

# THE UNIVERSITY OF BRITISH COLUMBIA

Department of Economics

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Winter 2014

## Economics 573

### ENVIRONMENTAL ECONOMICS

This is a graduate course environmental economics. Topics include: the theory of externalities and public goods, analysis of environmental policies, recent work on climate change, growth and the environment, innovation, health effects of pollution, environmental policy in open economies, second best issues (such as double dividend), and some issues in renewable resource management. The course is suitable for both M.A. and Ph.D. students. Students should be comfortable with microeconomic theory at the M.A. level (such as Econ 500) and should have some familiarity with econometrics. A previous course in environmental economics is not required.

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#### Requirements

Final exam	40%
Problem sets	20%
Report on an unpublished article	15% (Due Feb. 14)
Short state-of-the-art literature review	25% (Due last day of class)

The report on an article should be similar to (but a bit more detailed than) a referee report on an article for a decent journal. You should summarize and assess the contribution of the article, and provide critical and / or constructive comments. You should make a recommendation as to whether a revised version of the article would be suitable for publication in a top journal (such as the *American Economic Review*), or alternatively a good field journal (such as the *Journal of Environmental Economics and Management*); or whether it should be rejected. You will be responsible for choosing an unpublished paper to review. Your choice must be approved by me in writing (by email) before you write your review. Suggestions regarding how to find an article: check out websites of researchers working in the relevant area; NBER working papers; or recent conferences in the field, such as the Banff AERE conference, NBER Summer Institute, etc.

The short state-of-the-art literature review should be a review of a small number (4 or 5 papers?) of the most recent important contributions to a narrowly defined topic (for example, merits of using border taxes in a climate change agreement, effects of air pollution on human health, effects of subsidies to buy hybrid vehicles, etc). You should begin by reviewing the main questions and issues in your literature, what is known, what is controversial, etc. And then critically review the most recent important contributions. You are free to choose any topic in the field of environmental or resource economics (theory or empirical or both). The topic should be approved by me before you write the review.

There is no textbook. However, the following may be useful to consult for background reading.

Kolstad, C. *Environmental Economics*, Oxford University Press (Second edition, 2010)

Baumol and Oates, *The Theory of Environmental Policy* (Second Edition, 1988)

Copeland, Brian R. and M. Scott Taylor. *Trade and the Environment: Theory and Evidence*, Princeton University Press, 2004.

Maler, K.-G. and J.R. Vincent, *Handbook of Environmental Economics*, Vol. 1-3.

## PRELIMINARY READING LIST

### 0. Introduction

Heal, Geoffrey "A Celebration of Environmental and Resource Economics," *Review of Environmental Economics and Policy*, 1 (2007):7-25.

Stavins, R., "Environmental Economics," NBER Working Paper 13574, Nov. 2007.

### 1. Externalities, property rights and public goods

Mas-Colell, Whinston and Green, *Microeconomic Theory* (1995), ch.11

Baumol, W., and W. E. Oates, 1998. *The Theory of Environmental Policy*, Second Edition, Cambridge University Press. Ch. 2-4.

Coase, R., "The problem of social cost," *Journal of Law and Economics* 111 (1960): 1-44.

Helfand and Rubin, "Spreading versus concentrating damages," *JEEM* 27 (July 1994): 84-91

Baumol and Bradford, "Detrimental externalities and non-convexity of the production set," *Economica* 39 (1972): 160-76. [Similar material is in Baumol and Oates, *The Theory of Environmental Policy* (Second Edition, 1988) Ch. 8]

Copeland, B.R. and M.S. Taylor, "Trade, spatial separation, and the environment," *Journal of International Economics*, 1999

### 2. Regulatory Instruments

#### Taxes, subsidies, regulations, permits

Goulder, Lawrence H., and Ian W. H. Parry, "Instrument Choice in Environmental Policy." *Review of Environmental Economics and Policy* 2008: 152-174

Keohane, Nathaniel O., Richard L. Revesz, and Robert N. Stavins. "The choice of regulatory instruments in environmental policy," *Harvard Environmental Law Review* 22(1998): 313–67.

Holland, S. P., "Taxes and Trading versus Intensity Standards: Second-Best Environmental Policies with Incomplete Regulation (Leakage) or Market Power" *Journal of Environmental Economics and Management*.

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Fraas, A. and R. Lutter, "A Comment on 'Efficient Pollution Regulation: Getting the Prices Right,' by Muller and Mendelsohn Resources for the Future Discussion Paper 11-36, Aug. 2011.

Fullerton and West, "Can Taxes on Cars and on Gasoline Mimic an Unavailable Tax on Emissions?," *Journal of Environmental Economics and Management*, 2002

Montgomery, W. D. "Markets in Licenses and Efficient Pollution Control Programs." *Journal of Economic Theory* 5 (1972): 395-418.

Hahn, R.W., "Market power and transferable property rights," *QJE* 1984: 753-766.

M. Fowlie and J. M. Perloff "Distributing Pollution Rights in Cap-and-Trade Programs: Are Outcomes Independent of Allocation?" forthcoming, *Review of Economics and Statistics*.

- Goulder, L., "Markets for Pollution Allowances: What Are the (New) Lessons?" *Journal of Economic Perspectives* 27(1), Winter 2013.
- Stavins, R. N., "The SO<sub>2</sub> Allowance Trading System and the Clean Air Act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal* 65(2), June 2012.
- Carlson, C., D. Burtraw, M. Cropper and K. Palmer. 2000. Sulfur dioxide control by electric utilities: what are the gains from trade? *Journal of Political Economy* 108: 1292-1326.
- Chan, H.S. "An Ex Post Evaluation of the U.S. Acid Rain Program," mimeo, U of Maryland, 2013
- Costello, C., S. Gaines and J. Lynham, "Can catch shares prevent fisheries collapse? ". *Science*. 321(2008): 1678-1681.

### **Liability**

- Shavell, "A model of the optimal use of liability and safety regulation," *RAND Journal of Economics*, 15 (1984): 271-80.
- Alberini and Austin, "Accidents waiting to happen: Liability policy and toxic pollution releases," *Review of Economics and Statistics*, 84 (2000): 729-41

### **Uncertainty**

- Baumol and Oates, Ch. 5
- Weitzman, "Prices vs. Quantities," *Review of Economic Studies* 41 (1974): 477-91.
- Stavins, Robert N., 1995. "Correlated Uncertainty and Policy Instrument Choice," *Journal of Environmental Economics and Management*, January 1996.
- Kelly, D., "Price and quantity regulation in general equilibrium." *Journal of Economic Theory* 125 (2005): 36-60.
- Pizer, William, "Combining Price and Quantity Controls to Mitigate Global Climate Change," *Journal of Public Economics* 85 (3), September 2002, 409-34.
- Lewis, T. "Protecting the environment when costs and benefits are privately known," *Rand Journal of Economics* 27 (1996): 819-847.

### **Innovation**

- Jaffe, A. B., Newell, R. G. and Stavins, R. N., 2003, 'Technological Change and the Environment', NBER Working Paper 7970, Also in Maler, Karl-Goran and Vincent, Jeffrey (eds.), *Handbook of Environmental Economics Vol. 1*, pp. 461-516 (Elsevier Science, Amsterdam).
- Kerr and Newell, "Policy-induced technology adoption: evidence from the U.S. Lead Phasedown," *Journal of Industrial Economics* 51 (2003): 317-343
- Mohr R.D., "Technical Change, External Economies, and the Porter Hypothesis," *Journal of Environmental Economics and Management* 43(2002): 158-168.
- Popp, David, "Induced Innovation and Energy Prices," *American Economic Review*, 92(1), March 2002, 160-180.

Acemoglu D, Aghion P, Bursztyn L, and Hémous D. "The Environment and Directed Technical Change," *American Economic Review*, Feb. 2012; pp. 131-66

Aghion P, Dechezlepretre A, Hémous D, Martin R, and Van Reenen J "Path Dependence in Clean versus Dirty Innovation: Evidence from the Automotive Industry" mimeo Harvard, 2011.

### **Political Economy of Environmental Policy**

Aidt, "Political internalization of economic externalities and environmental policy," *Journal of Public Economics* 69 (1998): 1-16.

Lyon, T. and J. Maxwell, "Self-Regulation, Taxation and Public Voluntary Environmental Agreements" *Journal of Public Economics*. Volume 87,1453-1486, 2003.

Brett, Craig; Keen, Michael , "Political Uncertainty and the Earmarking of Environmental Taxes," *Journal of Public Economics*;75(3), March 2000, pages 315-40.

Marsiliani, Laura; Renstrom, Thomas I., "Time Inconsistency in Environmental Policy: Tax Earmarking as a Commitment Solution," *Economic Journal*;110(462), March 2000, pages C123-38.

### **3. Empirical Analysis of Selected Environmental Policies**

Fullerton and Kinnaman, "Household responses to pricing garbage by the bag," *American Economic Review*, Sept. 1996, 971-984.

Auffhammer, Maximilian and Ryan Kellogg. 2011. Clearing the Air? The Effects of Gasoline Content Regulation on Air Quality. *American Economic Review*. Vol. 101(6): 2687-2722

Bento, Antonio, Larry Goulder, Mark R. Jacobsen, and Roger H. von Haefen, "[Distributional and Efficiency Impacts of Increased U.S. Gasoline Taxes](#)" *American Economic Review*, June 2009.

Ito, K., "Do Consumers Respond to Marginal or Average Price? Evidence from Nonlinear Electricity Pricing," *American Economic Review*, Forthcoming.

Allcott, Hunt, and Michael Greenstone (2012). "Is There an Energy Efficiency Gap?" *Journal of Economic Perspectives*, Vol. 26, No. 1 (Winter), pages 3-28.

Allcott, Hunt, and Dmitry Taubinsky, "The Lightbulb Paradox: Evidence from Two Randomized Experiments." mimeo, 2013

*Others may be announced*

### **4. Effects of Pollution on Health**

Chay, Kenneth Y., and Michael Greenstone. 2003. "The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession." *Quarterly Journal of Economics*, 118(3): 1121–1167.

Chay, Kenneth Y., and Michael Greenstone. 2005. "Does Air Quality Matter? Evidence from the Housing Market." *Journal of Political Economy*, 113(2): 376–424.

Currie, Janet, and Matthew Neidell. 2005. "Air Pollution and Infant Health: What Can We Learn From California's Recent Experience?" *Quarterly Journal of Economics*, 120(3): 1003– 1030.

Currie, Janet, and Reed Walker. 2011. "Traffic Congestion and Infant Health: Evidence from E-ZPass." *American Economic Journal: Applied Economics*, 3(1): 65–90.

Schlenker, W. and W. Reed Walker "Airports, Air Pollution, and Contemporaneous Health" mimeo 2011

## 5. Second best (Monopoly, trade barriers and labour supply)

Barnett, "The Pigouvian tax rule under monopoly," *American Economic Review* 70 (1980): 1037-41.

Besanko, D., "Performance vs. design standards in the regulation of pollution," *Journal of Public Economics* 34 (1987): 19-44.

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Goulder, Lawrence H., Ian W. H. Parry, and Dallas Burtraw, 1997. "Revenue-Raising vs. Other Approaches to Environmental Protection: The Critical Significance of Pre-Existing Tax Distortions." *RAND Journal of Economics*, 28 (1997): 708-31

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Bento, A. M., and . Jacobsen. "Ricardian Rents, Environmental Policy and the 'Double-Dividend' Hypothesis." *Journal of Environmental Economics and Management* 53 (2007):17-31.

## 6. Economic Growth and Environmental Quality

Kenneth Arrow, Partha Dasgupta, Paul Ehrlich, Gretchen Daily, Lawrence Goulder, Geoffrey Heal, Simon Levin, Karl-Göran Maler, Stephen Schneider, David Starrett, and Brian Walker, "Are We Consuming Too Much?" *Journal of Economic Perspectives*, Summer 2004.

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Copeland, B. R. and M.S. Taylor, "Trade, growth and the environment," *Journal of Economic Literature*, 42 (March 2004): 7-71. (read pp. 7-23)

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- Andreoni, James and Arik Levinson. "The Simple Analytics of the Environmental Kuznets Curve," *Journal of Public Economics*, 2000
- Levinson, A. and J. O'Brien, "Environmental Engel Curves," mimeo, Georgetown, 2013.

## 7. Environmental Policy in an Open Economy

- Copeland, B.R., "Trade and the Environment," in D. Bernhofen, R. Falvey, and U. Kreickemeier, eds., *Palgrave Handbook of International Trade*, Palgrave MacMillan, (2011): 423-496.
- Copeland, B.R., "International Trade and the Environment: Policy Reform in a Polluted Small Open Economy," *JEEM* 26 (1994): 44-65.
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- Barrett, S., "Strategic environmental policy and international trade," *Journal of Public Economics* 54(1994): 325-38.
- Copeland, Brian R., "Trade and environment: Policy linkages," *Environment and Development Economics*, (Special issue on Trade and the Environment), 5 (2000): 405-432.
- Ederington, W.J and J. Minier, 2002. "Is environmental policy a secondary trade barrier? An empirical analysis," *Canadian Journal of Economics*.

## 8. Renewable Resources and Trade

- Brander and Taylor, "International trade between consumer and conservationist countries," *Resource and Energy Economics* 19 (1997): 267-97
- Copeland, B.R. and M.S. Taylor, "Trade, tragedy and the commons" *American Economic Review* 2009
- Taylor, M.S., "Buffalo Hunt," *American Economic Review* 2011

## 9. Global environmental problems / Climate Change

### Transboundary pollution and trade

- Copeland, B. R. and M.S. Taylor, "Trade and Transboundary Pollution," *American Economic Review* 85 (1995): 716-737.
- Sigman, H., "International Spillovers and Water Quality in Rivers," *American Economic Review* 92 (September 2002), 1152–1159.
- Copeland and Taylor, "Free trade and global warming: A trade theory view of the Kyoto Protocol," *Journal of Environmental Economics and Management*, 49 (2005): 205-34.

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- Cristea, A., D. Hummels, L. Puzzello, and M. Avetysyan: "The Contribution of International Transport to Global Greenhouse Gas Emissions," *Journal of Environmental Economics and Management*, forthcoming
- Shapiro, J. "Trade, CO2, and the Environment", Mimeo, MIT Nov. 2012
- K. Desmet and E. Rossi-Hansberg, "On the Spatial Economic Impact of Global Warming," Mimeo, Princeton, 2012

### **Estimating damages / Adaptation**

- Mendelsohn, R., W. D. Nordhaus and D. Shaw, "The Impact of Global Warming on Agriculture: A Ricardian Analysis," *American Economic Review*, September 1994, 84 (4), 753-771.
- Hanemann, W.M; A.C. Fisher, and W. Schlenker, "Will U.S. Agriculture Really Benefit from Global Warming? Accounting for Irrigation in the Hedonic Approach," *American Economic Review*, March 2005.
- Olivier Deschenes and Michael Greenstone "The Economic Impacts of Climate Change: Evidence from Agricultural Output and Random Fluctuations in Weather," *American Economic Review* March 2007.
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- A. Barreca, K. Clay, O. Deschenes, M. Greenstone J. S. Shapiro "Adapting to Climate Change: The Remarkable Decline in the U.S. Temperature-Mortality Relationship Over the 20th Century". Mimeo MIT. Dec. 2012

### **Discounting**

- Stern, Nicholas, "The Economics of Climate Change." *American Economic Review* 2008
- William D. Nordhaus, "A Review of the Stern Review on the Economics of Climate Change," *Journal of Economic Literature*, Sept. 2007
- Martin L. Weitzman "A Review of the Stern Review on the Economics of Climate Change," *Journal of Economic Literature*, Sept. 2007

### **Fat tails**

- Martin L. Weitzman "On modeling and interpreting the economics of catastrophic climate change," *Review of Economics and Statistics* 91 (2009): 1–19.

- William D. Nordhaus "The Economics of Tail Events with an Application to Climate Change" *Rev Environ Econ Policy* (2011) 5(2): 240-257
- Robert S. Pindyck "Fat Tails, Thin Tails, and Climate Change Policy" *Rev Environ Econ Policy* (2011) 5(2): 258-274
- Martin L. Weitzman "Fat-Tailed Uncertainty in the Economics of Catastrophic Climate Change" *Rev Environ Econ Policy* (2011) 5(2): 275-292

### **Border Measures / Carbon Leakage**

- Markusen, J.R., 1976. "International Externalities and Optimal Tax Structures", *Journal of International Economics* 5:15-29.
- Copeland, B.R., "Pollution Content Tariffs, Environmental Rent Shifting and the Control of Foreign Pollution." *Journal of International Economics*, 40 (1996): 459-76
- Hoel, M. "Should a carbon tax be differentiated across sectors?," *Journal of Public Economics*, 59 (1996): 17-32
- Keen, M. and C. Kotsogiannis, "Coordinating climate and trade policies: Pareto efficiency and the role of border tax adjustments." mimeo, University of Exeter, June 2011.
- Fullerton, Karney and Baylis, "Negative Leakage," mimeo, Jan. 2013.
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- Holland, S.P., "Taxes and Trading versus Intensity Standards: Second-Best Environmental Policies with Incomplete Regulation (Leakage) or Market Power" NBER Working Paper 15262, Aug. 2009
- Harstad, Bard, "Buy Coal! A Case for Supply-Side Environmental Policy," *Journal of Political Economy* 120(1), 2012: 77-115
- Babiker, M.H., and T.F. Rutherford, "The Economic Effects of Border Measures in Subglobal Climate Agreements," *The Energy Journal* 26 (2005): 99–126.
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- J. McKibbin W.J. and P.J. Wilcoxon, "The Economic And Environmental Effects Of Border Tax Adjustments For Climate Policy," CAMA Working Papers 2009-09, Australian National University, 2009.
- M. Fowlie, M. Reguant, and S. P. Ryan, "Market-Based Emissions Regulation and Industry Dynamics," Nov. 2012. Mimeo, UC Berkeley.