Lesson outline for May 1

TO PREP: write out the coal-fired power-plant example on the board again, both costs and benefits.

**Lecture:**

Last class, we ended by talking about externalities and economic efficiency! I hope you all watched the youtube video I sent out, too! Much easier than reading.

Can someone give me a working definition of a negative externality?

As we discussed, a negative externality leads to overproduction relative to an efficient level. Why?

So what policy could we use to address this negative externality? (3 Minute Think-pair-share)

There are a couple of strategies here. We (i.e., the government) could mandate that the power company change to some specific level of renewable energy production over time. We could also simply forbid the power company from producing pollution above some level. These types of strategies are known as ‘Command & Control’.

But the framing we’re using here gives us another option. From an economics point of view, you could bring this back to the ‘efficient’ outcome simply by making companies pay for the damage they do! If the cost was entirely internalized, wouldn’t this system head towards efficiency?

This is what a lot of market-focused solutions aim to do. There are basically two flavors of these types of solutions: Taxes and Cap & Trade. With a tax (pollution tax, sin tax, Pigouvian tax), you simply figure out what the cost of the emission of one unit of pollution (say, the cost of 1 ton of carbon) and charge emitters that cost.

What are the effects of this tax on:

* The amount of pollution produced?
* The amount of power produced?
* The cost to society?
* The amount that people pay out of their pockets for their power bill each week?

Cap and trade is a little more complicated, but in effect it does the same thing.

In a Cap & Trade situation, the government issues a permit to pollute up to a certain amount to all the companies in a sector. These permits allow a certain amount of pollution – say a certain number of tons of CO­2. Companies can then either use these permits or sell them to other companies.

There are several advantages to this market-based regulation, relative to Command & Control regulation. You can imagine that under a Cap-&-Trade system, companies have an incentive to clean up their act and switch over to low-carbon alternatives, so that they can sell their permits to other, dirtier companies.

It turns out that the outcome is even more favorable than that, however. Keep mind that not all power companies are the same. Different power companies may rely on different fuels (even different kinds of coal) and one might have an easier time decarbonizing than another.

Let’s imagine 2 power companies: company 1 and company 2. Both of these companies operate coal-fired power plants. Company 1, however, is located in a desert region with lots of available land and a lot of sunlight. Company 2, on the other hand, is located in cloudy mountains, near a coal mine. Let’s think about the different options. If we use a command and control-type regulation, we could mandate that both of these companies switch to being 50% renewable in 10 years. For company 1, this transition is pretty easy – it has abundant sunlight and lots of available land where it could build solar panels. For company 2, however, this transition might be a lot more difficult – it is not near any obvious source of renewable power, and would need to make significant investments in order to make the shift.

In this case, it might make economic sense for company 1 to decarbonize entirely by switching to solar generation and sell ALL their permits to company 2. In this away, we still reduce pollution by the desired amount, but at a much lower cost than we would if we mandated the specifics of the shift.

This, in a nutshell, is the concept behind market-based policies – they allow the government to optimize for a desired outcome (i.e., less pollution) but allow the market to determine the cheapest way to get there.

Would it surprise you to know that the US has been using Cap & Trade successfully since 1990? We instituted a cap & trade system for sulfur dioxide from coal power plants in order to control Acid Rain.

Discussion of SO2: in the Northeast US, acid rain was a particular challenge. Sulfur dioxide has a relatively short atmospheric lifetime.

Let’s take a break here and talk for a bit. How about you guys break into 3 groups, choose one of the questions on the screen and talk about it for a few minutes.

* What questions do you have about these solutions?
* Do they make sense to you?
* What do you think most governments/regulatory agencies use?
* What kind of environmental problems do you think market-based solutions are best for?

**Part II: the costs of pollution and valuations of nature**

All of this discussion hinges on the idea that we can accurately identify the true costs of pollution. That seems like a big ask. What are some of the costs of pollution that you can think of?

Types of cost that are easier to count include

* Human health
* The built environment
* Food production
* Damage to the economies of various countries.
* Secondary costs – migration and conflict induced by climate change

Costs that are harder to quantify

* Damage to ecosystems and to nature

So this leads to what, for me, is a moral quandary about environmental economics: putting a price on nature. It’s not a ‘natural fit’. How does the idea make you feel?

I don’t particularly like the concept in a lot of ways – to my mind, the natural world shouldn’t need to justify itself to us in dollars and cents! But, when you are weighing regulatory decisions against people’s livelihoods and their ability to support themselves and their families, it can be a hard conversation to avoid. How do you feel about the idea?

So, accepting that it’s not the easiest conversation to have, let’s entertain the concept. What ‘value’ does nature have? How, if we were so inclined, would we put a dollar value on the natural world?

(Think-Pair-Share: 3 minutes) Turn to the person next to you and take the next 3 minutes to list 3 different ways we can think about the economic value of nature/intact ecosystems to us, value that we might be losing to pollution.

**Different valuations**

* Natural resources – direct extractive value
* Tourism/recreation
* Ecosystem services
* Future biotechnology potential
* Mental value (cities with more trees and green space have healthier people!)
* Erosion resistance (think dunes!)
* Disease resistance
* Water quality (oysters in the Chesapeake, stormwater runoff examples)
* Existence value

Ecosystem services – 4 different kinds

1. Provisioning
2. Supporting
3. Cultural
4. Regulating

What about the value of nature in and of itself? Can we attach a dollar value to something just existing?

* Poll people “How much would you spend to save X”
* Value of nearness to X in real estate
* How much do people spend to come see X

All of these bias us towards the spectacular, but little things and unlovely things deserve protection, too!

Talk about Scott’s example about hunting all the whales and investing in the stock market

More real example of the same thing: the use of DDT. How will you feel when Malaria comes back because of climate change, and threatens your family?

6th mass extinction: rate of spp loss 1000x background loss rate.

Thomas Malthus: late 1700s-early 1800s.