“What business are you in?”

“I’m an environmental economist.”
“Environmental economics” is not oxymoronic.

1. The causes of environmental problems (in a market economy) are economic.

2. The consequences of environmental problems have important economic dimensions.

- Therefore, an economic perspective is essential for
  - Understanding environmental problems
  - And therefore can be exceptionally helpful for the design of solutions that will be effective, economically sensible, and politically pragmatic.

### The Causes of Environmental Pollution are Economic

**May** firms go beyond full compliance with the law (sacrifice profits in the social interest)?

For publicly-owned firms:
- Fiduciary responsibility to shareholders
- But the business-judgment rule

Where does the pollution go?
- Commercial laundry next door
- Does cost (to laundry) show up in annual report of steel producer?

**Pollution is an externality.**
The Consequences of Environmental Pollution have important Economic Dimensions

1. Producer $\rightarrow$ Producer
   (steel production & laundry services $\rightarrow$ $)
2. Producer $\rightarrow$ Consumer
   (paper production & recreational fishing)
3. Consumer $\rightarrow$ Consumer
   (secondary exposure to cigarette smoke)
4. Consumer $\rightarrow$ Producer
   (littering in a movie theatre $\rightarrow$ $)

- Economic consequences $\geq$ financial consequences
  - Economics is not the same as accounting

Economic Valuation of the human health impacts of environmental pollution

- You drink dirty water: feel sick for two days, stay home from work, go see the doctor
- How should we economically value the damages of your exposure to this pollution?

1. Lost wages (reduced productivity)?
2. Medical costs (whether paid, insured, or “free”)? [Opportunity Cost]
3. “Pain-and-suffering”?

- Economics takes a holistic view, because #3 cannot be observed
  - The economic value of the damages are whatever you truly feel (believe) that they are!
  - Not what you say the damages are, but what you really feel that they are.
    - Your minimum willingness to accept (WTA) compensation to tolerate exposure
    - Your maximum willingness to pay (WTP) to avoid exposure
Can meaningful numbers be put on these concepts?

- There’s good news and bad news. First, some good news …
  - Over the past 50 years, economists have developed rigorous methods for reliably estimating people’s WTA and WTP associated with a wide range of environmental threats and damages.
  - Now, some bad news: you’ll have to take a course in environmental economics — or at least read part of a book — to learn about those methods.

- Are these methods just the province of pointy-headed academics?
  - No, the concepts and specific methods are validated, even required by:
    - Executive Orders by Presidents Reagan, Bush, Clinton, Bush, and Obama
    - Federal statutes, including parts of Clean Air Act, Clean Water Act, CERCLA, and many others
    - Best analytic methods are laid out by Guidelines of U.S. Office of Management and Budget, U.S. Environmental Protection Agency, and others.

- If we have concepts and methods for valuing damages of environmental pollution, then we have methods for valuing benefits of public policies.

What about the costs of environmental policies?

- How much does it cost to reduce a ton of SO₂?
- Total costs increase at an increasing rate.
- In other words, incremental or marginal costs increase.

<table>
<thead>
<tr>
<th>Emission Reduction (million tons)</th>
<th>Total Cost ($ billion)</th>
<th>Average Cost ($/ton)</th>
<th>Marginal Cost ($/last ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>$2.2</td>
<td>$270</td>
<td>$270</td>
</tr>
<tr>
<td>10</td>
<td>$3.6</td>
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<td>$720</td>
</tr>
<tr>
<td>12</td>
<td>$9.3</td>
<td>$720</td>
<td>$2,775</td>
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</tbody>
</table>

- This general pattern is ubiquitous — for virtually all environmental policies:
  - Increasing marginal costs.
The Costs of Pollution Control

The Damages of Pollution
The Benefits of Pollution Control

Total Benefits (Avoided Damages)

$\rightarrow$

Pollution Control

$\leftarrow$ Dirtier Air

Cleaner Air $\rightarrow$

Think about your own pollution-control policies.

- We all exercise pollution control policies, where we get the benefits and we pay the costs
  - Keeping the kitchen floor clean
  - Do you keep it perfectly clean?
  - Why not?
- And how clean do you keep your garage floor?
- What about the cleanliness you expect in a surgical theatre?
- Why do we individually and collectively choose different levels (standards) of acceptable cleanliness in these different cases?
  - It seems that benefits and costs matter.
  - In fact, we behave as if we’re doing a very specific kind of analysis!
The Efficient Level of Pollution Control

- Maximizing the difference between benefits and costs: the efficient level of pollution control effort is not an infinite level.
  - The efficient amount of pollution is not zero.
  - Interest groups on both sides of the policy spectrum may be dissatisfied
    - Not enough benefits to please Greenpeace
    - Too much cost to please the Chamber of Commerce
- Markets produce this efficient quantity of goods and services for most products,
  - But not for externalities.
- So, this is not a call for laissez-faire, but for a legitimate role for public (government) intervention.
  - But not all government intervention is created equal.
  - There are some very costly forms of environmental regulation,
  - … and other approaches that harness market forces on behalf of environmental protection, and hence are cheaper – example is “cap-and-trade”
The Global Climate Policy Challenge

- Kyoto Protocol came into force in February 2005, with first commitment period, 2008-2012

- Even if the United States had participated, the Protocol’s direct effects on climate change would be very small to non-existent

- Science and economics point to need for a credible international approach

- Climate change is a classic global commons problem — so it calls for international (although not necessarily global) cooperation

Placing Copenhagen (December 2009) in Perspective

- Cliché about baseball season applies to international climate change policy: it’s a marathon, not a sprint
  - Scientifically: stock, not flow environmental problem
  - Economically: cost-effective path is gradual ramp-up in target severity (to avoid unnecessary capital-stock obsolescence)
  - Economically: technological change is key, hence long-term price signals
  - Administratively: creation of durable international institutions is essential

- International climate negotiations will be an ongoing process – much like trade talks – not a single task with a clear end-point.

- Bottom-Line: sensible goal for Copenhagen was progress on sound foundation for meaningful long-term action, not some notion of immediate “success”
Alternative definitions of “success” at COP-15

- It would have been possible – but actually unfortunate – to achieve what some people would have defined as “success” in Copenhagen:
  - A signed international agreement, glowing press releases, & photo opportunities
  - That would have been unfortunate, because ........

- Such an agreement could only have been the “Kyoto Protocol on Steroids”
  - More stringent Annex I targets, & no meaningful action by key developing countries
  - Signature but no ratification by U.S. (just like Kyoto)
  - No real progress on climate change
  - Remarkably, some groups – including many advocacy organizations, as well as the international press corps – would have applauded such a step

What actually happened in Copenhagen?

- Organizational failure (47,000 advance credentials – capacity of 15,000)
- Political grandstanding & lack of consensus
- But last-minute, direct negotiations among key national leaders
  - Leaders of United States, China, India, Brazil, and South Africa
  - Virtually unprecedented in international negotiations
  - Saved COP-15 from complete collapse
  - Produced a significant political framework, the Copenhagen Accord
- Accord addresses two of the key deficiencies of Kyoto Protocol:
  - (1) expands coalition of meaningful commitments to include all major emitters
  - (2) extends time-frame of action
The Copenhagen Accord

- The “good news”
  - Provides for real cuts in greenhouse gas emissions by all major emitters
  - Establishes a transparent framework for evaluating countries’ performance against their commitments
  - Initiates a flow of resources to help poor, vulnerable nations carry out both mitigation and adaptation
  - Submissions received from 130+ parties, which account for >80% of 2006 global emissions

- The “bad news”
  - Not on track for 450 ppm (2°C)
  - Annex I/non-Annex I distinction remains, in words (but blurred in action)
  - Future of UNFCCC threatened (bad news?)

- U.S. (& Chinese) domestic policy action is critical

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Core of Likely Future U.S. Action: Cap-and-Trade +/-

- Meaningful legislation (HR 2454/Waxman-Markey) with cap-and-trade passed by House in June, 2009, by small margin

- Attention now focuses on Senate
  - Kerry-Lieberman proposal (May 2010)
  - Politics difficult: 60 votes required
  - Bi-partisan opposition (coal & rural states)

- Major substantive issues remain
  - Ambition, allocation, offsets, cost-containment mechanisms, international competition protection, regulatory oversight, nuclear power provisions, offshore oil & gas provisions
  - Gulf oil spill will be used by supporters and opponents of climate bill
Cost-Effective Economy-Wide Climate Policy
Achieves Very Different Reductions from Different Sectors

Anticipated Economic Impacts of U.S. Climate Policy

- **Cumulative cost**, 2012-2030 – 0.3% to 0.9% of GDP
- Essentially a **tax on coal**: coal price increases **280%** relative to BAU (2030)
  - Coal $\rightarrow$ natural gas, then nuclear & renewables for electricity generation
  - **Impact on gasoline price**: increase of 9% (35¢/gal) relative to BAU (2030)
  - **Gasoline demand**: 5% fall below BAU by 2030
- **Electricity sector** accounts for **80%-90%** of emissions reductions
Other Important U.S. Climate Policy Developments

- **Carbon Tax** – some real interest and some phony interest
- **Stimulus Package** – $80 billion for renewables and energy-efficiency
- Automobile and Appliance Energy **Efficiency Standards**
- Court-Ordered **Regulation** under the Clean Air Act
  - U.S. Supreme Court decision & Obama “endangerment finding”
  - Regulation would be ineffective and costly – but force Congress’s hand?
- **Sub-National Policies** – California’s AB 32, RGGI, etc.
  - May turn out to be the core of U.S. action
    - Good news – can be linked
    - Bad news – inferior to a national approach

U.S. Political Timing:
A Challenge for the International Process

- Recession (and unemployment)
- Other domestic policy priorities: economic stimulus, health care, financial regulation, and now – the Gulf oil spill
- Public perceptions
- Congressional deliberation, difficult politics, and challenging numbers
- U.S. mid-term elections (November, 2010) *work against* bipartisanship, and make it more difficult to vote to raise energy prices
• So, “Environmental Economics” is not an oxymoron.

For More Information

The Harvard Environmental Economics Program
www.hks.harvard.edu/m-rcbg/heep/

www.stavins.com

• An economic perspective is essential for a
  • full understanding of environmental problems.

• And therefore for the design of solutions that are:
  • environmentally effective
  • economically sensible
  • politically pragmatic