

The Microeconomics of Urban Adaptation to Climate Change in Europe

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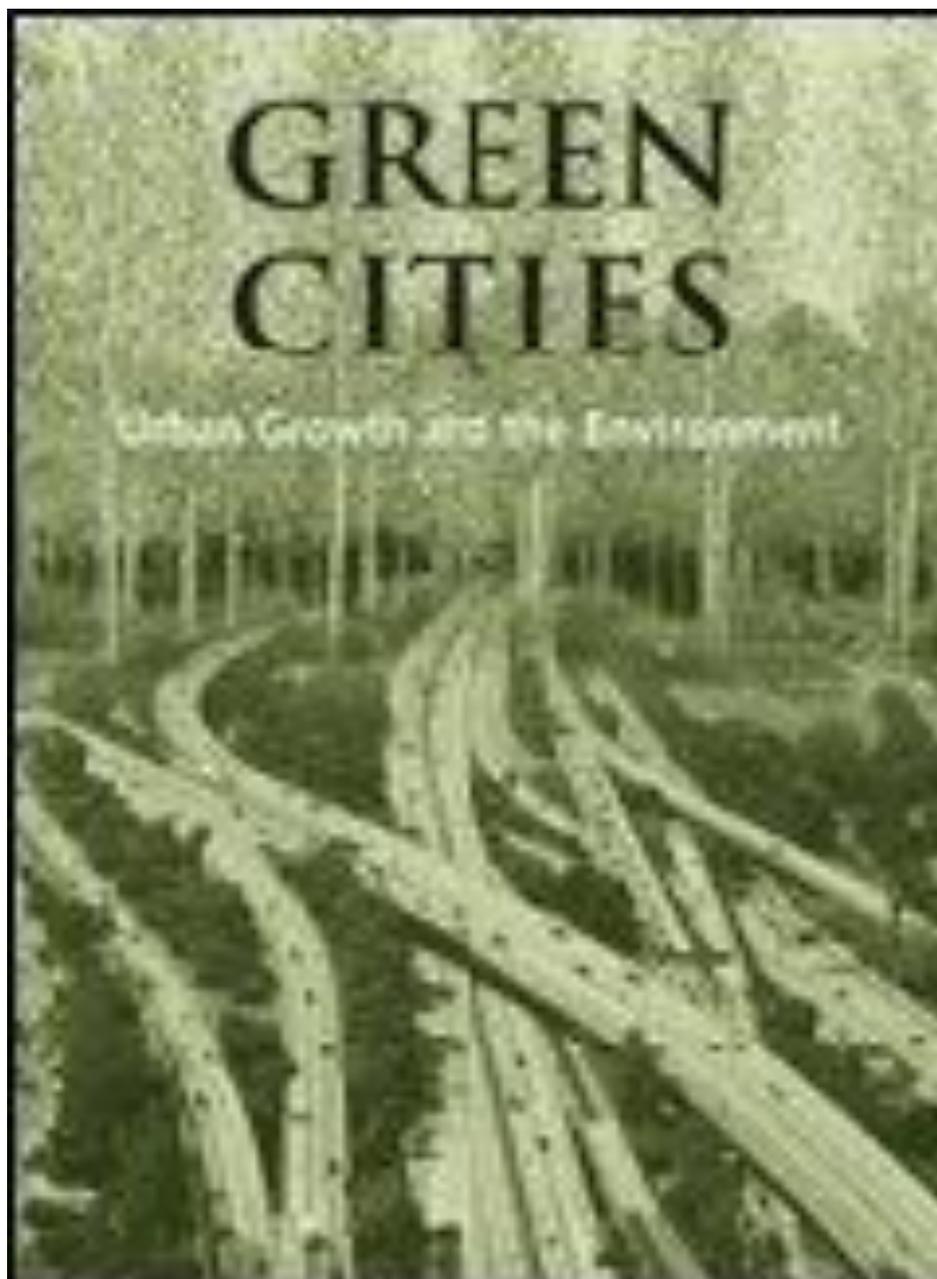
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Introduction

- I do research on applied environmental and urban topics
- The developed world lives in cities
- The developing world is urbanizing
- Urban quality of life dynamics in growing cities
- Causes and consequences of “green cities”

GREEN CITIES

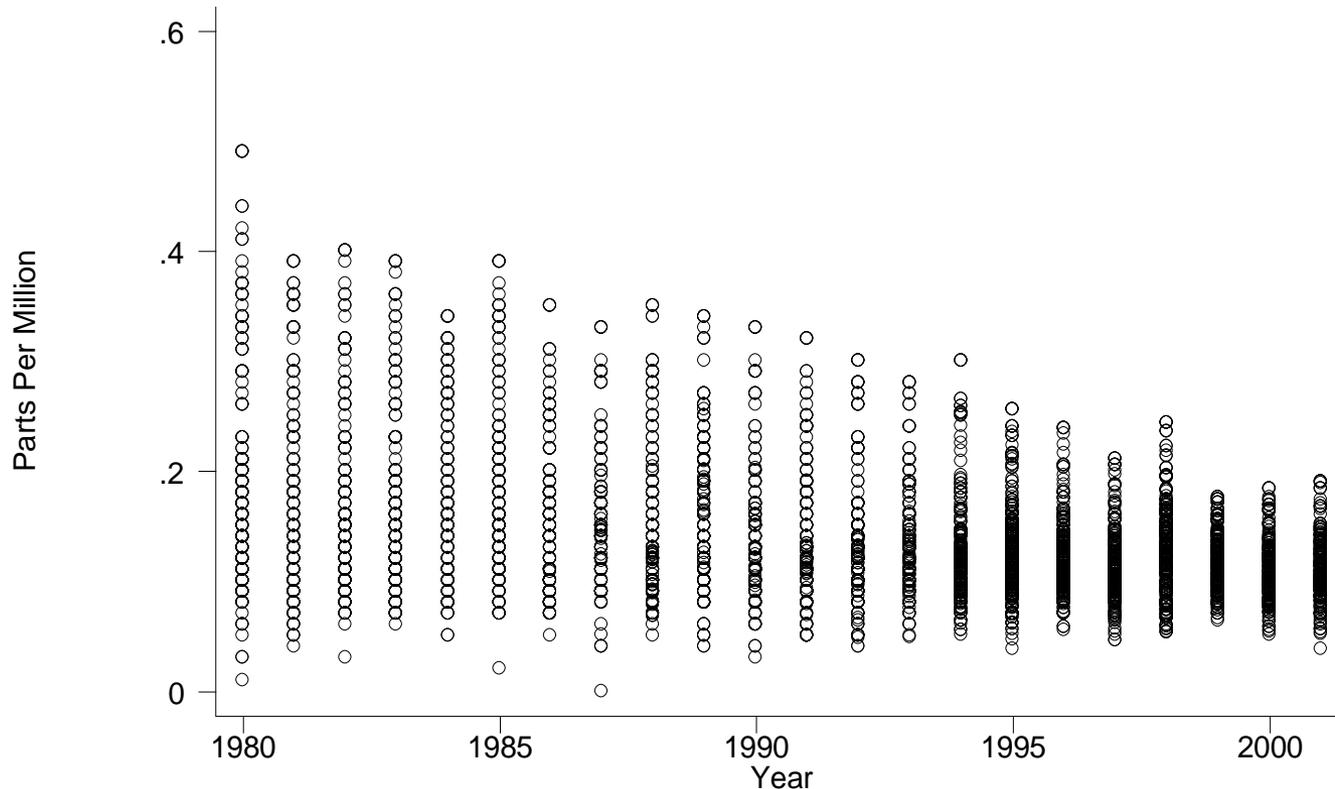
Urban Growth and the Environment



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California Pollution Progress During a Time of Growth

California Data on Maximum 1 Hour Reading



The Distribution of Ambient Ozone By Monitoring Station

Optimism About the Rise of Green Cities

- London and NYC and Los Angeles as leading examples of “Consumer Cities”
- Human capital and health capital as the key to urban development
- Working now on a book predicting the growth of China’s Green Cities
- Why?
- Rising incomes
- Rising educational attainment

My Climate Change Mitigation Research

- Car Growth and Engel Curves
- Urban Carbon Footprints in the U.S and China
- **The greenness of China: household carbon dioxide emissions and urban development**

Zheng, Siqi; Wang, Rui; Glaeser, Edward L.; Kahn, Matthew E., [Journal of Economic Geography](#), Volume 11, Number 5, 23 September 2011 , pp. 761-792(32)

- International Trade in Renewable Power Systems Equipment

Today's Focus is Cities not Farmers

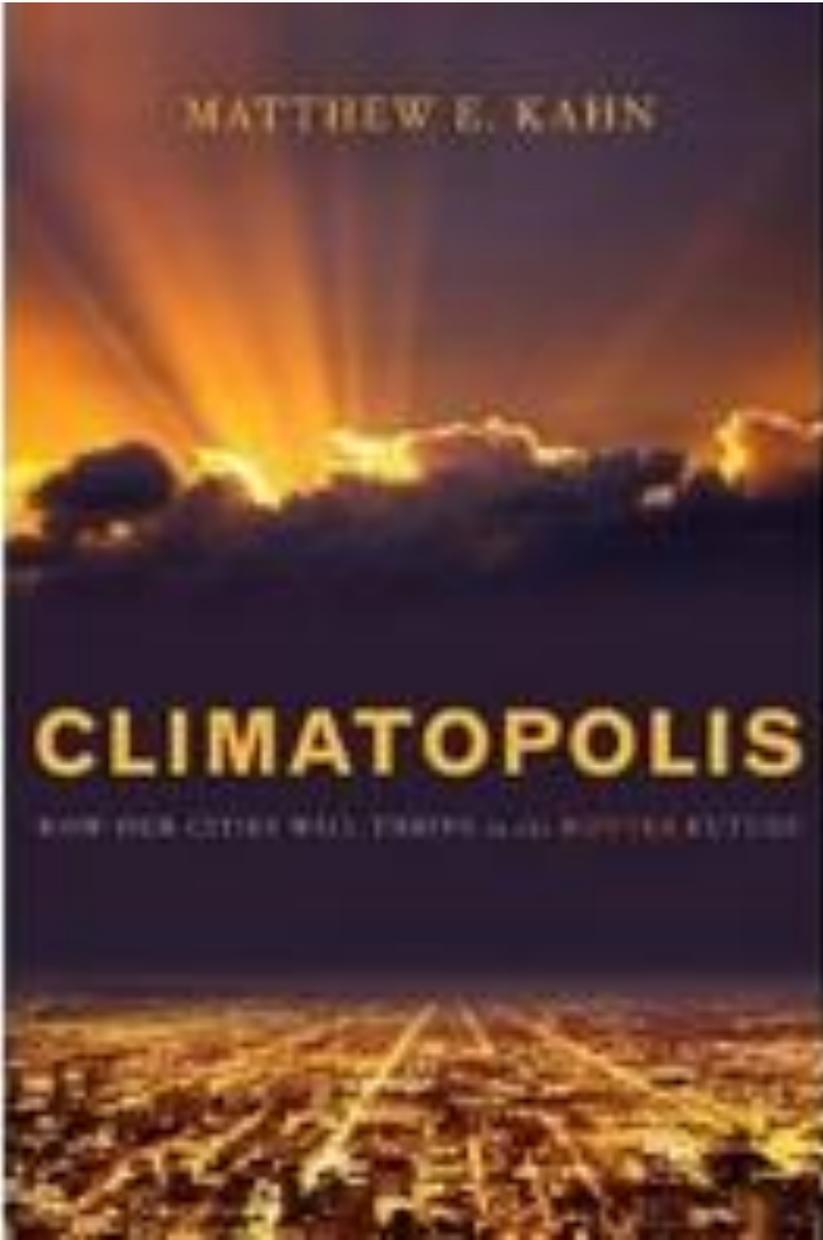
- Climate Change Adaptation
- Risky topic because of the challenge of refuting hypotheses and predicting how climate change will impact our different cities
- Prospective analysis of the role of individual households, firms and governments responding to incentives and new information about the uncertain new challenges posed by climate change.
- Why an urban focus?

Why Focus on Adaptation Rather than Mitigation?

- Global GHG Treaty Failure in Copenhagen in December 2009
- Fundamental World free rider problem
- With the World unable to cap global GHG emissions --- Climate Change is coming

Contrasting Carbon Mitigation and Climate Change Adaptation

- Different “Kettle of Fish”
- **Mitigation** = In a world with 7 billion people who each seek to live the American Dream there will be a lot of gas
- **Adaptation** = We want to be happy and healthy
- Out of narrow self interest, we have strong incentives to adapt to changing climate conditions



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CLIMATOPOLIS

HOW THE CITIES WE LIVE IN WILL SHAPEN OUR FUTURE

Adaptation Margins

- Private choices made by individuals: locational choice both across cities and within cities, time allocation, durables purchased
- Private choices made by firms: locational choice, R&D investments and new products
- Public choices made by local and national governments

What is New in Climatopolis?

- Climatopolis is an optimistic but realistic book about how urbanites will cope and continue to thrive in the face of anticipated but uncertain climate change
- An examination of the “Small Ball” little choices we make that aggregate up to help protect us against new risk
- Microeconomics book focused on geography and urban quality of life

Climate Change's Impacts on Our Cities

- Cities around the world will face:
 - 1. Average hotter temperature
 - 2. sea level rise and flooding
 - 3. water scarcity
 - 4. natural disaster risk
 - 5. low probability now higher of truly horrible scenarios (fat tail events)
- Climate scientist: can and will quantify this risk, such measurement is their job!!

My Core Question About Climate Change's Urban Consequences

- Without engaging in too much science fiction;
- How will climate change affect urban quality of life in developed and developing country cities?
- How will urbanites, urban firms and urban politicians respond to the challenges posed by climate change?
- If a specific city's quality of life deteriorates, what happens next?

Why Does An Economist Have Anything Interesting to Say Here?

- I do not have a “crystal ball” about what climate change will do to city X or city Z
- But, there is a long historical track record on how we have responded to past disasters
- We also know a lot about how people respond to “new information” in terms of making new choices over where to live and how to live
- We know how profit seekers respond to perceived opportunities

Now a Detour to San Diego, CA

- Every city and every community within each city will face different impacts from climate change
- Specificity
- Anticipating likely impacts will play a key role in adapting --- worst case scenario planning
- The San Diego story is completely general and is offered as an example to highlight two different visions of our urban future

The San Diego Foundation's 2050 Study

“A Regional Wake Up Call”

- 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%

Scenario #1: The Ugly Case

- We do not plan ahead
- Individuals ignore the threat of climate change
- Governments ignore the threat of climate change
- Businesses ignore the threat
- We are shocked and suffer when; flooding, heat, fires, water and electricity and food scarcity hit our cities

Scenario #2: A More Realistic Scenario

- The climate shocks will impact day to day markets that we participate in
- While in the short run it may be hard to respond to the resulting changes in market prices
- In the medium term, there will be many coping strategies

Capitalism's Price Signals

- The key role of:
- Insurance prices
- Real Estate prices
- Food prices
- Electricity prices
- Water prices
- When they are high signaling to consumers and producers , opportunities and challenges and “directing traffic”

How Do Households Respond to these Signals?

- Try to move to cooler, safer areas of the city
- Conserve on scarce natural resources
- Build with safer materials that face lower risk
- Arrange the work day to minimize exposure to extreme heat and pollution

How Do Firms Respond to these Signals?

- Endogenous Innovation and the Anticipation of Suffering
- Entrepreneurs are always looking for new profitable markets
- Anticipating Desperate Republicans in the year 2050, actually creates profit opportunities for the young Al Gores in 2020.
- “Endogenous” innovation and induced technological change --- what problems do our “nerds” focus their efforts on?

Supply Side and Innovation

- Market Potential --- climate change increases the aggregate demand for safe housing and energy efficient appliances
- This triggers R&D
- Fixed costs of R&D
- Acemoglu and Linn (2004)

Endogenous Innovation and Acemoglu and Linn (2004)



Government as “Friend” or “Foe” of Adaptation

- Politician incentives – they should recognize that skilled, mobile people are the “golden goose” of urban growth → “friend”
- **FOE:** In the U.S though, natural monopolies for water and electricity pricing creating bad incentives
- **FOE:** Local zoning policy affecting land use decisions
- **FRIEND:** trusted information middleman
example of Smog Alerts , early warnings

Escape from San Diego?

- What if none of my predictions play out?
- If a city such as San Diego's quality of life suffers due to climate change, home owners there suffer an asset loss
- Households there can migrate to a Detroit or another Northern city whose quality of life is relatively better
- Migration acts as an implicit insurance policy
- Internet and "twitter world" keeps us fully informed,

Europe as a System of Cities

- The United States consists of hundreds of major cities; LA vs. Detroit (100 to 1!)
- 3% of people switch states every year
- European integration offers the possibility to migrate to another area
- Implicit portfolio assumption that climate change's impacts will not be perfectly correlated across Europe
- Real estate price dynamics across Europe's cities

Adjustment Times

- Yes, “in the long run we are all dead”
- But, if people anticipate certain trends or new possibilities, this creates new opportunities for other cities in Europe
- Land constraints and elastic housing supply (Glaeser and Gyourko)
- Possibility of building up at higher density (China built a 15 story hotel in six days)
- <http://www.youtube.com/watch?v=E76uJi744>
Do

European Empirical Work

- Hedonic pricing of climate in Italy, Madison and Bigano
- Trends in deaths from heat waves (France, Moscow)
- Insurance price dynamics in flood zones and coastal areas
- Urban heat island effect and actions by local governments to prepare

Ideas About Geography Research

- Detailed GIS maps pinpointing exactly where flooding could occur, detailed information on risk priorities by geographical area
- Anticipating flows of “environmental refugees” --- origin nations and destination nations within the EU
- Gains to trade as Europe grows older? Self interested migrants will go to those countries offering the highest real wages

City Competition and the “King of the Hill”

- Migration Across Cities --- Recall the San Diego example
- Skill as the “Golden Goose” for Cities
- What determines if a city is “sustainable” in the face of climate change?

The Fate of the Urban Poor

- By definition, the poor have fewer resources to adapt
- Less voice with government
- Climate change will make them poorer
- Of course, we can protect the poor by reducing our GHG emissions now – but that is not going to happen
- To help the poor to adapt, they must grow richer

Coping with Climate Change in the Developing World

- Flood Risk, heat waves, water shortages in cities teaming with the urban poor
- The Death Toll from Natural Disasters (Kahn 2005 RESTAT)
- Economic development as the best adaptation strategy

Can Farmers Cope with Climate Change?

- Mendelsohn vs. Roberts and Schlenker
- environmental justice
- Heat waves
- Drought risk
- Inventories and storage
- Human capital
- Fungible physical capital and crop switching costs

Conclusion

- Yes, mitigation now is a wise insurance policy and it would make adaptation easier
- But, GHG emissions just keep rising
- City growth has caused climate change
- How do forward looking, self interested people and firms respond to an anticipated but vague threat?
- Fatalists or Anticipate and “pre-empt”?
- The future of U.S Republicans?

The Point?

- It would be a mistake to say, “Oh, Kahn says that we don’t need to worry about climate change because the magic of capitalism will save us from whatever will happen.”
- When we face a new challenge (that we created), capitalism is our best evolutionary response for allowing us to individually seek out new ways to cope.

Experimentation and Adaptation

- Capitalism will help us to cope due to the price signals and incentives it creates for behavioral change by self interested households and firms
- No “Manhattan Project” here, decentralized learning, and experimentation will create a variety of coping strategies

Final Thoughts

- Abrupt climate change poses an intellectual challenge to the optimistic economist
- Is optimism dangerous?
- The “lulling hypothesis” and mitigation politics
- Other UCLA Research on the geography of our future, see my Geography colleague Larry Smith’s “The World in 2050”