FRE 522 Environmental Externalities in the Global Economy

Course Outline

Class Time: TBD   Room: TBD

Instructor
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Prerequisite
FRE 502 (Food Market Analysis) and FRE 526 (Environmental Economics and Policy – Theory)

Description
This course examines barriers to efficient resource and environmental management arising from the trans-national nature of many resources and pollutants. Special emphasis is given to understanding the context and content of international agreements, and to measurement using econometric methods.

Learning Objectives
By the end of this course, successful students will be able to:
- Identify the main barriers to binding commitments on greenhouse gas reductions
- Evaluate the different mechanisms through which environmental regulation hinders or augments export competitiveness
- Describe role of natural disasters in driving domestic and international migration
- Assess usefulness of international conservation treaties for protecting endangered species
- Demonstrate effect of labels on consumption of imported agricultural products
- Estimate relationship between trade volumes and exotic species introductions

Class Format
12 lectures of 1.5 hours, twice a week for 6 weeks.

Course Requirements (Subject to changes)

Exams and Problem Sets	Date	Percent of Grade
Assignments	Assigned every two weeks.	50 percent
Final Exam	To be announced.	47 percent
Class Participation	Contributions to class discussions.	3 percent

Exams

The final exam will be comprehensive (it shall cover all material taught in class), and will last two (or more) hours. You must take exams at the scheduled times unless you have another exam at the same time, serious illness, or an emergency. You must validate with documentation the reason(s) why you will be unable to take any exam.

Class Participation

Your participation grade depends on your contribution to class discussions. All contributions are appreciated, even questions asking for clarification of previously taught material. The sole aim of assigning a participation grade is to encourage active learning for everyone.

<u>Assignments</u>
The assignments will consist of problem sets and short essays addressing a specific question. There shall be three assignments.

Academic Dishonesty

Students are expected to comply with the usual rules of academic conduct, which are outlined in UBC's statement on academic misconduct. They are also advised to look at some of the tutorials on how to avoid plagiarism, including http://vpacademic.ubc.ca/integrity/ubc-regulation-on-plagiarism/. Harvard's tutorial is particularly useful, as it identifies many common practices---like rearranging excerpts pasted from online sources, as well as self-plagiarism---that are serious forms of academic misconduct. Students with questions regarding these policies are advised to discuss them with the instructor.

Online Course Material
Available at Connect: http://www.connect.ubc.ca. You are required to regularly login to your course page for FRE 522. Your syllabus, course-lecture slides, additional material, announcements, assignments, and grades are available there.

Course Outline and Readings
1. [5 lectures] Climate Change and Other Transboundary Pollution Problems
    a. Disincentives to regulate unilaterally: leakage and competitiveness
        i. estimating leakage
            1. Aichele and Felbermayr (2015). Kyoto and Carbon Leakage: An Empirical Analysis of the Carbon Content of Bilateral Trade. *The Review of Economics and Statistics*. Vol. 97, No. 1, Pages 104-115. Available at: http://www.mitpressjournals.org/doi/abs/10.1162/REST_a_00438#.V-XAepMrIUE
        ii. competitiveness loss from environmental regulation
            1. Broner, Bustos, Carvalho (2012). Sources of Comparative Advantage in Polluting Industries. NBER Working Paper No. 18337. Available at: http://www.nber.org/papers/w18337
        iii. border-tax adjustments
            1. Carbone et al (2011). Embodied Carbon Tariffs. NBER Working Paper No. 17376. Available at: http://www.nber.org/papers/w17376
            2. McAusland & Najjar (2015). Carbon Footprint Taxes *Environmental and Resource Economics*. Volume 61, Issue 1, pp 37–70. Available at: http://link.springer.com/article/10.1007/s10640-013-9749-5
    b. Environmental catastrophes and human migration
        i. Bohra-Mishra, Oppenheimer, Hsiang (2014). Nonlinear permanent migration response to climatic variations but minimal response to disasters. *PNAS*. 9780–9785, doi: 10.1073/pnas.1317166111. Available at: http://www.pnas.org/content/111/27/9780.short
2. [4 lectures] International Bioeconomics
    a. Species Conservation + CITES

i. Hsiang and Sekar (2016). Does Legalization Reduce Black Market Activity? Evidence from a Global Ivory Experiment and Elephant Poaching Data. NBER Working Paper No. 22314. Available at: http://www.nber.org/papers/w22314

b. Invasive Species

i. Costello, Springborn, McAusland and Solow (2007). Unintended biological invasions: Does risk vary by trading partner? *Journal of Environmental Economics and Management*. Volume 54, Issue 3, Pages 262–276. Available at: http://www.sciencedirect.com/science/article/pii/S0095069607000782

ii. Lodge et al (2016). Risk Analysis and Bioeconomics of Invasive Species to Inform Policy and Management. *Annual Review of Environment and Resources*. Vol. 41. Available at: http://www.annualreviews.org/doi/abs/10.1146/annurev-environ-110615-085532

c. Conservation Payments

i. Alix-Garcia, Shapiro, Sims (2012). Forest Conservation and Slippage: Evidence from Mexico's National Payments for Ecosystem Services Program. *Land Economics*. vol. 88 no. 4 613-638. Available at: http://le.uwpress.org/content/88/4/613.short

ii. Kerr (2013). The Economics of International Policy Agreements to Reduce Emissions from Deforestation and Degradation. *Rev Environ Econ Policy*. 7 (1): 47-66. Available at: http://reep.oxfordjournals.org/content/7/1/47.short

3. [3 lectures] Product Standards and Labeling

a. Country of Origin Labeling (COOL)

i. Kim, Hu, Maynard, Goddard (2013). U.S. Consumers' Preference and Willingness to Pay for Country-of-Origin-Labeled Beef Steak and Food Safety Enhancements. *Canadian Journal of Agricultural Economics*. Volume 61, Issue 1, Pages 93–118. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7976.2012.01260.x/full

b. Fair Trade & Eco-labels

i. Loureiro and Lotade (2005). Do fair trade and eco-labels in coffee wake up the consumer conscience? *Ecological Economics*. Volume 53, Issue 1, Pages 129–138. Available at: http://www.sciencedirect.com/science/article/pii/S0921800904003611

ii. Arnot, Boxall, Cash (2006). Do Ethical Consumers Care About Price? A Revealed Preference Analysis of Fair Trade Coffee Purchases. *Canadian Journal of Agricultural Economics*. Volume 54, Issue 4, Pages 555–565. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7976.2006.00066.x/full

iii. Shimshak, Ward and Beatty (2007). Mercury advisories: Information, education, and fish consumption. *Journal of Environmental Economics and Management*. Volume 53, Issue 2, Pages 158–179. Available at: http://www.sciencedirect.com/science/article/pii/S0095069606000957

Examples for problem sets and assignments.

Example 1:
The graph below depicts an equilibrium in an *unregulated*, closed economy for some good Q. For future reference, call the country in question "Home." Denote the autarkic level of Home output and consumption Q_A and D_A respectively; denote the autarky price for the good by P_A.
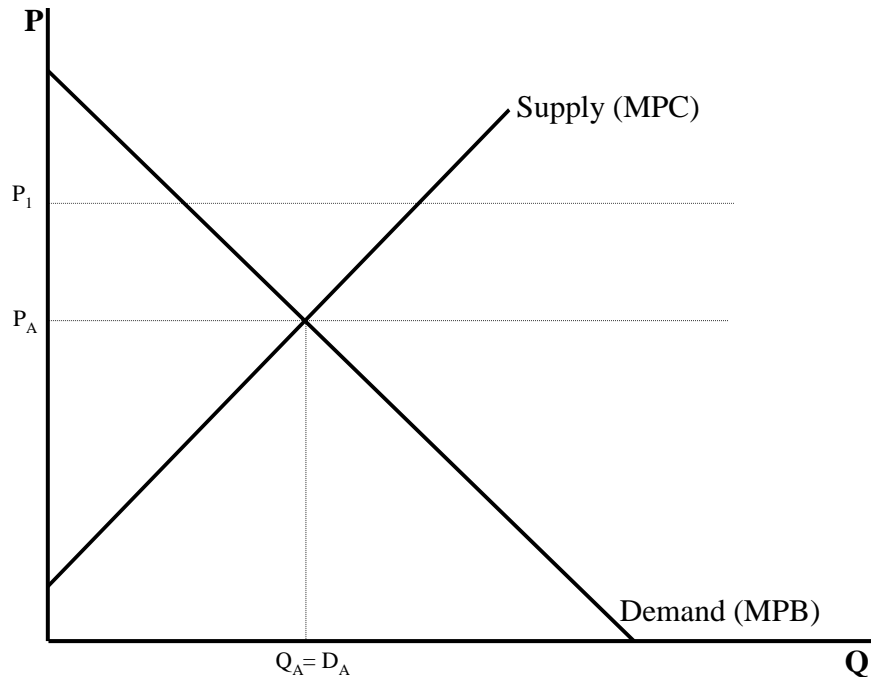
(1) Suppose that domestic *production* of the good generates pollution that harms the health of Home citizens, and that pollution is unregulated.

    (a) Recreate the graph above in your blue book, and draw/label curves associated with the marginal social cost (MSC) of producing the good and the marginal social benefit (MSB) of consuming the good. (Note that one of these curves will be redundant).

(2) Suppose that Home would face a fixed world price P_1 for the good if Home were open to free trade.

    (a) Use your graph to show the effect of opening to trade on Home's consumer surplus, producer surplus, and damages from pollution; assume domestic pollution continues to be unregulated in the open economy. Who in Home gains and who loses from the opening up to free trade?

    (b) Does opening to trade increase or reduce Home's overall welfare? If opening to trade has an ambiguous effect on Home welfare, discuss the conditions determining the ambiguity.

(3) Consider now the effect of different environmentally motivated regulations. Assume that the country is *initially* open to free trade at world price P_1. Suppose the government imposes an export tax (the value of which equals the marginal damage from pollution).

    (a) Use a fresh reproduction of the graph from the previous page to show whether the export tax raises or lowers Home welfare (relative to the case where Home is open to free trade and imposes no taxes whatsoever).

    (b) What would be a superior form of regulation? Explain.

(4) Now suppose Home is instead a "large" open country, i.e. its behavior affects world prices.

    (a) *Explain* whether a large country (that exports the dirty good) has an incentive to set an environmental tax that is less or greater than the marginal damage from the externality.

    (b) How would your answer change if the country was instead an importer of the dirty good?

Example 2:

Consider a country that is closed to international trade in goods but has a capital stock K, the size of which depends positively on local producer surplus (PS), i.e. $dK/dPS>0$. Assume that pollution is a by-product of production of dirty goods.

Suppose that the government chooses environmental policy so as to maximize the sum of local consumer surplus (CS), local producer surplus (PS), government revenue/expenditures, less damages from pollution (D). In particular, suppose the government chooses the environmental tax τ so as to maximize

$W=CS+PS+\tau Q+t_k K(PS)-D$

For this, recall $CS \equiv \int_0^Q MPB(q)dq - P^c Q$

$PS \equiv P^S Q - \int_0^Q MPC(q)dq$

(where MPB is marginal private benefit and MPC is marginal private cost)

and $D=\int_0^Q MDam(q)dq$, where $MDam$ is the marginal damage from another unit of pollution.

Show that if the capital tax is *negative*, then the government wants to set an inefficiently *strict* environmental tax, i.e. if $t_k<0$ then $\tau>MDam$. Explain why this "NIMBY" outcome occurs.

Hints:
- Differentiate W with respect to τ to derive the first order condition for the government. Rearrange this first order condition to show whether the τ that solves $dW/d\tau=0$ is smaller or larger than *MDam*.
- You may wish to make use of Leibnitz's rule.[1]
- Should you feel it necessary to make additional assumptions in order to answer this question, be sure to list what these assumptions are.

Example 3:
DISCUSS ONLY <u>ONE</u> OF THE FOLLOWING QUOTES
   A. "Economists rightly urge nations to follow a domestic program of internalizing costs into prices. They also wrongly urge nations to trade freely with other countries that do not internalize their costs (and consequently have lower prices). If a nation tries to follow both those policies, the conflict is clear: free competition between different cost-internalizing regimes is utterly unfair." (Herman E. Daly, "The Perils of Free Trade," *Scientific American,* November 1993, p.52.)

   B. "Overall, there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness." (Adam B. Jaffe, Steven R. Peterson, Paul R. Portney, and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature* XXXIII: 132-163.)

   C. "Worry over competitiveness has thus led to the illegitimate demand that environmental standards abroad be treated as "social dumping." Offending countries are regarded as unfairly subsidizing their exporters through lax environmental requirements. Such implicit subsidies, the reasoning continues, ought to be offset by import duties. … According to Senator Boren, the subsidy would be calculated as "the cost that would have to be incurred by the manufacturer or producers of the foreign articles of merchandise to comply with the environmental standards imposed on U.S. producers of the same class of merchandise." (Jagdish Bhagwati, "The Case for Free Trade," Scientific American, November 1993, pp. 44-5.)

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[1] Leibnitz's rule—the derivative of an integral $\int_{a(x)}^{b(x)} F(u;x)du$ is as follows:

$$\frac{d}{dx}\int_{a(x)}^{b(x)} F(u;x)du = F(b(x);x)b'(x) - F(a(x);x)a'(x) + \int_{a(x)}^{b(x)} \frac{\partial F(u;x)}{\partial x}du$$