Macroeconomic of reaching the climate targets: The role of revenue recycling

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The economics of climate change

Session 2: Modelling mitigation

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EU Climate Targets

Limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change

- **2030/2050 Climate Target Plans for the EU**

  2030: cut greenhouse gas emissions by at least 55%

  2050: become climate neutral

- **International dimensions**

  EU only accounts for < 8% of GHG emissions

  Encourage international partners to increase their ambition

This presentation

- Where do we stand? – EU emissions and targets

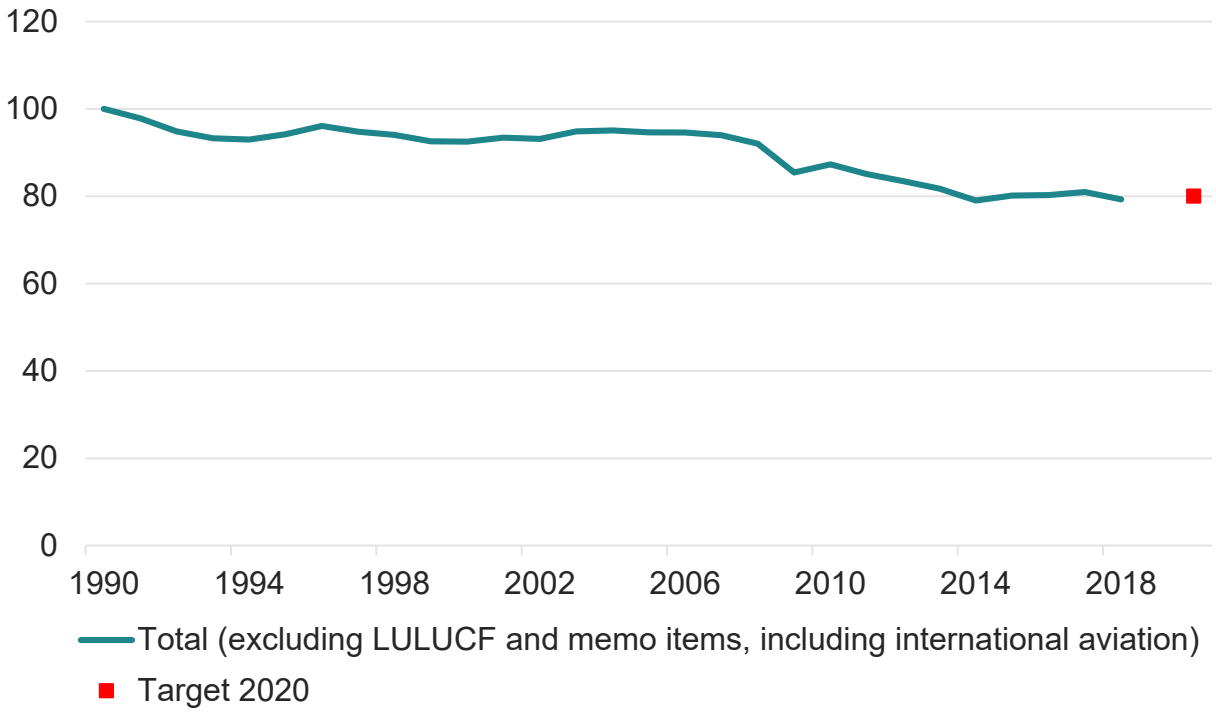
- Macroeconomic effect of climate mitigation:
  Focus on carbon pricing and recycling

➢ Recycling carbon tax revenues can mitigate the costs towards net zero emissions

Greenhouse gas emissions – EU perspective

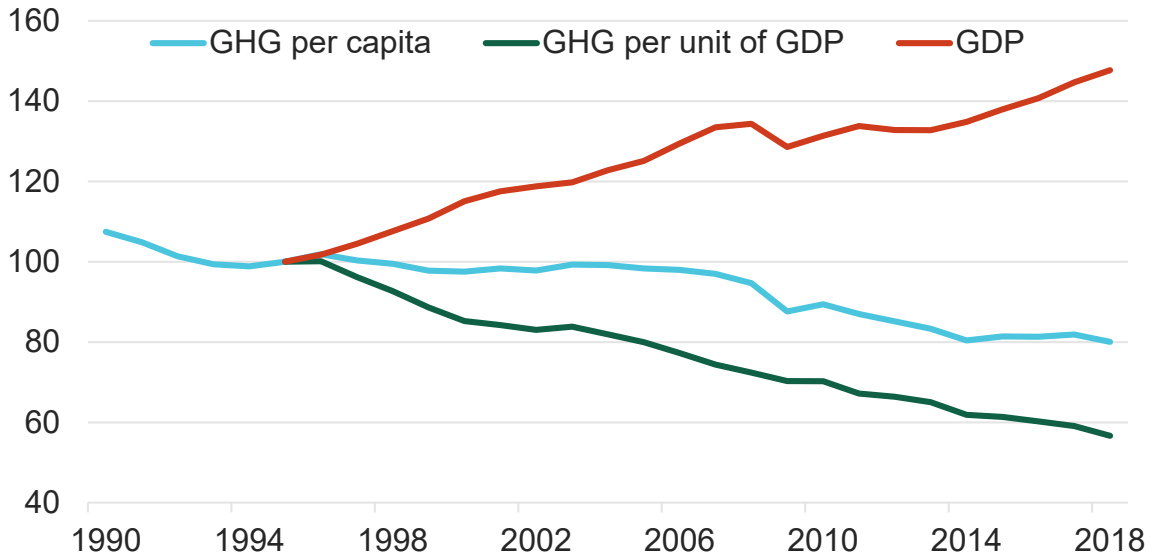
Decoupling between economic activity and GHG emissions

GHG emissions, EU-27, 1990-2018
(index 1990=100)



Source: EUROSTAT, EEA

Development of GHG emissions compared to GDP and population, EU-27, 1990-2018
(index 1995=100)



Source: EUROSTAT, EEA

Targets:

- GHG emissions beyond the Kyoto Protocol.
- 2020 target: - 20 % will also be met
- 2030 target: - 55% from -40%.
- 2050 target: climate neutral.

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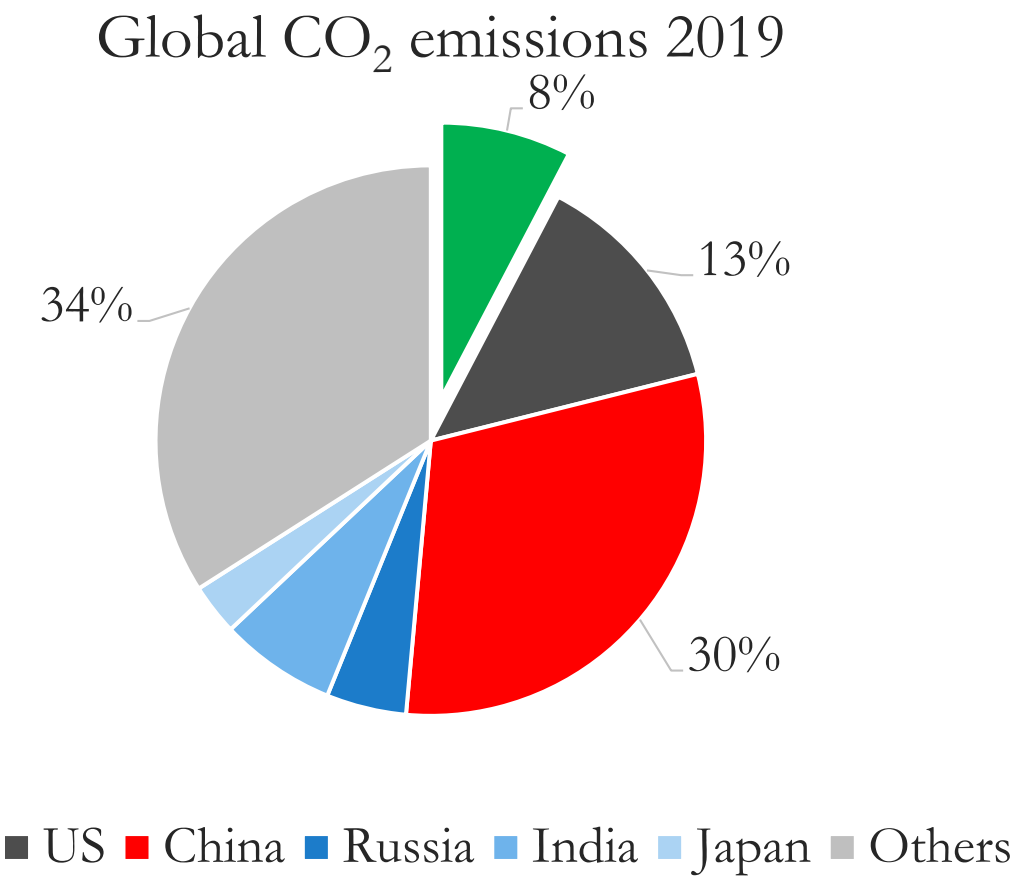
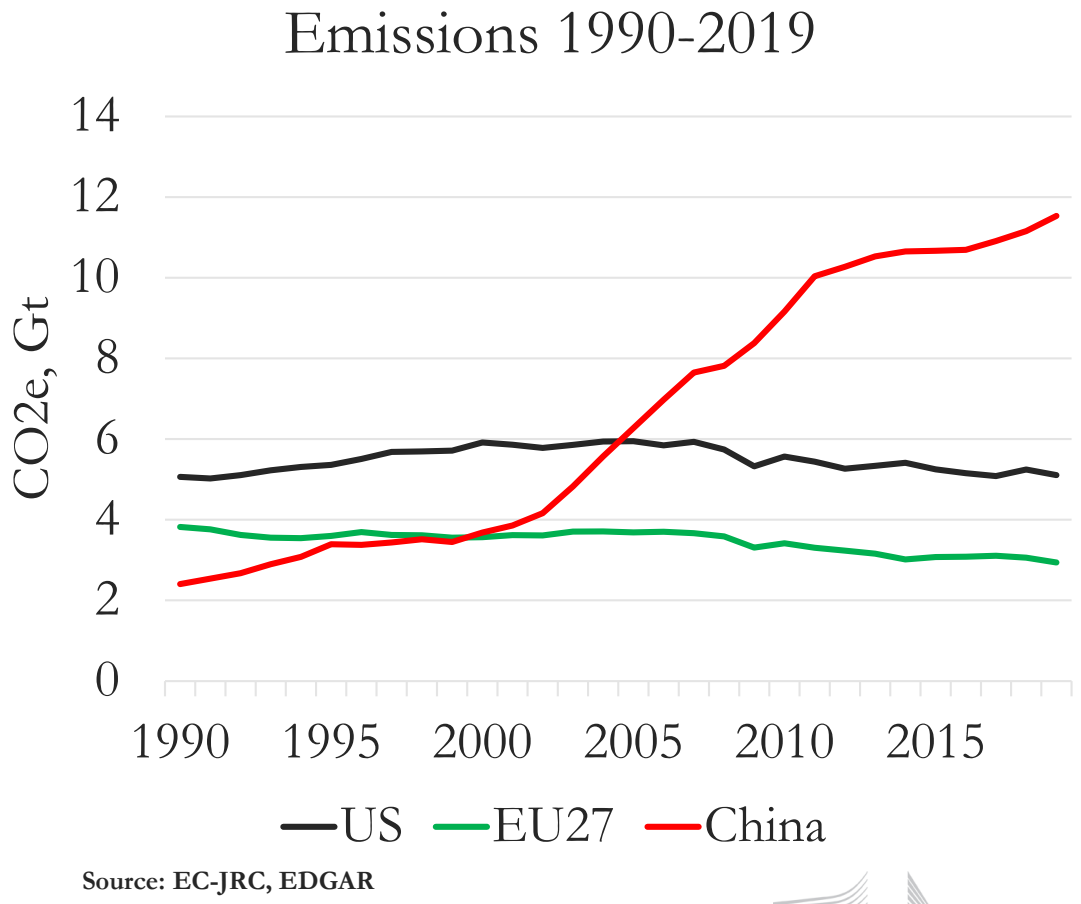
Greenhouse gas emissions – world-wide perspective

EU only accounts for ca. 8% of GHG emissions



Source: EC-JRC, EDGAR



Source: EC-JRC, EDGAR

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E-QUEST – sectoral dynamic general equilibrium model

Roeger, Varga, in 't Veld, 2021 (forthcoming)

Main features

- **Combine large scale CGE features with D(S)GE:**
  input-output structure in a fully forward-looking model
- **7 sectors:**

- Energy sources: Electricity and Fossil fuel producers
- Capital producers: Electricity-intensive/Fuel-intensive capital manufacturing,
  Other capital manufacturing (e.g. construction)
- Other sectors: Emission-intensive sectors (e.g. transport),
  Rest of sectors (e.g. legal services)

- **2 regions: EU and rest of the world**

Macroeconomic assessment with the E-QUEST model

Main features

- **Households**: liquidity constrained and not-liquidity constrained, three skills
- **Firms**: monopolistic competition
  capital, labour, energy and intermediate good inputs
- **Fiscal and monetary policy rules**
- **Market frictions**
- **Technological progress:** learning-by-doing
  autonomous energy efficiency improvements
- **Emission abatement:** factor/fuel substitution, abatement equipment

Double targets – double dividends?

Is it possible to achieve environmental and economic gains by using environmental taxes to reduce other pre-existing taxes? (Goulder, 1994)

- **Primary cost** of reducing emissions
- **Revenue effects**

  - Tax interaction effect: carbon-tax raises price level, (reducing real wages, increases costs) + *tax base erosion effect*
  + Revenue recycling effect: using revenue to reduce other taxes

- ***But no revenue recycling effect from regulation!***

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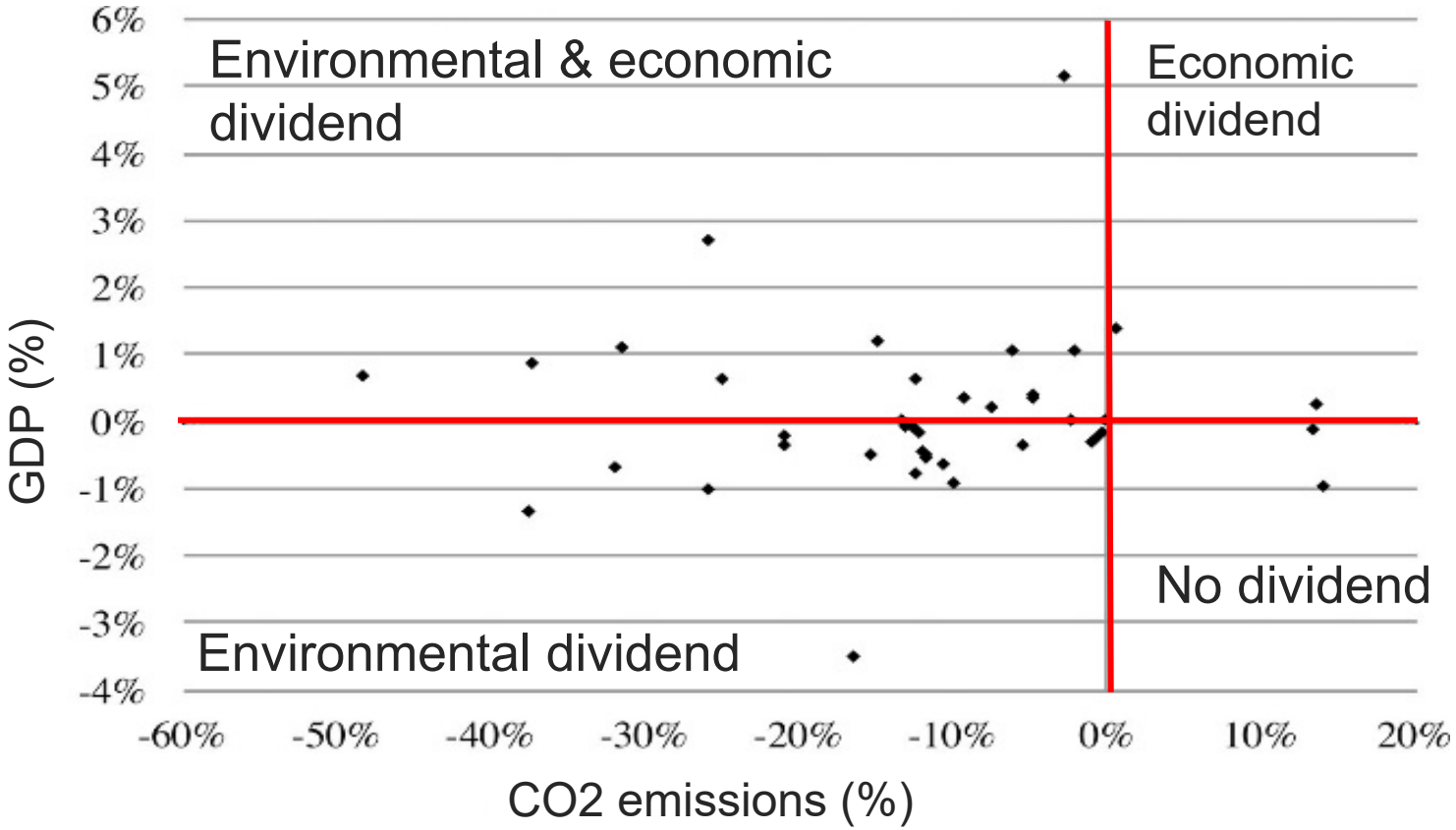
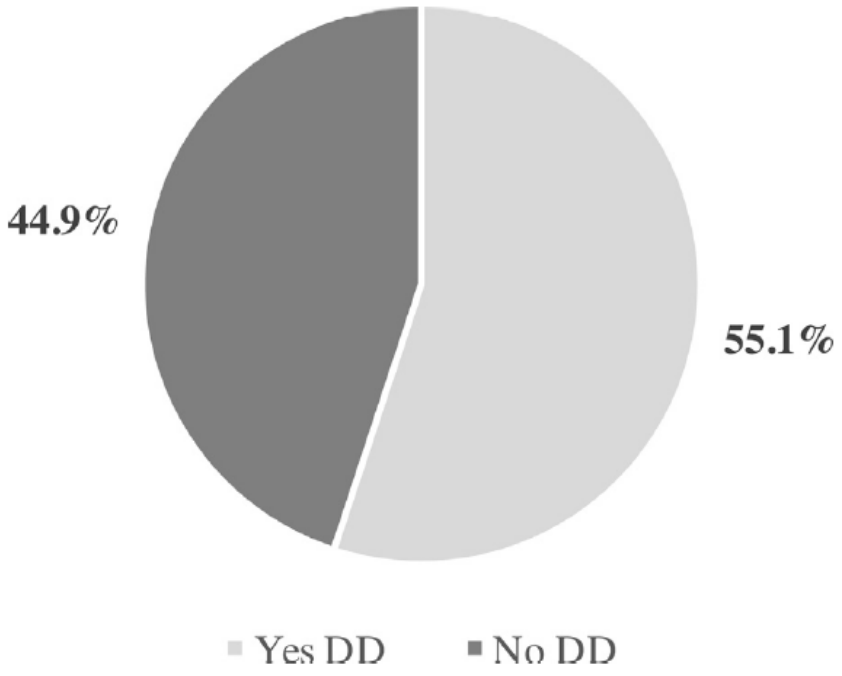
Double targets – double dividends?

Freire-González (JPM, 2018) meta-analysis, 69 simulations





- Most studies point to environmental benefits
- Economic dividend is not straightforward

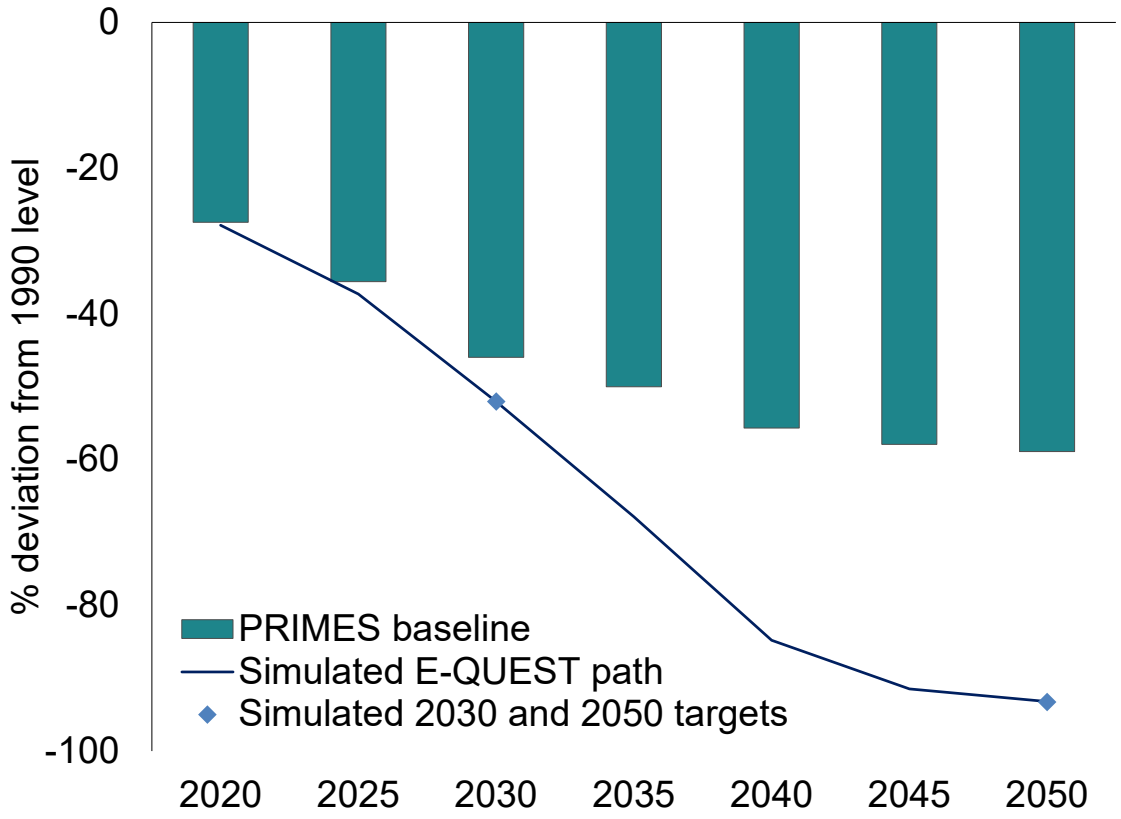
Building-up the climate target scenarios

Simulate an emission path towards the 2050 target

Instruments:

- regulation
- carbon tax with recycling
  - lump-sum transfers
  - targeted labour tax
  - consumption tax
  - capital tax
  - clean subsidy

Baseline and simulated GHG emission path, EU



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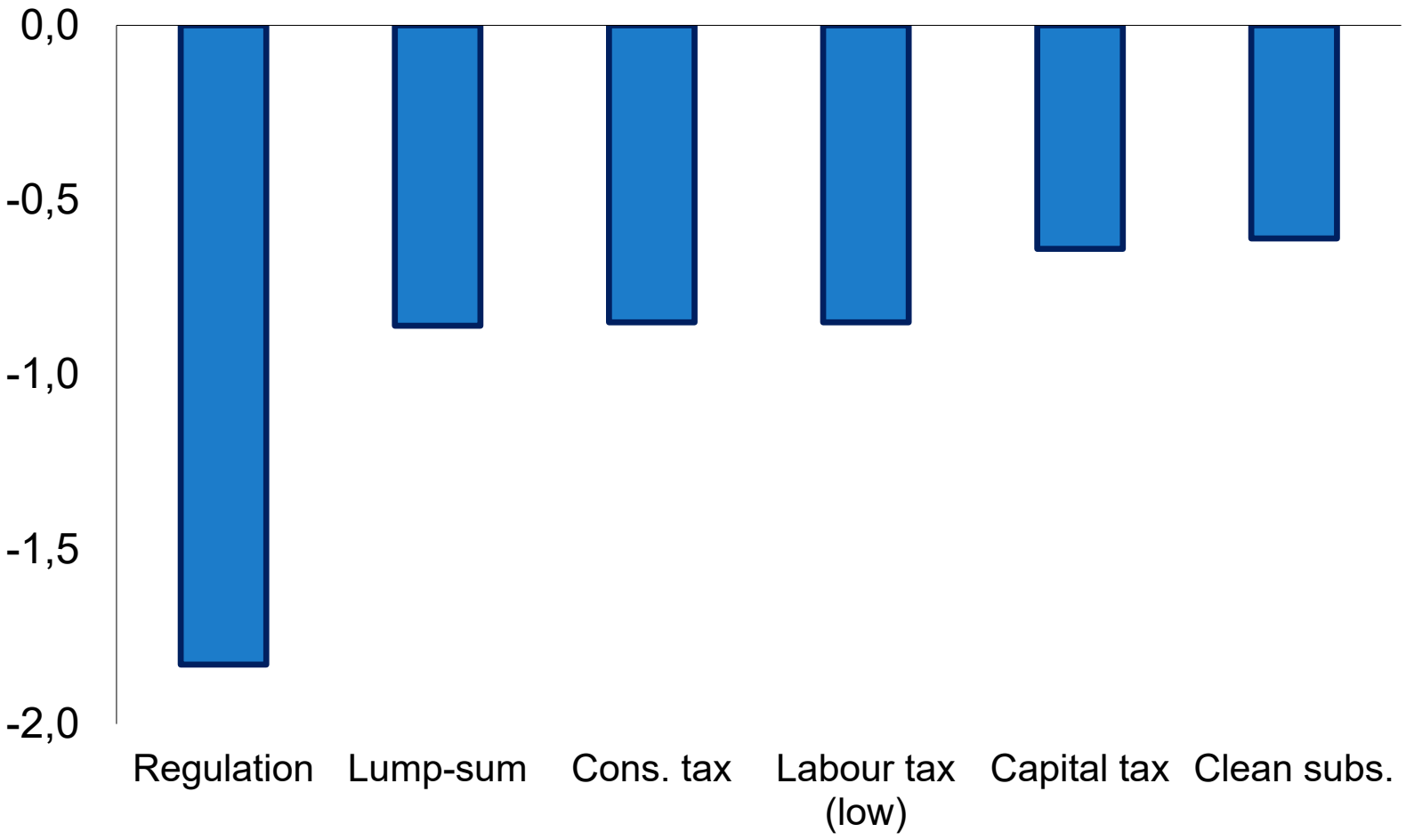
Benefits of carbon pricing & recycling

GDP effects, EU-27, 2050

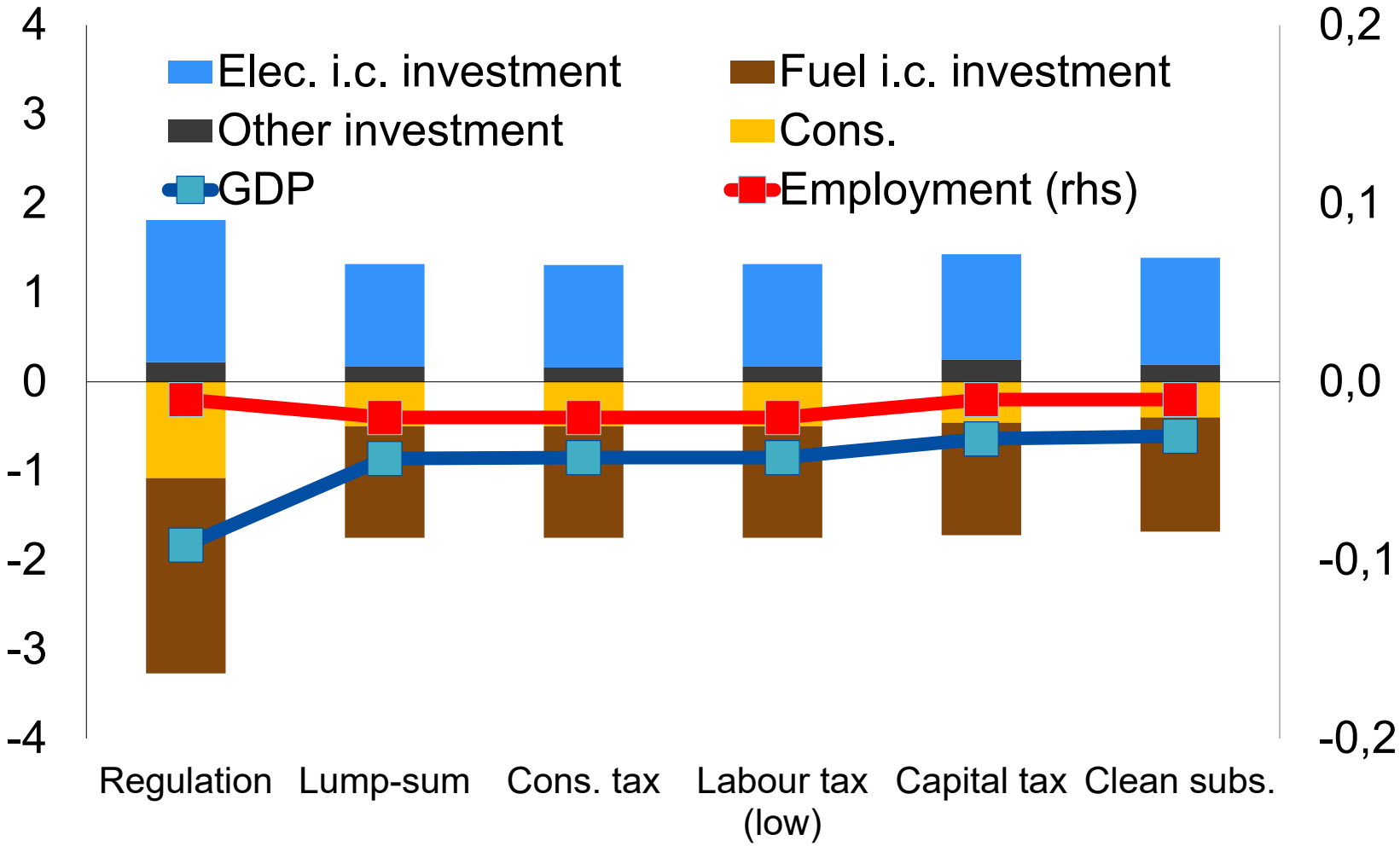


- Carbon price & recycling can mitigate the effects relative to strictly regulation based policy
- Weak double dividend relative to lump-sum transfers
- Supporting technological transformation with capital/clean subsidies have strong mitigating effects

% deviations in baseline GDP

‘Weak’ double dividend

Macroeconomic effects, EU-27, 2050

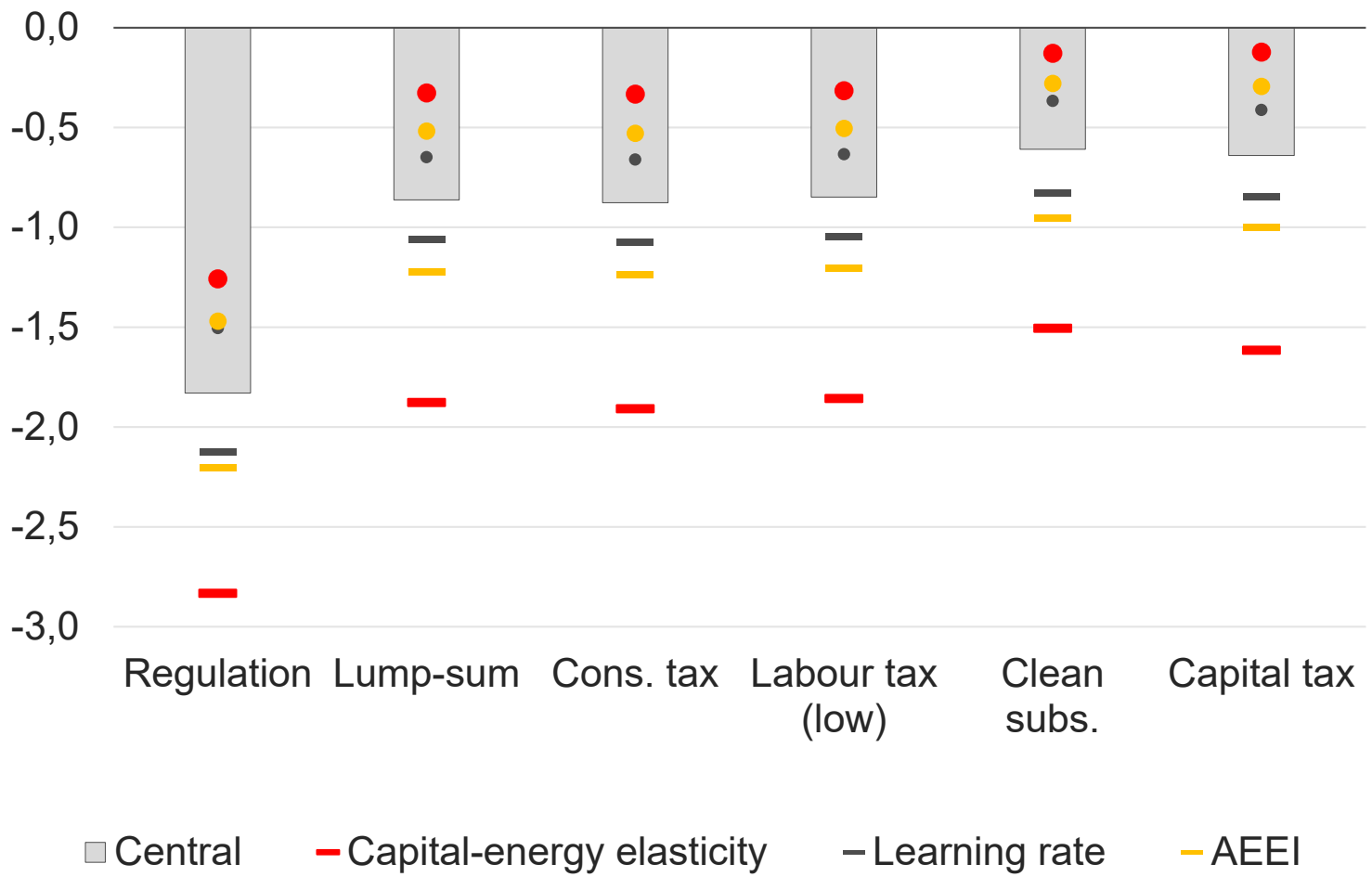


- Large sectoral shift from fuel-intensive to electricity-intensive capital
- No strong employment effects
- Recycling can mitigate consumption losses

% deviations in baseline GDP

Sensitivity scenarios

EU GDP effects 2050, sensitivity analysis



% deviations from baseline

Role of technological assumptions

- Elasticity of substitution between the clean and dirty capital-energy bundle
- Learning by doing rate
- Autonomous Energy Efficiency Improvement rate

Summary

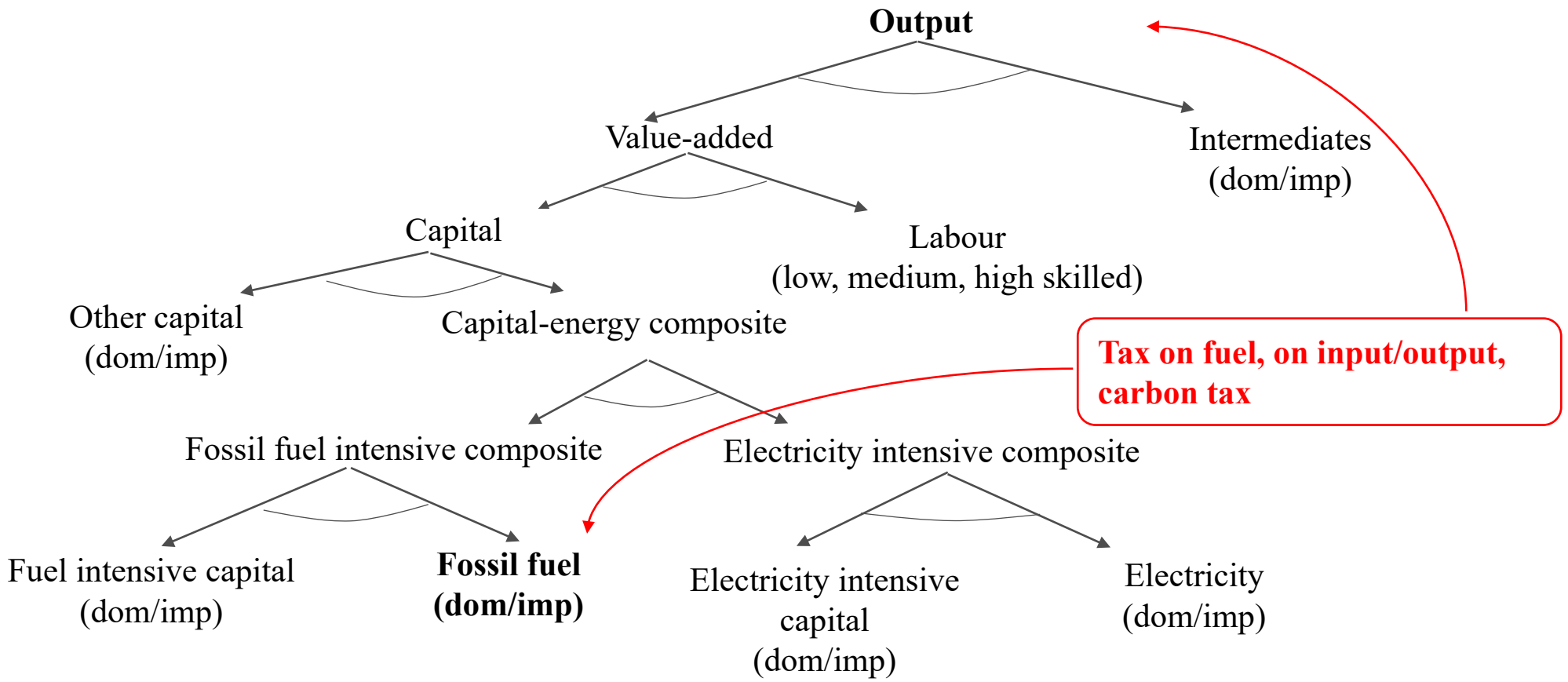
- **Recycling carbon tax revenues to reduce distortive taxes/subsidise clean energy can mitigate the cost of green transition towards net zero emissions**

- **Economic costs of climate change will increase and become substantial, likely to be higher than the cost of green transition (IPCC, 2018)**

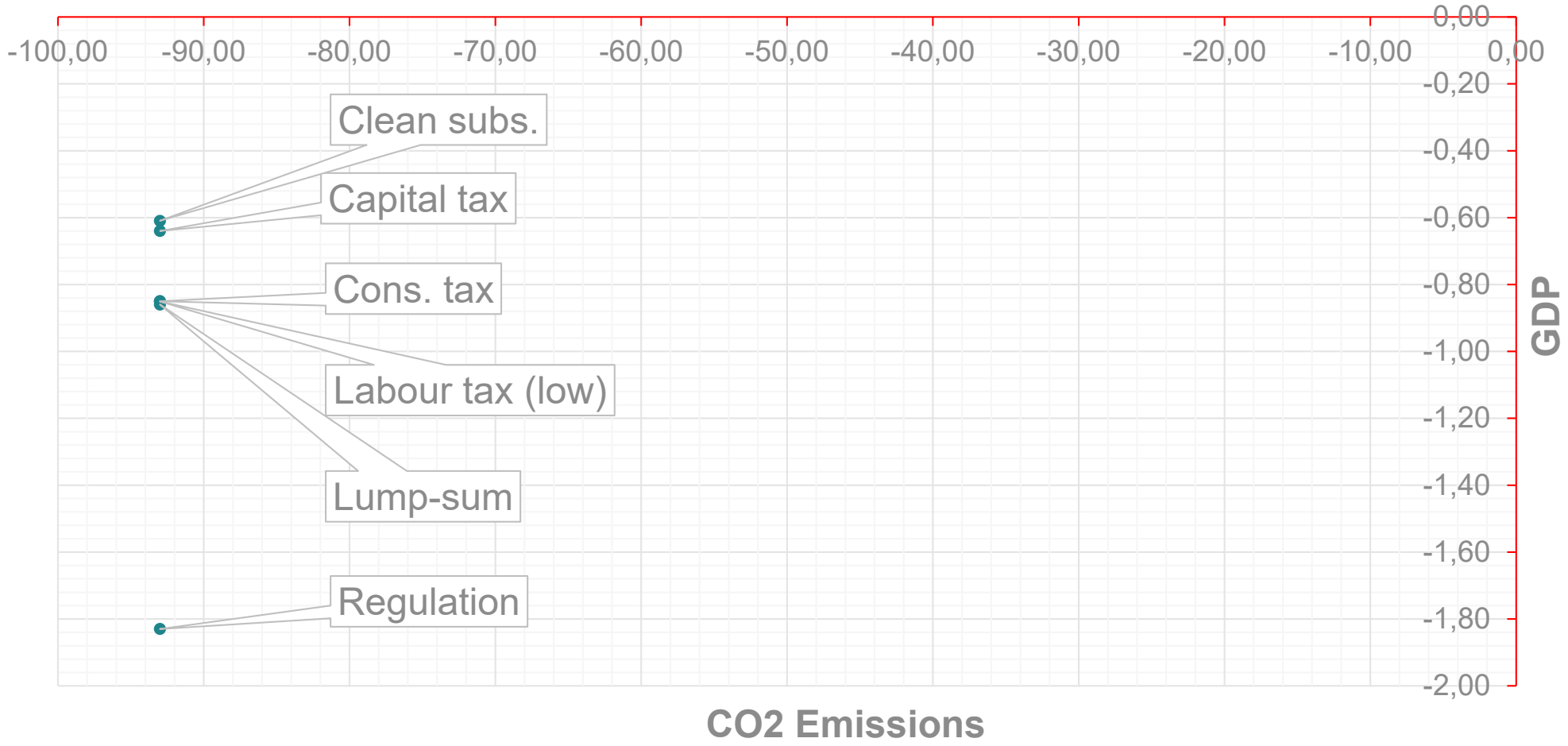
THANK YOU

Extra slides

E-QUEST – production structure



Double dividend 2050



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