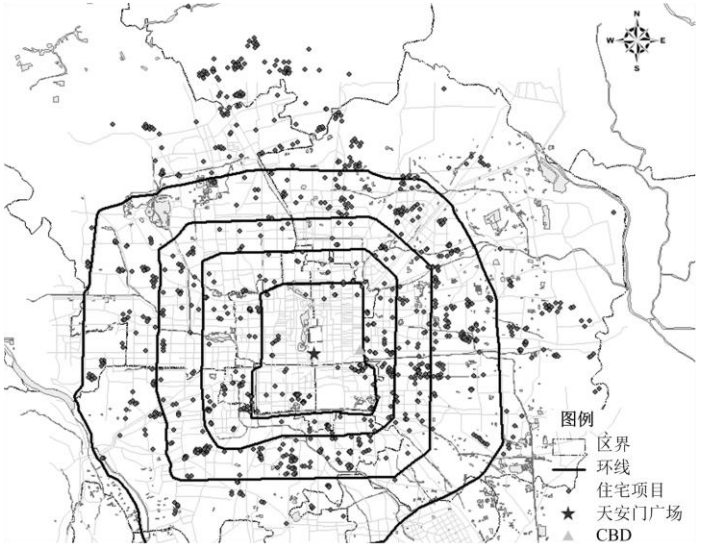
By Siqi Zheng and Matthew E. Kahn

Journal of Urban Economics, 63, 2008: 743-757.

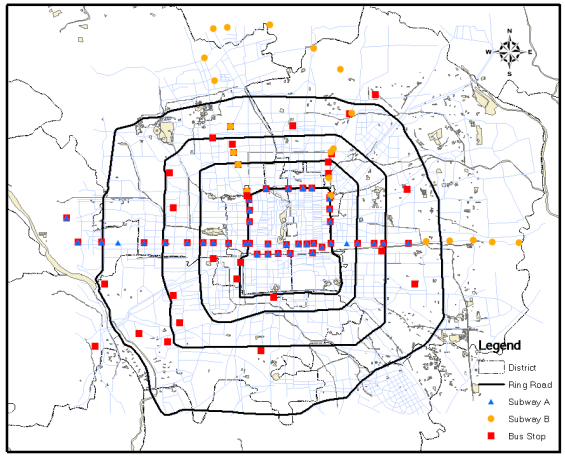
Home Price = *f* (physical characters, distance to CBD, distance to infrastructures)

Empirical analysis (Hedonic model)

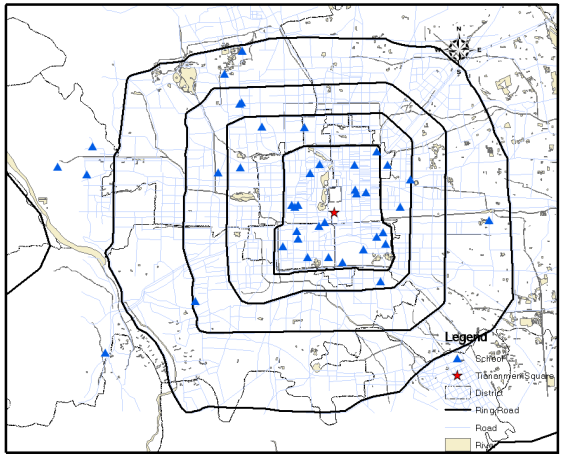
$\log(P) = c_0 + c_1 * X_1 + c_2 * X_2 + c_3 * X_3$



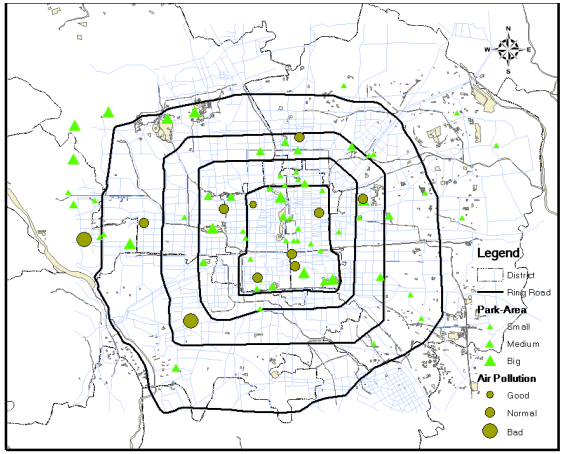
New-built commodity residential projects in Beijing (2004-2005)



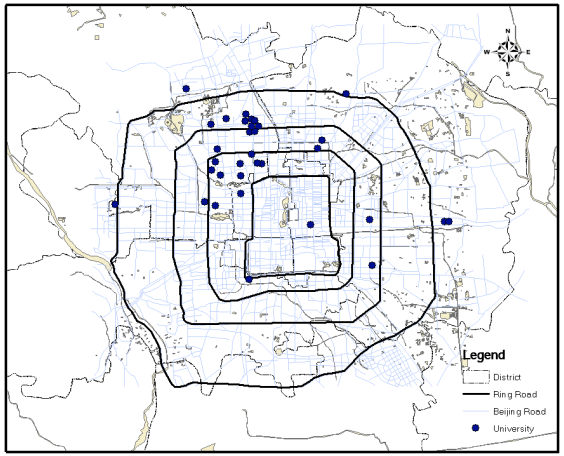
Bus stops and subway stations



Primary and middle schools



Parks and air quality



Key universities

Our Recent Mask Research

- The population can partially offset pollution exposure by buying masks and air filters
- Costly self-protection
- We use *Taobao.com* daily Internet sales data and study the relationship between government announced PM2.5 readings and daily sales

Internet Product Demand as a Function of Government Announcements

Variables	(1)	(2)	(3)	(4)
Dependent variable:	mask	filter	sock	towel
Six Government Alerts:				
excellent (*default*)				
good	0.131**	-0.015	-0.060	-0.011
	(0.057)	(0.066)	(0.060)	(0.057)
lightly polluted	0.201**	0.100	-0.020	0.023
	(0.088)	(0.096)	(0.062)	(0.066)
moderately polluted	0.372***	0.219*	-0.084	-0.014
	(0.092)	(0.115)	(0.072)	(0.072)
heavily polluted	0.648***	0.386***	-0.165**	-0.138
	(0.129)	(0.131)	(0.071)	(0.087)
severely polluted	1.357***	0.915***	-0.237**	-0.246**
	(0.194)	(0.246)	(0.106)	(0.096)
ln(PM2.5)	0.268***	0.102*	0.091***	0.083***
	(0.052)	(0.054)	(0.024)	(0.032)
Control variables	YES	YES	YES	YES
Observations	3085	3085	3085	3085

The Rich vs. The Poor

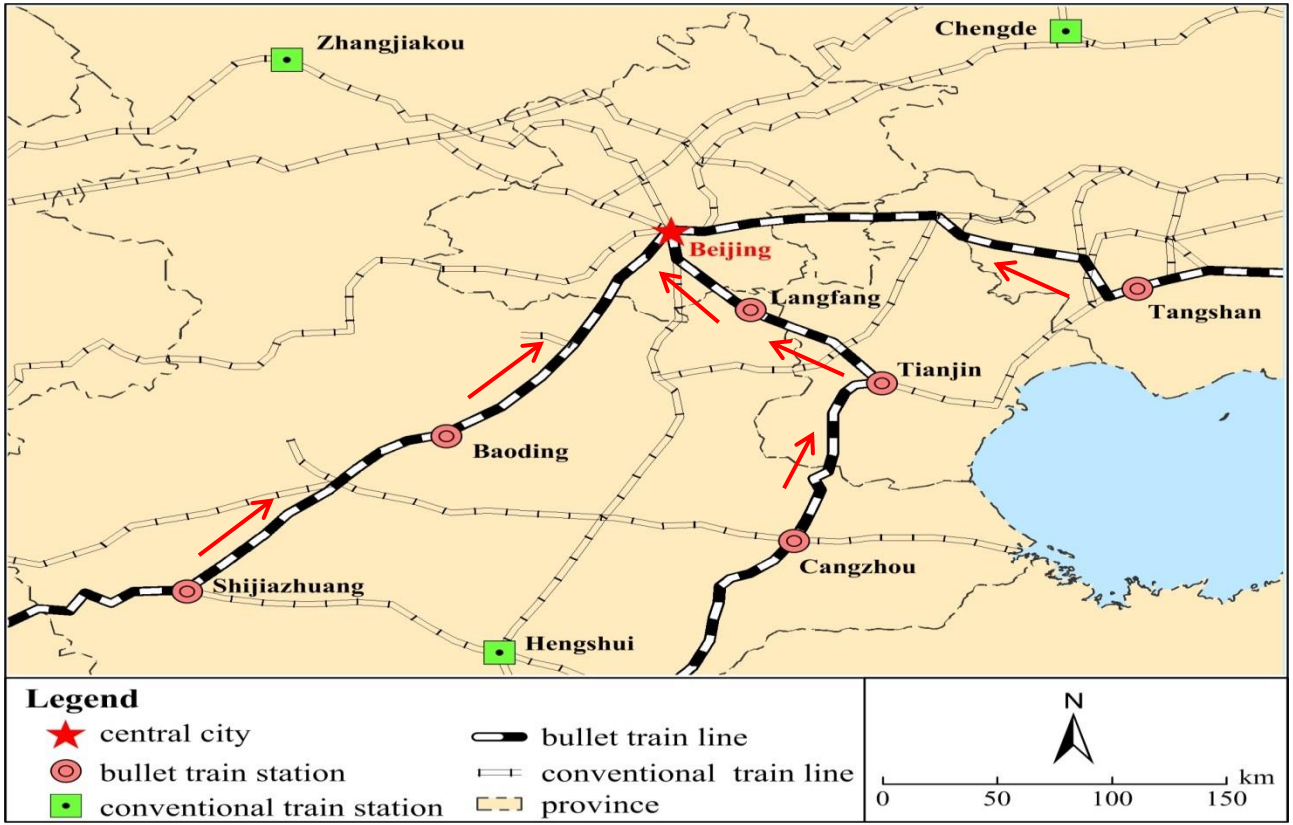
Internet Sales as a Function of Air Pollution and Household Income

Variables	(1)	(2)	(3)	(4)
Dependent variable:	mask	filter	sock	towel
ln(PM2.5)	0.8078***	-0.0556	0.4549***	-0.1075
	(0.165)	(0.111)	(0.093)	(0.069)
ln(PM2.5)*middle income	0.0012	0.2325***	0.0030	0.0225
	(0.062)	(0.079)	(0.042)	(0.048)
ln(PM2.5)*high income	0.1237	0.2746***	0.0169	0.0940
	(0.094)	(0.075)	(0.064)	(0.085)
Control variables	YES	YES	YES	YES
Income group dummies	YES	YES	YES	YES
City fixed effects				
Observations	1326	1326	1326	1326
R-squared	0.843	0.888	0.857	0.913

The Rise of China's System of Cities and the "Menu"

- Tiebout "Voting with your Feet" as the domestic passport system fades away
- China's bullet trains facilitate market integration and mitigate the cost of megacity growth (Zheng and Kahn PNAS Plus 2013)
- Cities such as Xiamen and Hong Kong and natural beauty augmented by "green attributes"

Greater Beijing Area



commute time change between Beijing and some nearby cities (minutes)

	2006	2010
Langfang	45~60	20
Tianjin	90~120	30
Baoding	90~120	58
Cangzhou	160~180	90
Shijiazhuang	180	120
Hengshui	180	
Zhangjiakou	240	
Chengde	300	

located in “sweet spot”

not located in “sweet spot”

Yangtze River Delta

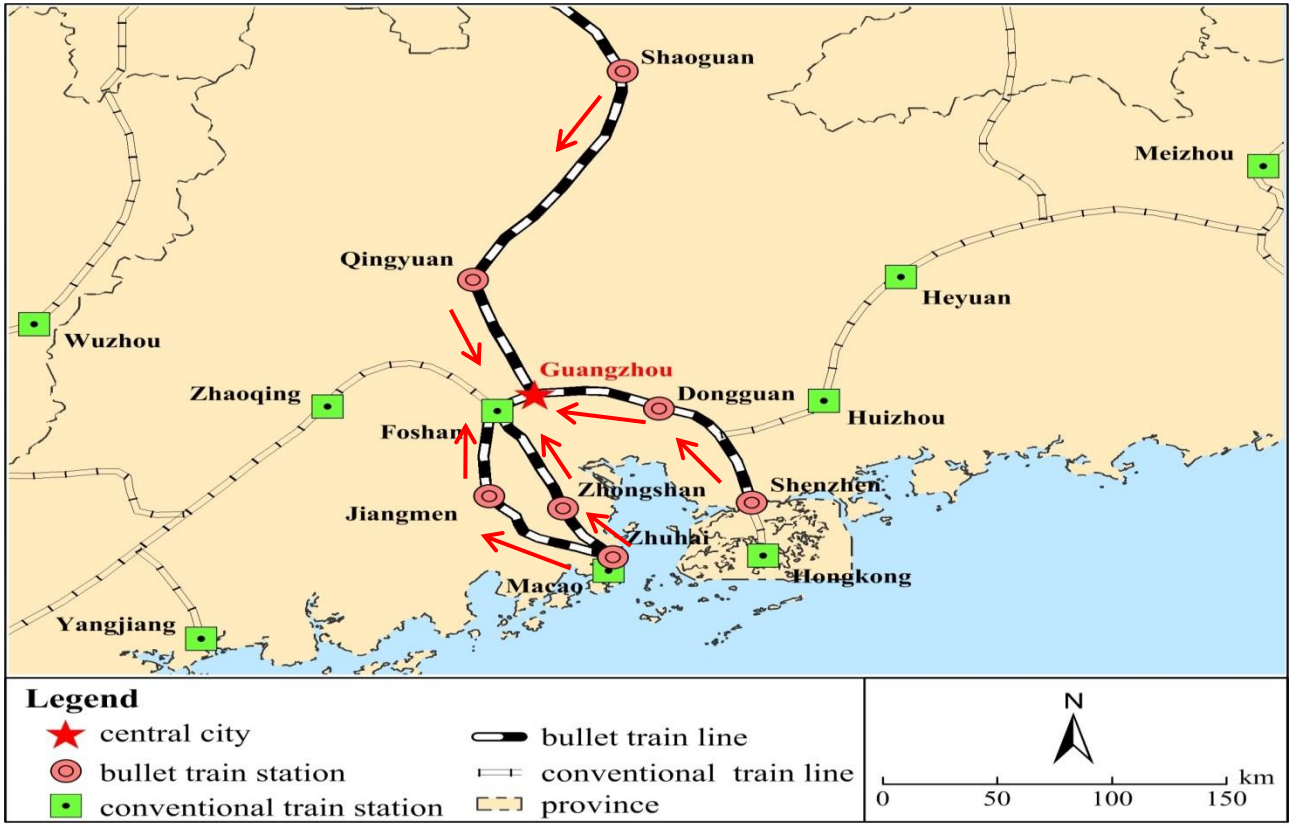
commute time change between Shanghai and some nearby cities (minute)

	2006	2010
Suzhou	60~90	30
Hangzhou	120~150	50
Nanjing	180~240	100
Shaoxing	150~180	110
Hefei	360~450	180
Huzhou	—	
Yangzhou	300	
Wuhu	420	
Nantong	500	

located in “sweet spot”

not located in “sweet spot”

Pearl River Delta



commute time change between Guangzhou and some nearby cities (minute)

	2006	2010
Qingyuan	50~60	23
Dongguan	60	30
Jiangmen	—	45
Shaoguan	240~280	46
Shenzhen	120	60
Foshan	30	
Zhaoqing	100~150	
Huizhou	120	
Hong Kong	120	

located in “sweet spot”

not located in “sweet spot”

Bullet Train Paper (PNAS 2013) Findings

- A city's home price is an increasing function of local market potential
- Since bullet train connection increases a city's market potential, those close but not very close cities connected by the Bullet Train to the superstar cities experience price appreciation
- Second tier cities as a "safety valve" if the mega-cities get too big

Incentives for Government Officials to “Go Green”?

- Even though the people do not vote, will the local government supply public goods they desire?
- The Old Regime standards evaluated urban mayors based on GDP growth and social stability
- Pollution criteria have been introduced into the promotion criteria

National and Local Government Policy

- Zheng, Siqi, Matthew E. Kahn, Weizeng Sun, and Danglun Luo. "Incentives for China's urban mayors to mitigate pollution externalities: The role of the central government and public environmentalism." *Regional Science and Urban Economics* (2013).

China’s Mayors and Industrial Land

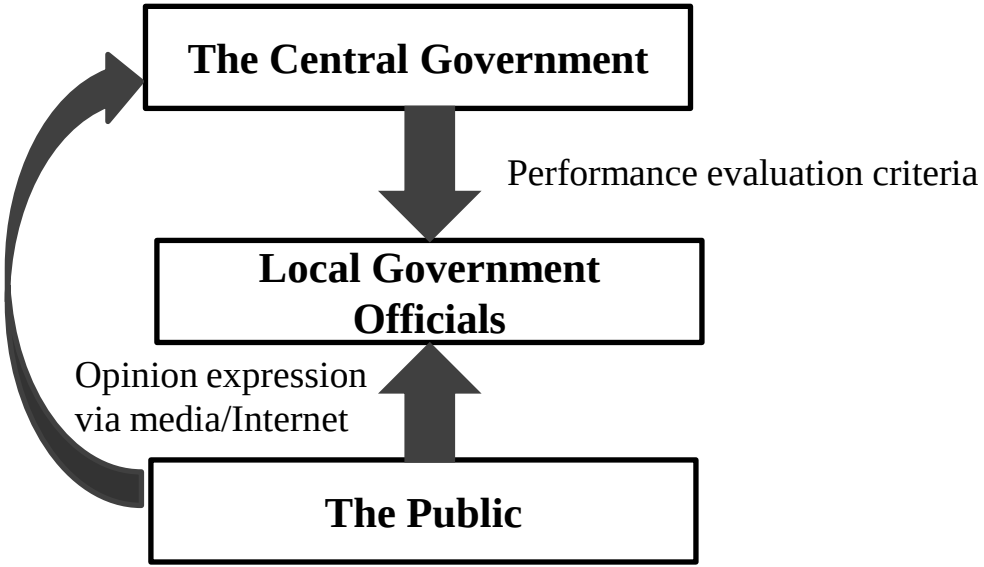
- There is no property tax in China
- Manufacturing is highly land intensive and SOE manufacturing is less productive
- A smart mayor will seek to close down Communist Old Manufacturing plants taking up lots of center city land
- Remediate the pollution and auction it off to developers
- Green City benefits of deindustrializing and makes the mayor rich!

A China and U.S Parallel

- Major Cities in the United States have deindustrialized (as has London)
- China's coastal cities are deindustrializing as wages rise, land costs, and environmental regulations rise
- Green city benefits of deindustrialization
- Transition to becoming "Consumer Cities"
- New "golden goose"
- For how many Chinese cities?

The “Sandwich” Story

The Fundamental Principal-agent Problem



Information Encourages Accountability

- Urbanites in China know more about their exposure to pollution than in the past
- Microblogs are a key source of information and the media writes about these issues
- Many Chinese urbanites have traveled abroad
- The PM 2.5 Controversies and measurement at the U.S Embassy

PM2.5 Debate in October 2011 in Beijing and Data Monopoly Smashed

Date	U.S. Embassy ($PM_{2.5}$)	MEP, China (PM_{10})
10-24	Moderate	Excellent
10-23	Very Unhealthy	Light Pollution
10-22	Hazardous	Slightly Polluted
10-21	Hazardous	Slightly Polluted
10-20	Hazardous	Light Pollution
10-19	Very Unhealthy	Good
10-18	Unhealthy	Good

Source: Los Angeles Times

Old Regime (Prior to the 2000s)

- China’s central government focused on GDP growth
- No competitive election. The upper-level government determines the promotion of lower-level officials.
- The State set up pure output-based (GDP) promotion criteria for local officials. Mayors had little incentive to address pollution issues with their growth focus
- The media ignored environmental issues
- Weak public participation and weak civil society

Motivations behind the Central Government's Green Push

- First, the national government may be responding to the rising "green" demand of the urban middle class.
- Second, domestic energy security concerns have risen on the central government's agenda as a result of electricity shortages and rapidly rising energy consumption.
- Third, the central government believes that the rest of the world is embracing the low-carbon energy agenda has created a market imperative for China to become a technological and economic leader in this nascent field (Boyd 2012).

Motivations behind the Central Government's Green Push (con't)

- The last explanation is that the central government seeks "legitimacy" with the Chinese people and also in the international arena, and making a commitment to pursuing environmental goals is one way to credibly signal to both domestic constituents and international actors that China is an international leader and that the Communist Party leadership cares about its own people (Wang 2012).

Discussion

- Our optimistic view about the rise of China's "Blue Skies" hinges on:
  - Rising middle class demand for quality of life
  - Increased information transparency (civil society and a media) that encourages the accountability of governments and firms
  - The inclusion of sustainability into local politicians' performance criteria
  - City mayors experimenting and competing
  - Technology transfer and endogenous innovation, ideas as public goods

Some Pessimism

- CO2 emissions over time if there is no serious carbon price?
- The future of coal use in China?
- The natural gas transition and the energy ladder versus endowments

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