

# Externalities and Climate Change

## Econ 1101

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## ECON 1101 Lecture 6.2

- 1. Alternative policies to correct externalities**
  - (a) Command and Control**
  - (b) Cap and Trade**
- 2. Cap and trade and climate change issue**

# ECON 1101 Lecture 6.2

## 1. Alternative policies to correct externalities

### 1.a Command and Control

### 1.b Cap and Trade

# Alternative policies to correct externalities

- With a negative externality, what are some other alternatives that can be used to achieve socially efficient quantity?
  - Perhaps price ceilings
  - Or supply controls
- We will focus on supply controls
- Limiting the quantity of production (like through a quota) is natural but there are two ways to do this:
  - 1 Command and control (not a market based solution)
  - 2 Cap and trade (quota with resale)

## 1.1 Command and control

- A policy where the government sets a strict limit to the production of a good with externality.
- In reality in this policy the government sets a strict limit in the production of the externality itself not necessarily on the good, for example fuel efficiency standards on cars actually limit the amount of CO<sub>2</sub> of using a car.
- This is not a market based solution (the government is not using directly the market to get an outcome but imposing a particular allocation).
- This system is very similar to quotas without resale market, and we will have the same problem:
  - Principle 2 of production might not hold: (recall principle 2 is producers with lowest cost are producing)

## 1.1 Command and control

- ... Principle 2 might not hold

Example – EconLand negative externality of 4.

- Command and control policy: let each producer to produce at most 0.6 units each.
- Outcome will be  $Q=3$  but  $S1, S2, S3, S4, S5$  will be producing is this efficient?
  - $Q=3$  is the efficient quantity however
  - this is not Pareto efficient since  $S4$  and  $S5$  are producing even though  $S1-S3$  are not at full capacity
  - So P2 does not hold because producers with lowest cost are not producing at full capacity (there is still room to reduce costs for the society and get a bigger social pie (more TS))

## 1.2 Cap and Trade

How does this system work?

- 1 First the government limits total production (“the cap”) by issuing allowances to all firms in the market:
  - allowance is just like a quota: a right to produce a certain amount of the good.
- 2 Firms are then free to trade allowances among themselves

Does this sound familiar?

- Yes this is exactly like a quota with a quota exchange market
- In fact they are the same thing with the only difference that the government gives allowances to partially produce to all firms operating in the market,

## 1.2 Cap and Trade

- We solved an example: again negative externality of 4 in econ land
  - quota of 0.6 to S1-S5
- Then we used what we learned last week from quotas to get price of widgets = 7, quantity = 3 and price of quota = 4 (from the marginal producer)
- Map this back to cap and trade and we have welfare analysis PS=16.5 (12 from quota revenue, 4.5 from producers costs) CS = 4.5 and with externality this looks same as with tax but remember now the green box is of producers.
- So we achieve efficient quantity and after resales of allowances S1-S3 are producing so principle 2 holds.



## 1.2 Cap and Trade

- To reiterate, the economics of the system that we just described for Cap and Trade works just like the supply management quota system that we went over in reading 3.
- However, in an environmental context, we usually use the term “allowances” instead of “quota” An allowance is a permit to emit a particular amount of pollution, like one ton of sulfur dioxide.
- This kind of system is usually called a Cap and Trade system.
- The total amount of emissions is “capped” People are allowed to “trade” allowances to emit the pollution

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# 2. Cap and Trade and Climate Change Issue

## Reading 4

# Cap and Trade and Climate Change Issue

- How can the framework for externalities be applied to the debate surrounding carbon dioxide regulation
- There is scientific consensus that global carbon emission must be cut (since they contribute to global warming)
  - For the platform debate in recitation lets take this as given
  - and let focus on policies that can potentially be pursued that impact carbon consumption
- From Reading 4:
  - Background to frame our ideas of policies surrounding carbon emissions
  - Kyoto Protocol: a cap and trade global policy
  - Numerical analysis: taxes and cap and trade

## Reading 4: Kyoto Protocol cap and trade (global)

- Issue: Should policies be pursued at the **global level** through the United Nations and world-wide treaties?
- A key reason for doing this is that carbon is an externality that operates at the global level
  - We don't need the UN to enact policies that make husbands put down toilet seats for their wives, as this is an externality that operates at the household level. (Big idea: Global externality)
  - Carbon emitted in the U.S. impacts China and vice versa
- Kyoto Protocol is a **Cap and Trade** system that allows trades across countries

## Reading 4: Kyoto Protocol

- U.S. did not sign the Kyoto Protocol
- Main reason: a policy dispute between the U.S. and the big developing nations like China and India
- U.S. argument: It won't do any good for the U.S. and Europe to cut back if it is completely offset by growth in emissions by China and India. U.S. wants limits on China and India. China is now the largest emitter of carbon in the world
- China argument. Yes China produces more carbon than U.S. But it has four times as many people

## Reading 4: Cap & trade and taxes

- Numerical analysis to examine the economics of externalities, allowances and taxes
  - same numbers as today class applied to carbon emissions
  - welfare analysis
- As discussed earlier command and control systems (reducing emissions by some %) have some problems
  - Real world application: cap and trade system for SO<sub>2</sub>
  - Example government requiring cut of emissions of 17%
- 2 main problems:
  - not efficient allocation of production
  - firms have no incentive to do more than their required decrease: compared to cap and trade where the financial reward of reducing emissions below the limit and trading allowances can generate innovation.

# Externalities and debate of carbon dioxide regulation

- Issue: Let's say we strike a deal and agree to **cut back carbon emissions**. Or we unilaterally decide as a country to do this
- How do we do it?
  - Command and Control?
  - Tax carbon (e.g. gas tax like in Europe?)
  - Cap and Trade (raise energy prices but give green box to someone besides government)
  - Subsidize innovation?
- Let the debates begin! (not right this second though)

# Notes

- For this lecture: we worked mainly in the whiteboard
- Slides are not self contained for this particular class
- To see more slides about this topic look at moodle lec 6(ii)