Some TikZ and PGFplot examples

(Tailored toward environmental economics topics)

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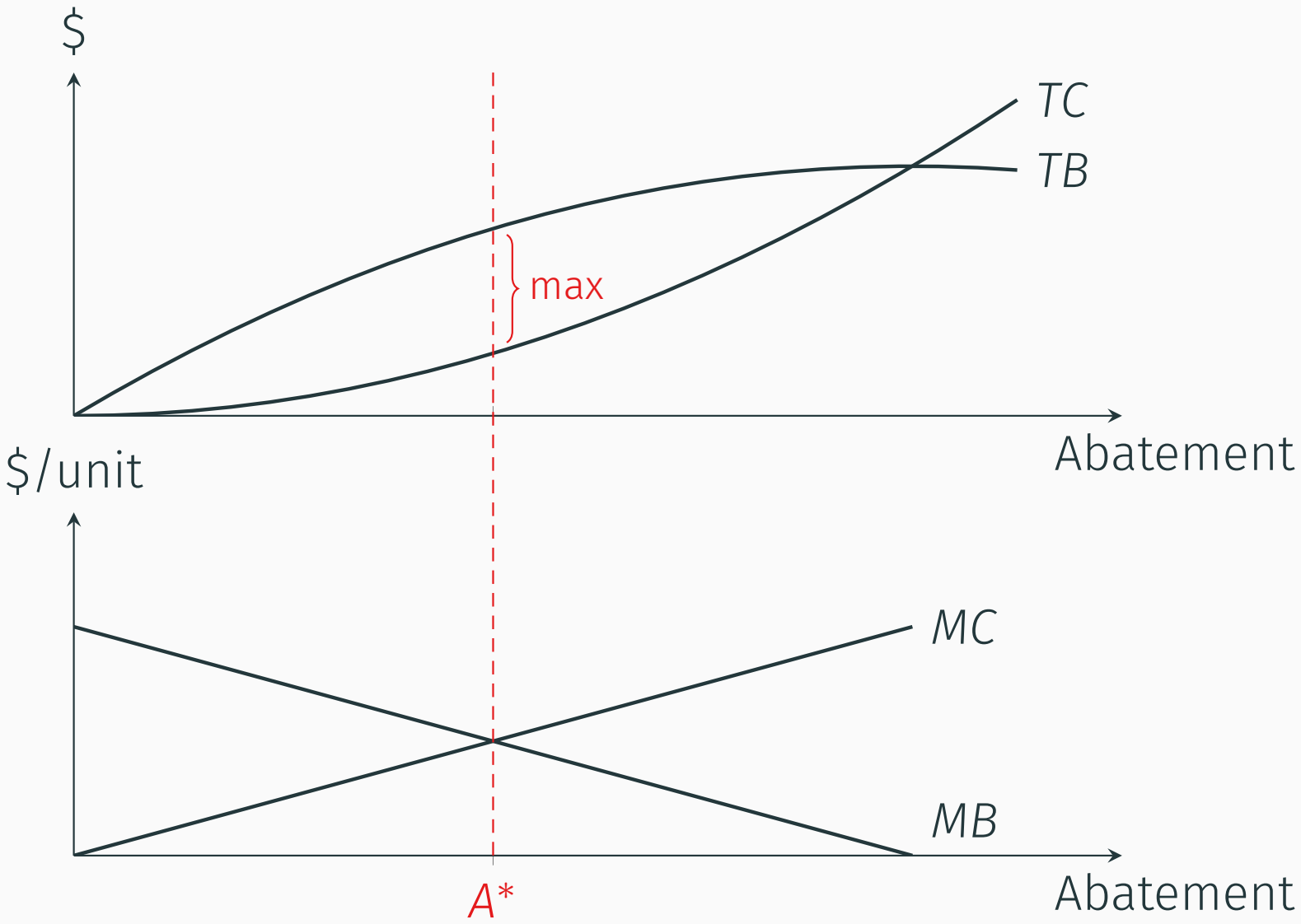
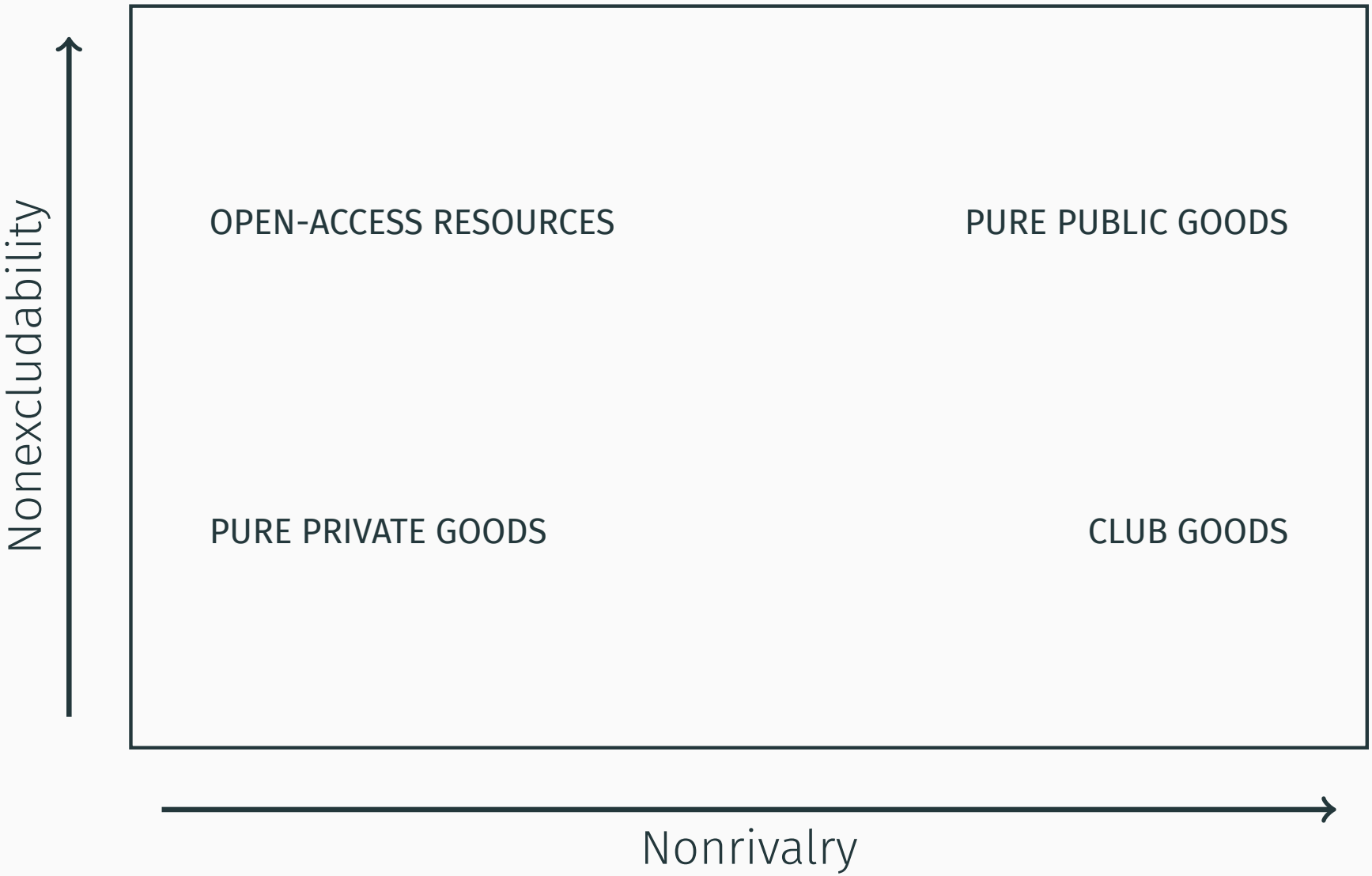
Equimarginal principle

Equimarginal principle



Public goods

Public goods taxonomy



Public goods example

For this example, X and Y are neighbours that both benefit if either of them spend some hours gardening (H).

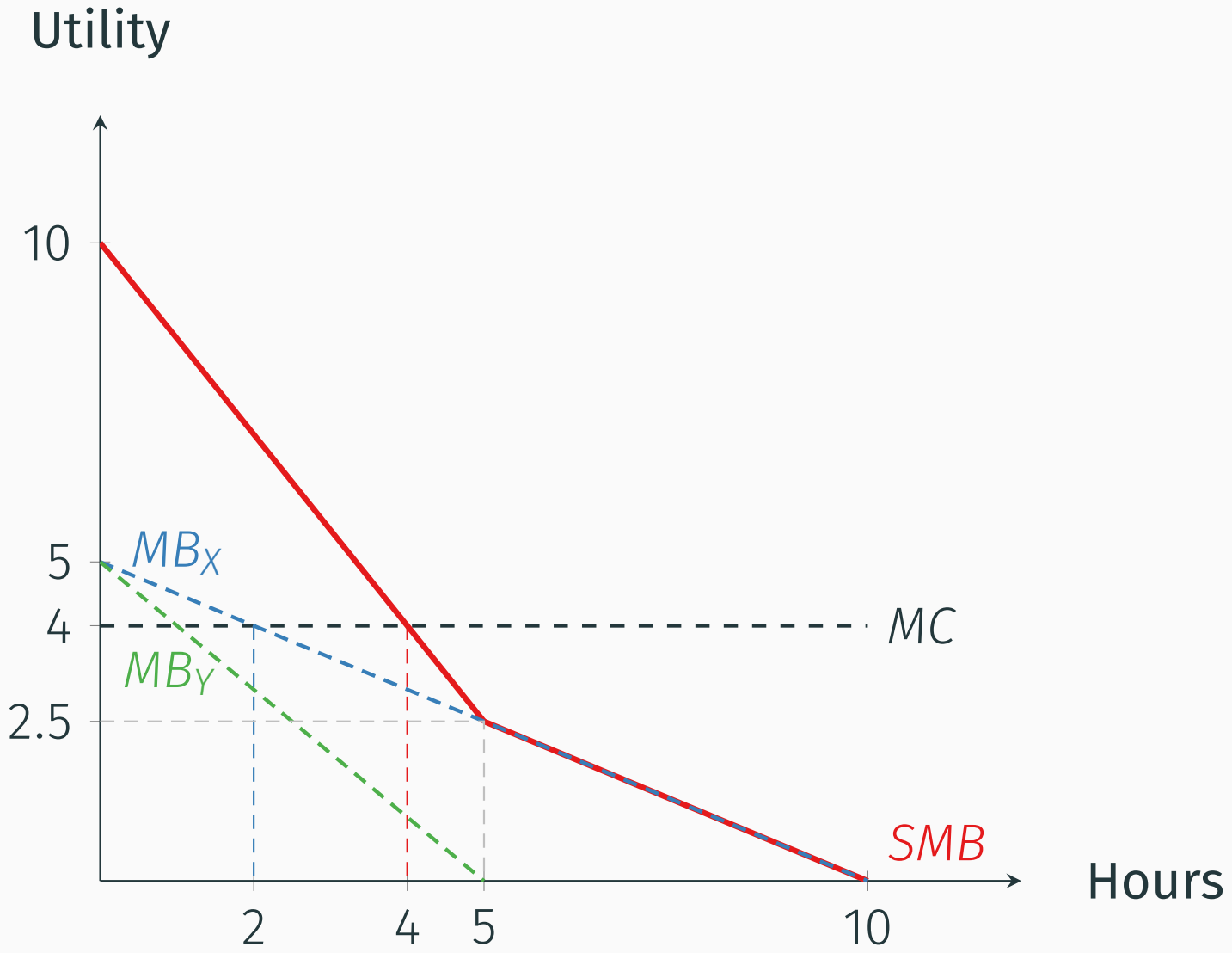
- $MB_X = 5 + \frac{1}{2}H$
- $MB_Y = 5 + H$

Note that the implied social marginal benefit curve (i.e. $SMB = MB_X + MB_Y$) has a kink.

$$SMB = = 10 + \frac{3}{2} \qquad \text{if } H < 5$$
$$= 5 + \frac{1}{2} \qquad \text{if } H \geq 5$$

We'll also assume that $MC = 4$.

Public goods example (cont.)



Externality with deadweight loss

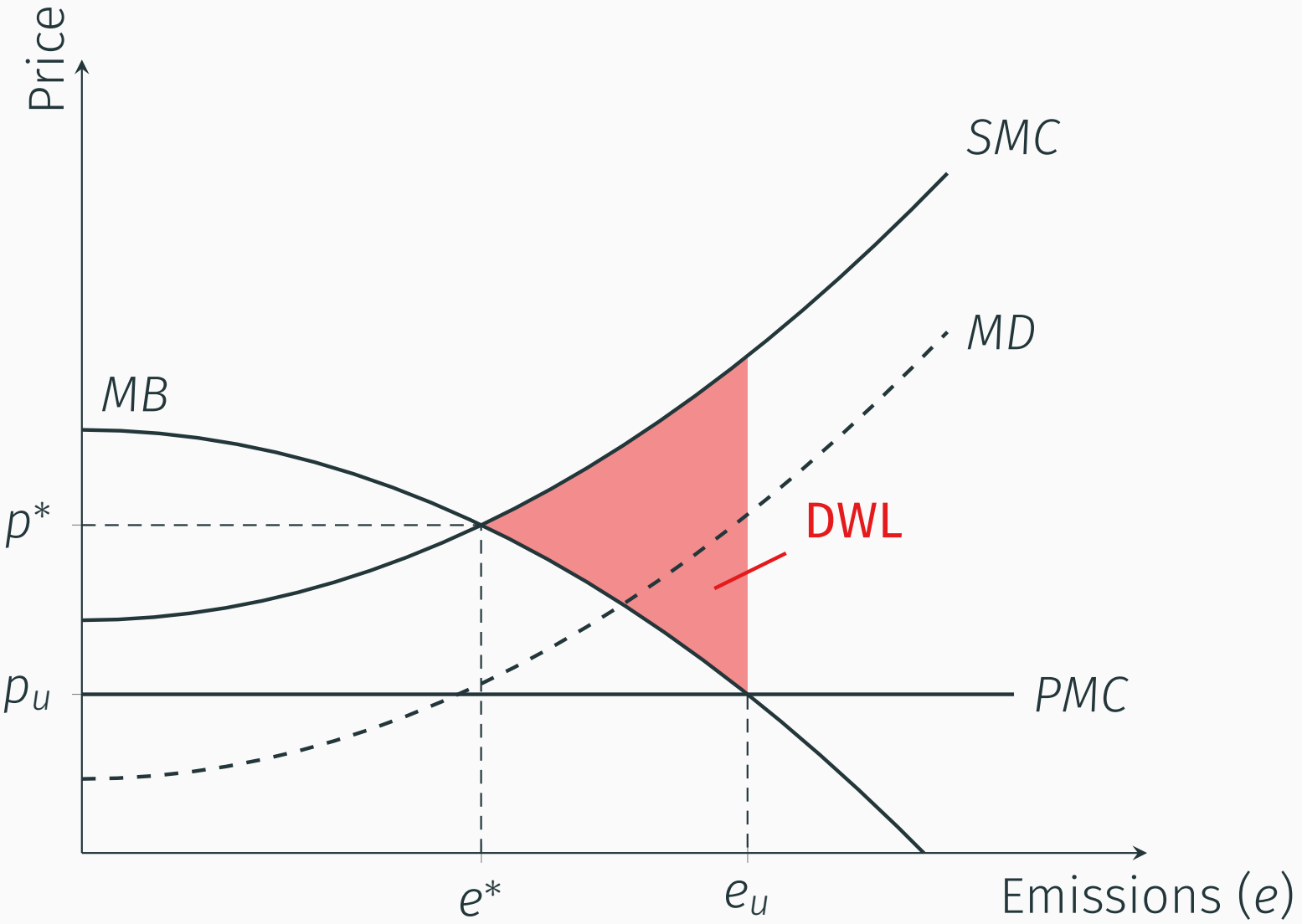
Externality with deadweight loss

For this example:

- Marginal benefits: $MB(e) = 40 - e^2$
- Private marginal cost: $PMC(e) = 15$
- Marginal damages: $MD(e) = e^2 + 7$

We'll compare the unregulated and social outcomes, and highlight the resulting deadweight loss.

Externality with deadweight loss (cont.)



Tradeable permits

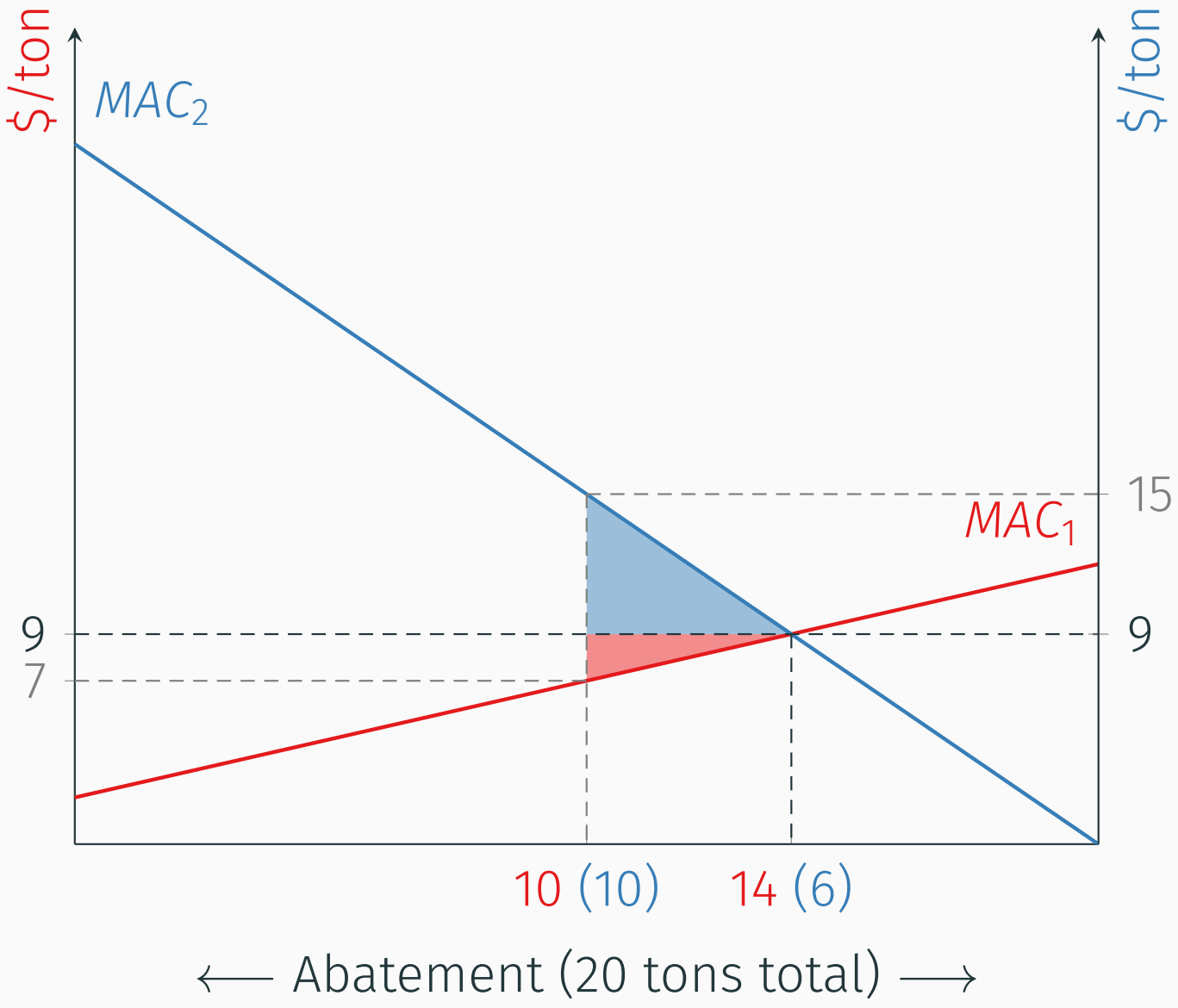
Tradeable permits

For this example:

- $MAC_1 = 2 + \frac{1}{2}A_1$
- $MAC_2 = \frac{3}{2}A_2$
- Total cap = 20 tons

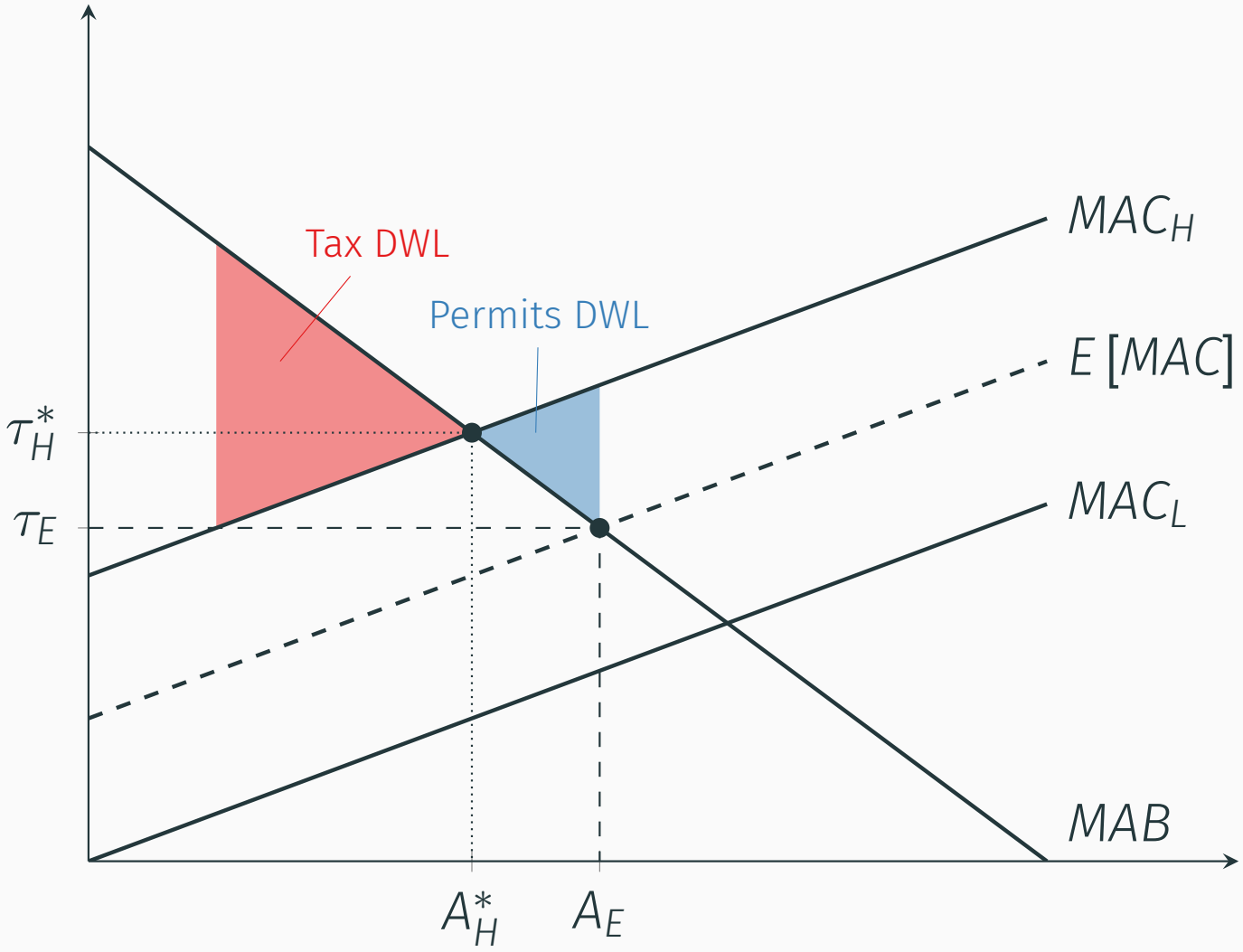
We'll compare outcomes and gains from trade versus a uniform allocation (i.e. where each firm abates 10 tons).

Tradeable permits (cont.)



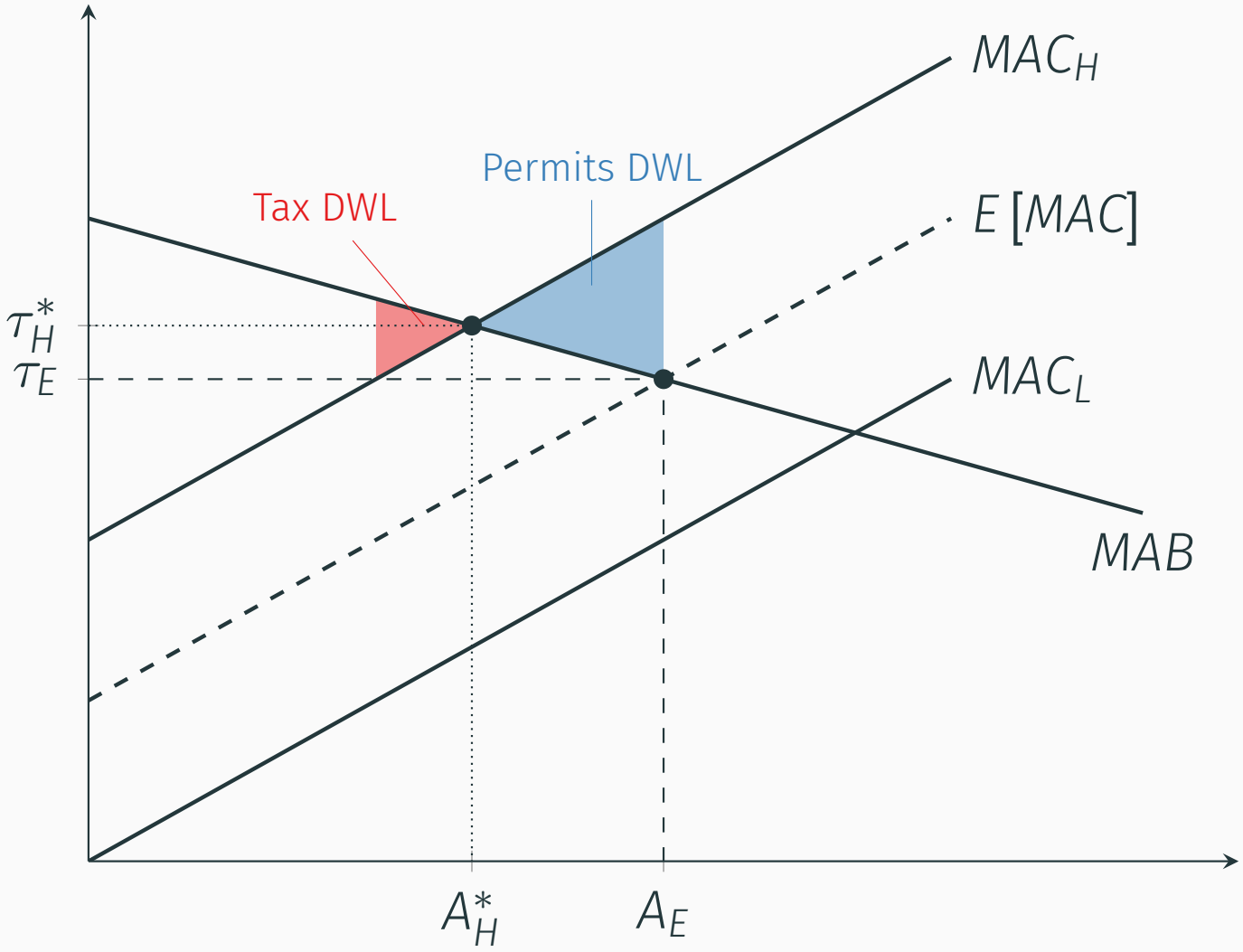
Prices vs Quantities (Weitzman rule)

Prices vs Quantities (1): Permits preferred



MAC flat relative to *MAB*, but uncertain. (Truth is MAC_H.)

Prices vs Quantities (2): Tax preferred



MAC steep relative to *MAB*, but uncertain. (Truth is MAC_H.)

Environmental Kuznets curve

EKC