Avoiding dangerous climate change through environmental tax reform: existing research and COMETR*

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Thesis

- Avoiding dangerous climate change requires global policies to reduce GHG and a carbon price signal: loud, long and legal
- EU is the global leader:
  - political targets, institutional reform: e.g. EU ETS, MSs' Environmental Tax Reforms (ETRs)
  - EU has responsibilities beyond global targets – historic additions to GHG stock
- Modelling studies suggest the profile and scale of carbon prices required
- For an EU price signal, ETS coverage is incomplete: an ETR could be a complement, covering small combustion sources
- An ETR could raise real carbon prices steadily, with flexible use of revenues to improve effectiveness, efficiency and equity
- A prospective ETR can benefit from earlier Member States' experience with ETRs, especially as regards competitiveness: this is the contribution of COMETR

Outline

1. The costs of mitigating dangerous climate change
   1. What is “dangerous”?
   2. Implications for GHG abatement and CO2-eq. prices
2. Mitigation policies and Environmental Tax Reform (ETR)
   1. Additional energy taxes, EU ETS, energy-efficiency regulation
   2. The policy instrument and objective problem
   3. Role of ETR
3. The problems of competitiveness and carbon leakage
   1. Evidence from the literature (IPCC reports)
   2. Importance of ex post evidence
4. The contribution of the COMETR project

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Targets to avoid “dangerous” climate change

- “dangerous” is an ethical and political issue
- EU’s target of 2ºC above pre-industrial is very stringent and requires stabilisation below 450ppm CO_2-equivalent to have a 50% probability of being met
- Stern, p. 284: “The current evidence suggests aiming for stabilisation somewhere within the range 450 - 550ppm CO_2e. Anything higher would substantially increase risks of very harmful impacts..”
- Most modelling scenarios have been for targets around 650ppm CO_2eq (EMF19, EMF21)
- Innovation Modelling Comparison Project (IMCP)
  - considered one around 550 CO_2eq (450 CO_2 only)
  - and focused on effects of Induced Technological Change (ITC)

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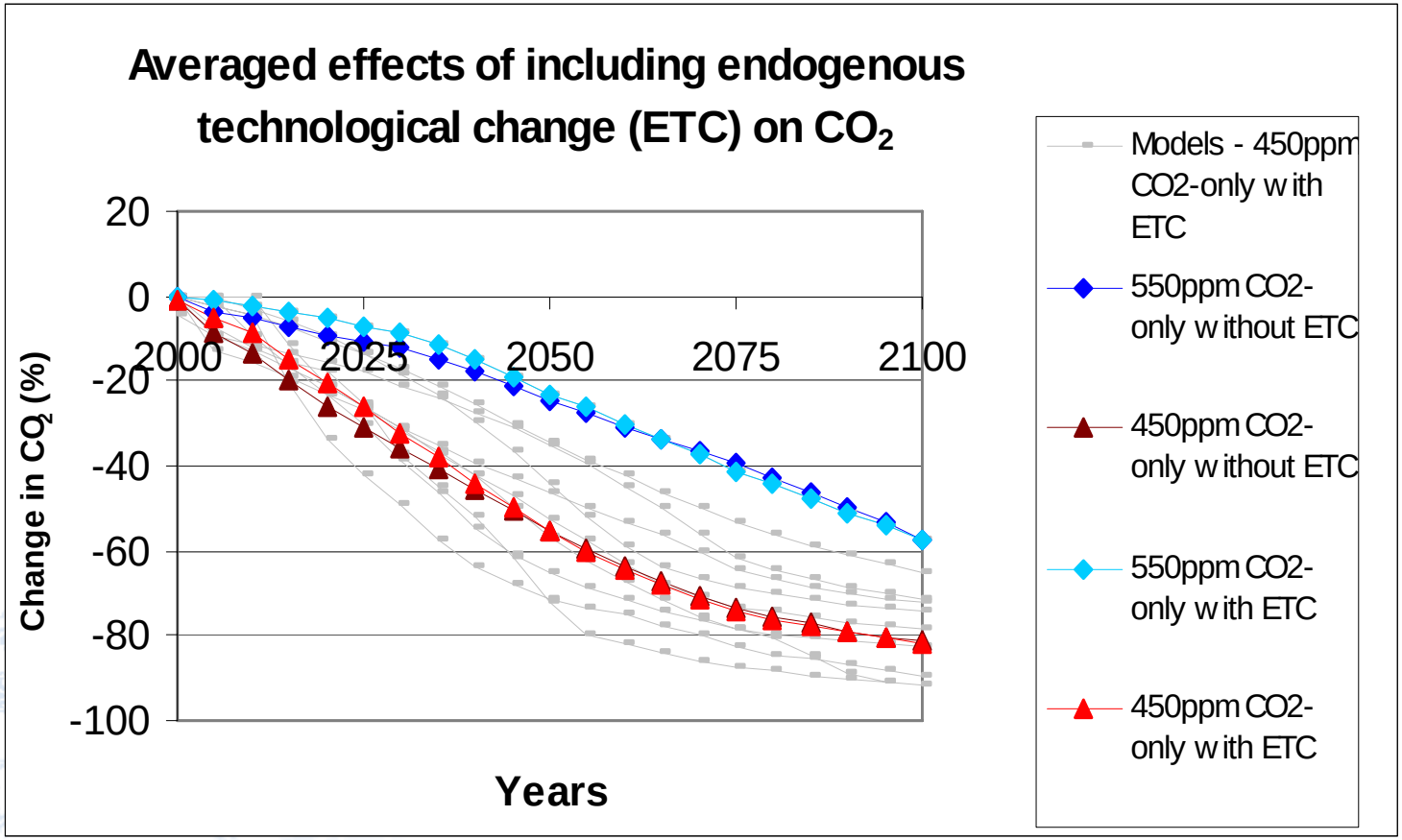
Required global CO_2 mitigation from IMCP models



550ppm CO_2-eq (450 ppm CO2-only) requires average reductions in global CO_2 around

20% in 2020

32% in 2030

56% in 2050

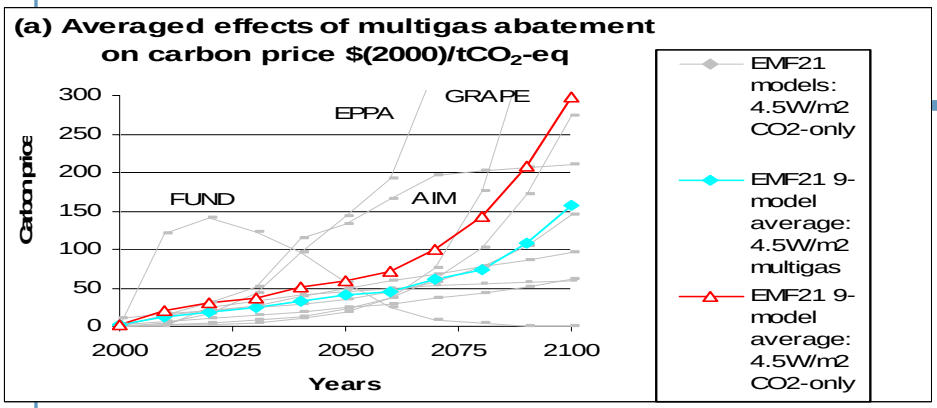
82% in 2100

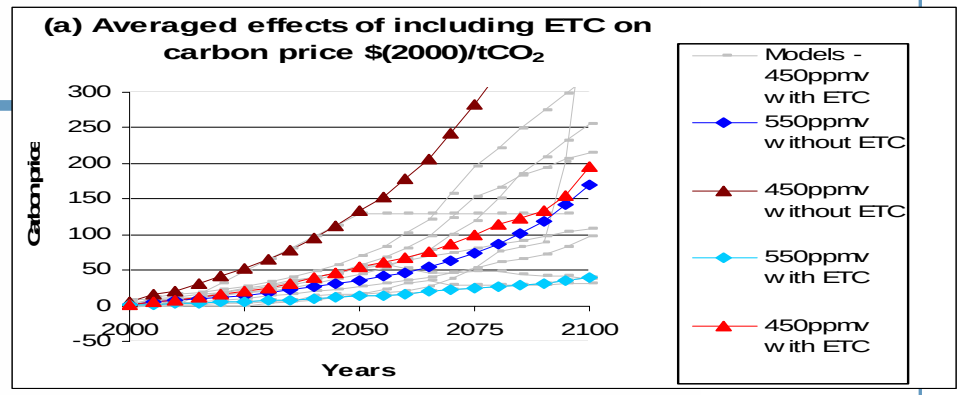
Source: Barker, T., M. Qureshi, and J. Köhler, 2006: *The Costs of Greenhouse Gas Mitigation with Induced Technological Change: A Meta-Analysis of Estimates in the Literature.* Working Paper 89, Tyndall Centre for Climate Change Research, Norwich, 63pp.

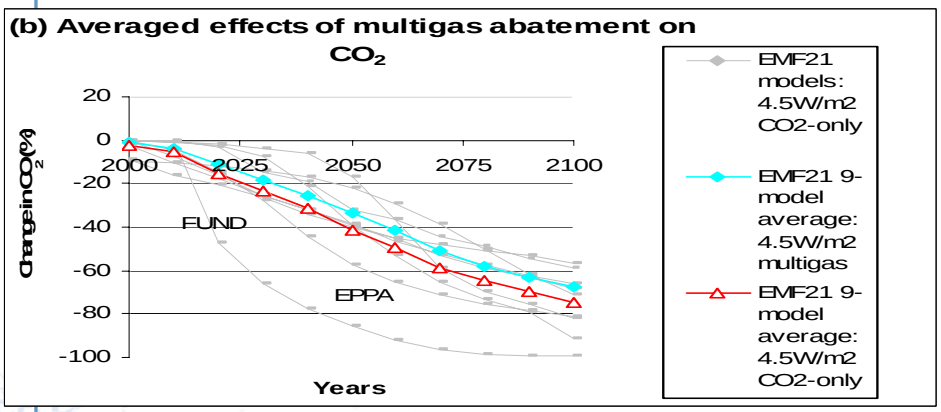
Average effects on carbon prices, CO2 and GDP of stabilization targets:

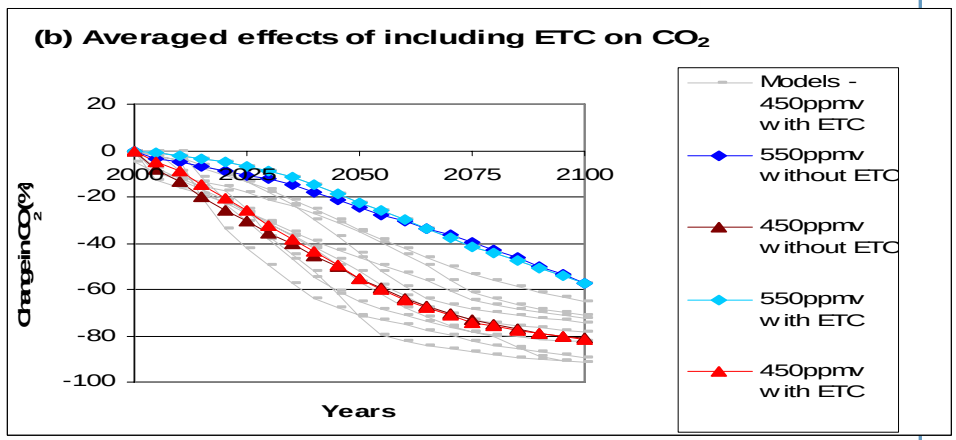
EMF21

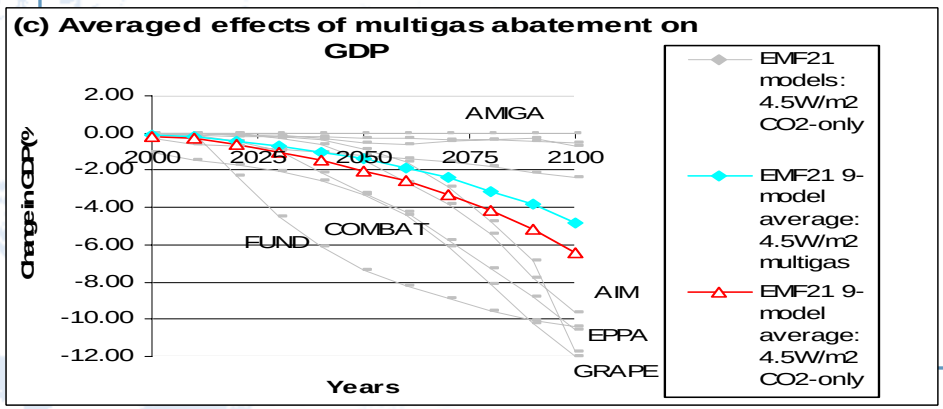
IMCP

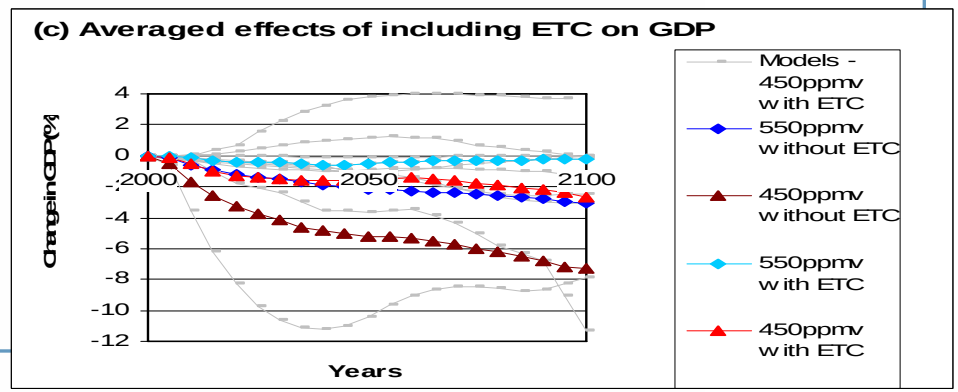




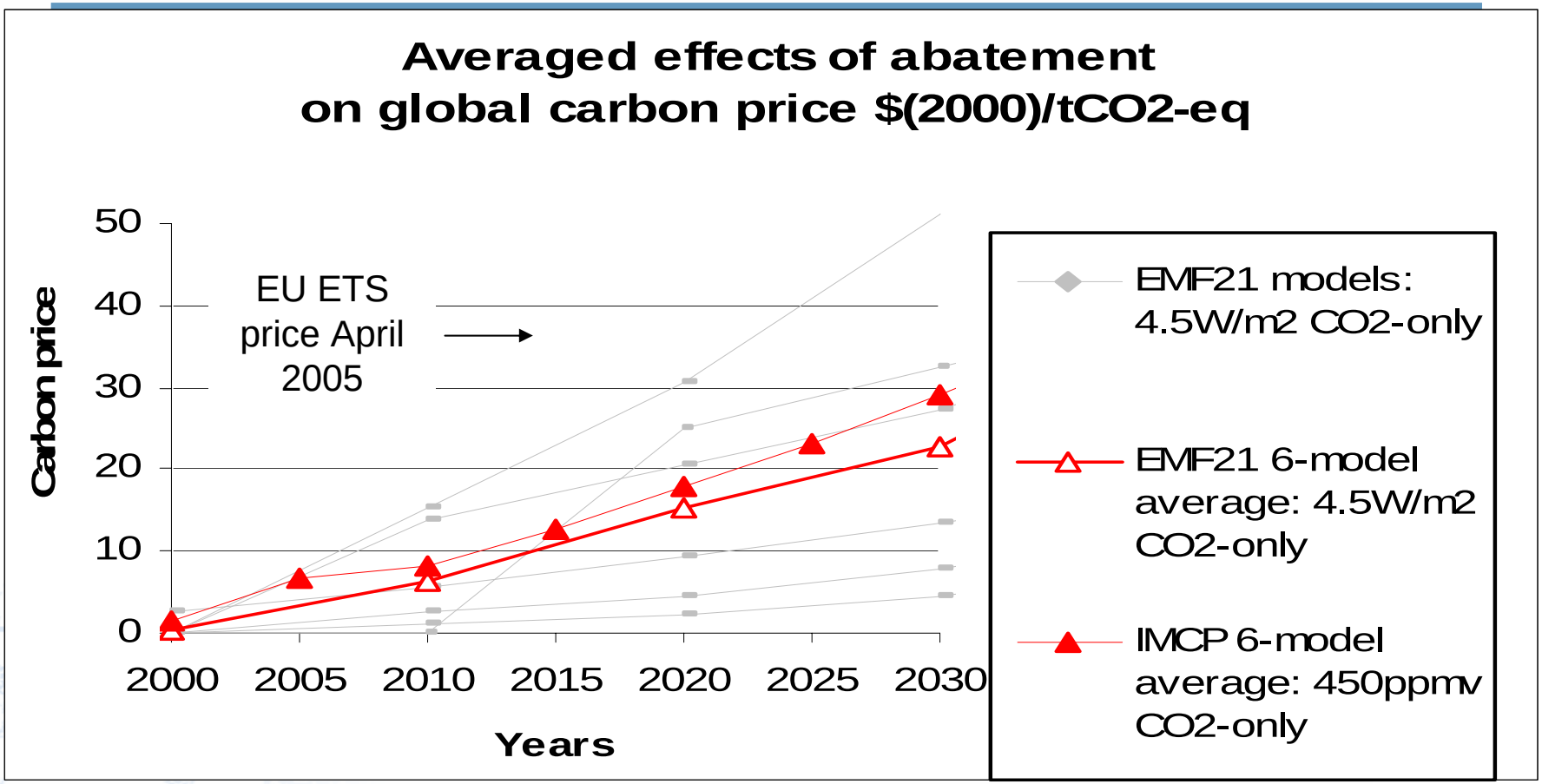








Carbon-price profile for 550ppmv CO_2-eq stabilisation: evidence from 12 model studies



Note: The model studies have been extracted from EMF21 and IMCP model comparison exercises, excluding outliers.

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Implications for policies to avoid dangerous climate change

- Models have limitations – stylised, partial coverage, problems in treatment of technological change - but
  - macroeconomic costs are very small in relation to expected GDP
  - recycling revenues, multigas options and encouraging technological change all significantly reduce the costs
- General technological change alone unlikely to work
  - improvements in energy efficiency are offset in their effects on CO_2 emissions by higher growth in exports, incomes and energy demand
  - therefore a rising real carbon price is required
- The problem is that of international agreement on action – hence importance of EU lead with 2020 targets
- Carbon-price policies are most efficient if all sectors of the economy are covered

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Implications for the carbon price for the EU to 2030

- A 550ppmv CO_2-eq target implies
  - 20% global CO_2 reduction below baseline
  - carbon prices rising to about 15-20 €/tCO_2 by 2020
- The literature:
  - insufficient and inadequate modelling studies for more stringent stabilisation below 450ppmv CO_2-eq (implied by 2ºC target)
  - (current levels: c430ppmv CO_2-eq)
- The EU and other OECD countries bear more responsibility of the stock of GHGs (from historical emissions) and for action
- In consequence, the implicit carbon price required
  - probably higher, about 10-12 €/tCO_2 2010, rising to 30-40 €/tCO_2 2020
  - i.e. an increase of 2 €/tCO_2 a year indefinitely in real terms
- EU-wide ETS and ETR should be designed to provide this signal for lowest costs

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Environmental targets and instruments

- Improving air and water quality, reducing climate change and loss of biodiversity are interlinked social targets
- A portfolio range of instruments is more effective
  - environmental problems interact – lower GHG -> lower air pollution
  - instruments have side-effects
  - and support each other
- Hence the value of a comprehensive reform of the tax system to shift the burden from goods (e.g. employment) to bads (e.g. pollution)

Current EU policies to achieve GHG targets

- EU Regulation (e.g. energy efficiency for auto-engines, appliances, clean coal) but
  - upward trends in energy use from income growth and new products e.g. hi-definition TVs, heavier cars
  - rebound effects
- EU ETS but
  - large combustion plants
  - excess profits (free allowance allocation)
  - transaction costs
- EU additional taxes on energy products: now at low rates
- Member State policies
  - Environmental tax reforms (ETR) including carbon taxes for household and small business GHG emissions

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revenues go to government	revenues from DTQ sales go to low-carbon households

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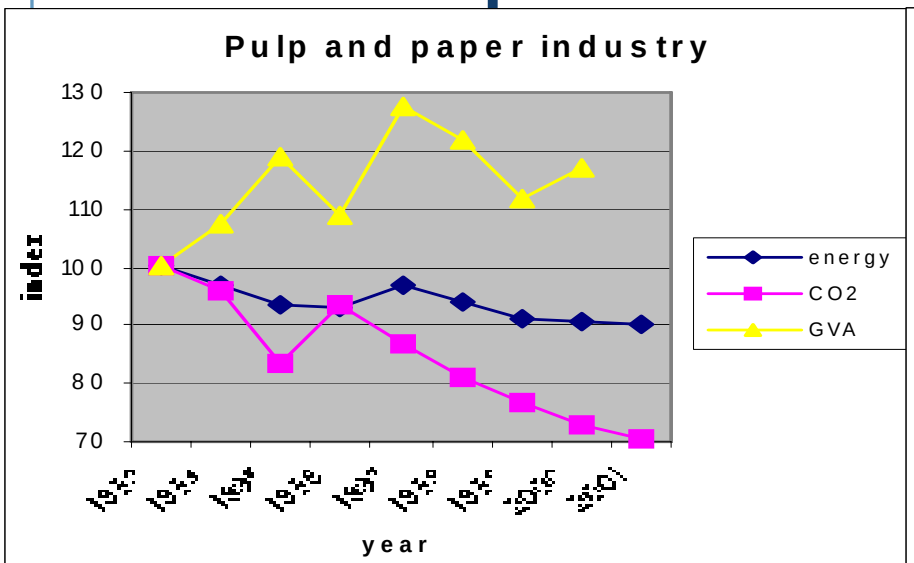
Environmental tax reform – political acceptance

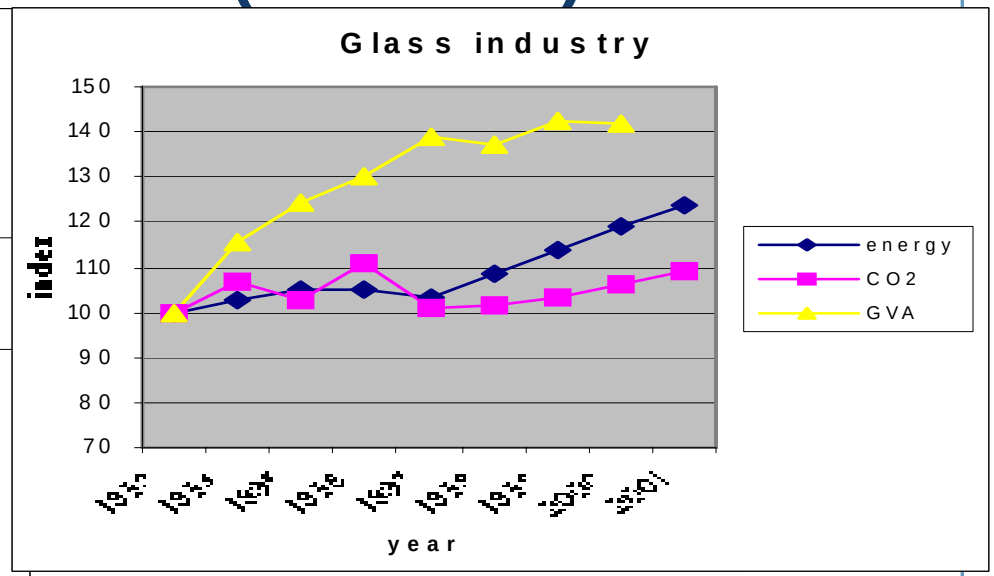
- History: political attractions, but repeated defeats
  - 1993 EU carbon-energy tax – recycled revenues via lower employment tax – but unacceptable to business
  - ETRs have failed in France and Italy
- ETRs have not been understood or accepted by voters (PETRAS project Energy Policy 2006)
- ETR has to be flexible depending on local labour market conditions
  - recycling via employment or more general tax reductions
- EU ETR should combine EU-wide additional energy taxes (for single-market efficiency) and MS use of revenues to suit local conditions

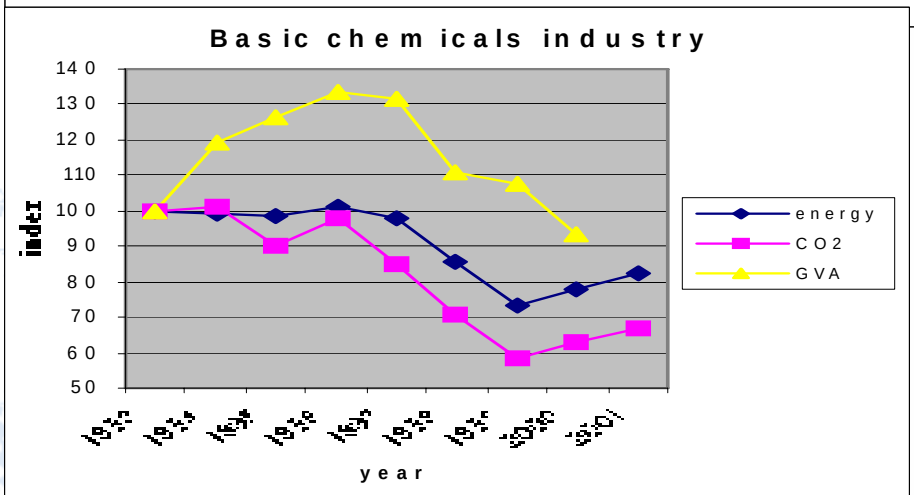
Member State ETRs 1990-2005

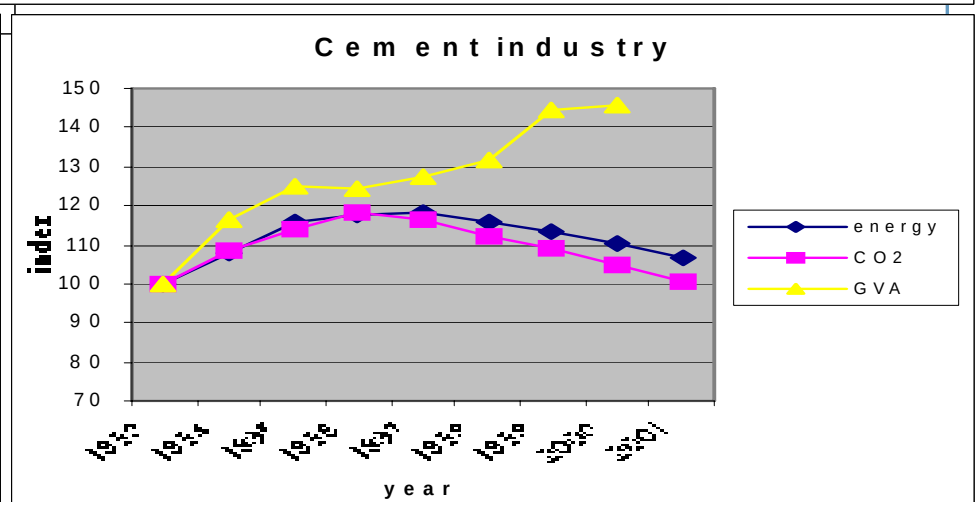
- COMETR: identified 6 ETRs to study in the EU (Sweden, Denmark, Finland, the Netherlands, UK and Germany)
- Very diverse: started in 1990s, but over different periods, sectors, rates, exemptions, design, politics
- Most ETRs very weak in effects – one of strongest was in Denmark, with substantiated effects
- Reasons:
  - elements of experimentation
  - Wish to be gradual and incremental
  - concerns for competitiveness and carbon leakage

Decoupling of carbon emissions substantiated in previous research (Denmark)









Data for Denmark indicates 10% CO2-reduction compared with business-as-usual for industry (Nordic Council of Ministers)

The macroeconomic costs of environmental tax reform (ETR)

- Costs not observable from market prices because
  - outcome of complex energy-environment-economy (E3) system interactions
  - involve changes in environment that have no market valuations
  - hypothetical: comparison of 2 states of the E3 system over future years
- Macroeconomic costs are usually measured in terms of future loss of GDP, comparing one hypothetical state of the world with another
  - but GDP often a poor measure of welfare – distribution of income and unemployment also count
  - Include benefits from use of tax or emission permit revenues
- Such costs can be offset by environmental benefits such as lower GHGs and air polluctions
- Free allocation of emission permits (as in phase I, EU emissions trading scheme (ETS)) yields no revenues to recycle

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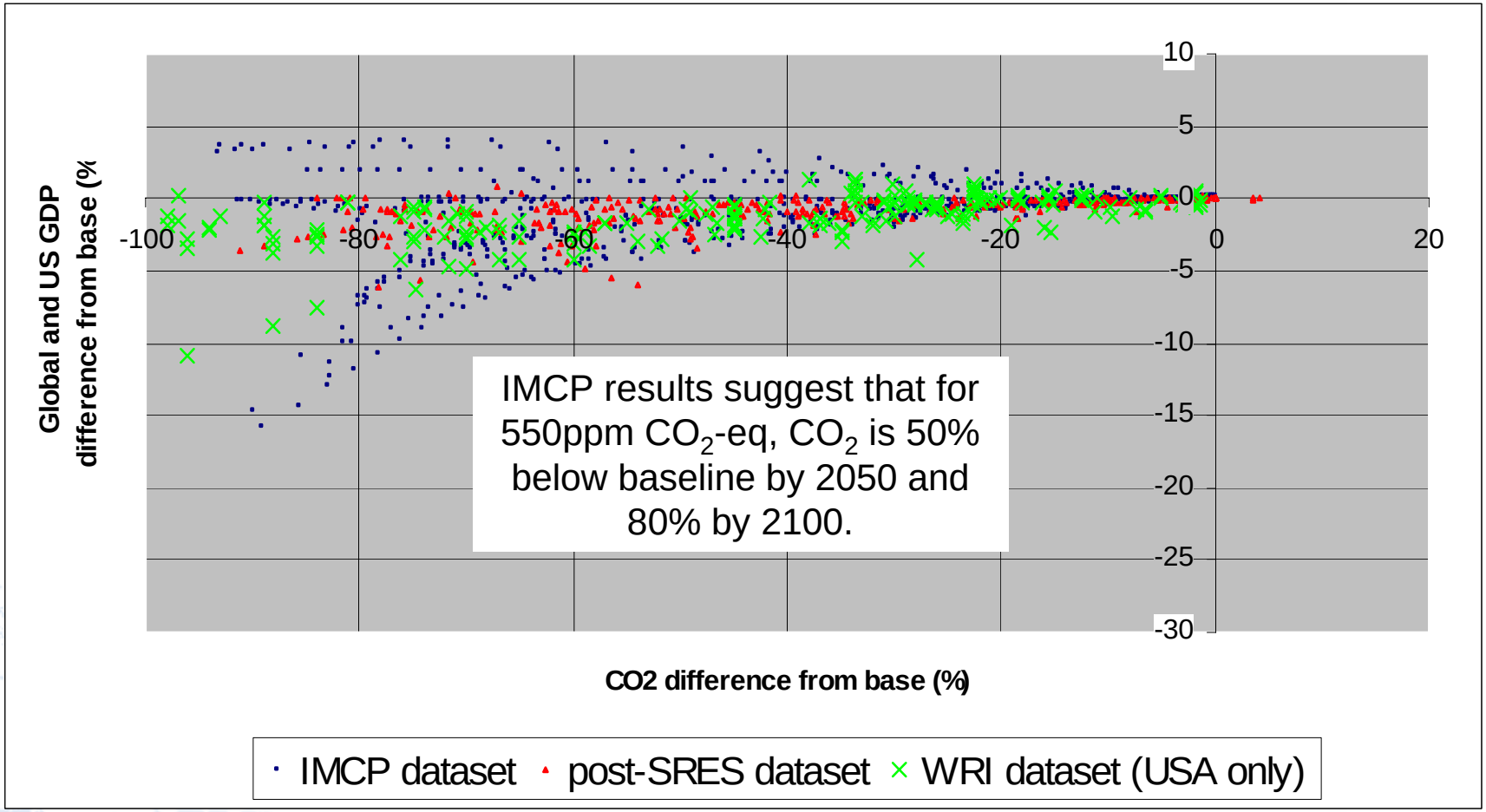
Scatter plot of CO_2-GDP: raw data for meta-analysis of recyling benefits



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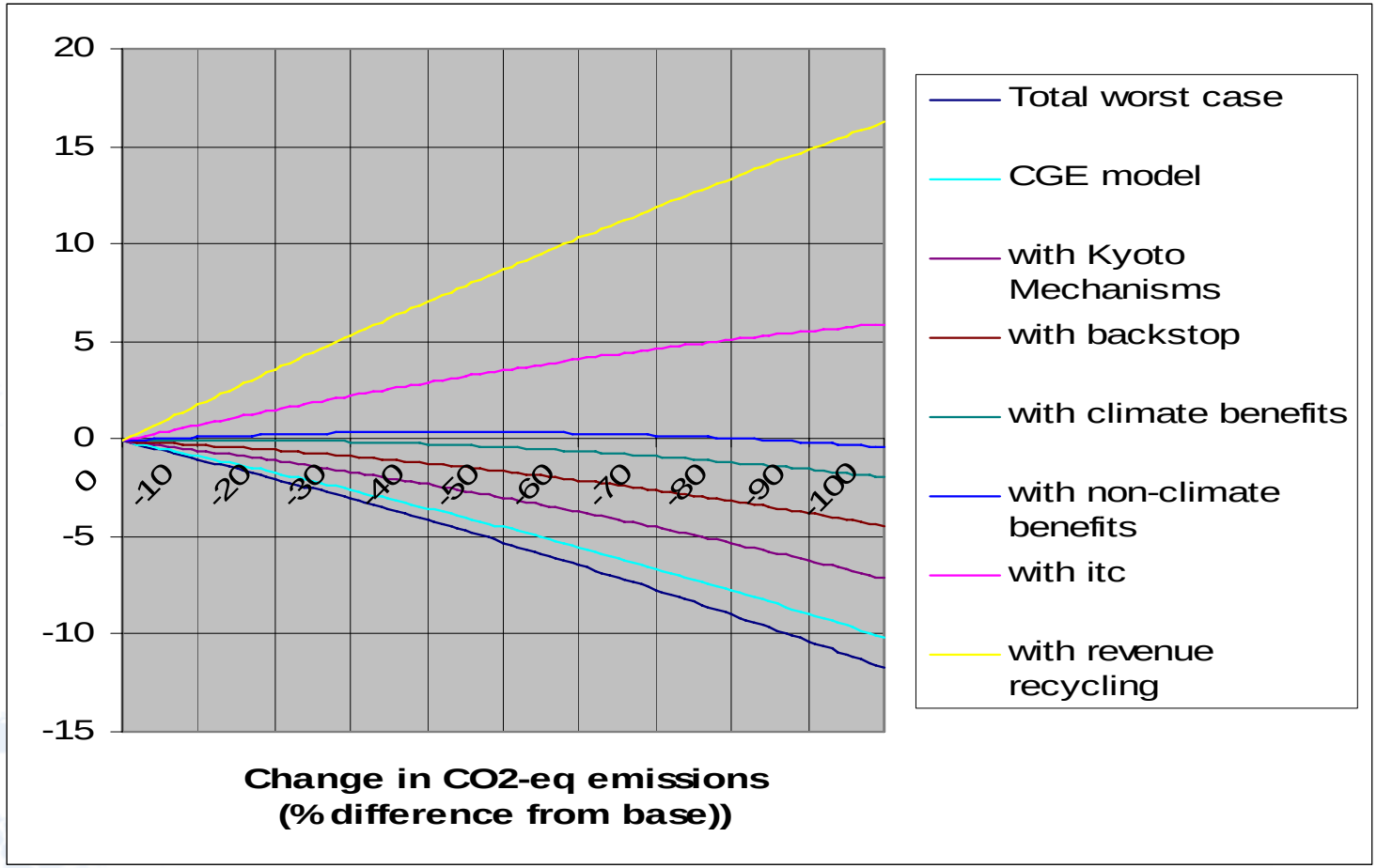
Meta-analysis of WRI-post-SRES-IMCP data : effects of assumptions (450ppm CO_2only)



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The literature on competitiveness and carbon leakage

- Both price and non-price competitiveness can be significant,
  - literature more developed for price competitiveness (esp. using CGE models)
- Important to allow for exchange rate offsetting for EU competitiveness
- Barriers to re-location of firms
  - information (local markets, laws, business), labour skills
- Energy costs are usually a small component of overall costs; emissions changes even lower
- Overall conclusion: sectoral competitiveness effects are likely to be insignificant, if policies are well designed, encourage new products and processes, allow time for adjustment and cover many countries

Contribution from COMETR: evidence from Member State policies

- Few studies in the literature are on *ex post* analysis – nearly all are *ex ante* evaluations of proposed policies (e.g. effects of Kyoto)
- The COMETR project has studied a diverse set of innovative, experimental policies in ETRs for 6 Member States 1994-2005, with projections to 2012
- Assessment of effects on competitiveness and carbon leakage in the context of the single market
  - Macroeconomic and sectoral effects
  - Detailed dynamic counterfactual modelling
  - Complemented by industrial analysis

Conclusion

- Critical time in environmental policy in EU
- Targets supported by ETS and regulations, but "price-signal" gap in policy for small GHG emitters
- ETR fills that gap
  - very attractive politically (e.g. UK politics)
  - many EU countries have experimented
  - but there have been and are industrial concerns
- COMETR specifically assesses competitiveness and carbon leakage effects at member State and EU level

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