



PUBLIC FINANCE RESILIENCE IN THE TRANSITION TOWARDS CARBON NEUTRALITY

Modelling policy instruments
in a global net zero emissions scenario

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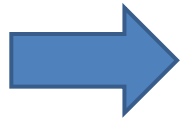
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Motivation and research question

- Most countries have pledged to some form of carbon neutrality (“NZE”)
- Questions on sustainability of public finances



How climate change mitigation policies impact public finances?



Existing literature

- Most NZE papers use an IAM framework
 - AR6 Chapter III (Riahi et al., 2022) ; NGFS (Bertram et al., 2021), etc.
- Fiscal implications mostly analyzed using spreadsheet models
 - IMF (CPAT model)
 - UK, USA: partial equilibrium
- Scarce examples of NZE scenarios in CGE
 - Drummond et al. (2021) global, Ballingal (2018) NZL, Fujimori et al. (2021) JPN
 - No GE analysis on fiscal implications



Key contributions

- A **global pathway** to 2050 compatible with the limitation to +1.5°C in a CGE model framework
- Quantification of **both direct and indirect effects** on public finances
- A policy mix with a **broad range of instruments**
 - carbon pricing
 - fossil fuel support removal
 - investment-related instruments
(buildings, power generation, decarbonization of households energy)



A CGE framework using ENV-Linkages

- OECD ENV-Linkages (Chateau, Dellink and Lanzi, 2014)
- Dynamic global Computable General Equilibrium (CGE) model
- Scope :
 - Global: 26 regions, 37 sectors
 - CO₂ emissions (fuel combustion, process, fugitive)
 - 2050 horizon



Two scenarios

- ***Baseline***

- Legislated Policies

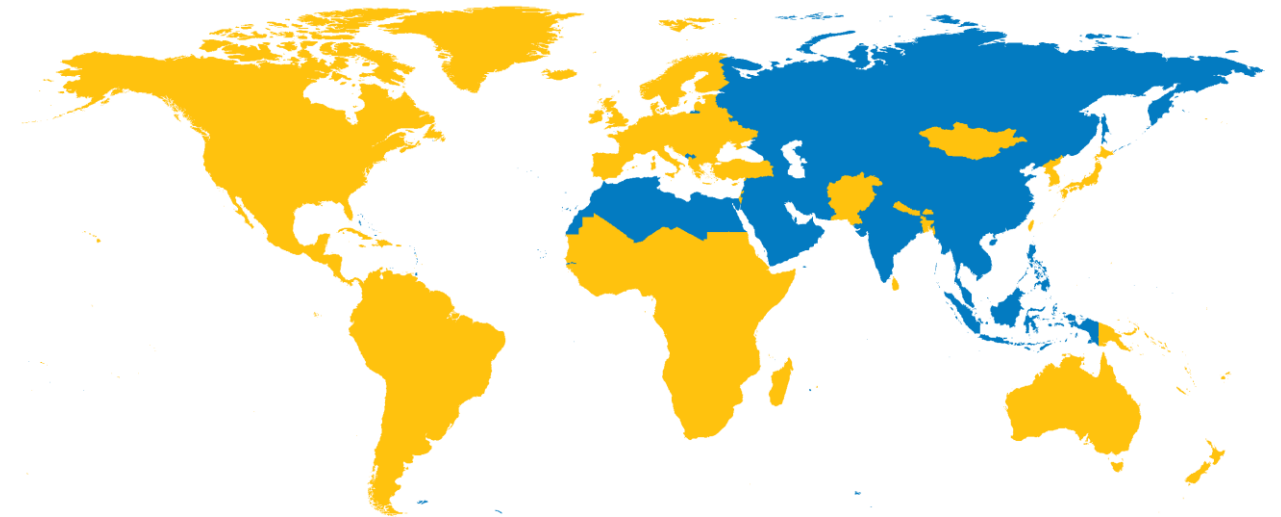
- ***NZE Ambition***

- NDCs in 2030

- Carbon neutrality

- in 2050 for regions where countries have such a pledge
 - in 2060 otherwise

Assumed year
of Net-Zero





Policy instruments in the *NZE Ambition* scenario

Carbon pricing

Emission trading systems with full auctioning, all combustion and process CO₂, all sectors except power generation

Fossil fuel support removal

Subsidies are reduced to 0 by 2030

Regulations in Power sector

Shift away from fossil fuels towards renewables and nuclear

Regulations to decarbonise buildings and transport

Electrification and energy efficiency improvements

Policies to stimulate firms' energy efficiency improvement

Small improvements, without specific costs

Subsidies to reduce and decarbonise household energy consumption

Electrification and energy efficiency improvements of households

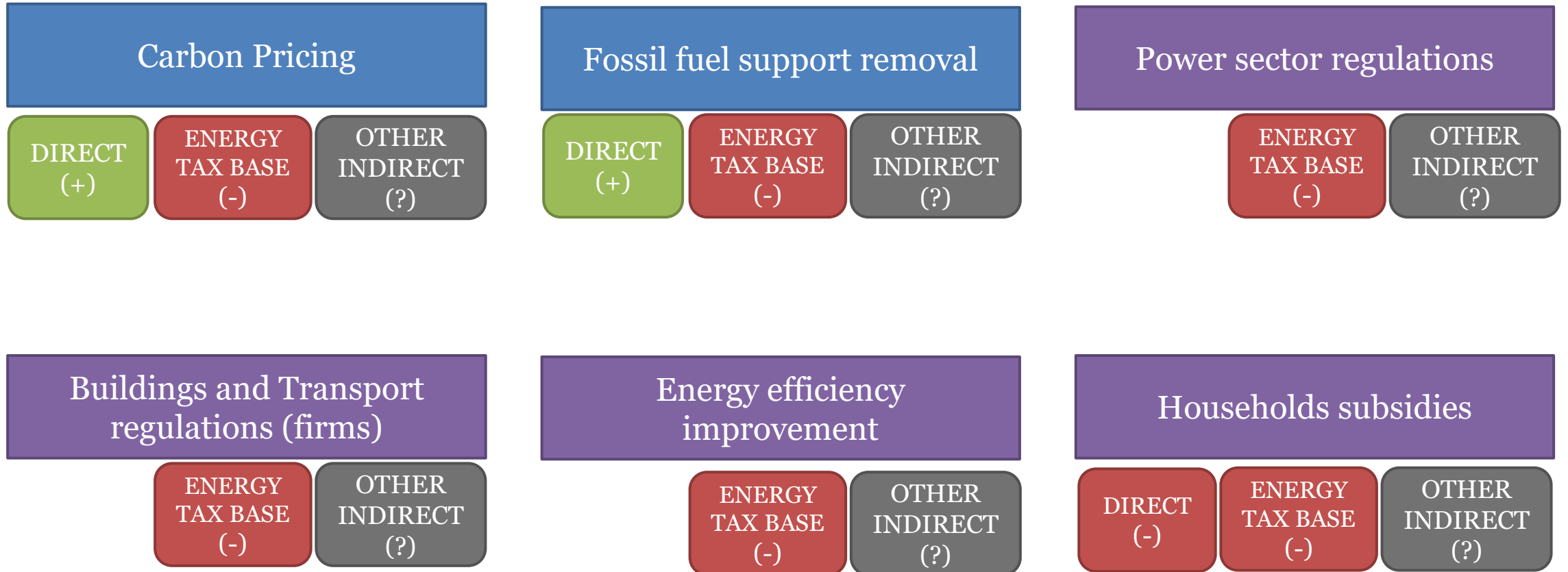


Policy instruments in the *NZE Ambition* scenario

- Price-based instruments are regular instruments in CGE models: carbon pricing and other taxes
- Regulations and incentives are more difficult to model:
 - Impact of an investment on energy demand or supply (e.g. EVs)
 - Data needed to inform the CGE
 - Soft-link with energy model (International Energy Agency, 2021)
 - Power generation mix, energy demand and investment



Six policy instruments with mixed fiscal impacts

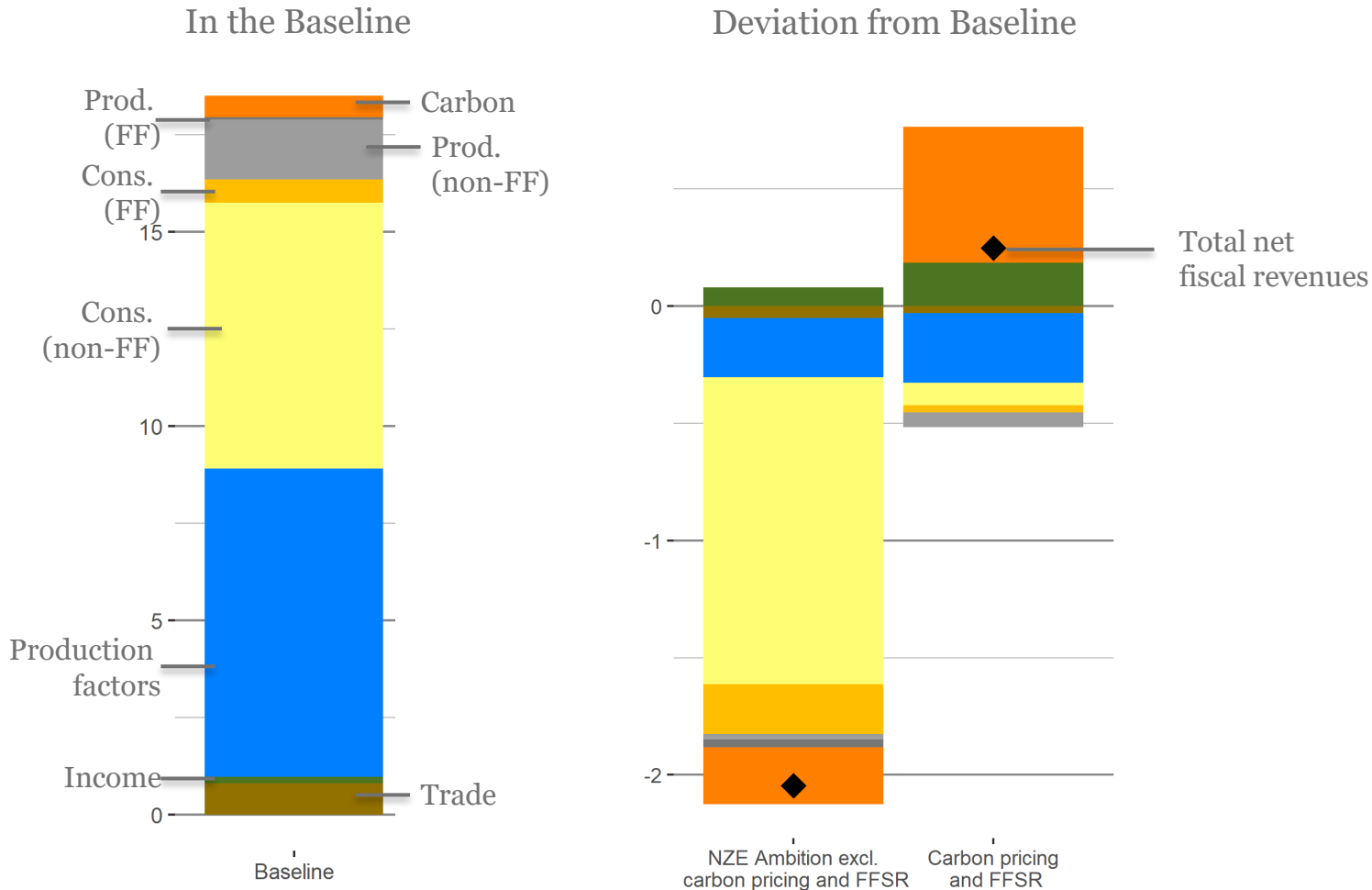


Net public revenues as an indicator of the different pressures (+ or -) on public budgets: difference between tax revenues and subsidy expenditures



Contributions of instruments to public budgets

Net public revenues by fiscal base in 2050 (% of *Baseline* GDP)

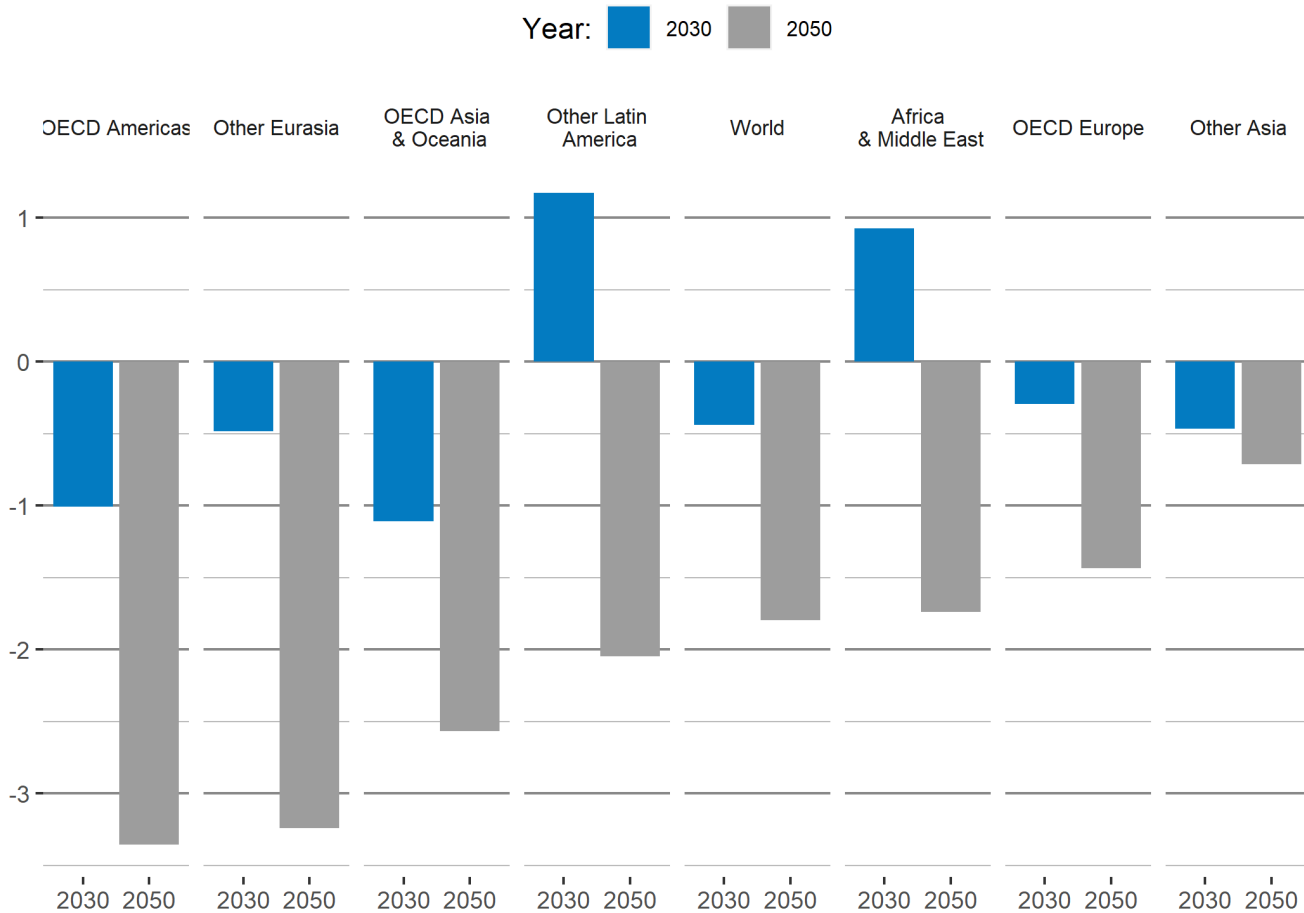


- Most revenues from labour and capital taxation and non-FF consumption
- Strong direct revenue-generating effect of carbon pricing
- Indirect effects are mostly negative



Large differences across regions and time

Changes in net public revenues in the *NZE Ambition scenario*
(% of *Baseline GDP*)



- More risk for public finances
 - Strong negative indirect effects
 - Limited revenues from carbon pricing
 - Dependency on fossil fuel production
- Less risk for public finances
 - Limited indirect effects
 - Large revenues from carbon pricing



Key take-aways

- Transition pathways to limit climate change to +1.5°C are available
- The transition is feasible with respect to its fiscal consequences
- Regional direct and indirect effects depend on
 - Economic structure
 - Ambition of climate mitigation objectives
 - Choice of policy instruments



Further work

- Further work using the modelling framework
 - Country-level studies on public finance
 - Pilot project on Spain
 - Beyond public finance
 - Labour and skills implications of the Fit for 55 EU package
 - Air pollution and climate mitigation policy interactions in Korea
 - Modelling approach relevant for OECD Inclusive Forum on Carbon Mitigation Approaches (IFCMA)



THANK YOU

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