



International Carbon Price Floors: Design and Impacts

**WTO TRADE AND ENVIRONMENTAL SUSTAINABILITY
STRUCTURED DISCUSSIONS, OCTOBER 4, 2022**

Ian Parry and Gregor Schwerhoff, IMF



Rationale/Design Issues

Coordination Regimes to Reinforce the Paris Accord

2030 Gaps to Address

Ambition: Pledged reductions only 1/3 to 2/3 of needed

Policy: Global CO₂ price >\$75/ton needed

Elements of Coordination Regimes

Small number of large emitters

Minimum carbon price

Difficulties in Paris Agreement

Negotiation: too many parties/parameters

Unilateral policy: deterred by competitiveness

Recent Proposals

Climate Club: Germany

International Price Floor: IMF

Coordination Regimes Need Pragmatic Design

Differentiated Responsibilities

Differentiate floors/transfer mechanisms.

\$75/50/25 floor price aligns global emissions < 2°C with 6 participants

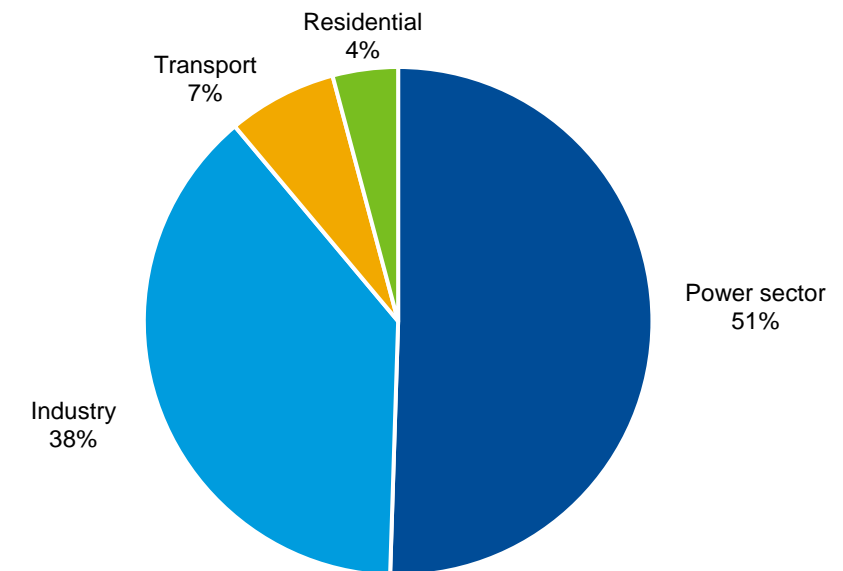
Accommodate other Approaches

CPAT maps other approaches to CO₂ reductions/carbon price equivalents

Sequencing

Start with power/industry

CO₂ Reductions by Sector Under \$75 Global Carbon Price, 2030



Source. IMF CPAT.

Price Floor vs. other International Regimes

Pure Carbon Price

Limited scope to address equity
Precludes countries without pricing

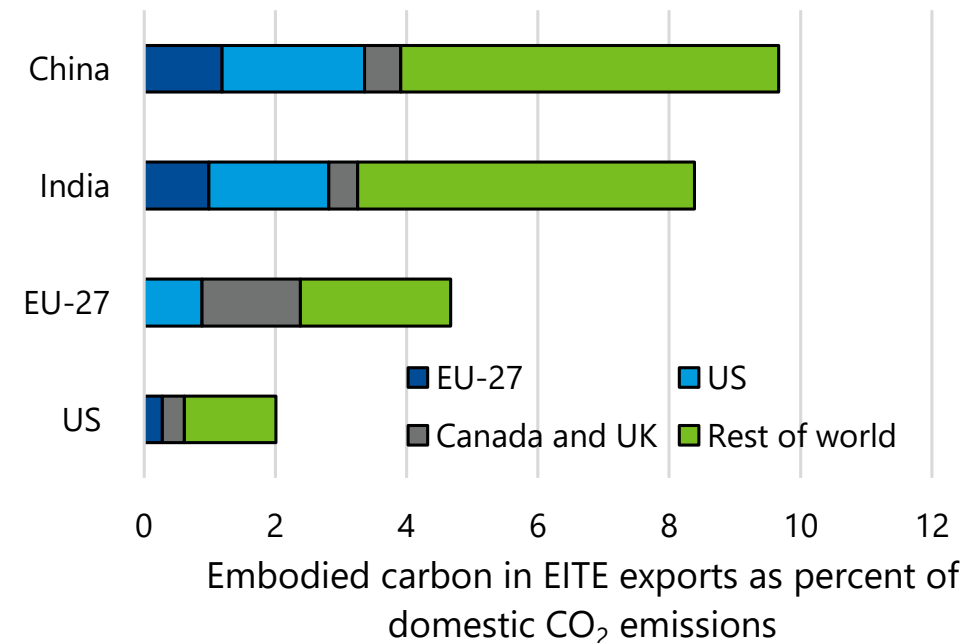
Global Carbon Market

Must accommodate countries without ETS
Address equity
Needs prices/caps aligned with temp. goals

Border Carbon Adjustments

Ineffective for global mitigation

Fraction of Domestic Carbon Emissions Embodied in EITE Exports to Trading Partners, 2015

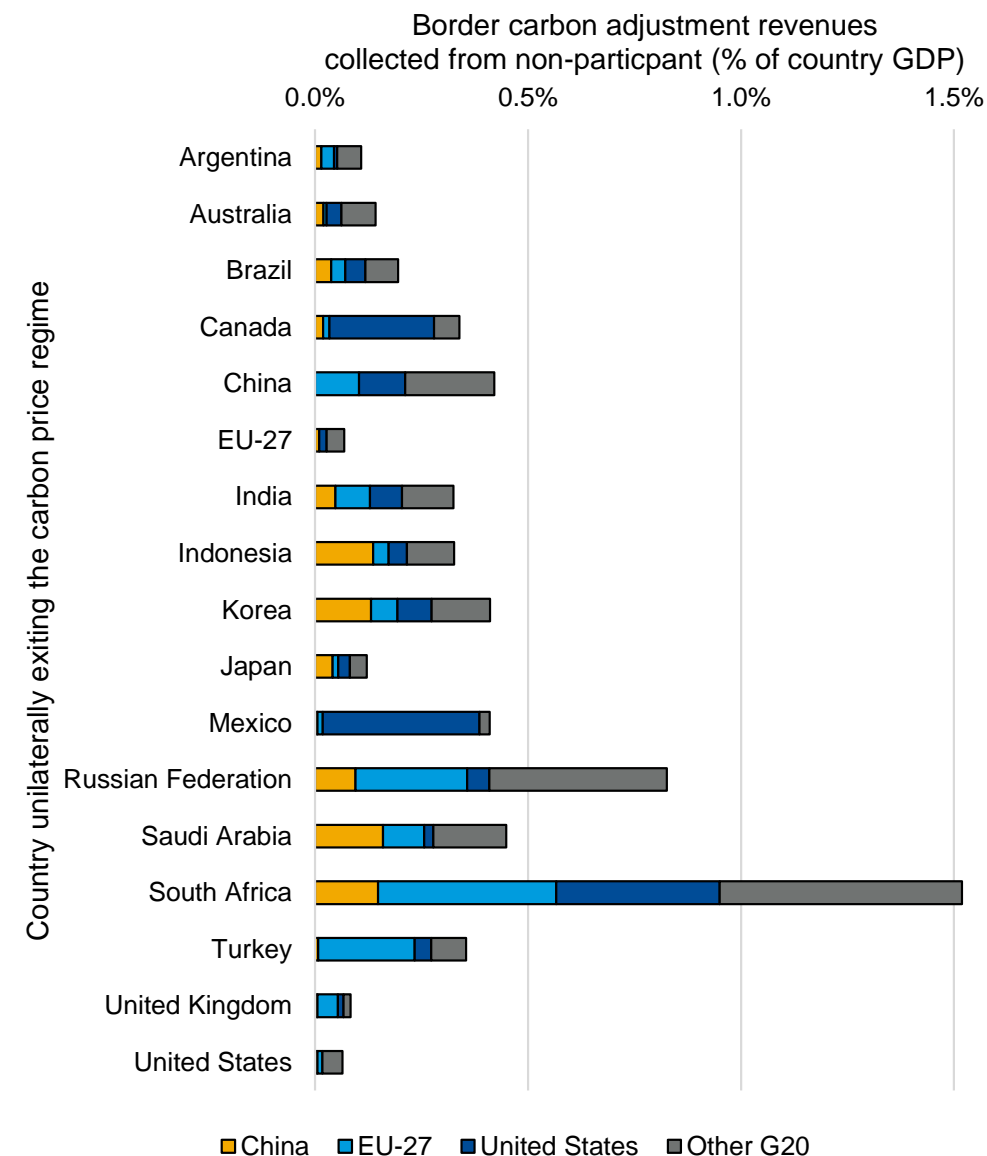


Source: OECD (2021). EITE = energy-intensive, trade-exposed.

BCA as Enforcement Mechanism for Price Floor?

BCA provides some incentive to join price floor but

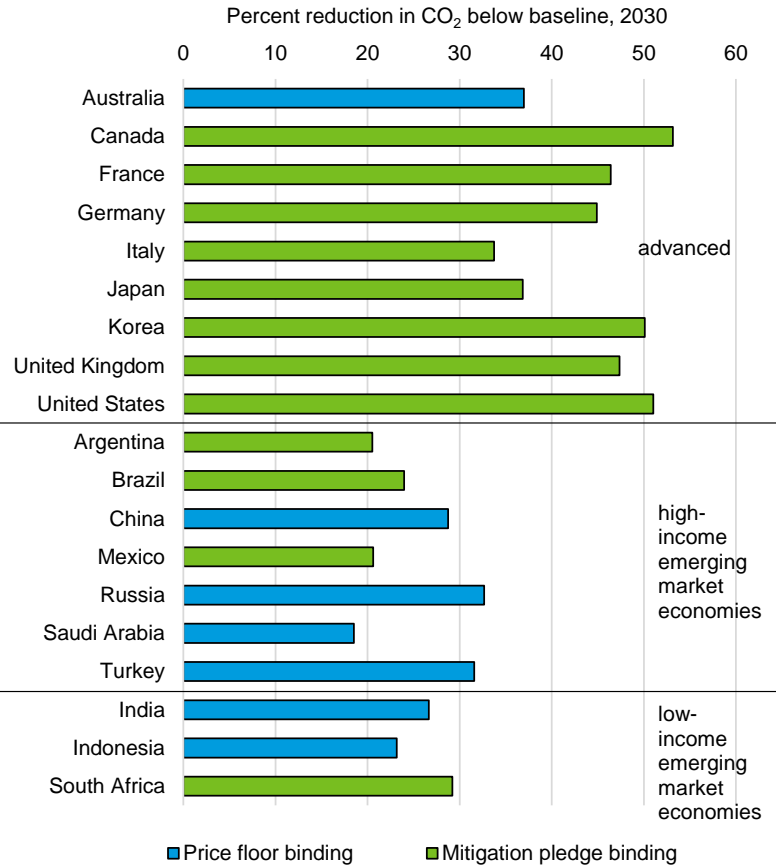
- Complicates negotiation
- All participants would need to price industry emissions
- Common BCA limits scope for differentiated pricing



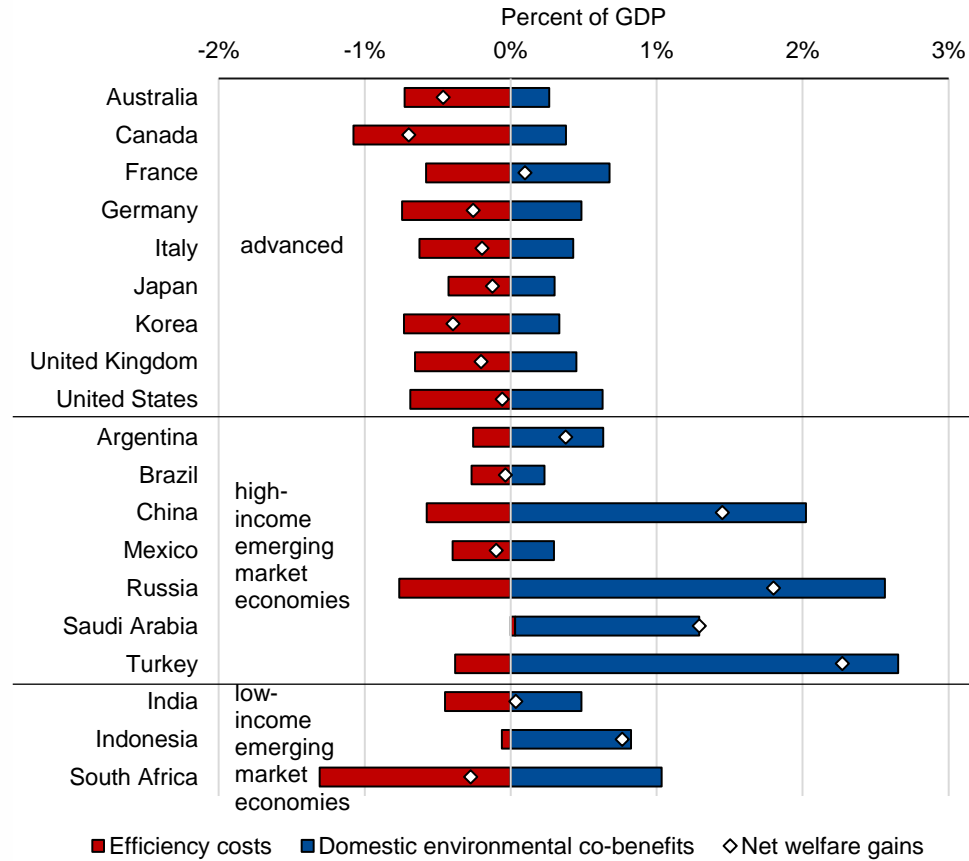
Impacts

Impacts of \$75/50/25 Price Floor

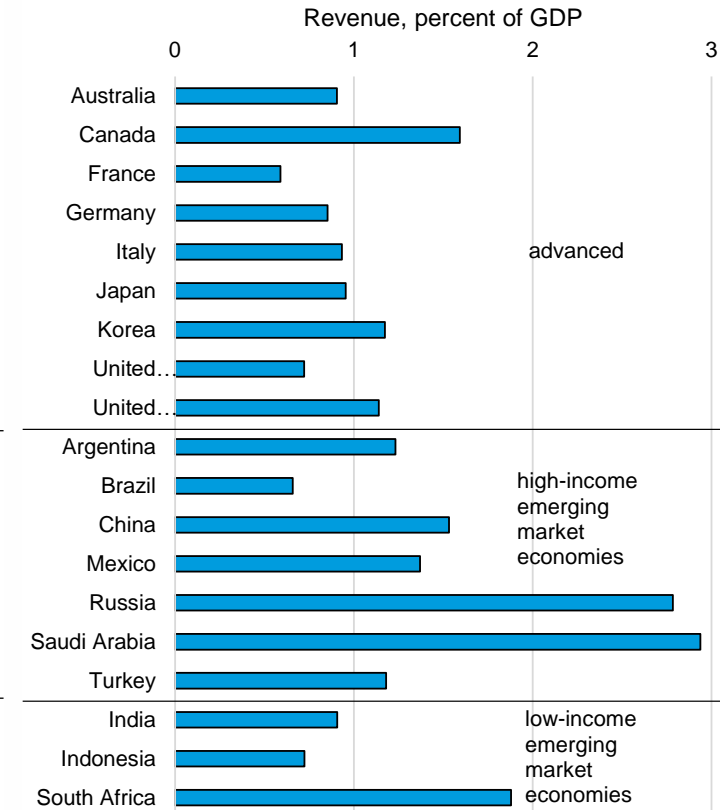
CO₂ Reductions by Country, 2030



Welfare



Fiscal

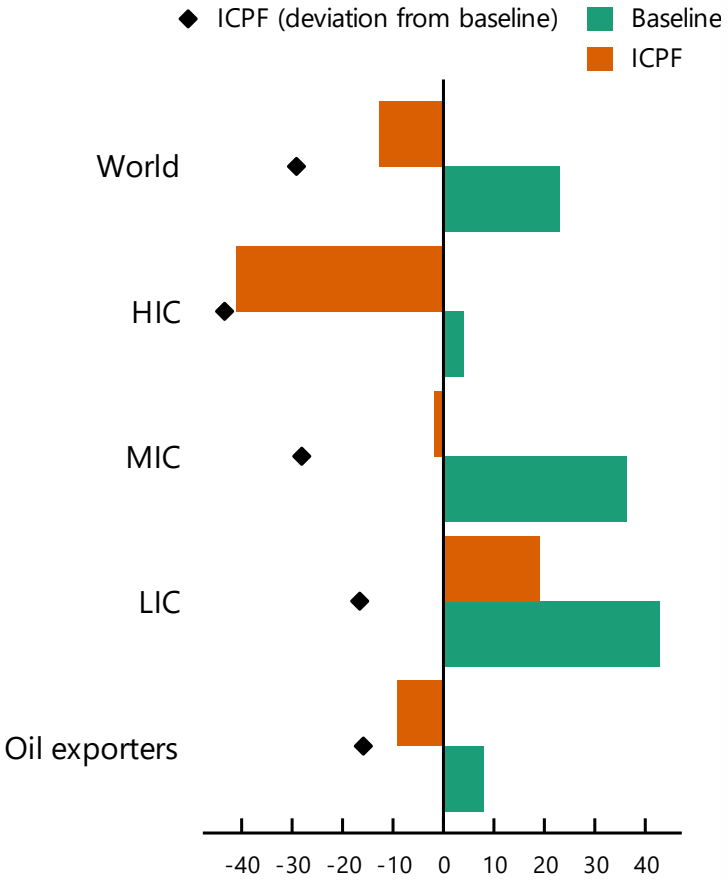


Source: IMF CPAT.

Macroeconomic effects

Emissions and macro: an ICFP increases substantially global emissions reductions without harming seriously growth

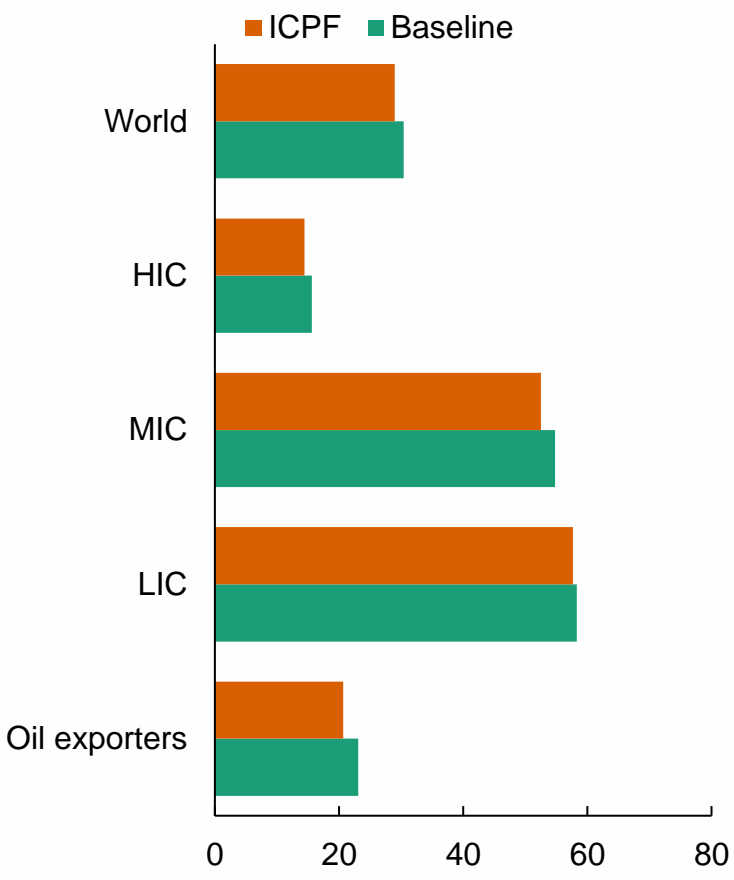
CO2 emissions in 2030
(percent deviation from 2019)



Real GDP in 2030
(percent deviation from baseline)



Real GDP in 2030
(percent deviation from 2019)



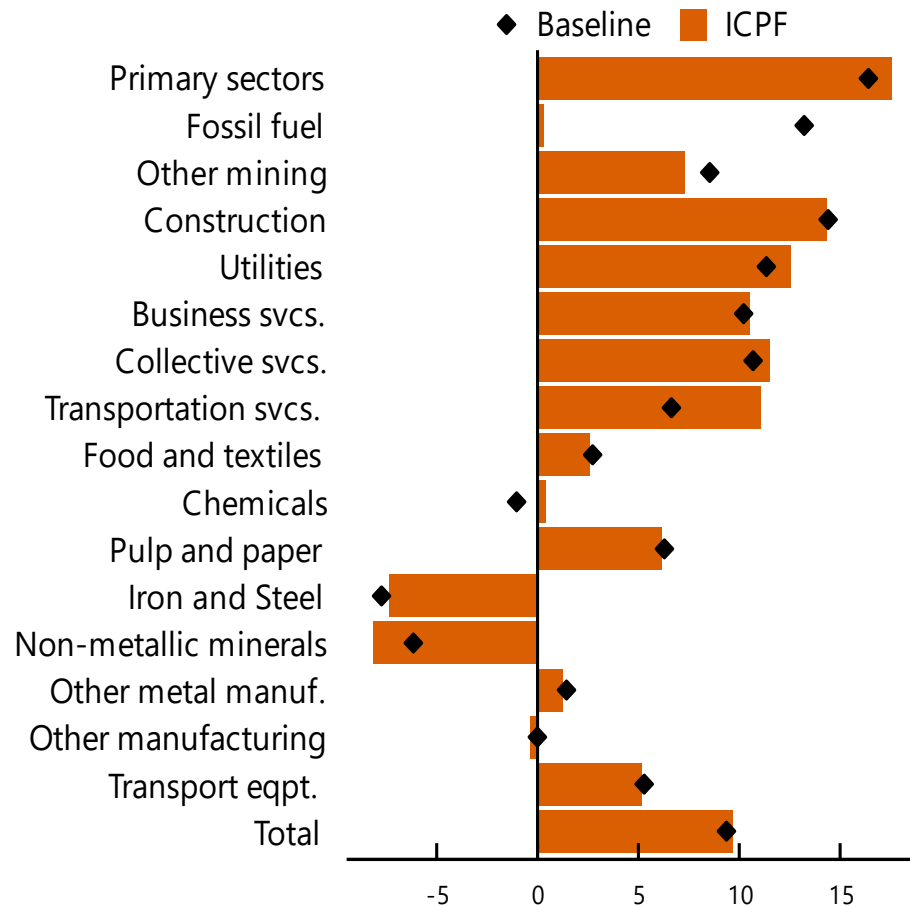
Source: IMF-ENV model
HIC=high-income countries; MIC=middle-income countries; LIC=low-income countries

Small aggregate impact hides large sectoral shifts that in turn will imply movement of labor force across sectors

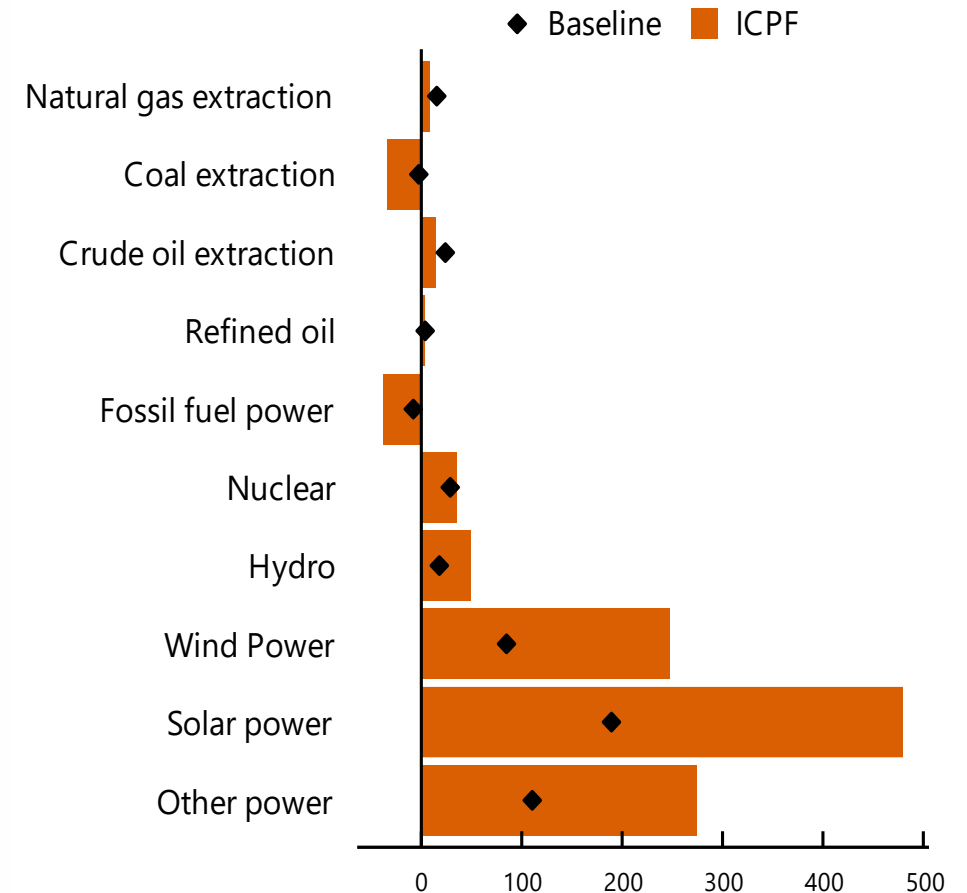
ICPF and baseline scenarios: global employment in 2030, by aggregate sector

(percent deviation from 2019)

Aggregate sectors



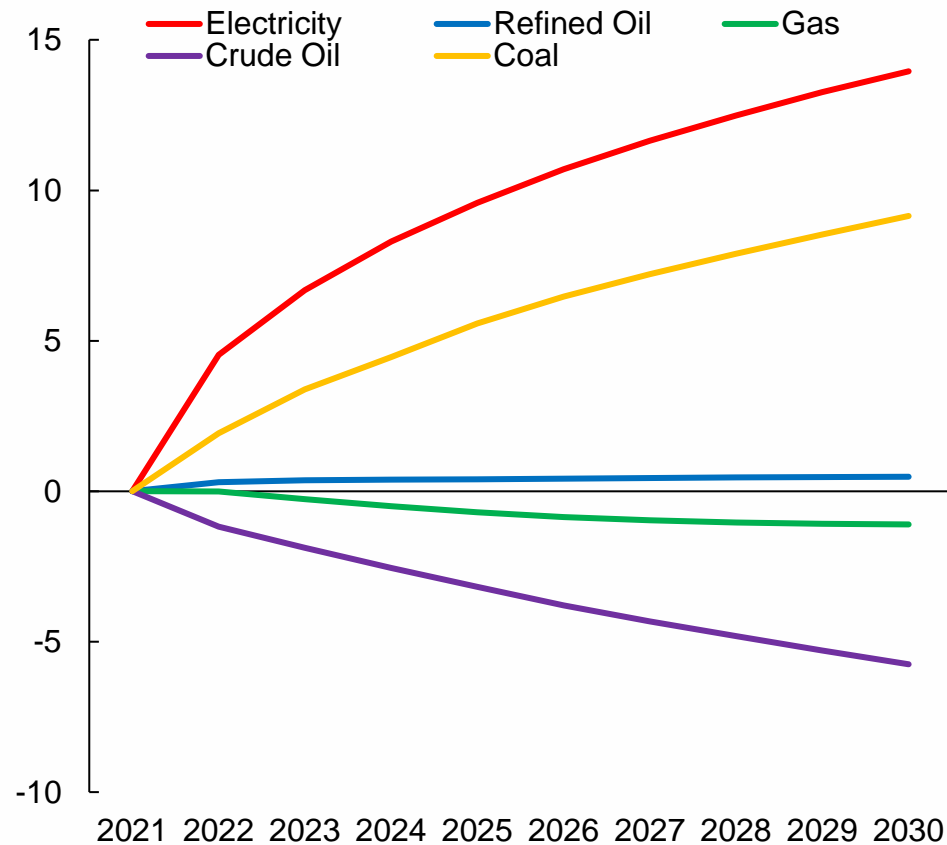
Energy sectors detailed



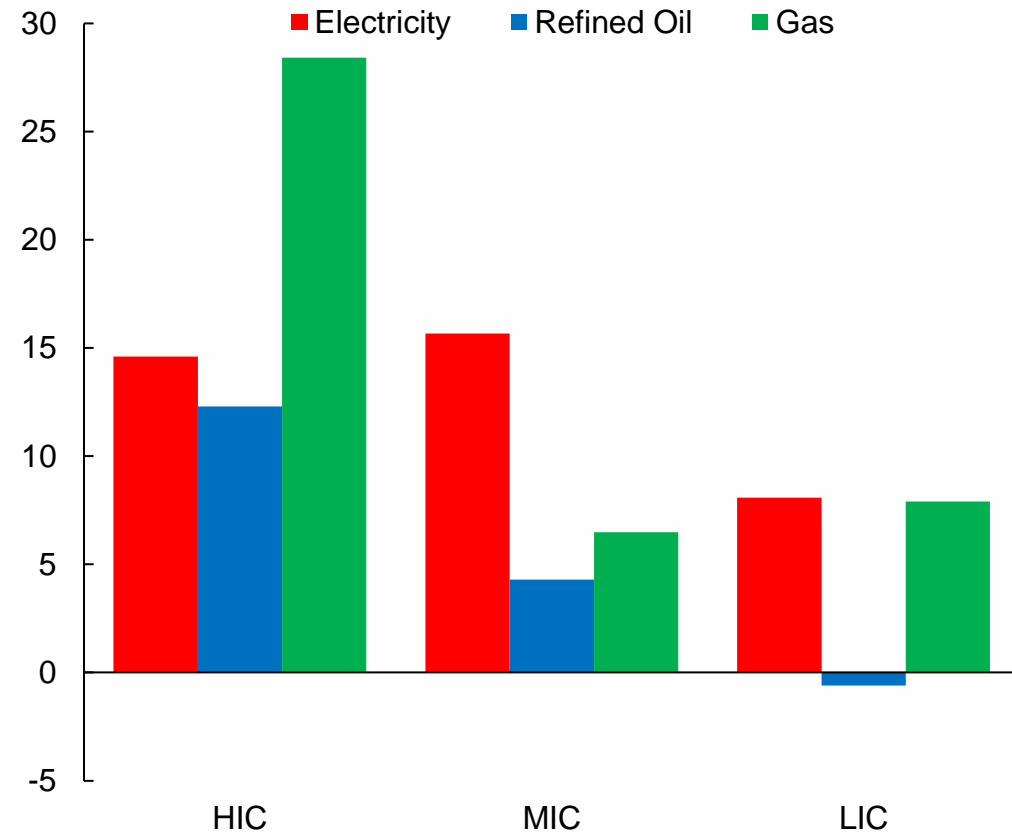
Source: IMF-ENV model

Changes in energy prices drive the reallocation of resources

Global energy supply prices 1/
(percent change from baseline)



Household consumer prices in 2030
(percent change from baseline)



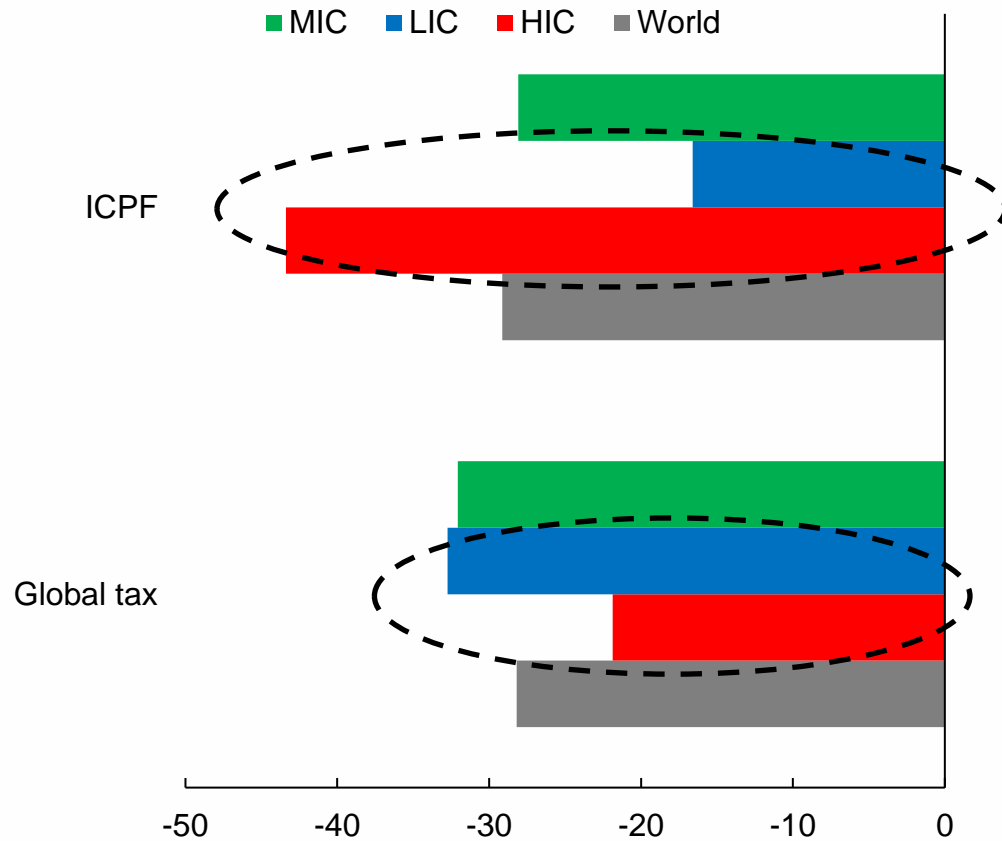
Source: IMF-ENV model

Note: 1/ Supply price are calculated as a world average of production price of the sector.

Burden sharing: ICPF achieves fairer burden sharing than a uniform global carbon tax with only small global efficiency costs

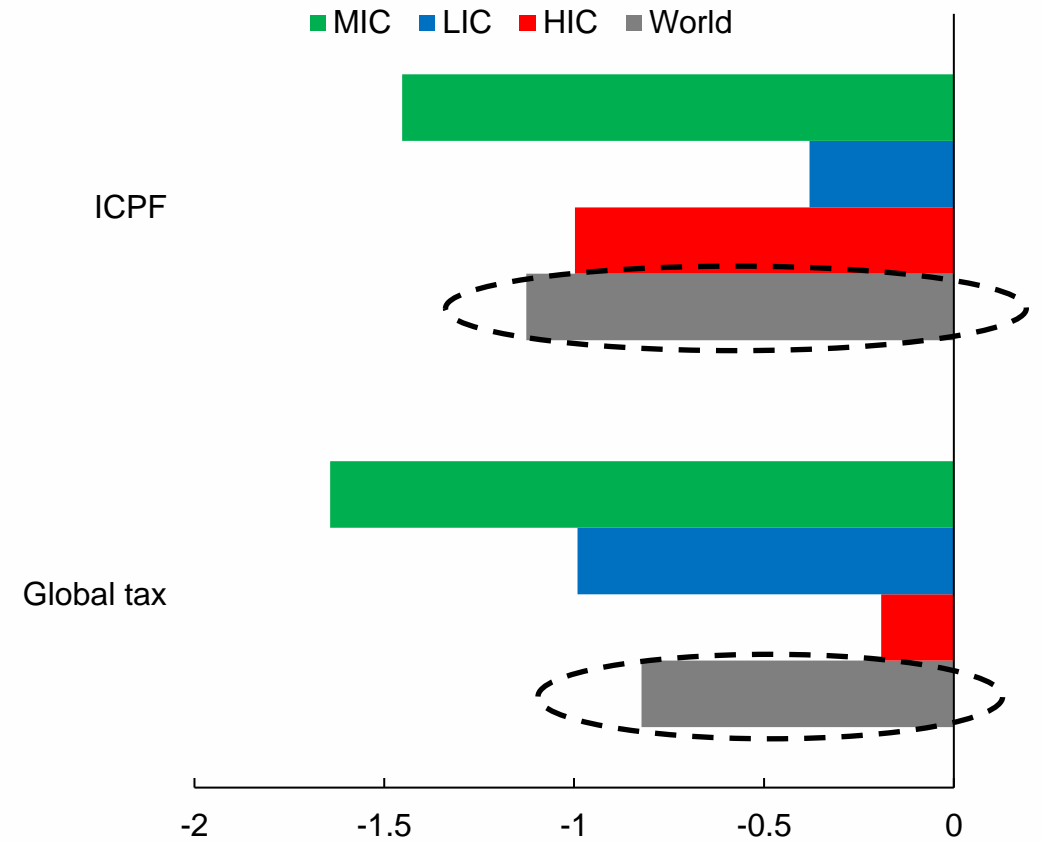
CO2 emissions in 2030

(percent deviation from baseline)



Real GDP in 2030

(percent deviation from baseline)

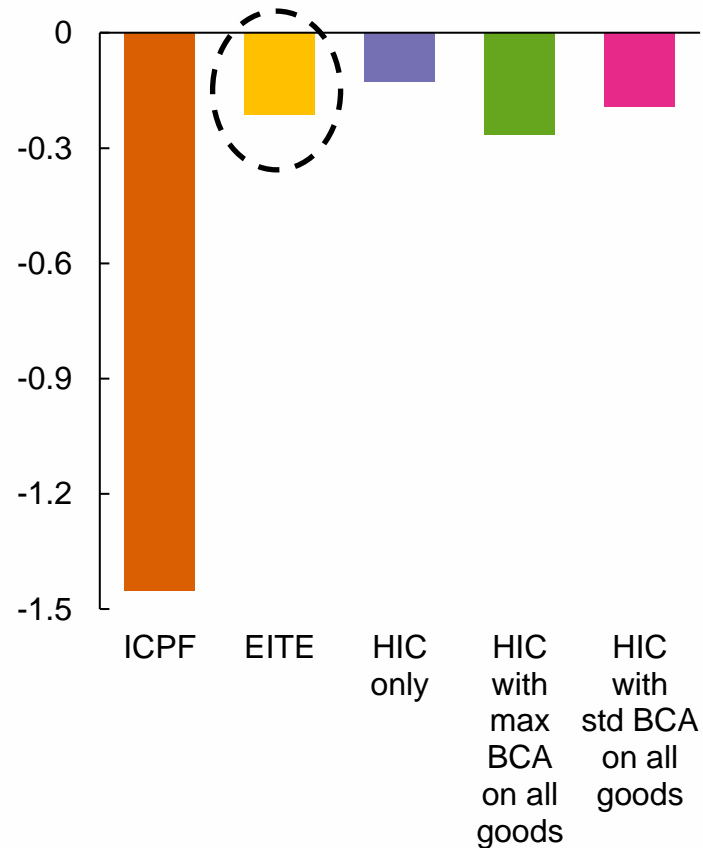


Source: IMF-ENV model

A sectoral carbon pricing agreement could offer a cooperative alternative to BCA

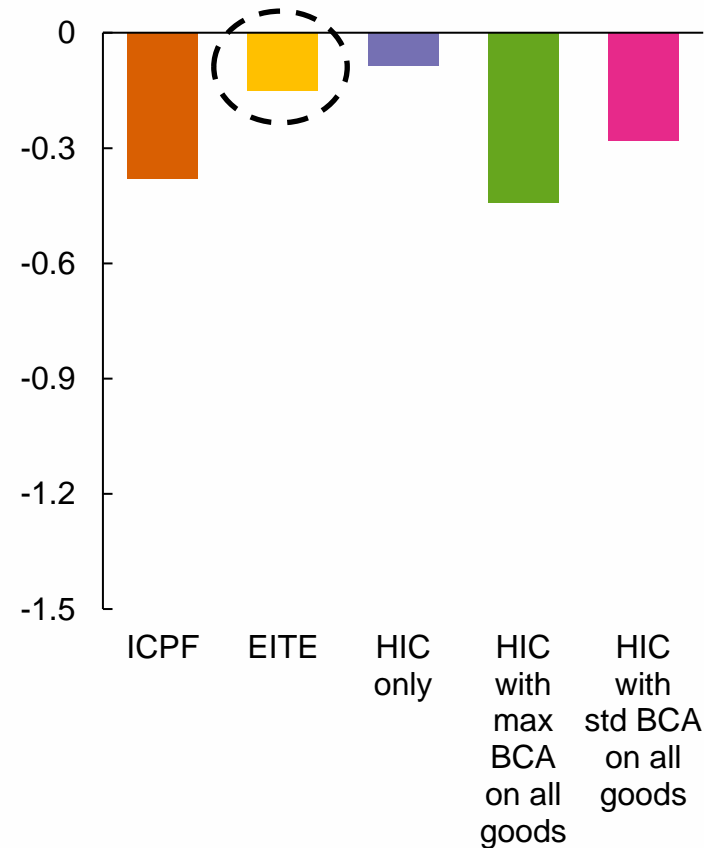
Real GDP in 2030 for middle-income countries

(percent deviation from baseline)



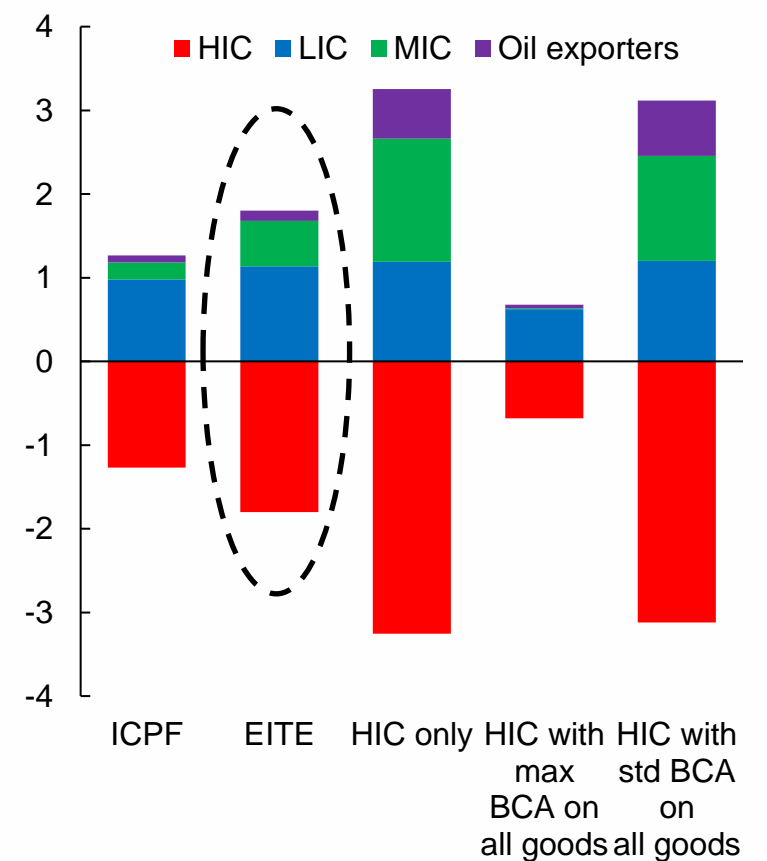
Real GDP in 2030 for low-income countries

(percent deviation from baseline)



Global market share of energy intensive industries 1/

(percentage point deviation from baseline)



Source: IMF-ENV model

EITE scenario=HICs apply ICPF; other countries apply carbon price floor to EITE sectors only.

Backup slides

Setting the stage

Compare in single framework various scenarios **to raise global climate action**:

- International carbon price floors (ICPF) proposal (Parry, Black, and Roaf 2021)
 - ▶ ICPF:
 - ◆ Carbon price floors differentiated by income level: \$75/tCO₂e for HICs, \$50 for MICs and \$25 for LICs
 - ◆ Carbon price **floor**: do max of carbon price floor and what is needed to reach NDC
 - ▶ Macro effects
 - ▶ Burden sharing –comparison with global uniform carbon price
- Unilateral climate action by HICs with Border Carbon Adjustment (BCA)
 - ▶ Competitiveness effects
 - ▶ Alternative of a sectoral carbon pricing agreement for energy-intensive and trade-exposed sectors (EITE)

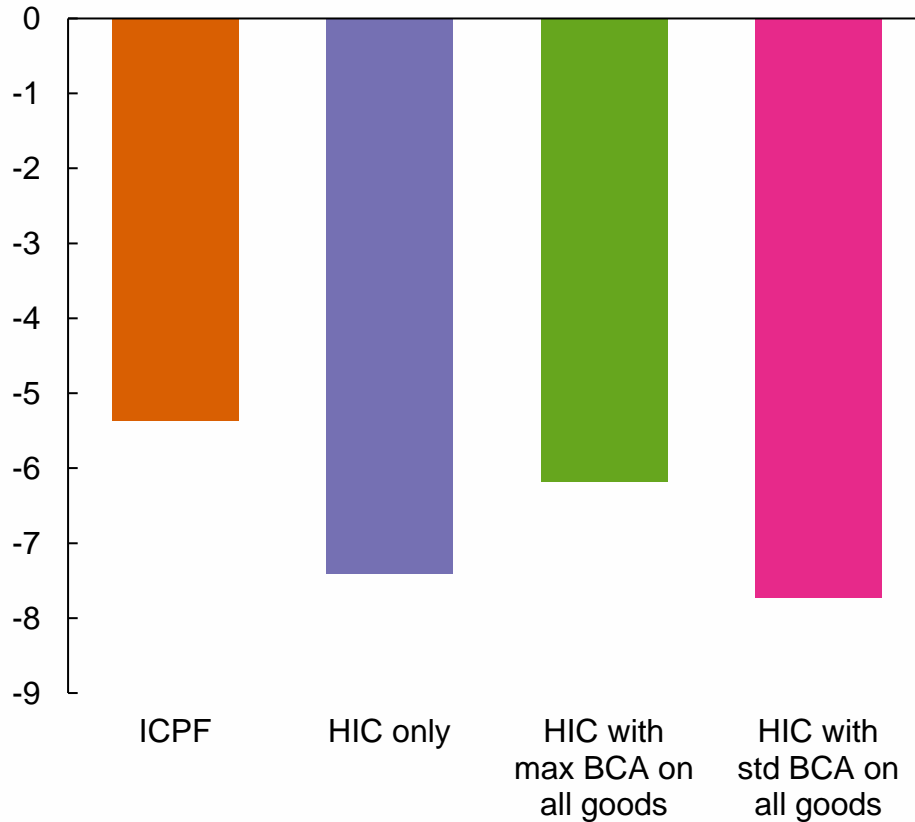
Description of the IMF-ENV model

- Recursive-dynamic, multi-regional, and multi-sectoral **computable general equilibrium (CGE)** model
 - ▶ Ideal to look at structural transformation, trade and competitiveness effects, decarbonization and development which are long-run issues
- Mainly neo-classical but features **vintage capital** (implying different degrees of substitution across inputs in short and long run)
- Each source of emissions is directly associated to the corresponding economic activity (ex. CO₂ emissions from coal burning in power sector or N₂O emissions associated to fertilizer use in crop sectors).
- Money is absent, agent expectations are not forward-looking, no labor market frictions.

But BCA is useful to address competitiveness effects in EITE sectors

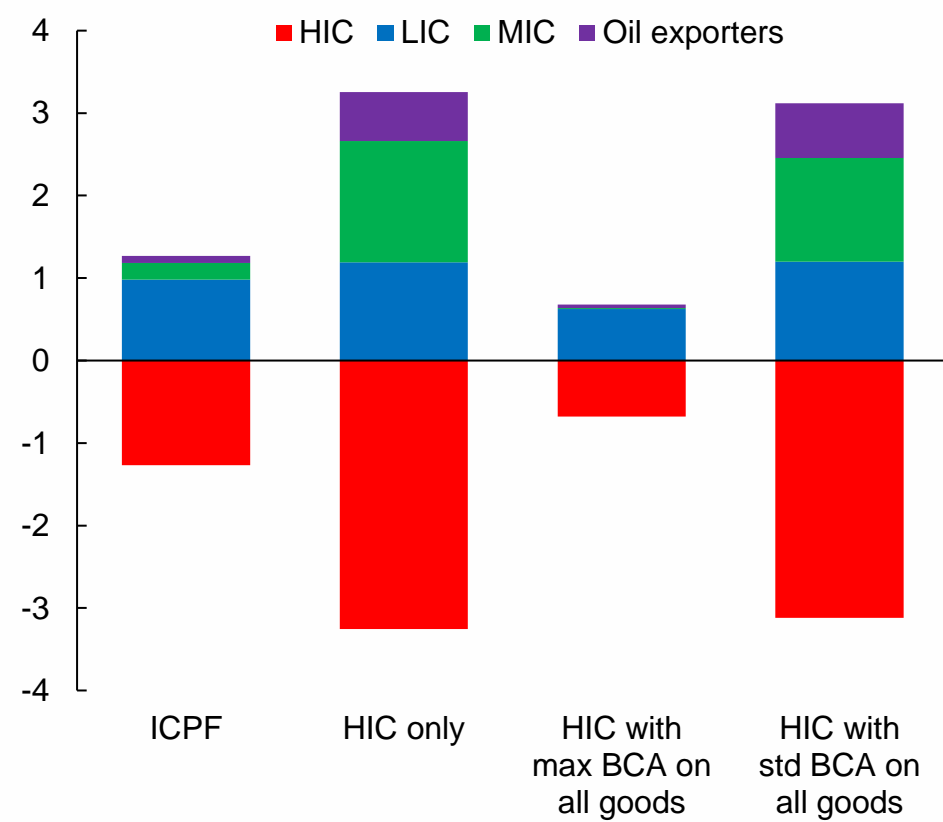
Real gross output of energy intensive industries in high-income countries in 2030

(percent deviation from baseline)



Global market share of energy intensive industries in 2030 1/

(percentage point deviation from baseline)



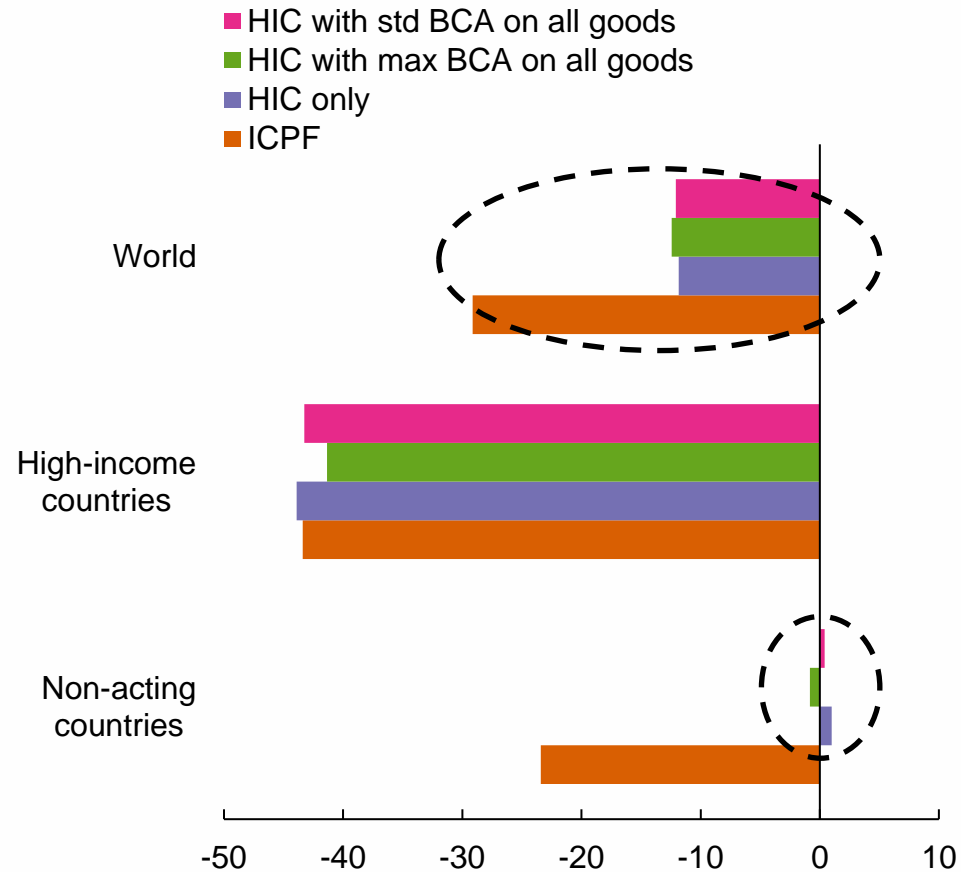
Source: IMF-ENV model

Note: 1/ Market share for a given commodity is the value of exports of a country as a percentage of world total exports.

Partial action and BCA: If only HICs join the ICPF, global emissions reductions are insufficient

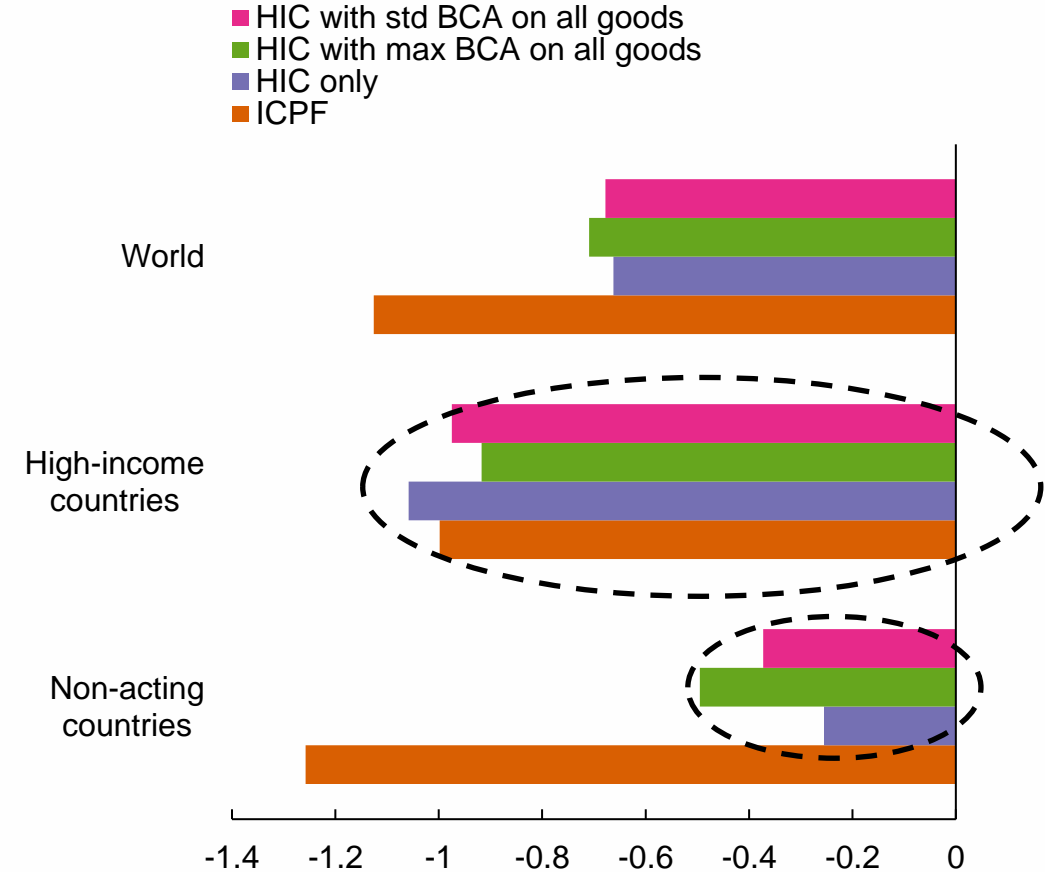
CO2 emissions in 2030

(percent deviation from baseline)



Real GDP in 2030

(percent deviation from baseline)



Source: IMF-ENV model

Max BCA: the BCA is calculated on foreign carbon content and complemented by an export subsidy.

Standard BCA: the BCA is calculated on domestic carbon content.

Conclusions

1. An international carbon price floor
 - ▶ Enhances strongly global climate mitigation at moderate macro costs
 - ▶ Contributes to improve the international burden sharing with limited competitiveness effects
2. Border carbon adjustment mechanisms have **only limited impacts**
 - ▶ Limit competitiveness losses for EITE industries and reduce carbon leakages

BUT

 - ▶ Do not deliver a strong additional reduction in global emissions
 - ▶ Do not provide sufficient incentives to join the carbon price floor
3. An ICPF for EITE sectors
 - ▶ Cooperative way to address competitiveness concerns
 - ▶ Can be a first step to introduce carbon pricing in other countries