Note from David: Many of you had a hard time (=low points) with my questions, usually because you did not read the question and/or consider the economics of the situation. As I told you *many times*, real economics is NOT about math and assumptions that "solutions" actually work. Real economics is about understanding incentives and choices and how to move people in the "right" direction. I hope that you will take ten minutes to compare your answers to my answers, to see where you were not thinking like an economist. Some of you may only care about your scores. Others, hopefully, will learn from your mistakes and THEN see how you can make a difference OUTSIDE of WUR with the improved understanding you gained in this class. As I mentioned, I wanted to teach – not lecture – you in this class, since learning lasts far longer than a grade. (I also wish that we had more than 3 weeks to "get to know each other" on these issues, as it takes some time to move from copy/paste the lecture notes to critical thinking.) Let's have a coffee and discuss these questions – and anything else in economics or education. Email me at dzetland@gmail.com.

Question 3 (Market failure)

You have been asked to reduce the environmental impact of global pollutants (e.g., Greenhouse gases like CO_2) from national, large scale polluters.

Assuming that measuring emissions is cheap (easy), please give one advantage and one disadvantage for each of these policies (one or two sentences for each advantage or disadvantage).

a. *Coasian (cap and trade) permits given to existing polluters for free ("grandfathering") that can be traded among companies in the same or different countries (5 points).*

Advantage: Can establish a global system via reciprocation of countries with caps. Equalizes marginal abatement/reduction costs. Easier to control who emits pollution (this is not an economic advantage, as it requires perfect information), but it's politically useful.

Disadvantage: Too many permits from one country can mean no reductions in pollution (global free riders) or impede innovation. Difficult to set correct cap and trading/bargaining TCs may be high.

b. *Pigouvian taxes that are collected nationally and distributed equally to citizens (5 points).*

Advantage: Generates revenue that citizens will like and limits pollutants (unlike too many C&T permits). Transparent comparison of taxes across countries. Promotes awareness (via money flows!)

Disadvantage: Too many free riders and no way to arbitrage among countries. Regional imbalances of costs of pollution/benefits from rebates. Cost of taxes is visible (C&T increases them indirectly).

Notes: I was more interested in DIFFERENT (dis)advantages (i.e., compare and contrast) than hearing the same thing, e.g., "C&T reduces Q and taxes reduce Q." Obviously.

No credit for saying that either will reduce pollution (by raising P or reducing Q), since that's obvious. Q says "easy to measure emissions," but does NOT say where the efficient level is, but *neither* C&T nor taxes work well when emissions are targeted at the wrong level.

BOTH C&T and taxes use market forces (i.e., market based instruments) to drive production to efficient users by increasing costs to inefficient producers, but C&T may not work as well if there's too little trading or TCs are too high. Taxes rebates may not be fair, but they are better than nothing for producers. C&T, OTOH, produces revenue for some producers but not for consumers, which is why producers will prefer C&T and consumers will prefer taxes with rebates.

Important! There is NO deadweight loss from either C&T or taxes, since they change Q from an inefficiently high level to an efficient level, i.e., they reduce "deadweight *excess.*"

Question 5 (Pollution control)

Suppose that you are visiting a slum in New Delhi, India, where the people get their drinking water from a polluted stream that runs past a factory (f) and small industrial businesses (s) that discharge ($D = d_f + d_s$) into the stream. Slum dwellers often suffer from water-related illnesses.

A local politician, elected recently after promising to deliver clean water to slum dwellers, has asked you to help him choose among three options:

   A. A regulation that requires the factory to discharge clean wastewater.

   B. A tax on factory discharges that will subsidize the price of bottled water in New Delhi.

   C. A tax on factory discharges whose revenue will be distributed equally to slum dwellers.

With respect to taxes, the politician gives you a report prepared by a consultant that lays out the following strategy for setting an optimal tax to reduce a pollution externality. It says: "Given industrial benefits from production equal to B(D) and social costs from discharges of C(D), set an optimal tax equal to t(D)."

Please answer the following sub-questions (assume no corruption):

a. Write the social net benefit function (benefits less costs) without a tax. (2 Points)

B(D) – C(D). Many students failed 5a and 5b by making up their own letters/formulas!

b. Write the factory's net benefit function with a tax. (2 Points)

B(d_f) - t(d_f). Note that the factory's private cost of discharges (pollution) is ZERO.

c. Explain the problem(s) with the consultant's strategy (1-2 sentences). (2 Points)

It's difficult to set the right tax, since pollution from the small businesses (d_s) is hard to know. The wrong tax will result in too much or too little pollution and/or abatement.

d. Choose the best option from A, B or C and explain why you chose it (1-2 sentences). (2 Points)

Choose C, since it reduces factory emissions AND relaxes the budget constraint of slum dwellers, who can also buy clean water with it. (You should NOT say that you do not trust them to use the money wisely. That's too paternalistic (remember The Knowledge Problem).

e. Describe why you rejected the other two options (1 sentence each). (2 Points)

A is troublesome b/c it fails to address d_s; B is troublesome since the subsidy will go to NON-slum dwellers, and the subsidy to slum-dwellers will be diluted.

Notes: Waste from plastic bottles are NOT a problem compared to unhealthy water (and it's OK to have clean water from BOTTLES). Taxes that reduce activity to an "efficient" level are NOT bad, and production at that level is NOT bad. Answers such as "I choose A/B/C because THAT will solve the problem and deliver clear water – i.e., "solution by affirmation" are worth ZERO points because the world cannot be saved by nice thoughts.

Question 6 (Game theory)

You just bought a farm that shares a lake with your neighbor. Both of you keep cows. You can give your cows water by taking it in buckets out of the lake (hard work) or letting them go to the lake to drink the water – an option that pollutes the lake. Your neighbor faces the same set of choices: fetch water at a cost or allow his cows to drink the water but damage its quality.

For either of you, the cost of gathering water in buckets is 5, but the cost to both when one allows his cows to drink from the lake is 3. There is, in other words, a negative externality when cows drink from the lake. If both of you allow your cows to drink from the lake, then the damage is 6 to each of you.

a. *Given these facts, please fill in the table below with the positive or negative payoffs from your potential actions in a non-communication, one-shot game (4 points)*

		Neighbor	
		Fetch from Lake	Drink from Lake
You	Fetch from Lake	-5,-5	-8,-3
	Drink from Lake	-3,-8	-6,-6

b. *Now solve the game. What is the Nash equilibrium? (2 points)*

Drink, Drink

c. *Please give ONE potential action to change this to a sequential or repeated game that may have better results. Note that you have not seen the neighbor's cows at the lake. (2 points)*

Communicate: Go talk first, to establish F,F pattern.

Repeat the game: Tell neighbor that you will be there for awhile and you'd like to keep the lake clean, then F. Note that it's neither efficient nor within the question to build a fence around the lake, have the government monitor access to the lake, shooting cows, etc.

Only assigned 8 of 10 points! Two for free.