Beyond Kyoto: Fiscal Policies for Equitable and Effective Action on Climate Change

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Main points

- Global collective action is required to address climate change post-Kyoto (2012)
- Modified ‘cap and trade’ regime with initial allocation based on per capita entitlements offers win-win opportunity for North and South
- Volatility of permit prices can be addressed through a price ceiling and floor (price band)
- Safeguards interests of buyers and sellers
- Promotes investment in non-carbon technologies
- Likely income transfers to sellers large but not in a relative sense

Outline

- Climate change – the problem stated
- Actions required
- Policy response so far (Kyoto Protocol)
- Beyond Kyoto—carbon markets
- Prices (carbon taxes) vs. quantities (permits)
- ‘Cap & trade’ with safety valve and price floor
- Per capita allocation and permit prices
- Quantifying income transfers

Climate Change?

- IPCC 4th Assessment (February 2007) states:

"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level"

Source: IPCC, *Climate Change 2007: The Physical Science Basis, Summary for Policymakers*, 5/2/2007

"the greatest market failure the world has seen"

An unusual externality:

- Effects are global
- Effects persist decades and centuries into the future
- Potentially very large risks (damages)
- High degree of uncertainty regarding both science and economics of climate change
- Irreversible damages and costs of mitigation

Evidence of Warming

- 0.74 °C rise in average air temperatures in past 100 years
- Warmest 12 years since 1850 were in 1990-2006
- Average ocean temperatures have increased
- “High confidence” that sea level rise increased from 19th to 20th century; 20th century rise is estimated to be 0.17 m

Causes

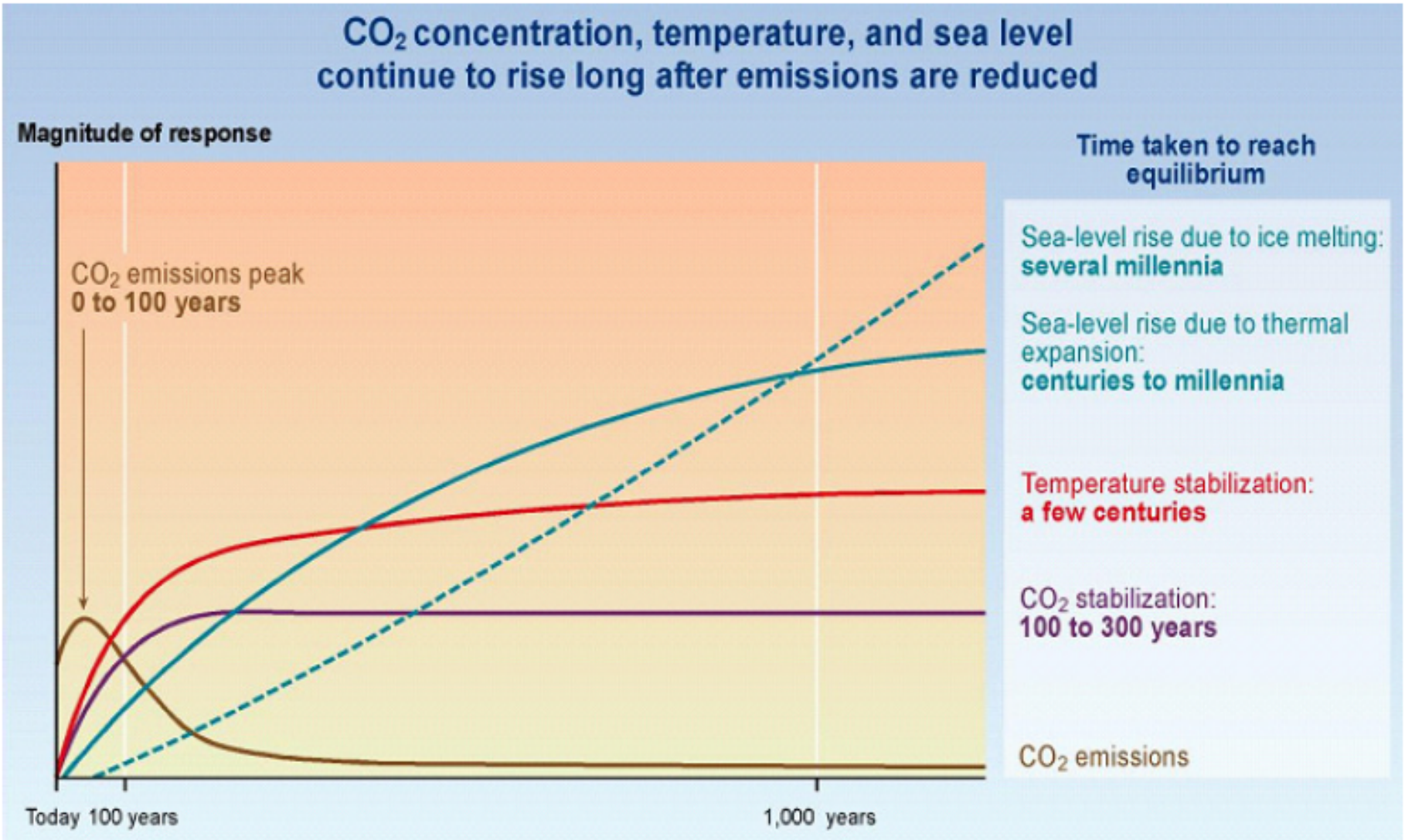
IPCC goes on to state:

- "Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations."
- "Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns."

Mechanisms

- Enhanced greenhouse effect
- Anthropogenic greenhouse gases (GHGs) in order of importance: carbon dioxide, methane, nitrous oxide, halocarbons
- GHGs differ in terms of their ability to trap heat in the atmosphere
- Also differ in terms of their "atmospheric lifetime", from tens to thousands of years
- Accordingly, gases vary in terms of their "global warming potential", from 1 for carbon dioxide to 310 for nitrous oxide and 1000s for halocarbons

Time Lags in Climate Response



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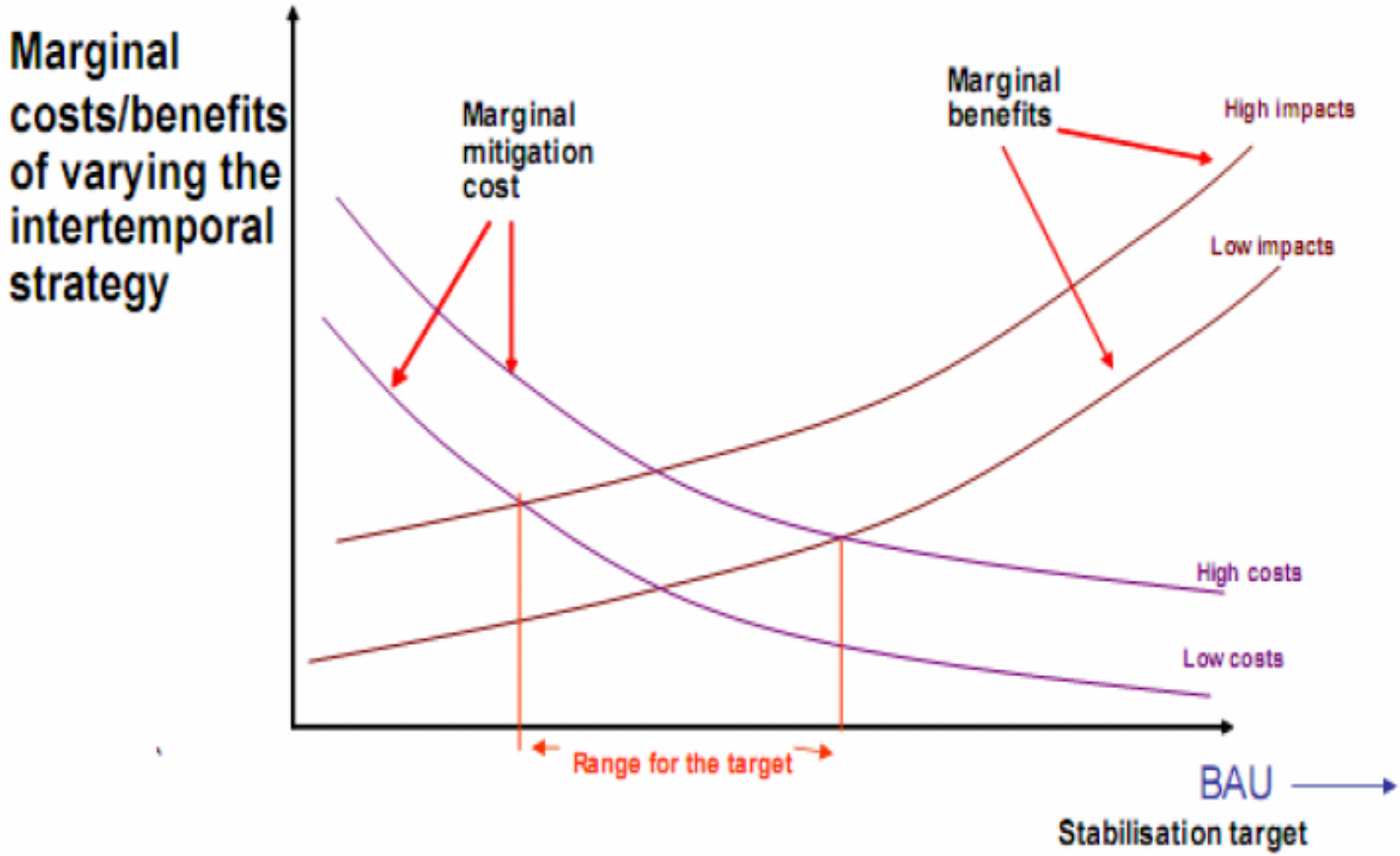
Costs of Mitigation

- Current CO2e concentration is 430 ppm
- Propose stabilizing CO2e at or below 550 pm
- At 550ppm, 0.5 probability of < 3°C rise by 2100, and unlikely that rise > 4° (relative to pre-industrial); under BAU a 0.5 probability of 5°C rise
- Assuming emissions peak in 2020, can achieve 550 pm with annual emissions cuts of 1 – 3% thereafter
- 10 year delay doubles annual rate of emissions decline required

Choosing a CO2E Stabilization Target



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Means of Reducing GHG Emissions

- Increasing efficiency of energy use
- Increasing efficiency of energy production
- Adopting low carbon technologies for power, heat, and transport, including CCS
- Reducing demand for emissions-intensive goods and services
- For non-fossil fuel emissions:
  - reducing deforestation
  - changing agricultural practices
- Augmenting carbon sinks—reforestation and afforestation

Policy Options for Reducing GHG Emissions

- Establishing a *credible* carbon price
- Removing fossil fuel subsidies
- Technology policy—R&D and deployment assistance
- Removing barriers to behavioral change
- "Carbon finance"–financial assistance to developing countries
- Promoting adaptation
- Preserving/augmenting carbon sinks

Kyoto Protocol

- 1997 agreement by developed countries to reduce GHG emissions
- Covers all major GHGs
- 161 countries accounting for 62% of emissions have ratified it as of late 2006
- Diplomatically binding targets for developed nations to cut emissions below 1990 levels by 5.2%
- Targets to be reached by 2012
- No targets for developing countries

Kyoto "Mechanisms"

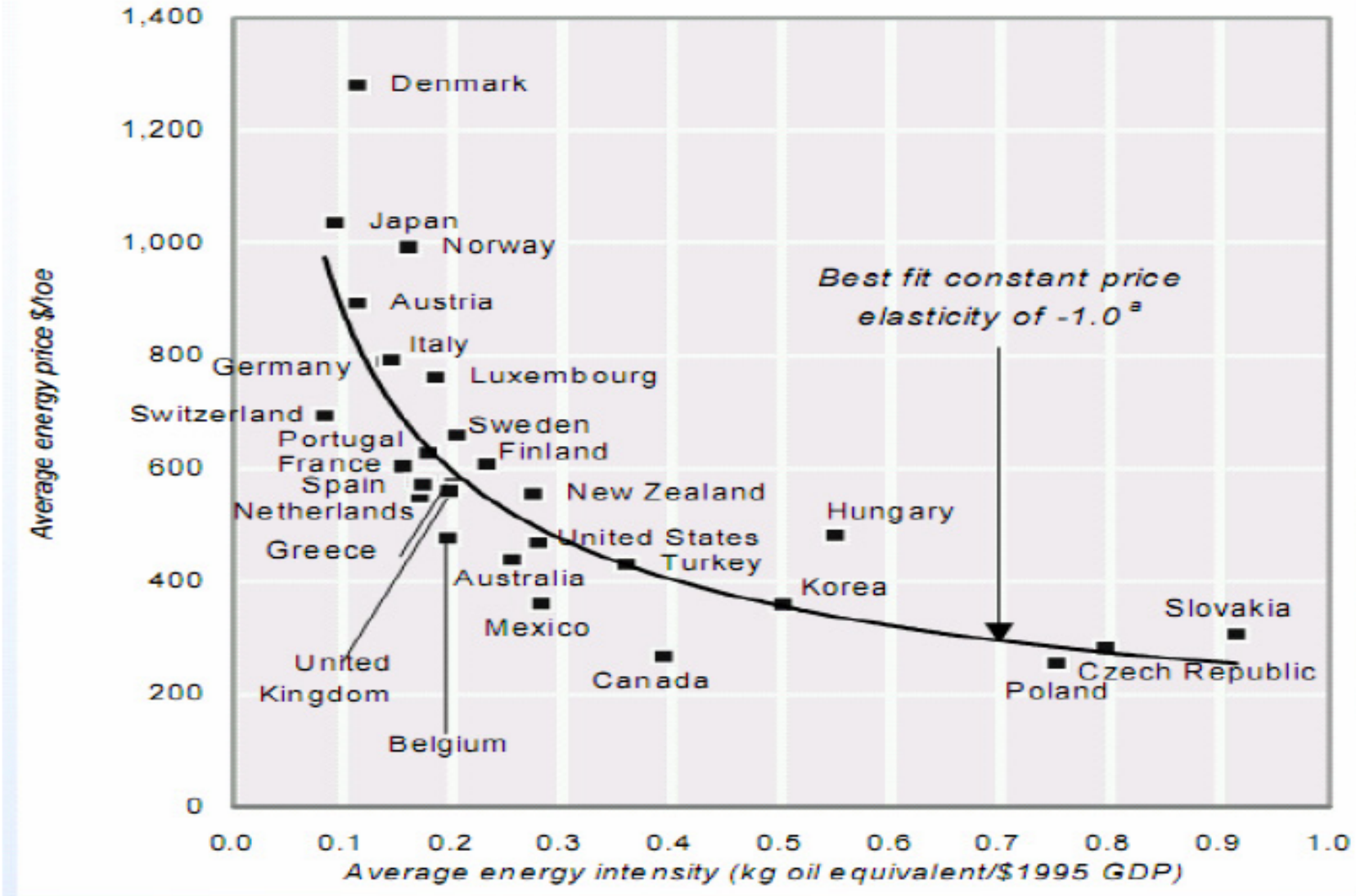
Mechanisms to promote flexibility and cost-effectiveness:

- Augmenting carbon "sinks" can be used to meet targets
- Emissions trading between countries (carbon market)
- Home country cuts can be achieved through projects in other countries (carbon market)
  - developed (Joint Implementation)
  - developing (Clean Development Mechanism)

Looking beyond Kyoto (2012)

- More conducive environment for a global agreement:
  - US presidential election (both candidates support some version of ‘cap and trade’)
  - Record oil prices
  - World food security
- Has to be based on principles of equity and efficiency

Importance of Price Signals



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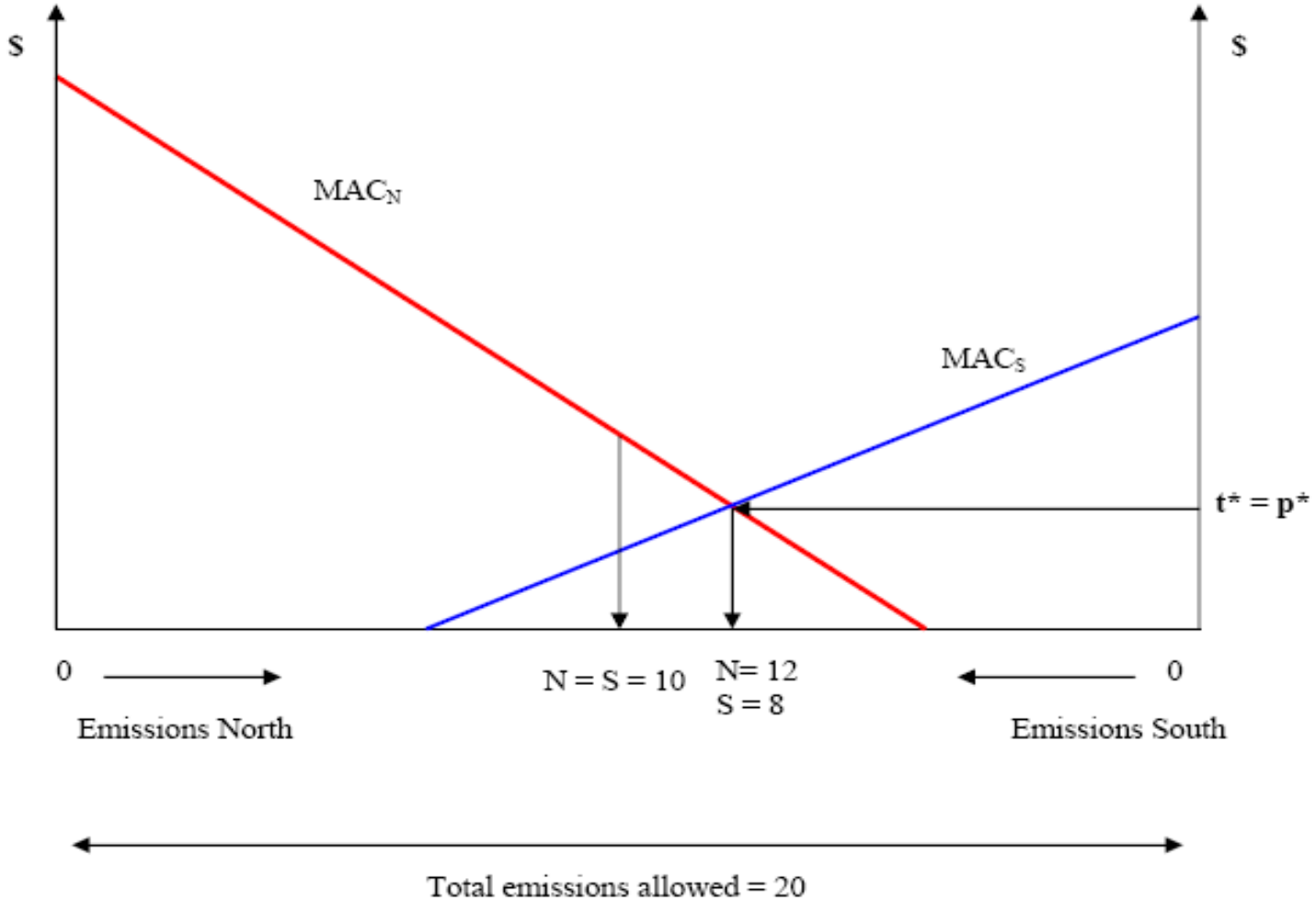
A cost effective abatement policy



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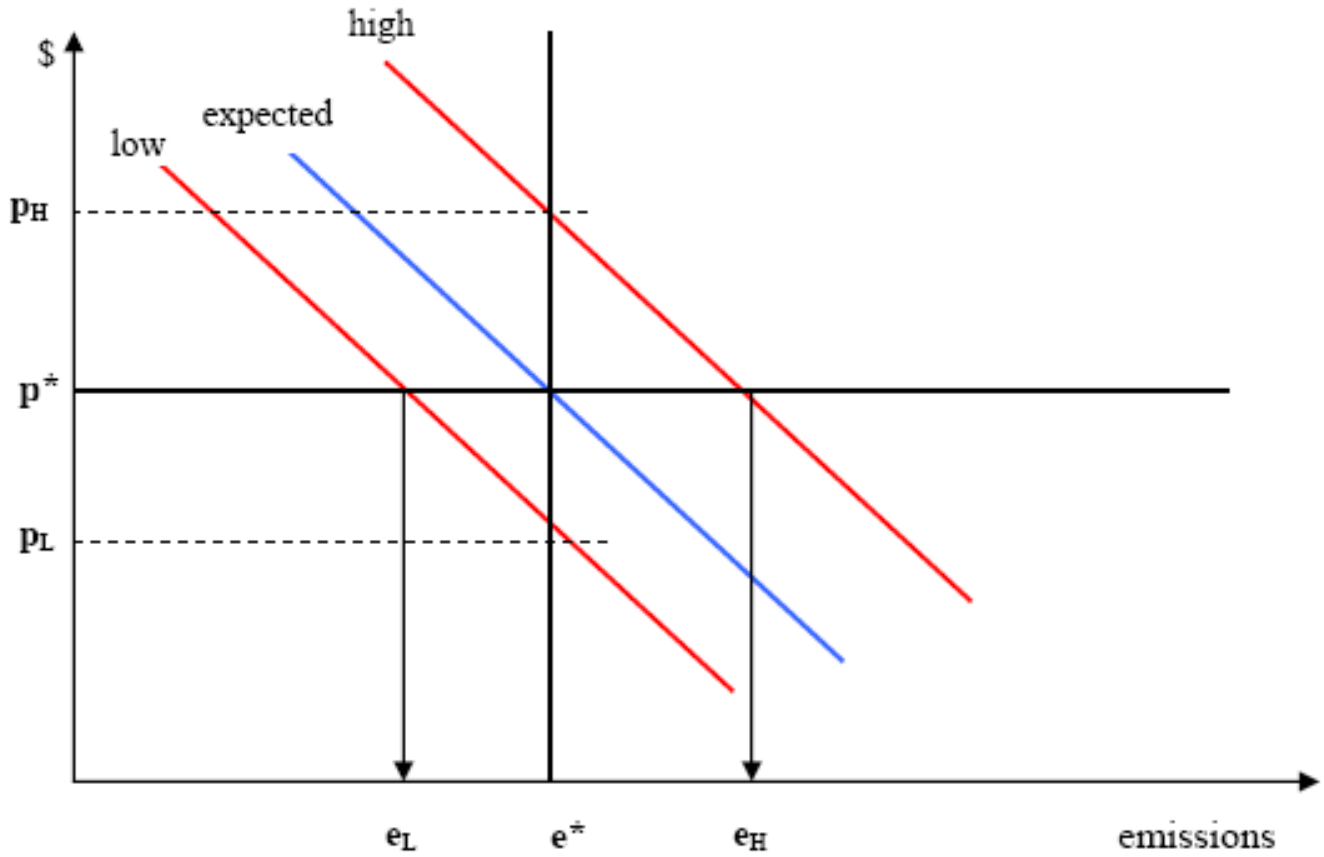
Uncertainty about abatement costs



Volatility of prices in a cap and trade system

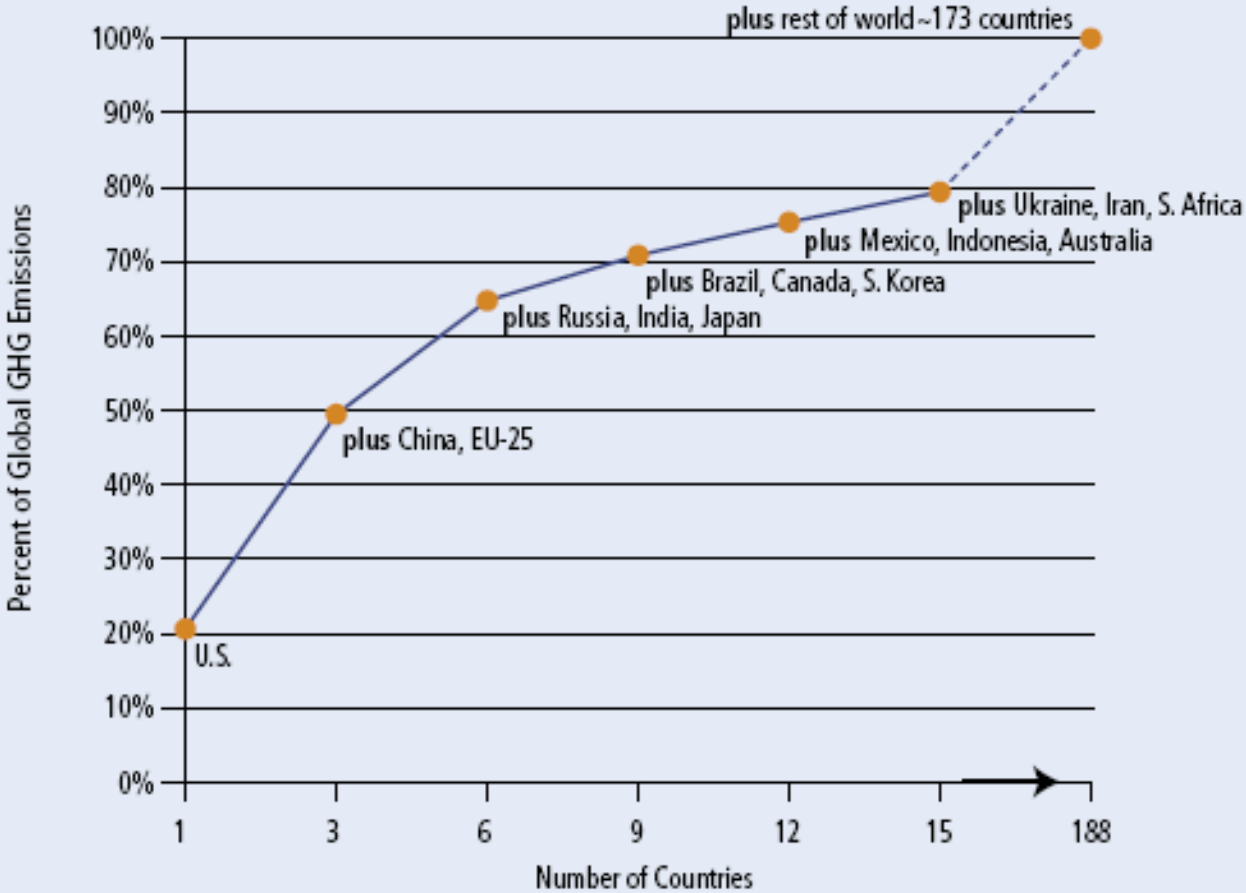
- Too high a price a problem for potential buyers in North (e.g., US)
- Too low a price a problem for potential sellers in South (e.g., India)
- So who are the potential buyers/sellers of emissions permits?

Top GHG emitting countries

CO_2, CH_4, N_2O, HFCs, PFC, SF_6

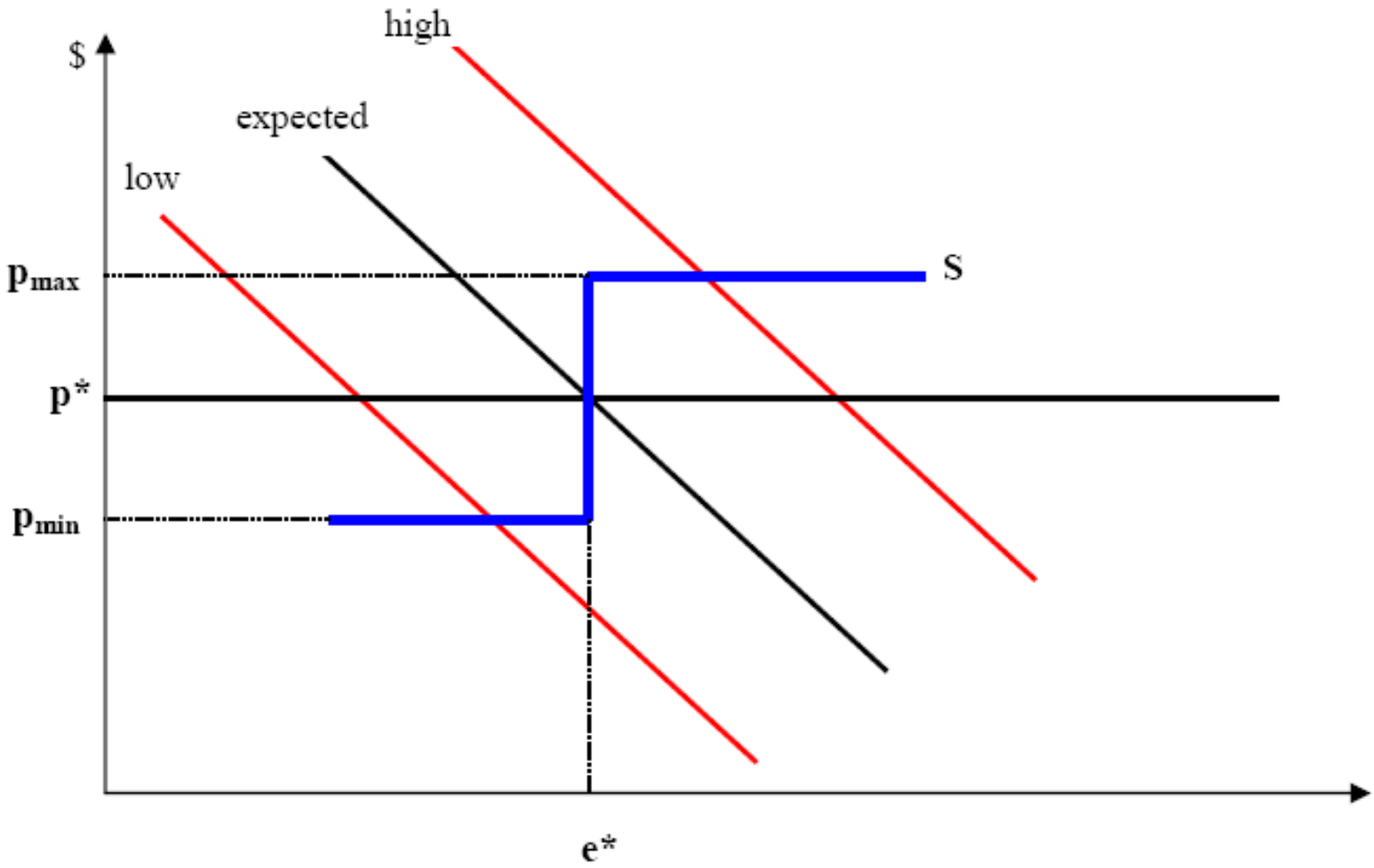
Country	$MtCO_2$ equivalent	% of World GHGs
1. United States	6,928	20.6
2. China	4,938	14.7
3. EU-25	4,725	14.0
4. Russia	1,915	5.7
5. India	1,884	5.6
6. Japan	1,317	3.9
7. Germany	1,009	3.0
8. Brazil	851	2.5
9. Canada	680	2.0
10. United Kingdom	654	1.9

Figure 2.3. Aggregate Contributions of Major GHG Emitting Countries



Sources & Notes: WRI, CAIT. Moving from left to right, countries are added in order of their absolute emissions, with the largest being added first. Figures exclude CO_2 from land-use change and forestry and emissions from international bunker fuels.

A modified cap and trade system



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Equity based allocation scenarios for ‘cap & trade’

- Per capita emissions of CO_2 are 7 tons annually (400-450 gigatons emitted by 6 billion people)
- Halving emissions by 2050 ➔2-3 tons per capita (9 billion people)
- US at present approx. 20 tons, EU/Singapore 10, China 3.5, and India 1
- Upper bound on ‘hot air’ sold by India: 1-2 billion tons? Plus abatement?
- EU GHG trades at $10/ton (too loose a cap?)
- $30-40/ton make technologies such as CCS commercially viable
- Likely income transfer (back-of-the-envelope)

Conclusions

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