Green Cities During a Time of Urban Growth

Matthew E. Kahn
UCLA and NBER
Institute of the Environment
Department of Economics
Department of Public Policy
Anderson School of Management
UCLA Law School

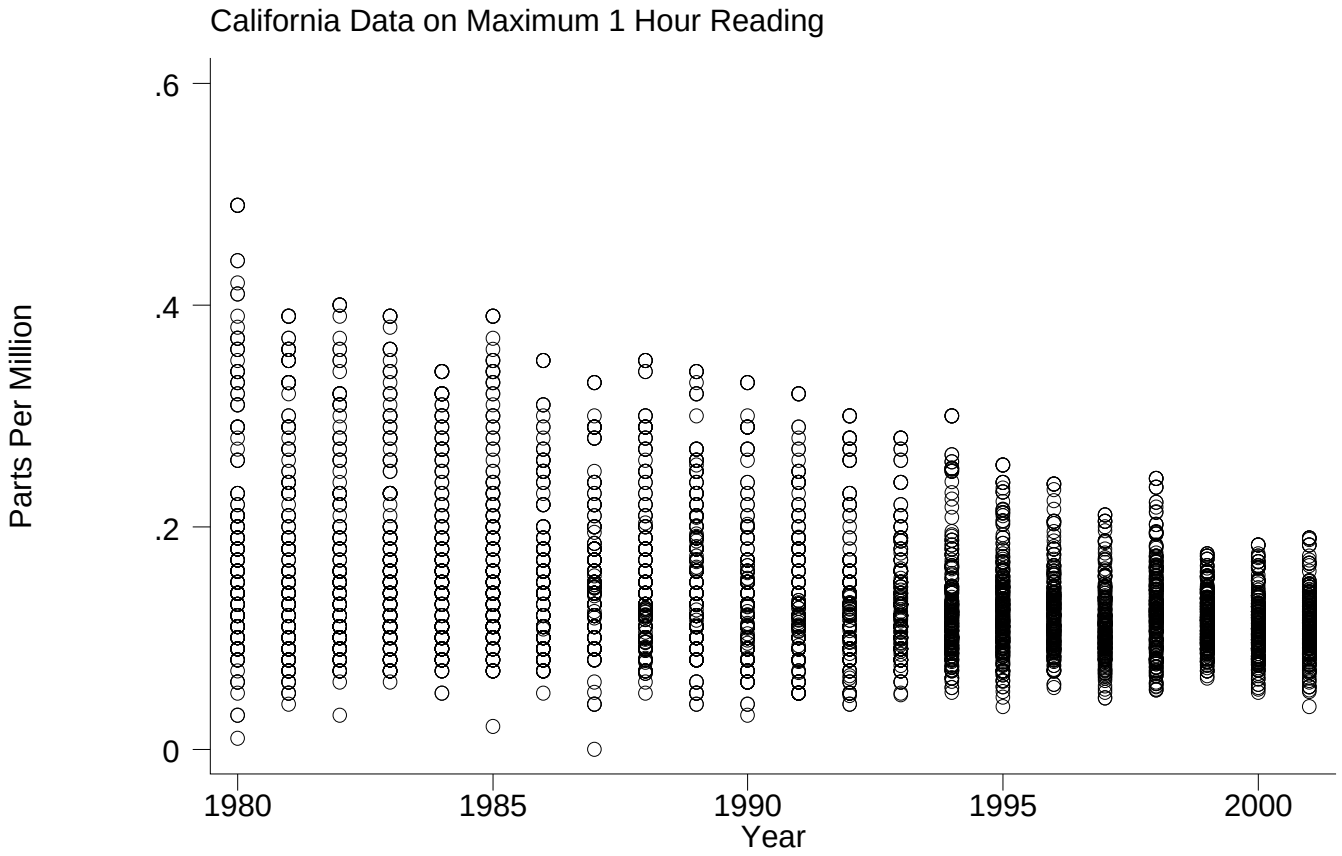
Introduction

- Quality of life challenges posed by urban growth:
- Air Pollution
- Infectious disease
- GHG emissions
- Do politicians at the local and national level have the right incentives to address these issues to reduce the cost of urban growth?

The “Local Green” Challenge

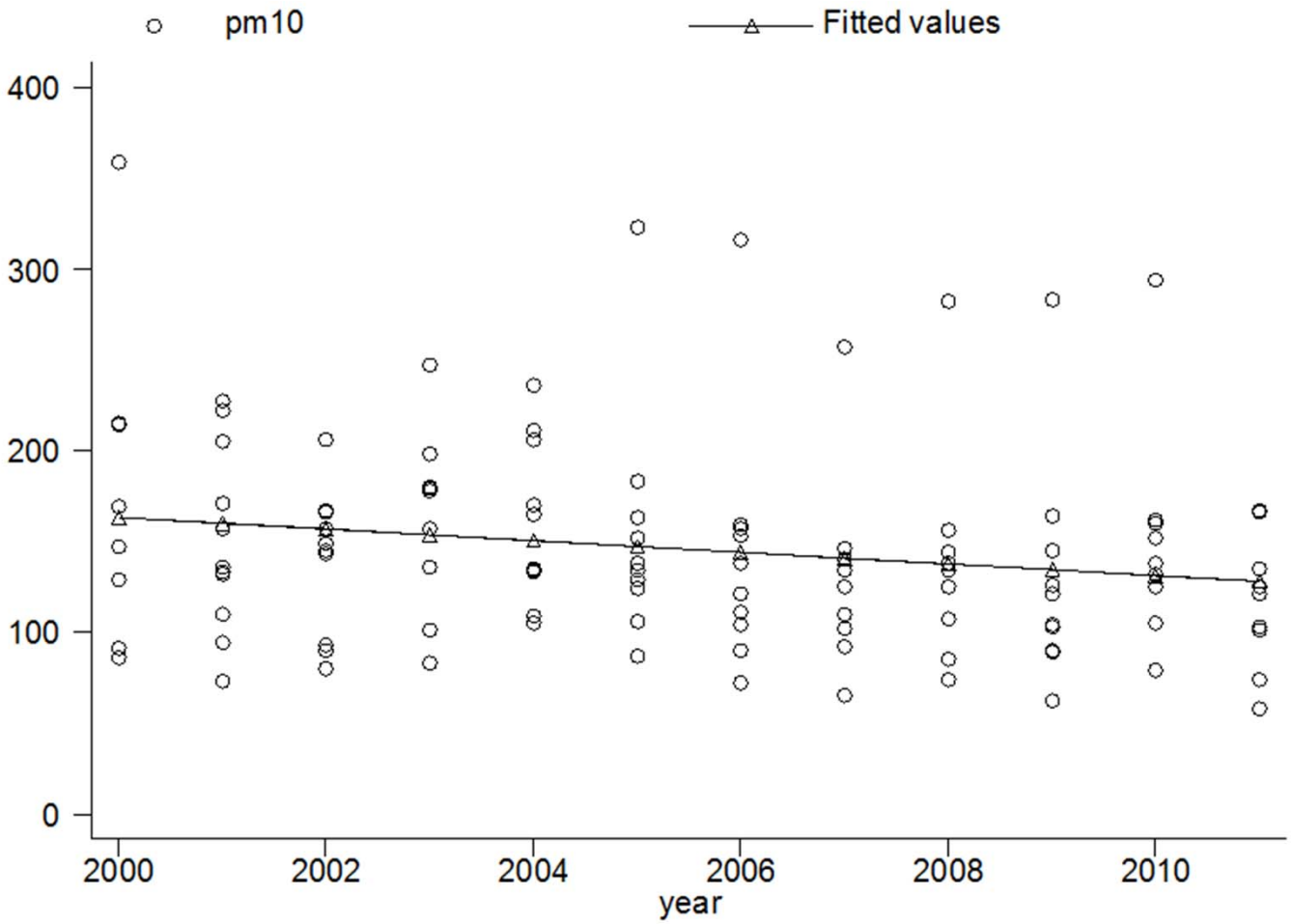
- Urbanization bundles 3 features
- 1. more people living in cities
- 2. higher per-capita income
- 3. suburbanization of people and jobs
- Air quality, water quality, green space, proper sanitation and garbage collection are all threatened by these trends

Air Pollution Progress in California

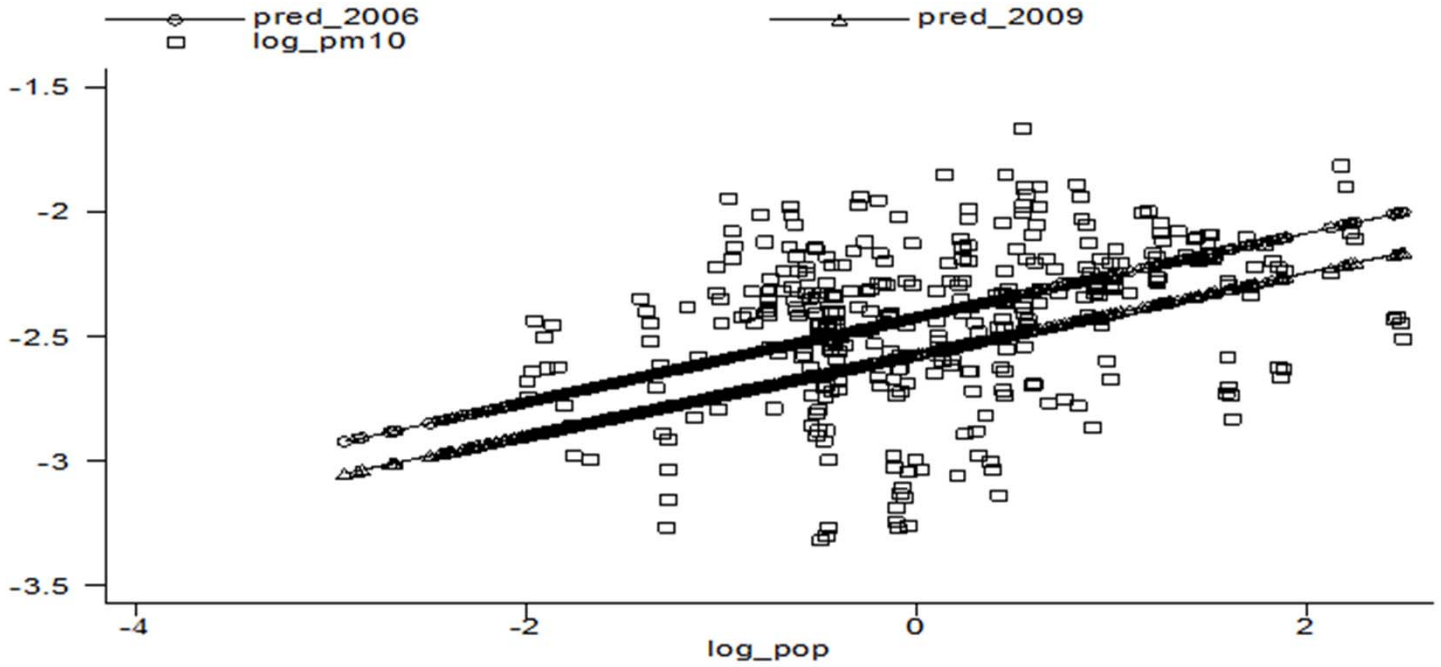


The Distribution of Ambient Ozone By Monitoring Station

Manila


pm10
Fitted values
400
300
200
100
0
2000
2002
2004
2006
2008
2010
year

Air Pollution Across China's Cities in 2006 and 2009



Bangkok, Thailand

- There is an active set of monitoring stations that have been measuring ambient PM10, ozone and carbon monoxide from 1997 to 2011.
- Including monitoring station fixed effects:
- PM10 has declined by 3.7% a year.
- carbon monoxide levels have declined by 4%
- ambient ozone has increased by 4.3% per year.

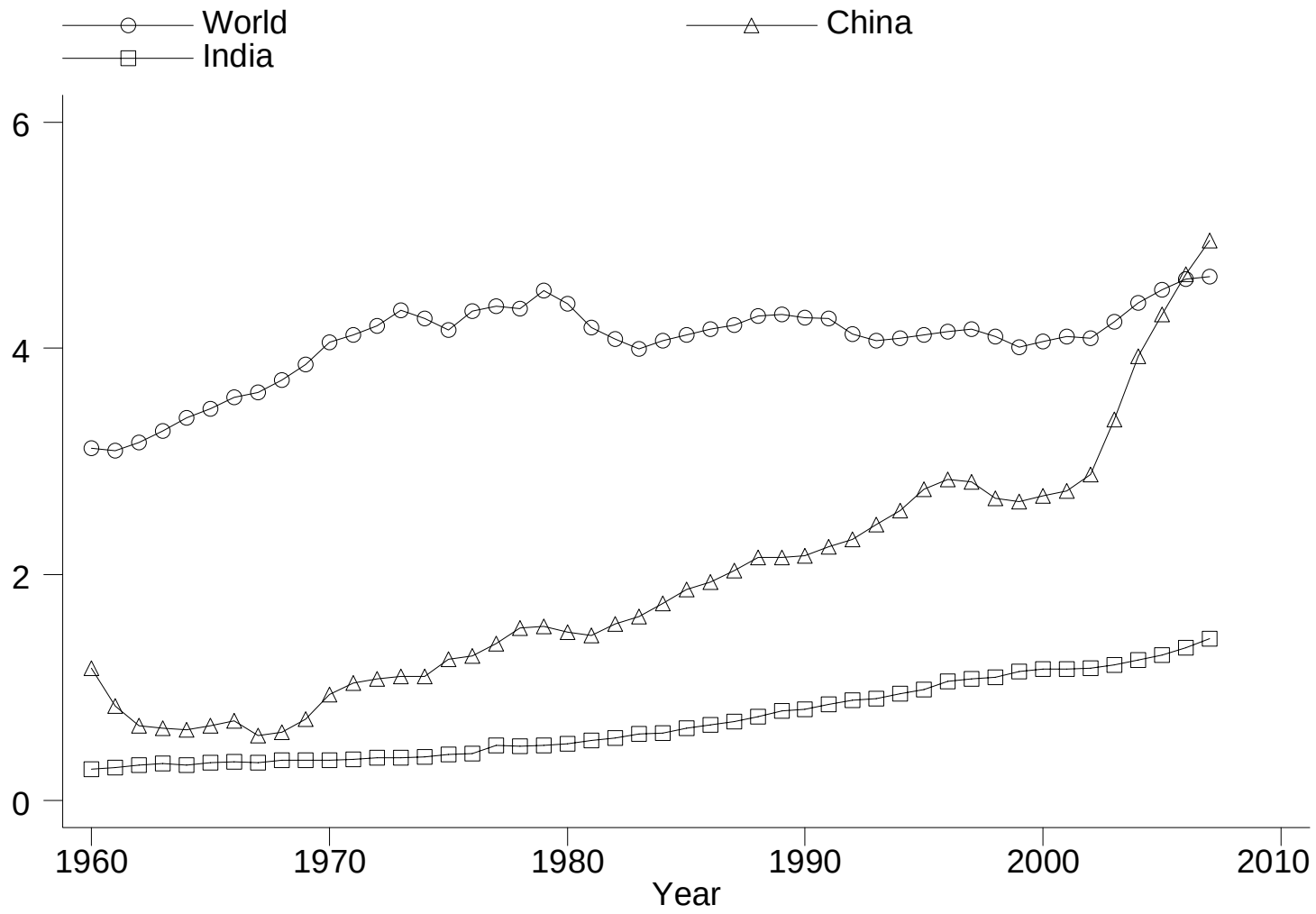
Optimism

- Mayors have strong incentives to address local pollution challenges
- Direct public health effects
- Educated demand “green cities”, they will vote with their feet and migrate away from cities that are low quality of life

The Challenge of Creating “Clean Cities”

- In the poorest cities, further urban growth increases contagious disease risk and the challenge of garbage collection and sewage treatment
- Who will finance the expensive water treatment systems?
- U.S breakthrough in the 1930s with the introduction of municipal bonds
- Access to capital markets for LDC cities today

The GHG Challenge

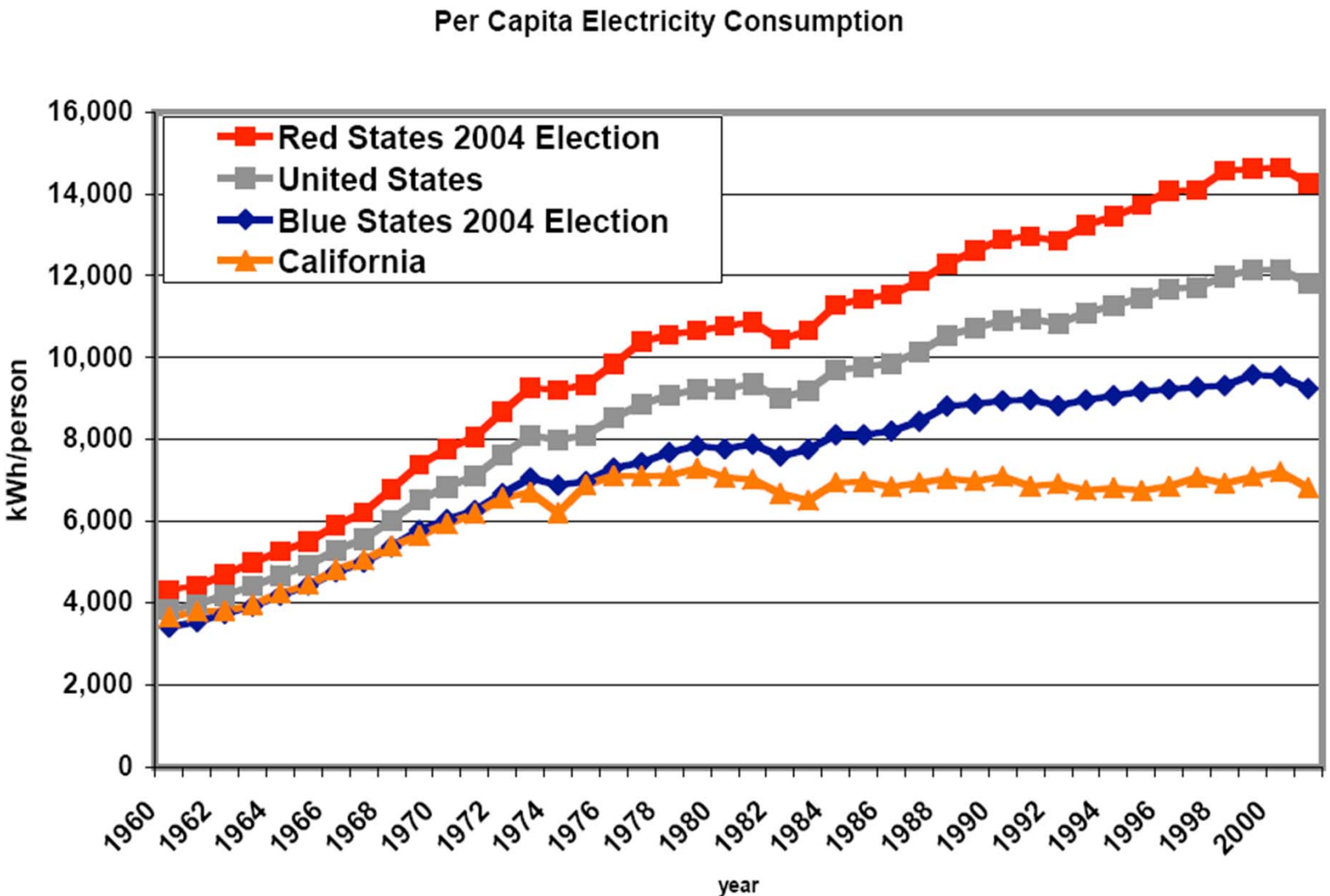


Time Trends in Per-Capita Carbon Dioxide Emissions

Too Much Gas!

- World population growth
- World per-capita income growth due to urbanization
- With a zero price on GHG emissions
- International free riding
- Example of total global gasoline consumption = people*probability own vehicle*miles drive*gallons per mile

Decoupling Carbon Growth from Income Growth, California



California's as the Green "Guinea Pig" in the U.S

- AB32 passed in 2006
- Arnold Schwarzenegger commits California to reduce its GHG emissions by 80% below 1990's level by the year 2050!
- Implications for:
- 1. industry, 2. transportation, 3. land use, 4. power generation
- Why California? Liberal and educated

Ideas as Public Goods

- Today, we don’t know which “low carbon” strategies are cost-effective
- California’s experiment creates new ideas and insights
- The rest of the world can mimic the good ideas and ignore the bad ones

Cities in LDCs

- Cities are collections of long lived capital
- Choices made today will persist for over 50 years
- Choices over road and public transit infrastructure
- Pricing of electricity
- Land use regulations
- Power sources for electricity
- Energy efficiency standards for buildings

Some Lessons from the U.S

- If jobs remain downtown, then public transit can be a widely used commute mode even by the wealthy (NYC)
- Higher electricity and water prices encourage innovation and efficiency
- Local land use regulation in center cities causes “sprawl” and a larger carbon footprint

The Low Carbon City Research Agenda

- Outside of the United States, data gaps:
  - household energy consumption differentials within and across cities
  - Do such differentials represent “selection or treatment? Does living in the city center cause one to have a low carbon footprint?
  - How costly is it to build energy efficient buildings and factories? How are these costs changing over time?

Strategies for Urban Adaptation

- Nations with more cities located in various geographical areas offer a larger menu for households and firms to migrate and “vote with their feet”
- For nations with few major cities, the need to use GIS analysis to identify which areas with the cities are at greatest risk from flooding, heat waves and other climate shocks

The San Diego Foundation's 2050 Study "A Regional Wake Up Call"

- Useful Case Study
- 4 degrees hotter on Average
- Sea level will be 12-18 inches higher.
- water demand up 37% while supply will down 20%
- Wildfires will be more frequent and intense.
- Public health will be at risk, (kids and elderly)
- Peak electricity consumption up 70%

How Will Households Respond to the “Wake Up Call”?

- Migrate to coastal temperate areas
- Seek energy efficient and water efficient durables
- Avoid areas at greater natural disaster risk
- Respond to High frequency information provision --- heat waves, smog alerts

How Firms Respond to these Predictions?

- The induced innovation hypothesis posits that for profit firms will respond to these expected price increases
- One person's misery is a firm's opportunity
- Time to build!

Endogenous Innovation

Conclusion

- I am an optimist about the rise of “green cities” around the world
- 7 Billion people --- ideas are public goods
- Information technology and the diffusion of “best practices”

Basic Books