Course Description.

This class is going to be different than in the past. It will be more contrarian and more skeptical. Since its last installment, in the fall of 2011, I’ve learnt or discovered some things that cause me to question whether many of the main findings in environmental economics, some of its most cherished conventional wisdoms, are correct. My plan is to invite you along on a journey of discovery in which we work together to figure out which of a series of prominent articles, some old and some new, stand up in the face of the surprising ideas I’ve come across. These are the two ideas:

1. **Curvature.** The standard assumptions regarding the shape of some crucial functions, most importantly that describing the benefits of abatement, might sometimes be violated. It is no longer clear to me that the marginal benefits to abatement of pollution must be declining in the level of abatement.

2. **Output effects.** Any analysis of pollution policy that is carried out entirely in the dimension of abatement levels, ignoring effects in the associated output market, can lead to incorrect answers.

   The first comes from recent work by epidemiologists on the relationship between ambient particulate pollution and human health. For a long time, scientists were pretty sure that low levels of pollution concentration are safe for humans, but that high levels are dangerous. This means that the first unit of abatement confers high marginal benefit because health risks are reduced by quite a lot. Later units of abatement confer lower and lower marginal benefits. The newest science says that the first unit of *exposure* causes the greatest incremental health damage, and later units are less and less harmful at the margin. If this is correct, then the first unit of abatement confers low marginal benefit. Later units of abatement confer higher and higher marginal benefits. Similar problems might be possible for water pollution.

   The second comes from my own new appreciation for the idea (which is widely accepted) of “windfall profits” associated with cap-and-trade programs to reduce emissions of greenhouse gases. The idea is that if valuable emissions allowances are given to polluters free of charge, the profits of the affected industry might actually rise above what they’d have been without the new and tighter environmental constraint. I have worked hard to understand the math of this phenomenon, when and how it can occur, and I now know that the key is to consider welfare effects in both the abatement domain and in the output domain. In great swaths of our literature, the output domain is ignored entirely. Because of this I’m not sure which of the important results in that literature are still correct when the output effects are considered.
The result of these two ideas or realizations is that my old way of teaching the class, in which I attempted to impart truth on a set of readings, is no longer satisfying to me. What’s more, I don’t think I could pull it off. I’m not a great actor, and if I’m not sure something is right I doubt I could convince you to believe it. My real suspicions would continually show through.

How the Course Used to Work

In the past, I’ve divided the course into two almost equal parts according to the main large themes in environmental economics: environmental policy analysis and nonmarket valuation. After some preliminary material, we would spend about half the course, the first half, studying policy. Then we would spend the other half studying nonmarket valuation. A variety of odds and ends filled in at the end. This is what I said about the course in the syllabus from 2011: “Each week we will take up a new topic, or perhaps two. There will be a set of readings for each topic. Students will be expected to have read the required readings for the week by Monday at class time. Most of our time will be devoted to lecture, but your active participation will be encouraged.” The goal each week, through lecture and discussion, was reach an understanding of some important topic in the field. We were trying to learn the truth, as espoused in the published literature. A rough outline of topics went like this:

1. Background: welfare measurement
2. Background: market failure (externalities and public goods)
3. Pollution policy: taxes, permits, technology incentives
4. Policy for nonpoint pollution
6. Value of a statistical life
7. Odds and ends: Option value and quasi-option value, the environmental Kuznets curve, climate change, valuing ecosystem services

How the Course Will Work This Time

I hope you’ll find this new approach interesting, even invigorating. My goal is to take you to the frontier of environmental economics, and then to try, with your help, to push on the frontier. Maybe even to nudge it outward in a few places.¹

We will spend five weeks working through a series of papers that I think are especially ripe for a complete re-thinking. Thus, some of the old material will be thrown out, along with my prepared lecture notes. We will spend one session on the theory of public goods, but no time will be devoted to the measurement of welfare change. We reclaim a few weeks there. The treatment of nonmarket valuation will be shortened quite a bit. Because of the changes, I’m afraid the schedule included in this syllabus is more tentative than usual. I cannot tell how far we’ll get.

In broad outlines, the course will progress as follows. First we’ll build our fundation by studying the old received wisdom of environmental policy. That will occupy the first two weeks.

¹As I try to put myself in your place, I can imagine that this enterprise might create a little anxiety in some. It’s strange and different. How will the exams work? What does it mean for future prelims? All I can say now is that I will work hard to be sure our exams are fair and reasonable, and that you will be given plenty of help in preparing for the prelim exam.
A two-week detour into climate change will give you time to prepare for what comes next, when we read a series of papers, one at a time, and work together to figure out if their results hold up in the face of (i.) increasing marginal benefits or (ii.) output effects or (iii.) both. After that comes a series of recent papers that we’ll study one at a time, always asking how they might be improved. Finally, we’ll turn briefly to nonmarket valuation and the value of a statistical life.

The introductory sessions will be in the traditional lecture mode, with discussion encouraged. After that we’ll all read one article at a time, probably only one per week, with the deliberate goal of determining whether its main results are true if marginal benefits slope upward, or if the output effects are considered. We’ll see whether the pace of one article per week is reasonable. Everyone will be expected to have read the paper carefully by Tuesday, when I’ll lead a lecture-type discussion of the paper and how it works. Then in the Thursday session two of you will present your analysis of the paper, considering its soundness in the face of one of our two “violations.” Five papers and ten students: each of you will get a turn leading one of these sessions.

Assigned Workload

This is another place where things are going to change from the past. We will have a series of mostly theoretical homeworks, and everyone will be required to take the mid-term exam. After that you have several choices. You can write an individual research paper. You can join a team, which I will lead, to work on a group research paper. You can take the final exam, which will be optional if you do a paper. Both paper projects are voluntary, but if you do neither then you must take the final exam. If you write a paper or join the group project, you may take the final exam too. Your presentation during the semester will also count in your grade.

The Group Research Paper

When I taught the course in Fall 2011, seven students volunteered to join a working group, which I led, to study the policy implications of an upward-sloping marginal benefit function. That experience was so rewarding, and the outcome so impressive, that I’ve decided to try to replicate it.\(^2\) Early in the term I will describe one or more ideas for a research paper. These will be ideas that I think are both interesting and feasible, in the sense that a group of smart people working together for a few months can reasonably expect to complete a paper for submission to a journal. You will be asked early to decide whether to join the working group. Those who join will be expected to meet weekly through the remainder of the semester, and each will be expected to contribute significantly to the project, most likely in pairs or threesomes. If this exercise works like it did the last time, it will be a great way to learn how the research process works in practice, all the way from choosing a topic, to deciding how to model the problem, to proving results (if theoretical) or obtaining data and executing an empirical strategy, to writing the paper. But remember: this project is voluntary.

The Individual Research Paper

If you prefer to work on a paper by yourself, you can do that rather than join the group project. If you choose this option, before the end of the fourth week of the semester (by February 14) those

\(^2\)The resulting paper, Goodkind et al. (2012), is on our syllabus.
choosing this option will be required to: 1) talk with me about your ideas for the paper; and 2) submit a two-page prospectus describing your plan. This document is to provide an overview of the problem that you intend to study and a sketch of the methods and possibly the data you will use. The paper itself will be due at classtime on Thursday, May 2. (This deadline is firm.) More details about the paper project will be contained in a separate handout.

Grading

Because of the experimental nature of this course, I plan to be more lenient in grading than usual. I want to be sure not to inject additional anxiety over grades. Still, the rules require that I assess your performance and issue grades, so here is how that will work. Your grade will be determined using the following weights, depending on your choice about the final exam and the paper:

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam</td>
<td>30 %</td>
<td>25 %</td>
<td>25 %</td>
<td>20 %</td>
</tr>
<tr>
<td>Joint paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiv Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final &amp; paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeworks</td>
<td>30 %</td>
<td>25 %</td>
<td>25 %</td>
<td>20 %</td>
</tr>
<tr>
<td>Paper</td>
<td>- 0 -</td>
<td>25 %</td>
<td>25 %</td>
<td>20 %</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>30 %</td>
<td>40 %</td>
<td>40 %</td>
<td>25 %</td>
</tr>
<tr>
<td>Final exam</td>
<td>30 %</td>
<td>- 0 -</td>
<td>- 0 -</td>
<td>25 %</td>
</tr>
<tr>
<td>Class participation</td>
<td>10 %</td>
<td>10 %</td>
<td>10 %</td>
<td>10 %</td>
</tr>
</tbody>
</table>

The grade for an individual paper will be assessed according to my judgment of quality, with scores ranging up to 100 for an ideal specimen. The grade for participation on the joint paper will be binary: either 90 if my assessment is that your contribution was not adequate; or 100 if my assessment is that your contribution was adequate. My expectation is that all who participate will get a grade of 100. (I worry more that, given the competitive nature of most graduate students, people will work too hard on the project.) Final grades will be calculated on a curve, using these weights. Plus and minus grades will be used, with scoring based on the following table:

<table>
<thead>
<tr>
<th>Weighted Final Grade</th>
<th>Weighted Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93–100</td>
<td>A</td>
</tr>
<tr>
<td>90–92.9</td>
<td>A–</td>
</tr>
<tr>
<td>87–89.9</td>
<td>B+</td>
</tr>
<tr>
<td>83–86.9</td>
<td>B</td>
</tr>
<tr>
<td>80–82.9</td>
<td>B–</td>
</tr>
<tr>
<td>-79.9</td>
<td>C</td>
</tr>
</tbody>
</table>

University Grading Standards

I will follow the University Grading Standards, found on the web at policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html.

Books and other readings.

The readings for the course will be taken mostly from published articles. You will also benefit from buying two books.


All readings not found in the texts will be available at the University library’s online reserve. The web address is eres.lib.umn.edu/eres/coursepage.aspx?cid=2239. I will provide you with the class password needed to log into the site.

Two blogs by environmental economists that I find interesting are *An Economic View of the Environment* by Rob Stavins (go to belfercenter.ksg.harvard.edu/analysis/stavins) and *Environmental Economics* by Tim Haab and John Whitehead (go to www.env-econ.net). I will refer to these and other bloggy sources from time to time and you should plan to visit them too.

**Final Exam**

The time for the final, in case anyone chooses to take it, is listed as 8:00am–10:00am Saturday, May 18. I will be willing to offer the exam at other times according to your schedules.
# COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Required Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Jan 22</td>
<td>Introduction: Output effects</td>
<td>Montgomery 1972</td>
</tr>
<tr>
<td>Jan 24</td>
<td>More on output effects</td>
<td>Buchanan and Tullock 1975</td>
</tr>
<tr>
<td>2: Jan 29</td>
<td>Introduction: Curvature</td>
<td>Weitzman 1974</td>
</tr>
<tr>
<td>3: Feb 5</td>
<td>Climate change: fat tails</td>
<td>Weitzman 2009</td>
</tr>
<tr>
<td>Feb 7</td>
<td>Against fat tails</td>
<td>McKitrick 2012; Horowitz-Lange 2009</td>
</tr>
<tr>
<td>4: Feb 12</td>
<td>Public goods</td>
<td>Laffont, ch. 2</td>
</tr>
<tr>
<td>Feb 14</td>
<td>Climate change: geoengineering</td>
<td>Weitzman 2012</td>
</tr>
<tr>
<td>5: Feb 19–21</td>
<td>Permits and market power</td>
<td>Hahn 1984; Meunier 2011</td>
</tr>
<tr>
<td>6: Feb 26–28</td>
<td>Technology adoption</td>
<td>Requate-Unold 2003</td>
</tr>
<tr>
<td>8: Mar 12</td>
<td>Nonpoint pollution</td>
<td>Hansen 2002; Segerson 1988</td>
</tr>
<tr>
<td>Mar 14</td>
<td>Mid-term exam</td>
<td></td>
</tr>
<tr>
<td>9: Mar 26–28</td>
<td>Permits and market manipulation</td>
<td>Stocking 2012</td>
</tr>
<tr>
<td>10: Apr 2</td>
<td>Efficient pollution regulation</td>
<td>Muller and Mendelsohn 2009</td>
</tr>
<tr>
<td>Apr 4</td>
<td>Multiple cities and sources</td>
<td>Goodkind and Coggins 2012</td>
</tr>
<tr>
<td>11: Apr 9</td>
<td>Env Accounting for Pollution</td>
<td>Muller et al. 2011</td>
</tr>
<tr>
<td>Apr 11</td>
<td>Ecosystem services (S. Polasky)</td>
<td>Polasky and Segerson 2009</td>
</tr>
<tr>
<td>12: Apr 16</td>
<td>Emissions trading and hot spots</td>
<td>Antweiler 2012</td>
</tr>
<tr>
<td>Apr 18</td>
<td>Water-quality trading</td>
<td>Horan and Shortle 2011</td>
</tr>
<tr>
<td>13: Apr 23</td>
<td>Contingent valuation</td>
<td>Haab and McConnell, chs. 2–4</td>
</tr>
<tr>
<td>14: Apr 30</td>
<td>Hedonics</td>
<td>Haab and McConnell, ch. 9; Albouy et al.</td>
</tr>
<tr>
<td>15: May 7</td>
<td>Value of a life</td>
<td>Ashenfelter; Shogren and Stamland</td>
</tr>
</tbody>
</table>
Session 1, January 22: Introduction: Output effects


Session 2, January 24: More on output effects


Session 3, January 29: Introduction: Curvature


Session 4, January 29: More on curvature

Session 5, February 5: Climate change: Fat tails


Session 6, February 7: Against fat tails


Session 7, February 12: Public goods


Session 8, February 14: Climate change: geoengineering


Sessions 9–10, February 19 & 21: Permits and market power. Nathan Paine


Sessions 11–12, February 26 & 28: Technology adoption. Derya and Jooyoung


Sessions 13–14, March 5 & 7: Water-quality trading. Beverly and Jay


Session 15, March 12: Nonpoint pollution. Jongwoo and Jaeseok


Session 16, March 14: Mid-term exam

Sessions 17–18, March 26 & 28: Permits and market manipulation. Jose and Jason


Session 19, April 2: Efficient pollution regulation


Session 20, April 4: Multiple cities and sources


Session 21, April 9: Environmental accounting for pollution


Session 22, April 11: Ecosystem services (Steve Polasky)


Session 23, April 16: Emissions trading and hot spots

Session 24, April 18: Water-quality trading


Sessions 25–26, April 23 & 25: Contingent valuation


Sessions 27–28, April 30 & May 2: Hedonics


Sessions 29–30, May 7 & 9: Value of a life