

The Economics of Climate Change

C 175 - Christian Traeger

Part 3: Policy Instruments

continued

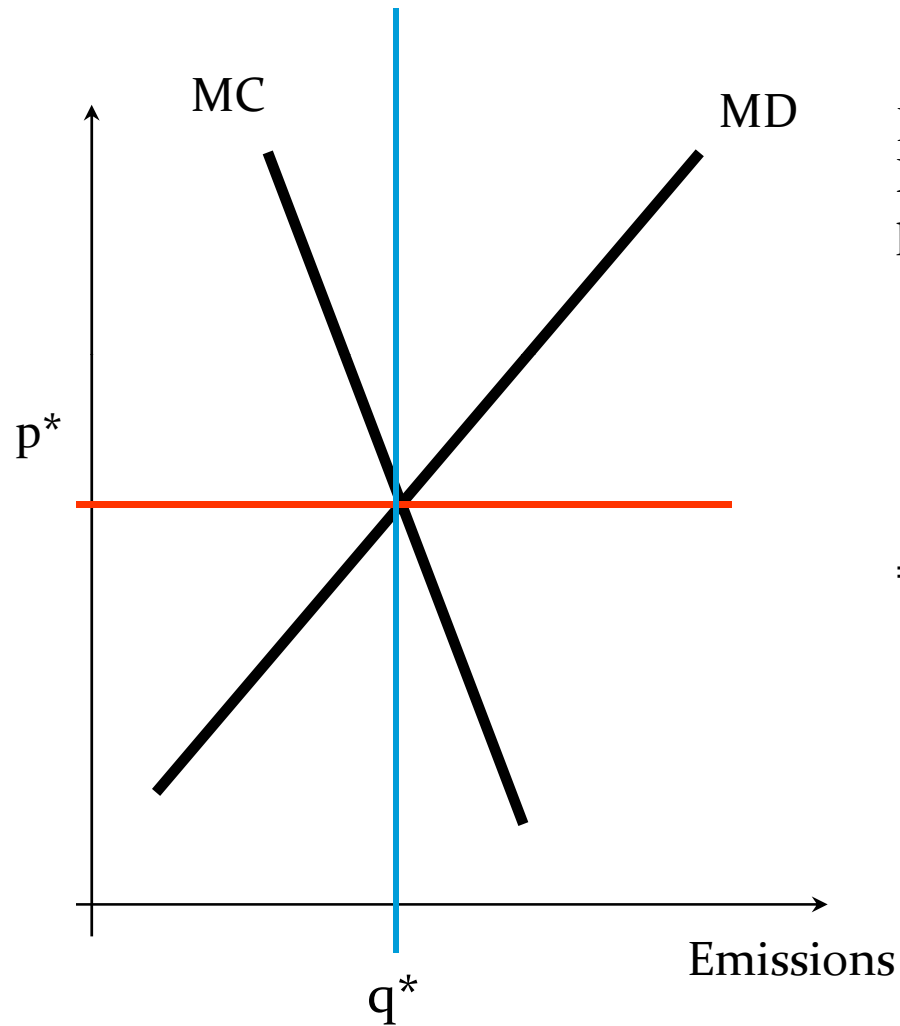
Cap and Trade vs Taxes

Lecture 12

Emissions trading vs taxes I

- Permit trading *and* emissions taxes identified as cost-effective policy instruments
 - Both equalize marginal abatement costs across sources
 - Emissions trading gives absolute emissions cap => uncertainty about prices
 - Taxes give certain price for emissions => uncertainty about emissions
 - Original idea
 - Equalize marginal abatement costs
- AND**
- Marginal abatement costs = marginal social damages(!!!!)
- With full information on abatement costs **AND** damages, both instruments would be equivalent
- Problem:
 - **Neither costs nor benefits are known with certainty**
 - **One should choose the policy which minimizes the costs of making a (slightly) wrong choice**

Quantities versus Prices

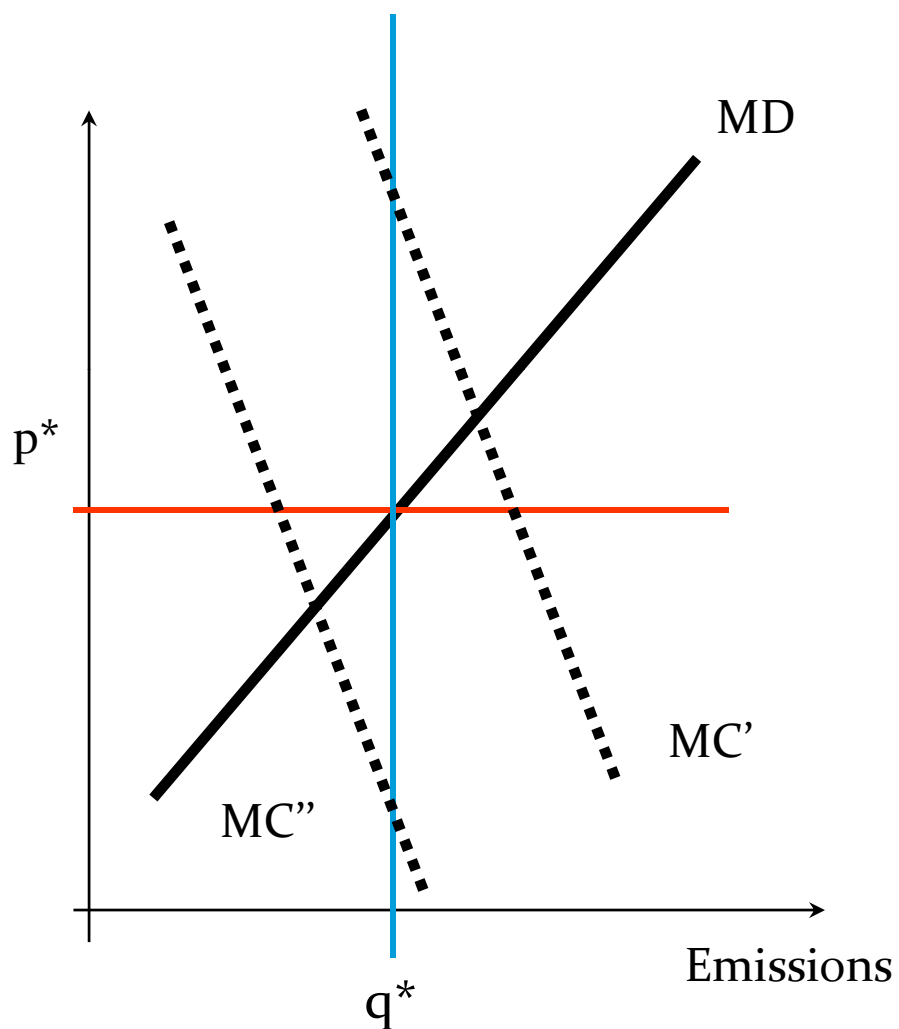


If marginal abatement costs of firms MC and marginal damage MD are perfectly known
=> policy maker can arrive at optimal emissions q^* through either

- fixing q^*
- setting price p^* (which leads to q^*)

=> Equivalence of price and quantity instruments under certainty.

Quantities versus Prices



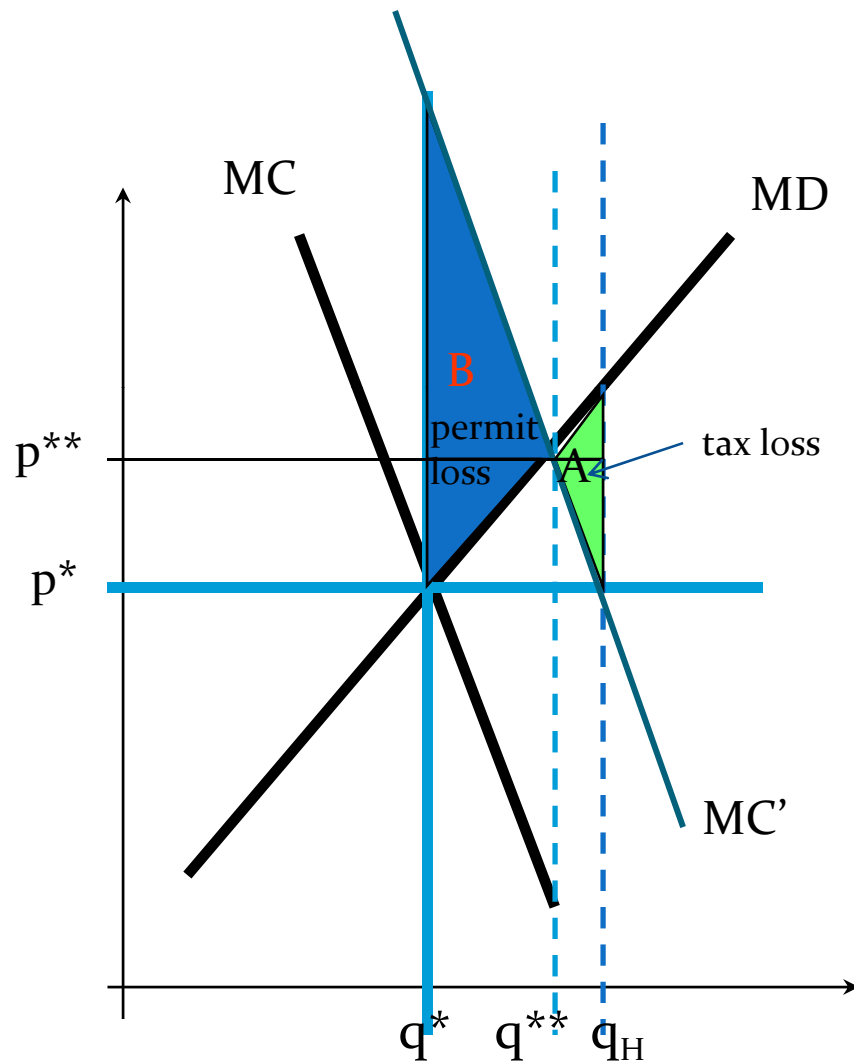
Question:

When regulator imperfectly informed about contract-relevant variable, are they still equivalent?

Example:

The actual marginal savings curve could lie between MC'' and MC'

Quantities versus Prices



Expected marginal costs are given by line MC .

If price instrument chosen, p^* is implemented.

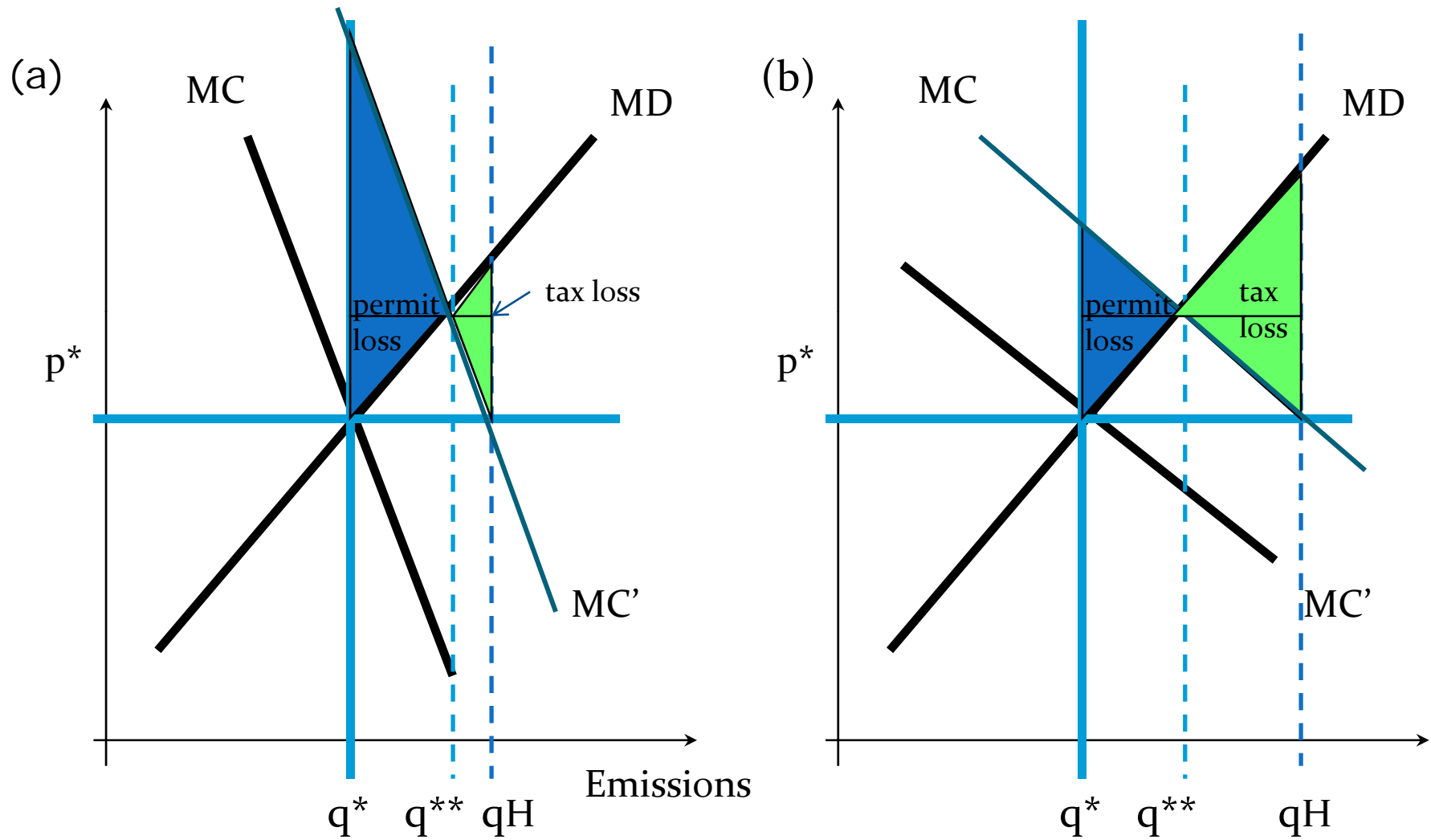
If marginal costs actually given by MC' , then new optimum is (q^{**}, p^{**}) .

Under p^* (tax) amount q_H will be emitted by firm => loss A .

If quantity instrument is chosen, q^* is implemented. If MC' is correct, q^{**} would have been optimal => loss B

$B > A$, so price instrument involves lower expected welfare loss under uncertainty.

Quantities versus Prices



Quantities versus Prices

- In case (a), price instrument involves lower losses.
- In case (b), quantity instrument involves lower losses.
- Determinant: relative slopes of MC and MD.
- With MS uncertain:
 - If MD more sensitive to changes in pollution than MC => set quantity
 - If MC more sensitive to changes in pollution than MD => set price
- Pizer (1998): In case of climate change, taxes seem to be preferable
- But:
- We can improve cap & trade to a hybrid systems by introducing a safety valves
 - => Above certain price arbitrary amounts of allowances are sold (or simply a fine is paid for uncovered emission)
 - => Introduces ceiling for permit price and thus abatement costs

Emission trading vs. taxes II

- Let's collect differences, pros, and cons of the different instruments!

(blackboard)

See also:

- Section 4 of Congressional Budget Office (2003),
“The Economics of Climate Change: A Primer” ?!
- Parry, I.W.H. & W.A. Pizer (2007), Emissions
Trading versus CO₂ Taxes, Resources for the Future.