



Netherlands Environmental Assessment Agency

Interactions EU policies for air and climate – a macro-economic assessment

BOLK workshop
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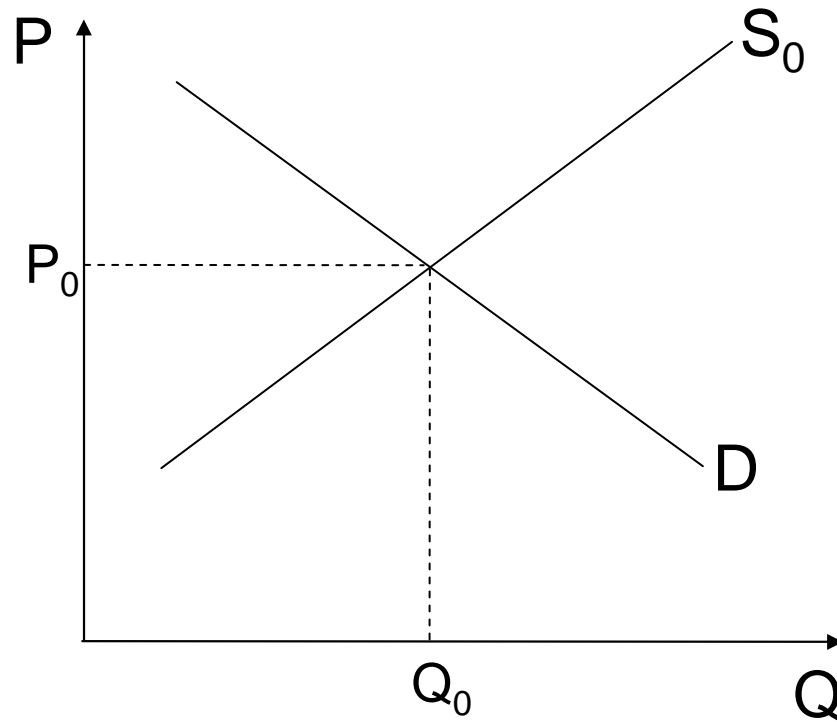
Objectives

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- Analyse interaction EU air and climate policies considering:
 - both end-of-pipe and structural measures
 - economic feedback mechanisms

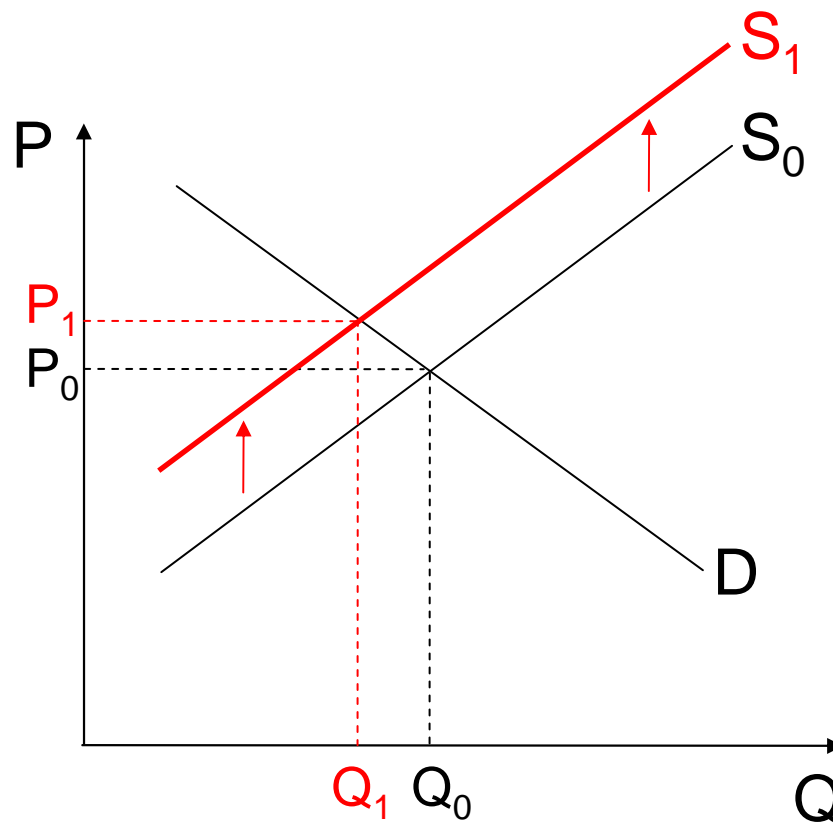
- NB: work in progress...

Economic general equilibrium model



- Equilibrium:
supply = demand

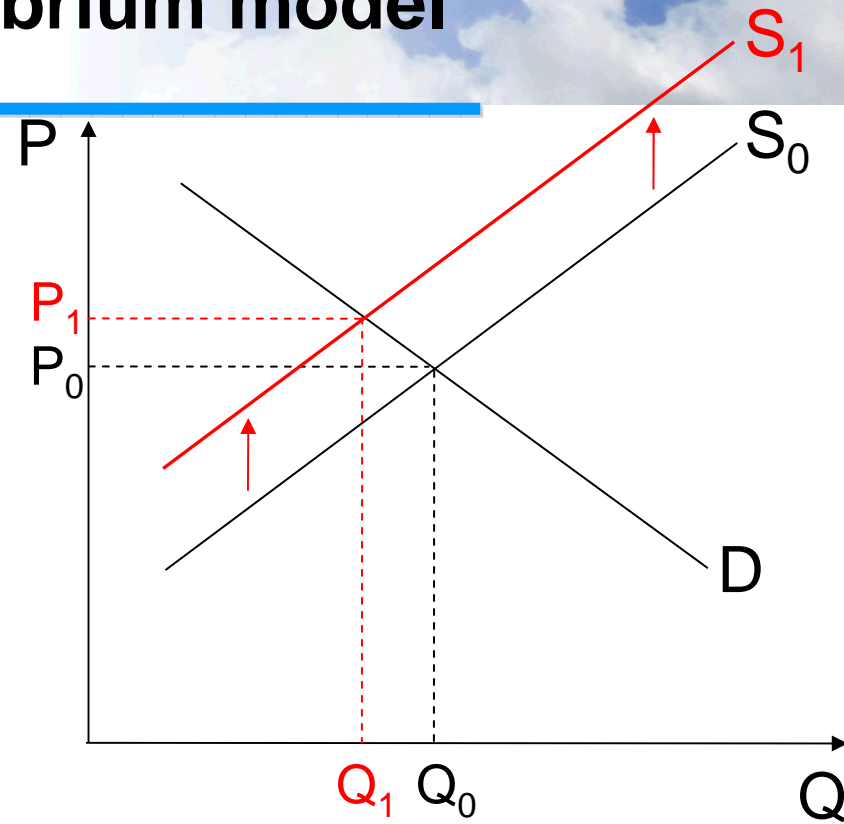
Economic general equilibrium model



- Environmental policy
- => new equilibrium

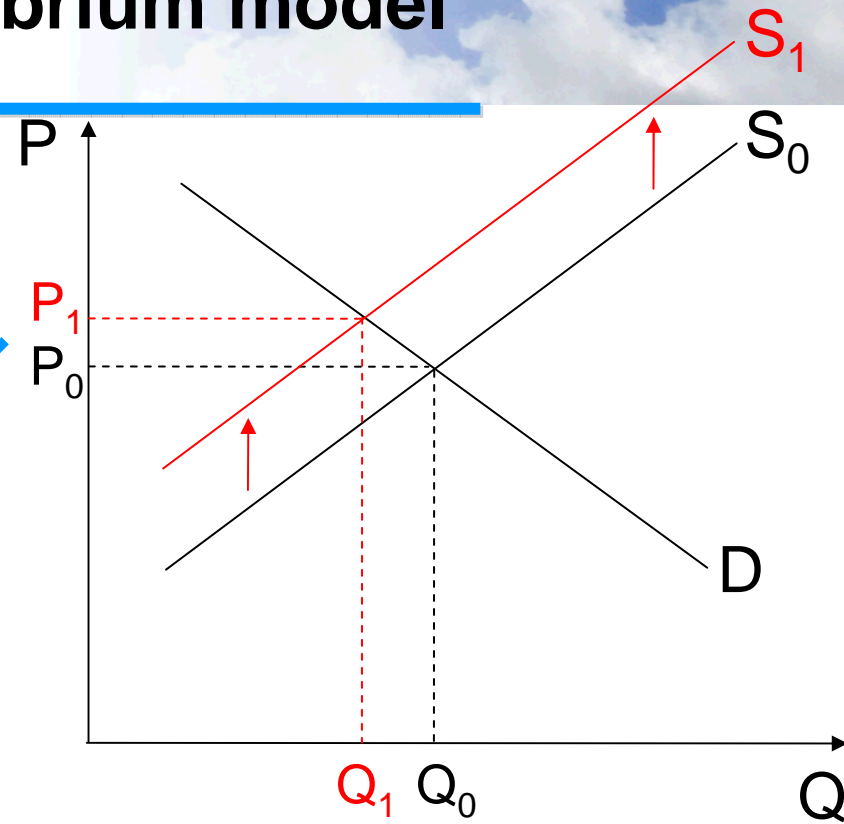
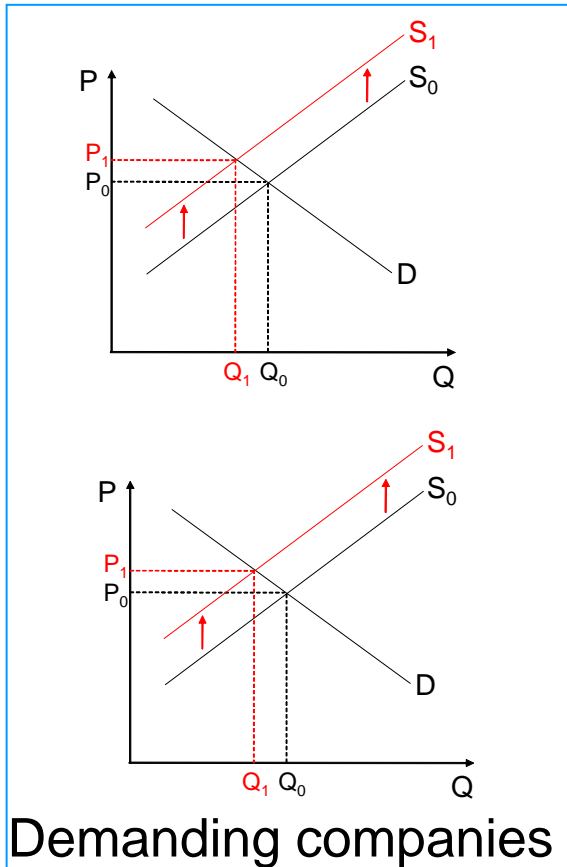
Economic general equilibrium model

- Markets are linked



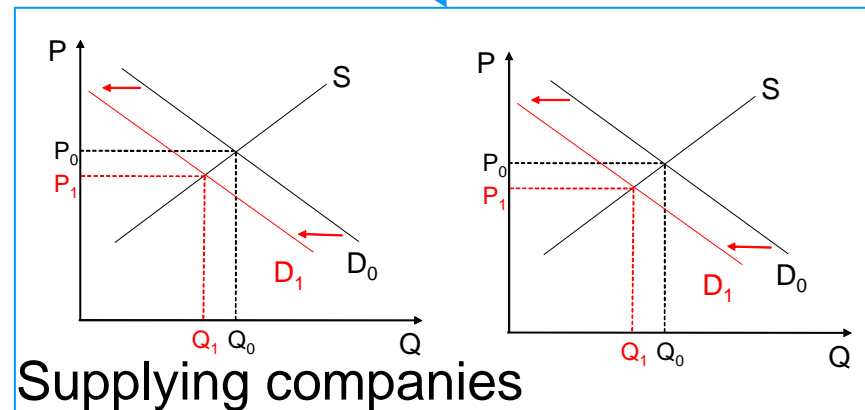
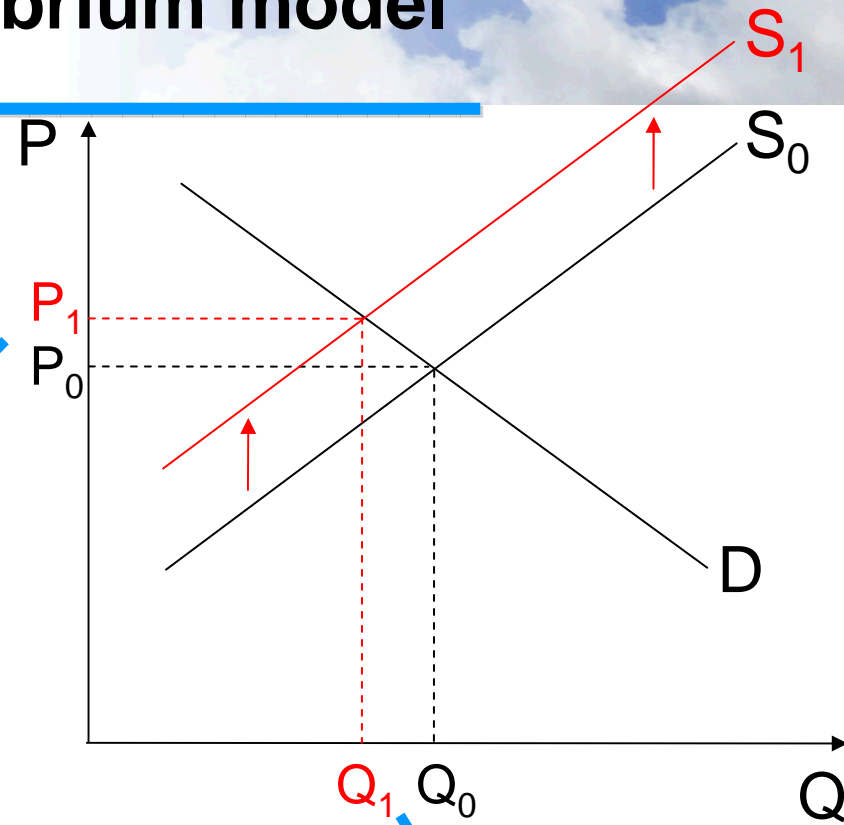
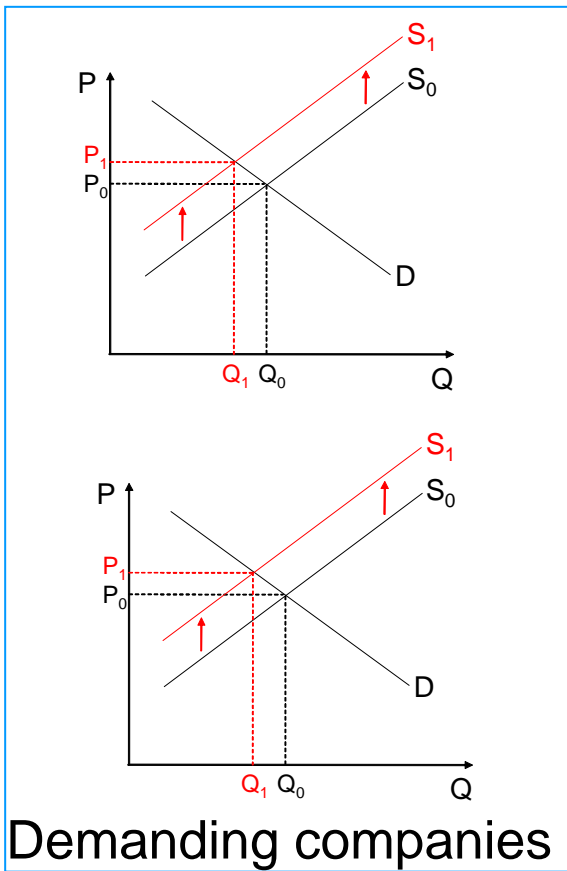
Economic general equilibrium model

- Markets are linked



Economic general equilibrium model

- Markets are linked



Economic general equilibrium model

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policy shock \Rightarrow

- changing prices
 - demand shift
 - reshuffling of production structure
 - relocation economic activities
 - new equilibrium in all markets
-
- economic feedbacks incorporated

Model used: Worldscan

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- Computable General Equilibrium Model for world
- 23 regions, 18 sectors
 - *9 EU27, 9 other Annex I, Brazil, India, China*
- electricity sector explicitly includes renewable energy technologies
- emissions: CO₂, CH₄, N₂O, SO₂, NO_x (energy & other)
- mitigation:
 - *change production structure and levels*
 - *end-of-pipe (CH₄, N₂O, SO₂, NO_x)*

Data

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- Annex I, China, India: GAINS databases
 - GDP, energy, emissions
 - IEA World Energy Outlook 2009, Reference Scenario
 - includes "current policy" air pollution control measures
- other regions: post-crisis scenario IMAGE/TIMER
- For EU:
 - end-of-pipe abatement cost curves from GAINS

Policy simulations

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- **Air** (SO₂ and NO_x):
 - NEC2010 in baseline
 - cost-effective - emission targets 2020 cf. objectives Thematic Strategy on Air Pollution
 - cost-benefit – more stringent targets, derived from results CBA for CAFE (Holland e.a., 2005)
- **Climate**: post-Copenhagen pledges
 - ‘low’ (EU -20%)
 - *emission trading only within EU, CDM allowed*
 - ‘high’ (EU -30%)
 - *emission trading Annex-I*

Macro results 2020, EU27

(NB preliminary)

Policy variants		ETS-price (€/ton CO ₂)	Average non-ETS price (€/ton CO ₂)	national income (% to BAU)
Climate policy	Air pollution			
Low	NEC2010	8.5	10.7	-0.1
Low	C-eff.	7.7	10.7	-0.2
Low	CBA	0.0	4.5	-0.4
High	NEC2010	12.1	n.a.	-0.2
High	C-eff.	11.8	n.a.	-0.2

Emissions 2020, EU27

Policy variants		GHG emissions (% to BAU)	SO ₂ emissions (% to BAU)	NO _x emissions (% to BAU)
Climate policy	Air pollution			
Low	NEC2010	-5.3	-3.3	-3.3
Low	C-eff.	-6.2	-15.6	-5.3
Low	CBA	-11.3	-38.9	-18.0
High	NEC2010	-7.5	-6.9	-4.5
High	C-eff.	-8.3	-16.0	-6.1

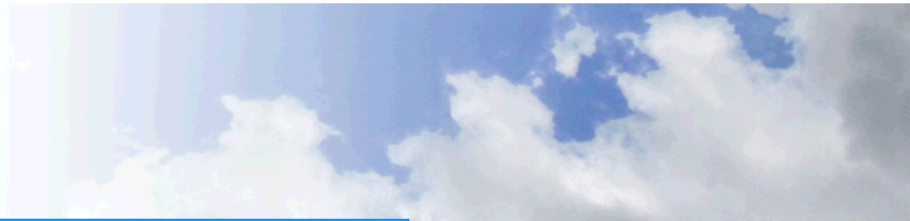
Co-benefits of air policy



- Air pollution policies
 - end-of-pipe abatement => no impact on GHGs
- but also
 - changes production structure
 - *fuel switch*
 - *energy saving*
 - *changes in production/consumption level*
 - => change in GHGs



structural changes



Policy variants		Agriculture	Energy intensive sectors	Petroleum, coal products	Transport
Climate policy	Air pollution				
Low	NEC2010	-0.9	-0.5	-2.5	-0.6
Low	C-eff.	-1.0	-0.7	-2.8	-0.7
Low	CBA	-1.9	-2.9	-7.7	-2.9
High	NEC2010	-1.2	-0.7	-2.2	-0.6
High	C-eff.	-1.2	-0.9	-2.4	-0.7

Air quality emission trading?

- Given
 - importance economic feedbacks
 - strong interactions between air and climate policies
 - many uncertainties (economic development, abatement cost, etc.)
- Key issue: how to set proper air quality targets and reach flexibility to improve local air quality EU
- Flexibility between
 - countries
 - gases

Conclusions

- more stringent targets for air pollutants make it more easy to achieve climate targets
 - reductions in air pollutants that are in line with CBA bring CO₂-price down
- end-of-pipe *and* production structure relevant in achieving further reductions of air pollutants
- strong interactions air \Leftrightarrow climate policies

Conclusions

- focus on air pollutants, climate will follow?
 - air policy: ‘self-interest’, short-term, ‘direct’ benefits, local/continental
 - in contrast with climate change (long-term, global)
- flexible instruments for air pollutants policies might help to take advantage of interactions with climate policies

But....



- further analyse results
- further investigate flexible mechanisms for air pollution policies
 - introduce exchange rates based on impact factors
- add other air pollutants (PM, NH₃, VOC)

