



Kill Bill or Tax: An Analysis of Alternative CO2 Price Floor Options for EU Member States

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History of CO₂ prices in EU ETS

- When the EU ETS was launched in 2005, the EU Commission was projecting allowance prices in the range of **€30/ton CO₂**
- Prices soon collapsed and remained stubbornly low

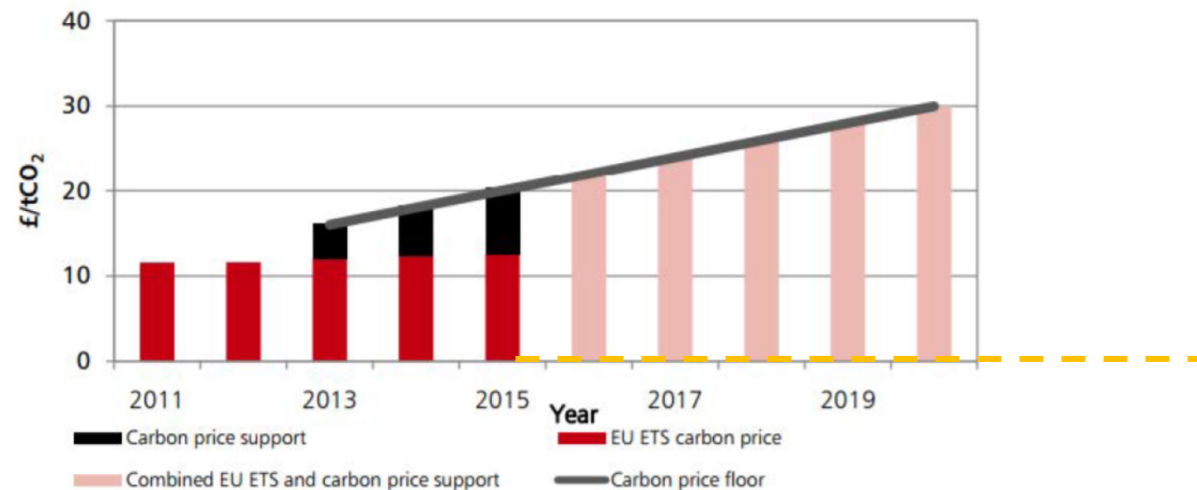


- Member States began to worry these prices were insufficient to meet long-term climate policy goals
- Various Member States are calling for CO₂ price floors
 - UK carbon price support, Dutch carbon tax, French and German proposals...

UK Carbon Price Support

- United Kingdom introduced domestic carbon floor for electricity generators in 2013; currently capped £18/ton (around €20/ton) through 2020.

Chart 2.A: Carbon price floor illustration (in real 2009 prices and calendar years)



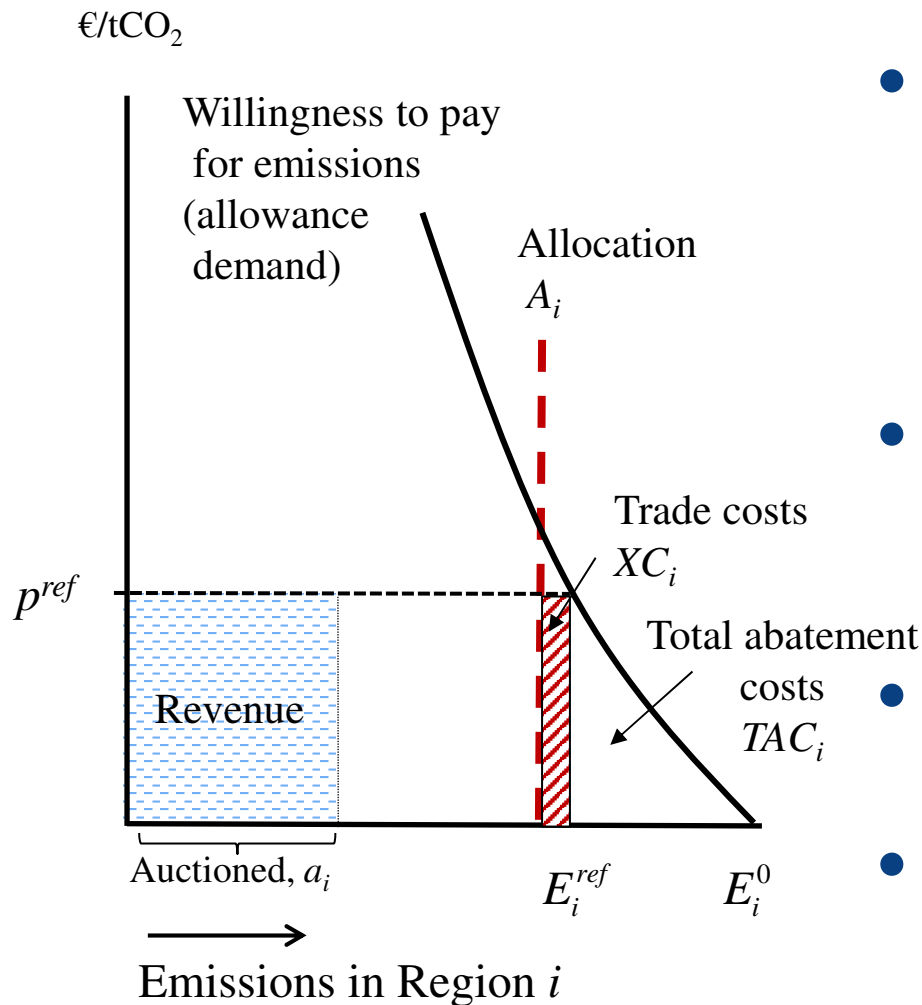
Source: HM Treasury, 2011

- Why do this, given that the cap is unaffected (waterbed effect)?

Three (unilateral) policy options

1. Domestic floor price (*TAX*)
 - Carbon tax on domestic covered sources equal to difference between domestic minimum price and ETS price (UK and NL strategy)
2. Unilateral auction reserve price (*KILL*)
 - Cancel own allowances for auction to achieve an EU-wide minimum ETS price (equal to domestic minimum price)
 - Equivalently, take auction revenues and buy and invalidate allowances
3. Domestic over-compliance requirement (*BILL*)
 - Domestic covered sources must surrender ratio of permits to emissions equal to domestic minimum price / ETS price (or 1, whichever is larger)
 - Equivalently, set a carbon tax and use the revenues to buy and invalidate allowances

Stylized analytical model



- Marginal benefits of abatement
 - at home: δ
 - abroad: $\beta\delta$
- Marginal benefits of public revenues
 - $1 + \gamma$
- Total compliance costs
 - $TAC + XC$
- Unilateral actor minimizes compliance costs net of total benefits

Approach

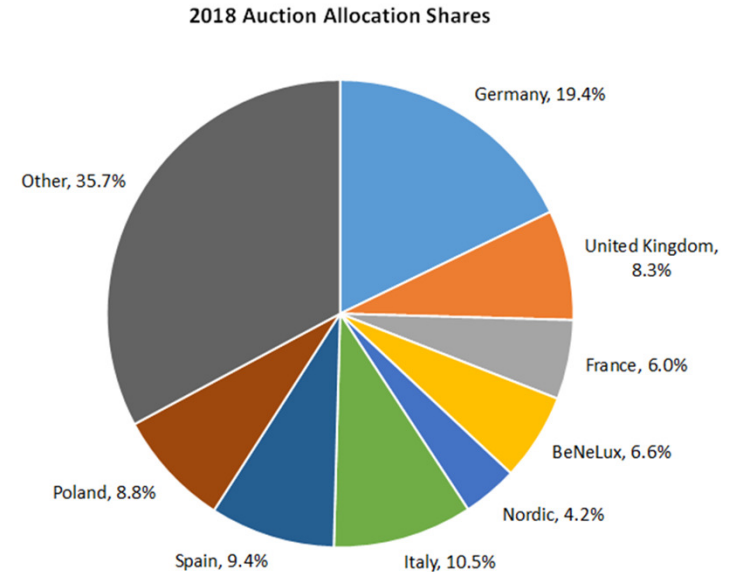
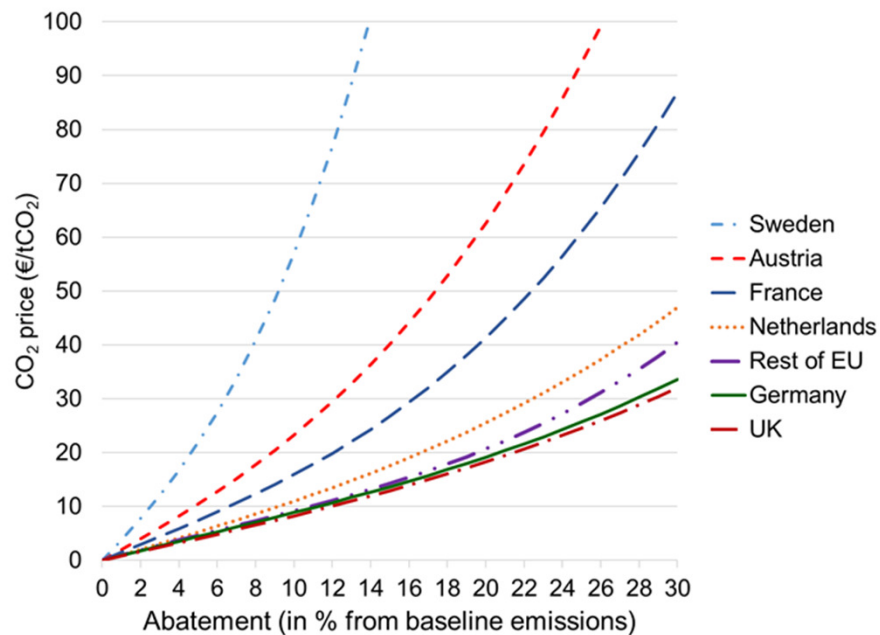
- Analytically and then numerically
- Compare effects of equivalent domestic price floors
- Derive optimal domestic price floors for each type

Implications of price floor options

	ETS price	Fiscal benefits	Environmental benefits	Terms of trade
<i>TAX</i>	(↓) Waterbed effect drives down price	(++) Large and positive: transfers home emission rents	(0/?) No change overall; shifts emissions abroad	(+/?) Benefits allowance importers
<i>KILL</i>	(↑↑) 1-1 price increase	(-/?) Allocation more valuable but must forego revenues to kill	(++) maximum reductions abroad for the price	(-/?) hurts importers but could benefit large exporters
<i>BILL</i>	(↑) from rise in allowance demand	(+) Auctioned allowances more valuable	(+) additional reductions abroad	(-/?) hurts importers

Quantitative impact assessment

- PE model based on MAC curves for EU-ETS
 - Generated from CGE model (GTAP 10; 2014 base year)
- Reference scenario calibrated to 2018:
 - verified emission allowances
 - CO₂ price of 15 €/tCO₂



Source: European Energy Exchange and ICE Futures Europe (2019)

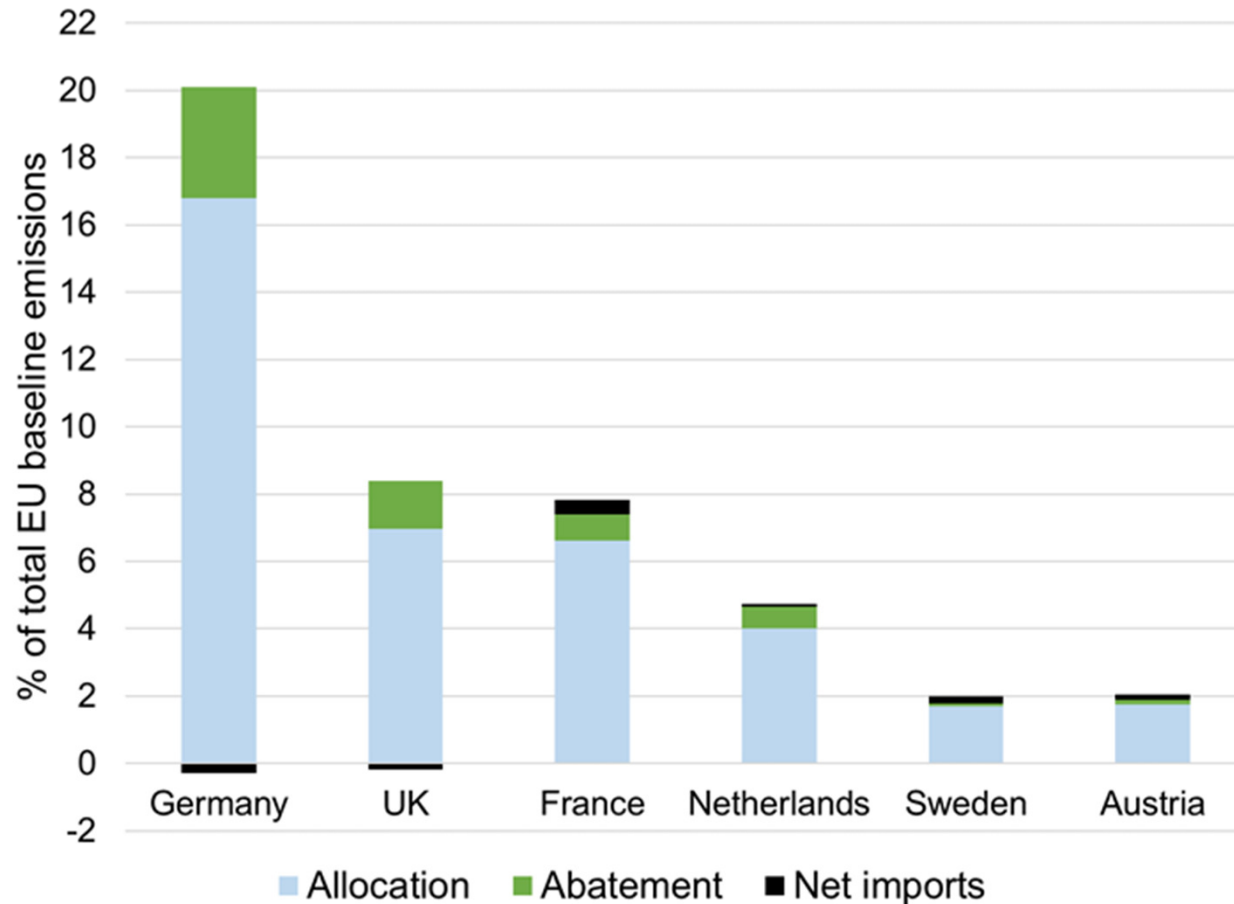
- Forerunner coalitions:
Germany
(+ UK + France +
Netherlands + Austria
+ Sweden)

Simulations

- Unilateral actors minimize total costs
 - Compliance costs (“central case”)
 - Direct abatement costs + net allowance imports
 - (net of) Fiscal benefits (sensitivity to γ)
 - Damages (sensitivity to δ)
- Costs as a function of domestic minimum price (Germany)
- Optimal unilateral policies and prices (individual fore-runners)
- Nash and cooperative equilibrium (all fore-runners)

Reference scenario

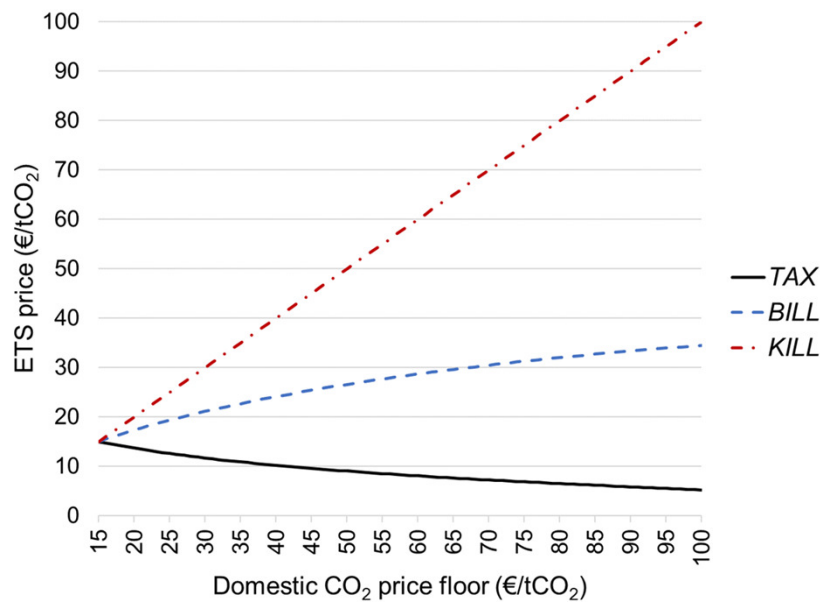
(% of EU ETS emissions, 2018)



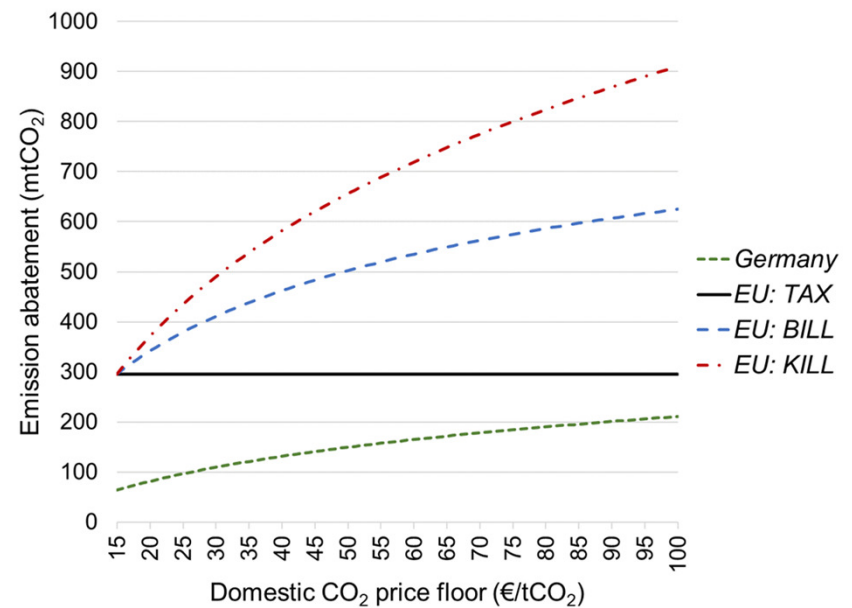
Emission price and abatement (unilateral action by Germany)



ETS price



Emission abatement

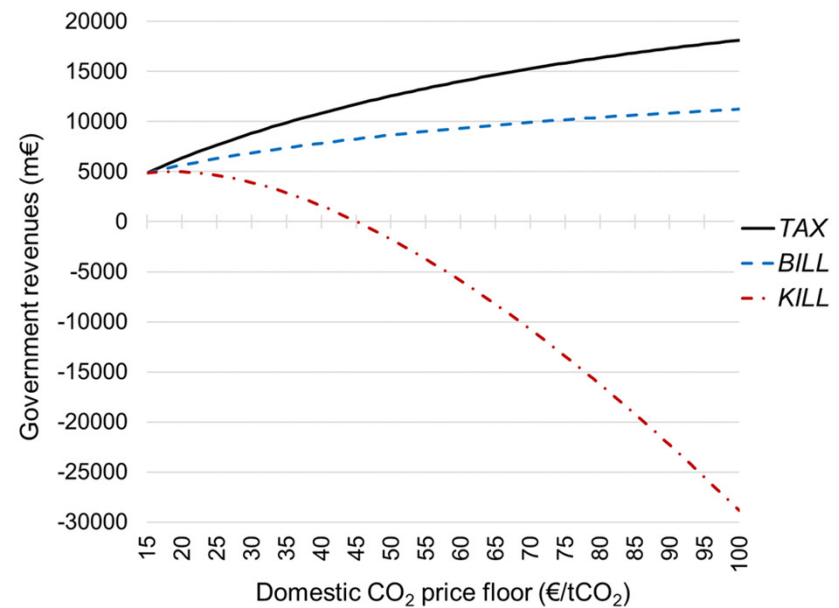
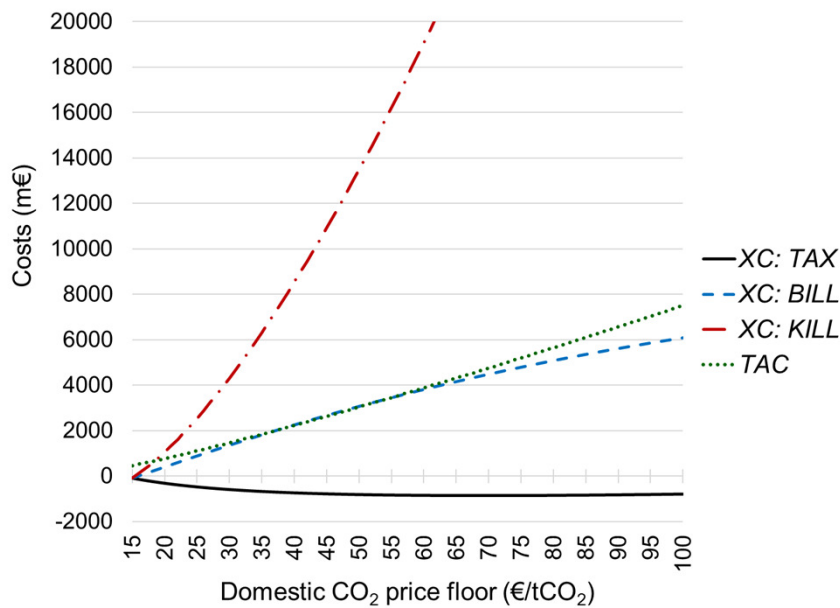


Compliance costs versus revenues

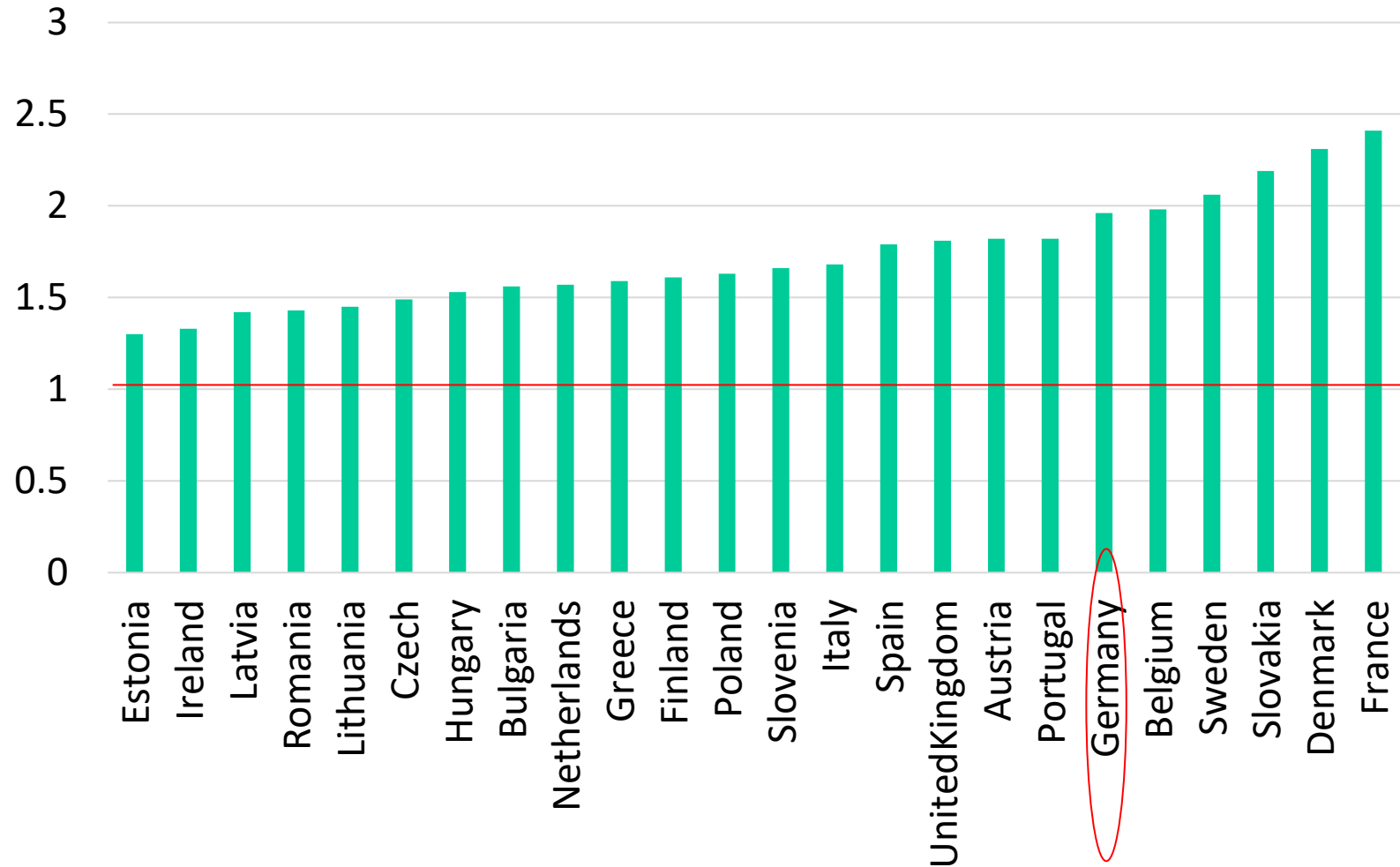
Abatement costs (*TAC*) and trade costs (*XC*)



Net revenues



Fiscal benefits: MCPF in the EU



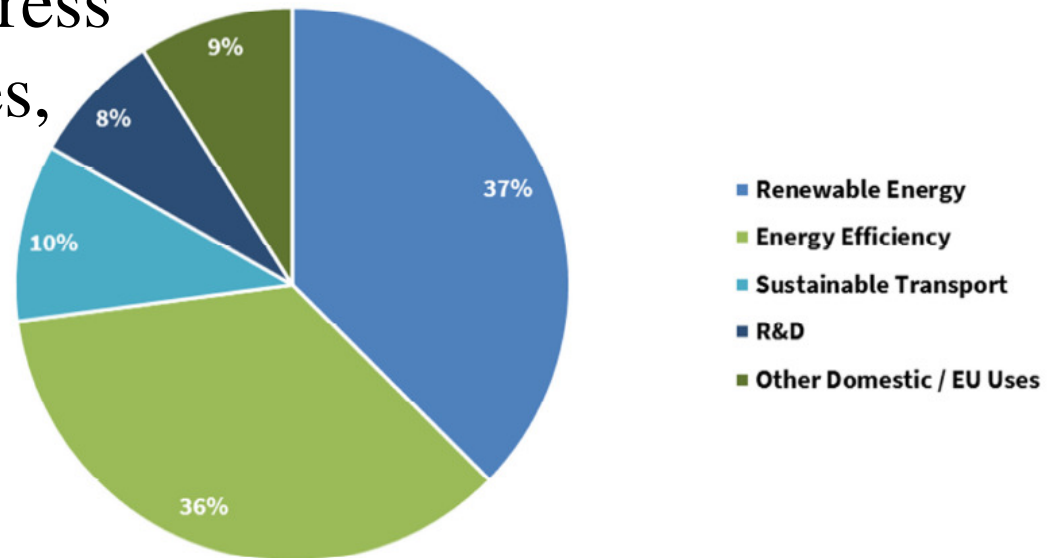
Source: Barrios et al 2013 for the EC

Other fiscal benefits

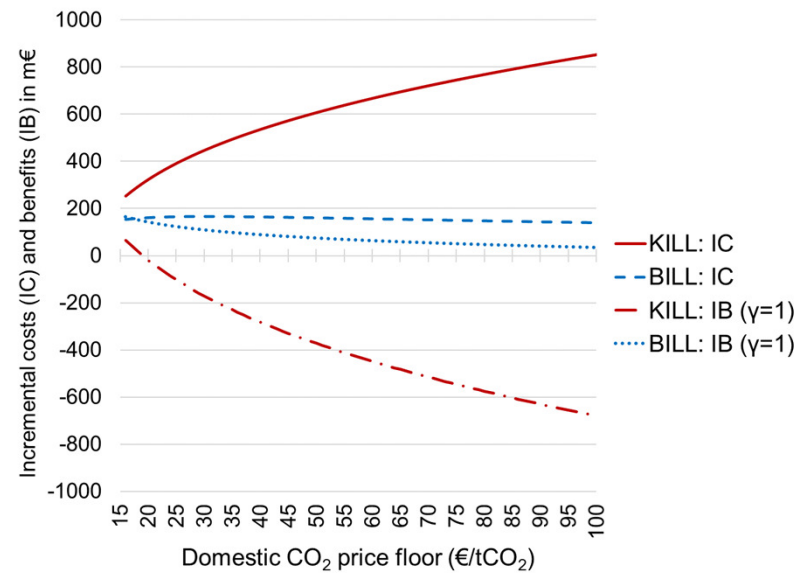
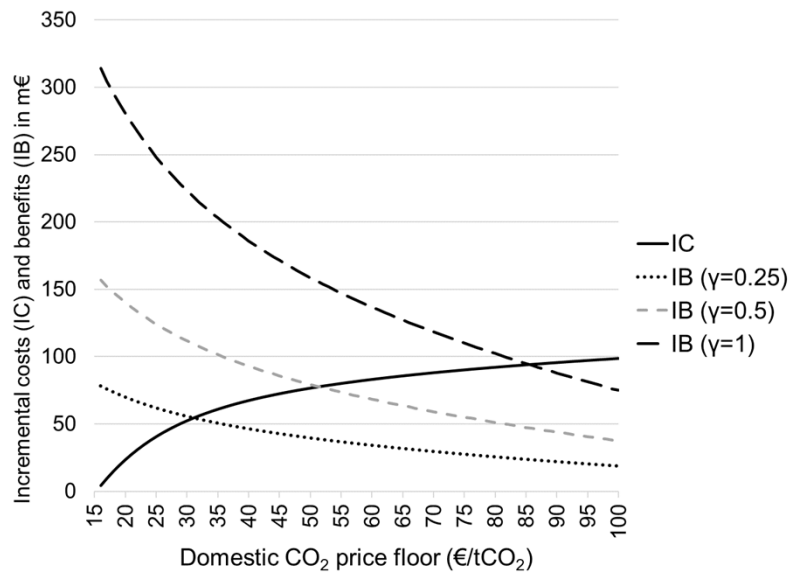
- Many countries earmark revenues from emission pricing toward investments in clean technology and other climate-related programs

- To the extent those programs address other market failures, their funding can generate excess benefits

Figure 6: EU member states' domestic use of auctioning revenue 2013-2017

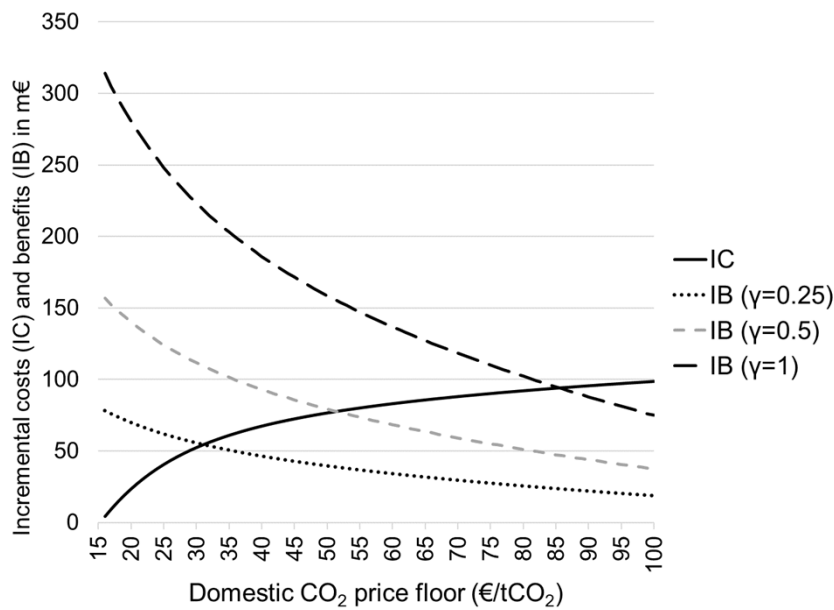


Incremental costs (IC) and incremental fiscal benefits (IB)

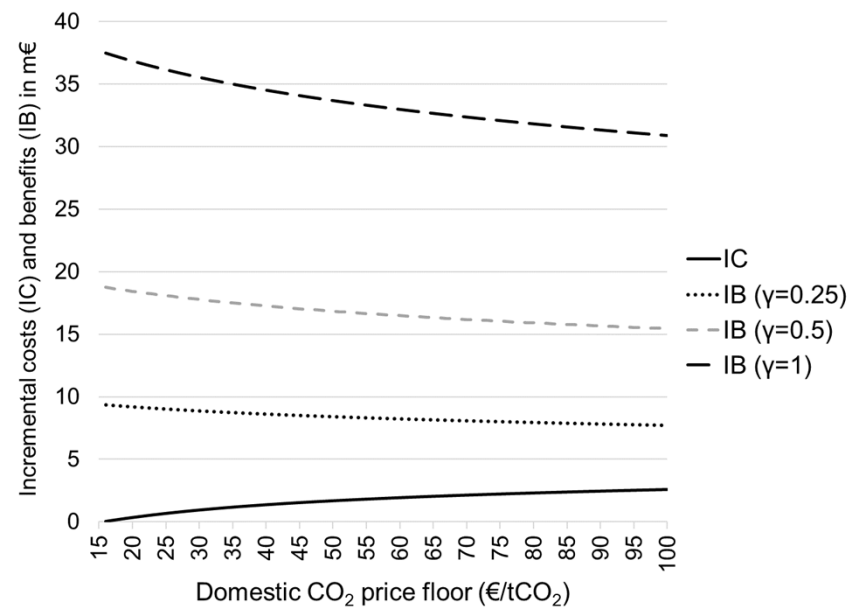


TAX: Incremental costs (IC) and incremental fiscal benefits (IB) by unilateral actor

Germany

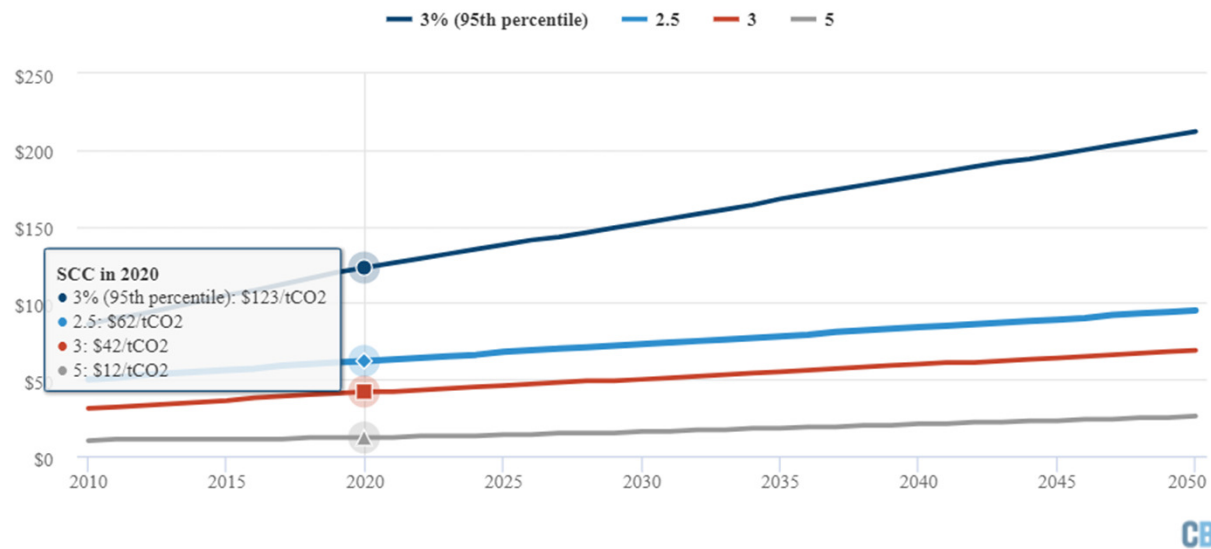


Sweden



Social Cost of Carbon

US social cost of carbon

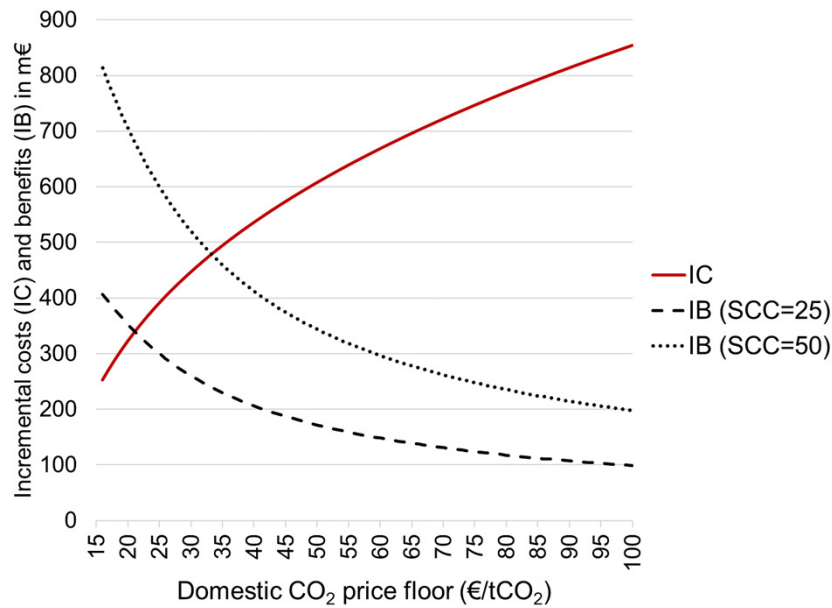


Current US social cost of carbon estimates, for each year to 2050 in \$ per tonne of CO2. The US defines four values for the SCC. These are a high-impact figure (95th percentile value for a 3% discount rate, dark blue line) and average values for three discount rates of 2.5% (light blue), 3% (red) and 5% (grey). Source: Interagency Working Group [2016 update](#). Chart by Carbon Brief using [Highcharts](#).

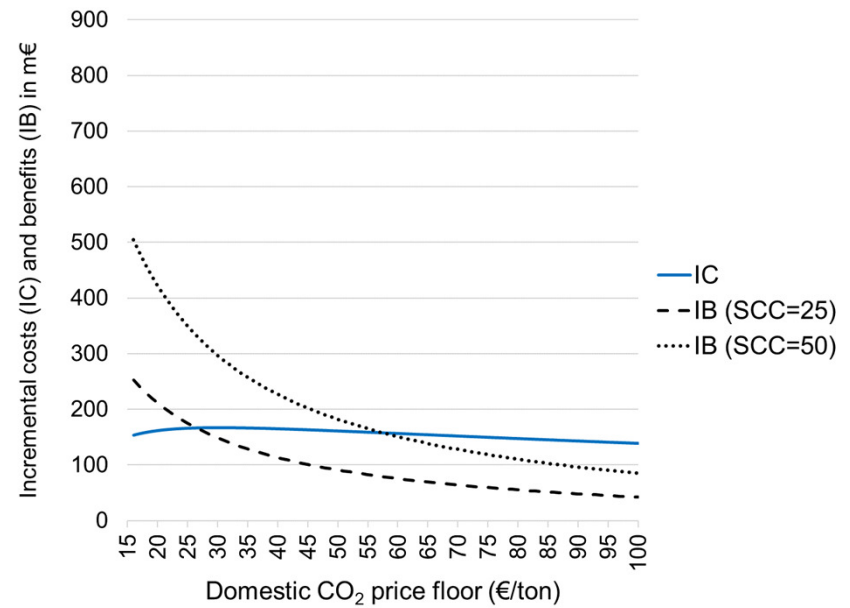
Incremental costs (IC) and incremental environmental benefits (IB)



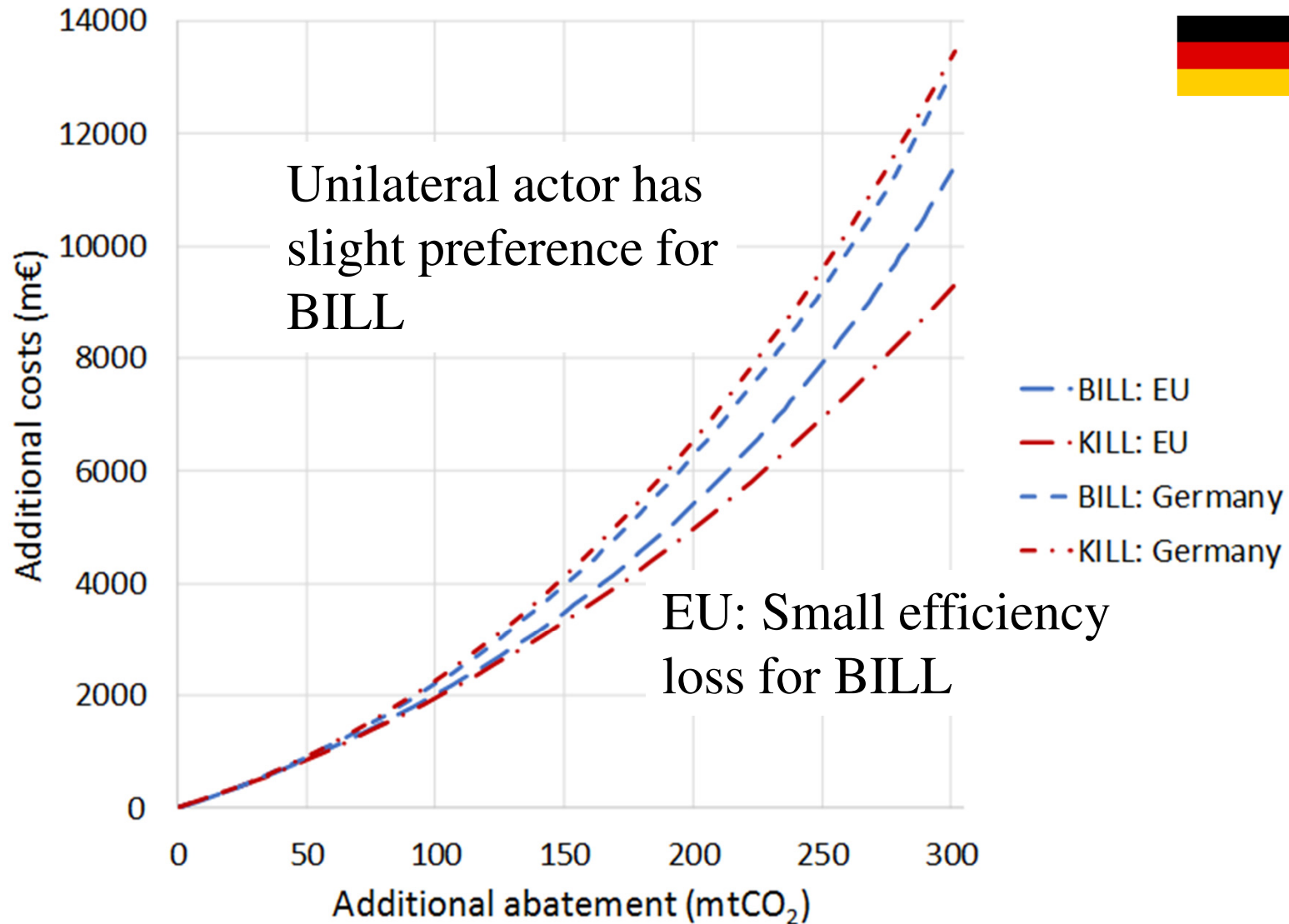
KILL



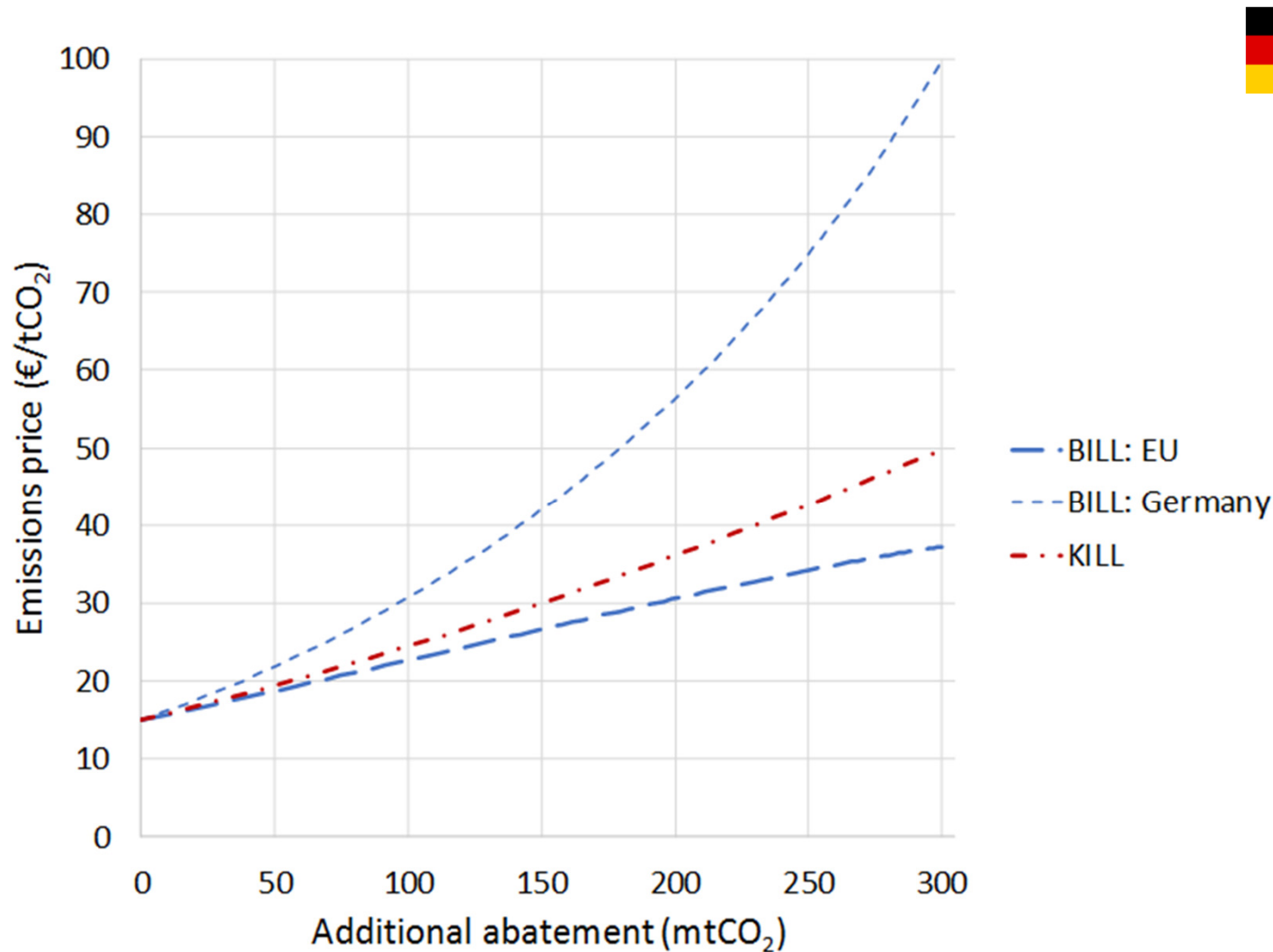
BILL



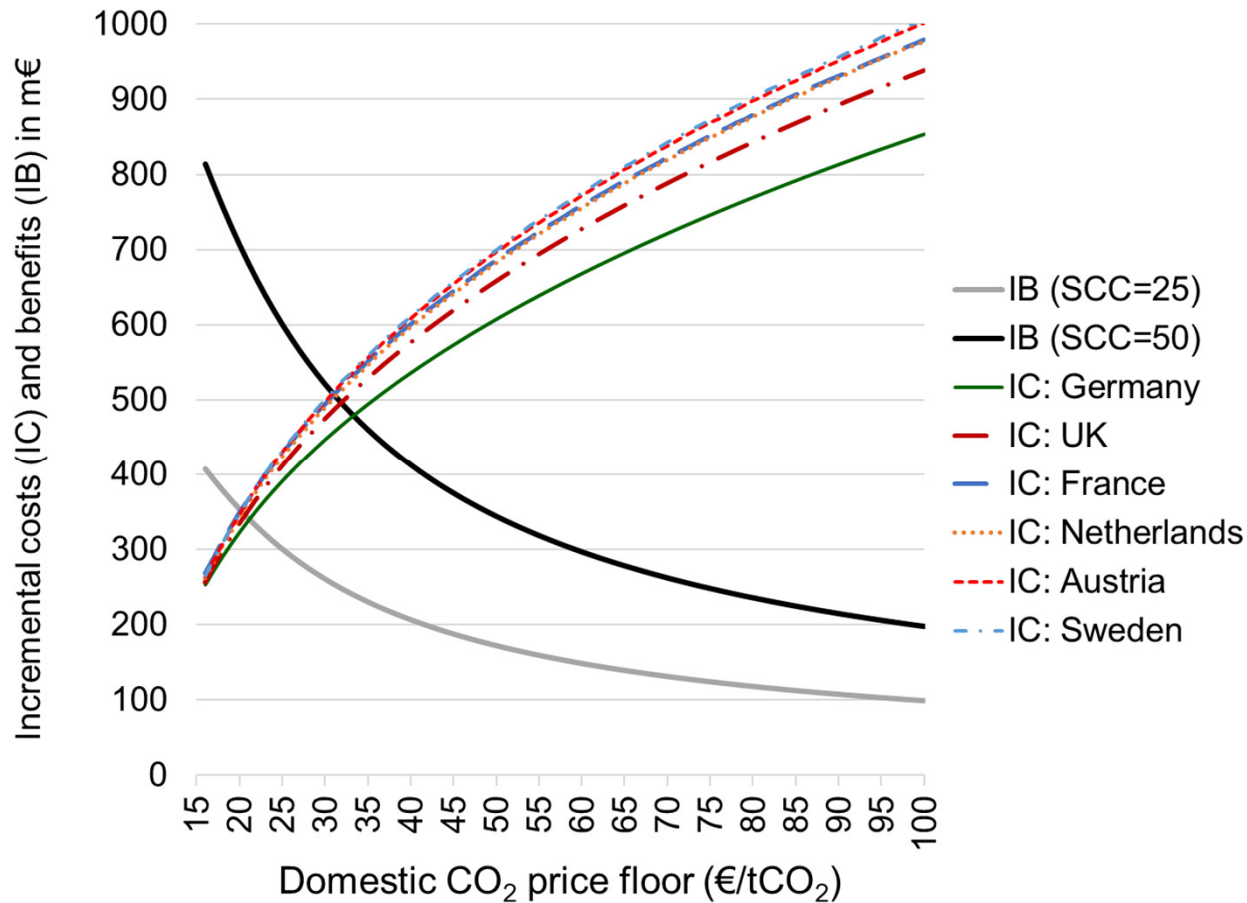
Total and Coalition Additional Costs by Additional Abatement (no fiscal benefits)



Emissions prices (€/tCO₂) for a given level of additional abatement



KILL: Incremental costs (IC) and incremental environmental benefits (IB) by country



Choice of unilateral policy and price floor

SCC (€/tCO ₂)	MCPF	Germany	UK	France	Netherlands	Sweden / Austria
0	1	None 15	None 15	None 15	None 15	None 15
0	1.25	TAX 34	TAX 38	TAX 80	TAX 51	TAX 100
0	1.5	TAX 52	TAX 55	TAX 100	TAX 78	TAX 100
0	2	TAX 75	TAX 76	TAX 100	TAX 100	TAX 100
25	1	<i>BILL</i> 25	<i>KILL/BILL</i> 20/29	<i>BILL</i> 27	<i>KILL</i> 20	<i>KILL</i> 20
25	1.25	<i>TAX</i> 34	<i>BILL</i> 29	<i>TAX</i> 80	<i>BILL</i> 36	<i>TAX</i> 100
25	1.5	<i>TAX</i> 52	<i>TAX</i> 55	<i>TAX</i> 100	<i>TAX</i> 78	<i>TAX</i> 100
25	2	<i>TAX</i> 75	<i>TAX</i> 76	<i>TAX</i> 100	<i>TAX</i> 100	<i>TAX</i> 100
50	1	<i>BILL</i> 54	<i>KILL</i> 32	<i>KILL</i> 31	<i>KILL</i> 31	<i>KILL</i> 31
50	1.25	<i>BILL</i> 61	<i>BILL</i> 70	<i>BILL</i> 74	<i>BILL</i> 86	<i>BILL</i> 100
50	1.5	<i>BILL</i> 68	<i>BILL</i> 73	<i>BILL</i> 80	<i>BILL</i> 89	<i>BILL</i> 100
50	2	<i>BILL</i> 80	<i>BILL</i> 79	<i>TAX</i> 92	<i>BILL</i> 94	<i>BILL</i> 100

Conclusions

- Without fiscal benefits and climate damages, *TAX* leads to substantial excess cost, *KILL* is by definition cost-effective, while *BILL* induces relatively small efficiency losses
- Fiscal benefits in particular promote *TAX*, but *BILL* also provides some benefits (*KILL* remains unattractive)
- Climate damages do not make *TAX* attractive for a single EU MS, but *KILL* and *BILL* become attractive
- Terms of trade effects are small initially, but may loom larger with more ambition
- Extensions:
 - *Benefits from emission relocation*
 - *Induced innovation (spillovers)*
 - *Interaction with market stability reserve*