McPeak
PPA 897
Lecture 9

Continuing the analysis of deviations from the perfectly competitive model

Externalities.

An externality occurs when an economic agent's consumption or production activities confer a benefit or impose a cost on other actors, and this benefit is conferred or this cost is imposed outside of a market.

(that is to say it takes place in a way other than through changing prices).

Alternatively, an externality occurs when a person's well-being or a firm's production capability is directly affected by the actions of other consumers or firms rather than indirectly through changes in prices.

A consumption externality is an externality generated by the consumption behavior of an economic actor.

- Smoke
- Drunken louts
- Loud music
- Vehicle exhaust.

A production externality is an externality generated by the production activity of a firm.

- Smokestacks
- Acid rain
- Noise and shaking houses
- Odors

Externalities can be positive or negative.

An externality that harms others by imposing a cost on them is a negative externality.

An externality that helps others by conferring a benefit to them is a positive externality.

What is a positive externality to one person can be a negative externality to another (wind chimes!!).

Positive externalities are sometimes called spillovers.

Positive externalities play a prominent role in growth theory and economic development.

Table 5.1 on page 93 to contrast types possible.

Illustrate:

Show negative externality graph (figure 18.1 in the reader)

Show positive externality graph (figure 18.2 in the reader)

Can address externalities by regulation.

Government can control the size of the externality by imposing an emission standard that limits the quantity of the externality imposing byproduct of production.

Marginal social cost equals marginal cost of abatement at efficient level of emissions (figure 18.3 in reader)

Can also charge an emissions fee, that taxes the amount of the emission. (figure 18.4 presents the contrast)

Introduce tax as a response to negative, subsidy as a response to positive.

A tax on production could also be used. If such a tax is designed to fully internalize the externality, it is called a Pigovian tax.

[show graph]

Taxes on fuels:

	Externality as a % of price	Tax as % of price
Natural Gas	1.1	6.4
Gasoline	16.7	16.6
Diesel	50.4	12.9
Coal	528.0	35.9

Point source pollution is pollution that can be traced to a single point – there is an identifiable source of the pollution that can serve as the point of control. "It is coming from that smokestack over there"

Non-point source pollution is pollution that cannot be traced to a single point – multiple small sources make it hard to identify where it originated. "It is coming from all these burping cattle"

Can create a market for the right to pollute. One view of externalities is that they exist due to a failure to clearly assign property rights.

Coase Theorem:

In the absence of transactions costs, and with symmetric information, the initial assignment of property rights does not matter in determining the efficient allocation of resources. [though it may matter from a distributional standpoint]

Boat owner rents boats to cruise about Onondaga Lake. Chemical firm dumps gunk in Onondaga Lake.

They choose levels of production, and have the following payoffs.

Initially, assume neither firm has the right to compensation.

Boat Company (boats used)				
		0	1	2
Chemical (tons dumped)	0	0 0	0 14	0 15
	1	10 0	10 10	10 5
	2	15 0	15 2	15 -3

Chemical firm has dominant strategy: BR to anything the boat firm does is 2
Boat firm knows this, chooses 1. 1 boat, 2 tons gunk.

Now assign right to boat firm that says they must be compensated at $7 per ton

Boat Company				
		0	1	2
Chemical	0	0 0	0 14	0 15
	1	3 7	3 17	3 12
	2	1 14	1 16	1 11

Chemical firm firm BR is always 1, boat knows this, picks 1 boat. 1 boat 1 ton gunk.

Now assign chemical firm the right to be compensated for any reduction in gunk emission from 2 tons at $6 per ton.

Boat Company				
		0	1	2
Chemical	0	12 -12	12 2	12 3
	1	16 -6	16 4	16 -1
	2	15 0	15 2	15 -3

Chemical firm firm BR is always 1, boat knows this, picks 1 boat. 1 boat 1 ton gunk.

Illustrate Pareto concepts by contrasting solutions.

Why might such compensation schemes not occur/ break down in reality?

1) Transactions costs may be high. How to bargain on behalf of one party if they are many?
2) Lack of information. What are the costs? Do both sides know and agree on the MC of the externality? Is the profit matrix agreed upon?

Tragedy of the commons.

Where do we have common property resources?

When a good is rival and has no exclusion.

Rival means one actor's consumption of the good in question precludes another actor's consumption of the good – the good is depletable.

Exclusion means that others can be prevented from consuming the good.

The fish in the ocean, the grass in a pasture, the water in a river, the oil under the ground, a seat in the lounge, a quick trip down a road, a quick download from the internet…

There is a distinction between a commons and an open access resource. In a commons, the number of users is defined, leading to greater cooperative potential. In an open access situation, there is no restriction on the number of users.

Commons – the academic village.
Open access – Marshall street.

Hardin provided the example of a village commons where multiple users have the right to graze animals. There is an incentive problem in the commons. Each user has an incentive to add animals and does not take into account the externality imposed on others brought about by adding this animal, only the direct costs they bear.

Note the distinction between an appropriation externality and a provision externality.

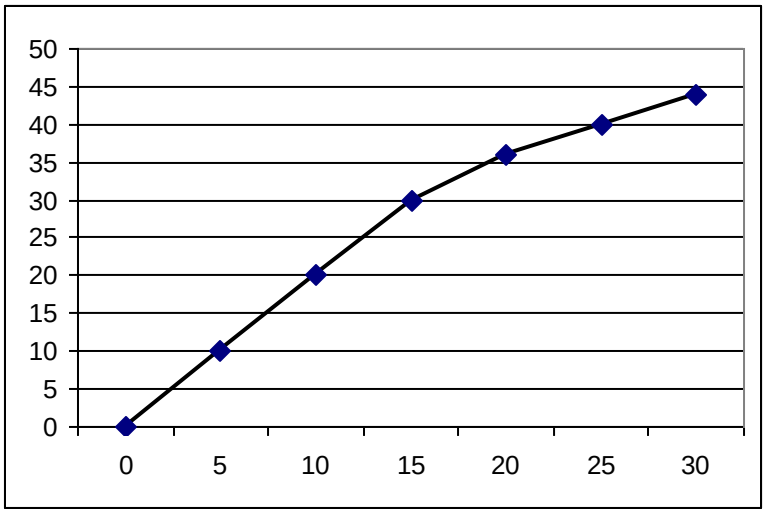
An appropriation externality is a static externality, and it is either your animals or my animals get the grass to produce milk in this setting.

A provision externality is a dynamic externality, and it is that together our animals impose a cost on the future provision of the good produced in the commons, that is we can cause environmental damage through overgrazing.

There is one pasture we share in common, and let's keep it simple and have it be just the two of us using this.

On this pasture, milk production as a function of total herd size is as follows:

# of animals	Liters of milk produced
0	0
5	10
10	20
15	30
20	36
25	40
30	44



For each livestock owner, the share of this total milk produced they receive is a function of your share of the total herd. The cash value of milk is $1 per liter.

For each animal put on the pasture, it costs $1 in private labor costs. (5 animals costs $5, 10 animals costs $10,…)

So if I have 5 animals and you have 5 animals, my payoff is (5/10)*20-5, or 5. If you had 15 animals and I had 5, then it is (5/20)*36-5, or 4. We can develop the following matrix of payoffs.

$$\Pi_1 = \left(\frac{h_1}{h_1 + h_2} \right) * f(h_1 + h_2) - c(h_1)$$, to give the general form.

	0		5		10		15	
0	0	0	0	5	0	10	0	15
5	5	0	5	5	5	10	4	12
10	10	0	10	5	8	8	6	9
15	15	0	12	4	9	6	7	7

(can extend down here to 20 (16,0); 25 (15,0); 30 (14,0))

Can go through and identify best response strategy. There is a Nash equilibrium in pure strategies of 15, 15 with a payoff of 7 to each. Note however that if they could restrain their stocking levels to 10, they would arrive at a Pareto improving outcome.

What if I privatize, and assign exclusive rights to one of the individuals?

	0	
0	0	0
5	5	0
10	10	0
15	15	0
20	16	0
25	15	0
30	14	0

I arrive at the efficient stocking level, as profit is maximized where total herd size for one individual is equal to 20 and the total payoff is 16.

Not really very fair though, is it!

Also consider the possibility that we develop an outside agency, say the state. This agency is able to impose a herd size limit of 10 animals per person and is capable of enforcing this.

Finally, consider the state charging a user fee of 50 cents per animal in addition to the one dollar per animal labor cost. The following payoff matrix results.

	0		5		10		15	
0	0	0	0	2.5	0	5	0	7.5
5	2.5	0	2.5	2.5	2.5	5	1.5	4.5
10	5	0	5	2.5	3	3	1	1.5
15	7.5	0	4.5	1.5	1.5	1	-0.5	-0.5

This also takes us to the socially efficient stocking level of 10, 10. Now the state gets 10 in tax revenue as well.

[localized degradation paper]

Responses to the commons:

1) Land tenure reform (assign rights – think Coase)
2) Limit use (restrict quantity – think emissions standard)
3) Charge fee that internalizes the negative externality (think emissions fee).

Public Goods.

Go back to the idea of goods being categorized by: rivalry and exclusion.

	Exclusion	No Exclusion
Rivalry	Private Good	Open Access
No Rivalry	Club Good	Public Good

Private good – candy bar.
Open access good – fish in the ocean.
Club good – concert, movie, country club.
Public good - national defense, clean air, city park.

A commodity or service for which the consumption by one person does not preclude others from consuming the commodity or service, and for which it is not feasible to exclude any one individual from access to this commodity or service.

Provision of a public good creates positive externalities. The value of the benefits is not reflected in a market.

It does help some to think through the supply and demand for a public good.

The social demand curve for a public good is derived by the vertical summation of the individual consumers' willingness to pay for the good in question for all consumers.

Recall that a private good had the horizontal summation for each consumer.

For a price of $2, I want 3 Whoppers, you want 1, a total of 4 is demanded. You and I are the only people, and if one of us consumes it, the other cannot.

Now consider a public good.

The free rider problem leads to underprovision of public goods.

There is an incentive to benefit from a positive externality without paying the cost of public good provision.

There are two stores side by side, but one entrance to the two stores. Each store is deciding whether to hire a guard to sit by the main door. Two guards are no more effective than one guard.

Costs $10 to hire, Benefit of a guard at the main door is $8 to each store. Baseline is no guard, no benefits (0).

	Hire	Don't hire
Hire	-2 -2	-2 8
Don't Hire	8 -2	0 0

Say we consider cooperating and splitting the cost.

Costs $10 to hire, Benefit is $8 to each store.

	Hire	Don't hire
Hire	3 3	-2 8
Don't Hire	8 -2	0 0

Still don't hire.

Show on graph. The societal demand curve is arrived at by vertical summation by all who will benefit from the public good.

Public goods example.

Every summer, a play is performed in an open air theater in a public park. No admission fee is charged. We are trying to determine the optimal number of days to perform the play. In this case, q is the number of days the play will be performed / number of performances (the play is only performed once per day). There are three people who make up society in this case; Hortensio, Ophelia, and Yorick. Hortensio's demand curve for the number of days the play will be performed is defined by 1100-100*q, Ophelia's is 500-50*q, and Yorick's is 400-50*q.

What is total marginal willingness to pay on the societal demand curve for the provision of the fifth day/ performance of the play?

If it costs $1000 to put on a performance, and no effort is made to avoid the free rider problem, what number of days will the play be performed and who will provide

Ways to deal with the free rider problem.

1) Social pressure.
2) Mergers
3) Privatization
4) Compulsory provision