



POTSDAM INSTITUTE FOR  
CLIMATE IMPACT RESEARCH

# Minimum Carbon Prices and Transfers in the EU ETS

Strommarkttreffen @ VKU, Berlin  
5. August 2016

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Transfers

- = Revenue redistribution
- = Initial allocation of allowances
- = Redistribution of auction revenues

Minimum Price

- = Price Floor

Pareto-improvements

- = Make one (country) better off  
while the other (country) is not worse off.

# EU ETS reform options based on policies of heterogeneous Member States. How to?

**Agreeing on an EU ETS price floor to foster solidarity, subsidiarity and efficiency in the EU**

(forthcoming)

O. Edenhofer, C. Roelfs, B. Gaitan,  
P. Nahmmacher, C. Flachsland

In: Ian W.H Parry, Karen Pittel, Herman Vollebergh (Eds.)  
Energy Tax and Regulatory Policy in Europe. MIT press.

**Reducing state-federal conflicts in public good provision policy: The role of fiscal transfer design.**

C. Roelfs, B. Gaitan, O. Edenhofer

Conference paper PET, EAERE 2016

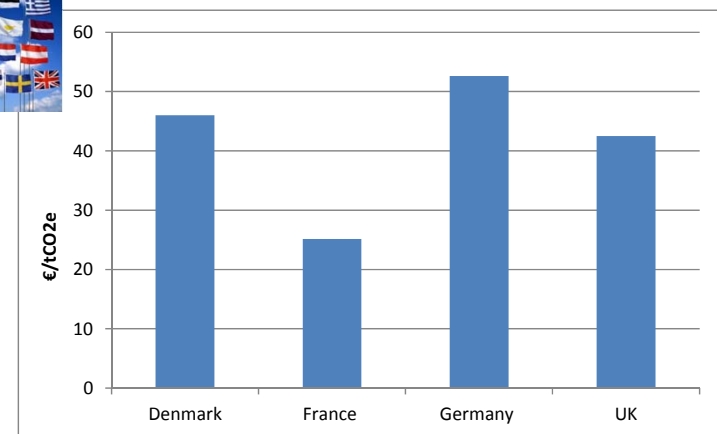
- **Design principle 1. Efficiency, transfers and solidarity**
- Design principle 2. Member States' preferences and subsidiarity
- **Implementation rule. Set a minimum price and provide appropriate transfers.**
  - **Incl. multilevel model**
- Emission-leakage cushioning effect of minimum price
- LIMES-EU application of EU ETS minimum price + German policy



# The EU and EU ETS as a laboratory for Climate Policy Multilateralism

How to design a multinational climate policy which is agreeable to all participating countries?

- Implement a (minimum) uniform carbon price and provide appropriate transfers.
- Ensure that no country is worse off than by its decentralized policy.



## Analysis of Edenhofer et al. based on two normative principles:

### Solidarity

Transfers across Member States are implemented to **pursue a common goal**, like climate change mitigation.

### Subsidiarity

Member States have different willingness-to-pay for mitigation, reflected by their policies. **EU policies** are only justifiable if they can **improve on the Member States' policies**.

## Design principle 1: Efficiency, transfers and solidarity

# Member States' income heterogeneity

Based on Chichilnisky and Heal, 1994

### Optimality //

all States  $i=1, \dots, N$ . Thus:

$$p_{ETS} = MAC_i = - \frac{\sum_k \lambda_k \frac{\partial U_k}{\partial a}}{\lambda_i MUC_i}$$

If the **income-level in Member States  $i$  is lower** than in Member State  $j$ , then:

$$MUC_i > MUC_j$$

poor      rich

### Requirement for allocative efficiency with ETS

- **Equalization of marg. social valuations of private consumption ( $MUC_{i,j}$ ),**
- via optimal transfers from rich to poor countries – independent of equity or justice reasons – such that:
- E.g. by initial allocation of allowances or redistribution of auction revenues.

$$\frac{\lambda_i}{\lambda_j} = \frac{MUC_j}{MUC_i}$$

## Design Principle 1

# Efficiency, transfers and solidarity

To reach a common **European goal of emission reduction with an ETS**

- transfers from rich to poor Member States are crucial.
- These transfers need to significantly **alter the willingness-to-pay for mitigation in poorer Member States.**
- Otherwise, an **ETS is not efficient.**

If **significant (optimal) transfers cannot be implemented**, then

- **richer Member States shall pay higher carbon prices** than poorer Member States.

## Design principle 1. Efficiency, transfers and solidarity

### One possibility of optimal EU ETS transfers

If

1. all countries  $i=1, \dots, n$  are weighted the same  $\lambda_1 = \dots = \lambda_n$
2. with **equal utility** functions.

Then, allocative efficiency within an ETS requires

1. **MAC equalization**

$$MAC_1 = \dots = MAC_n$$

2. and **MUC equalization**

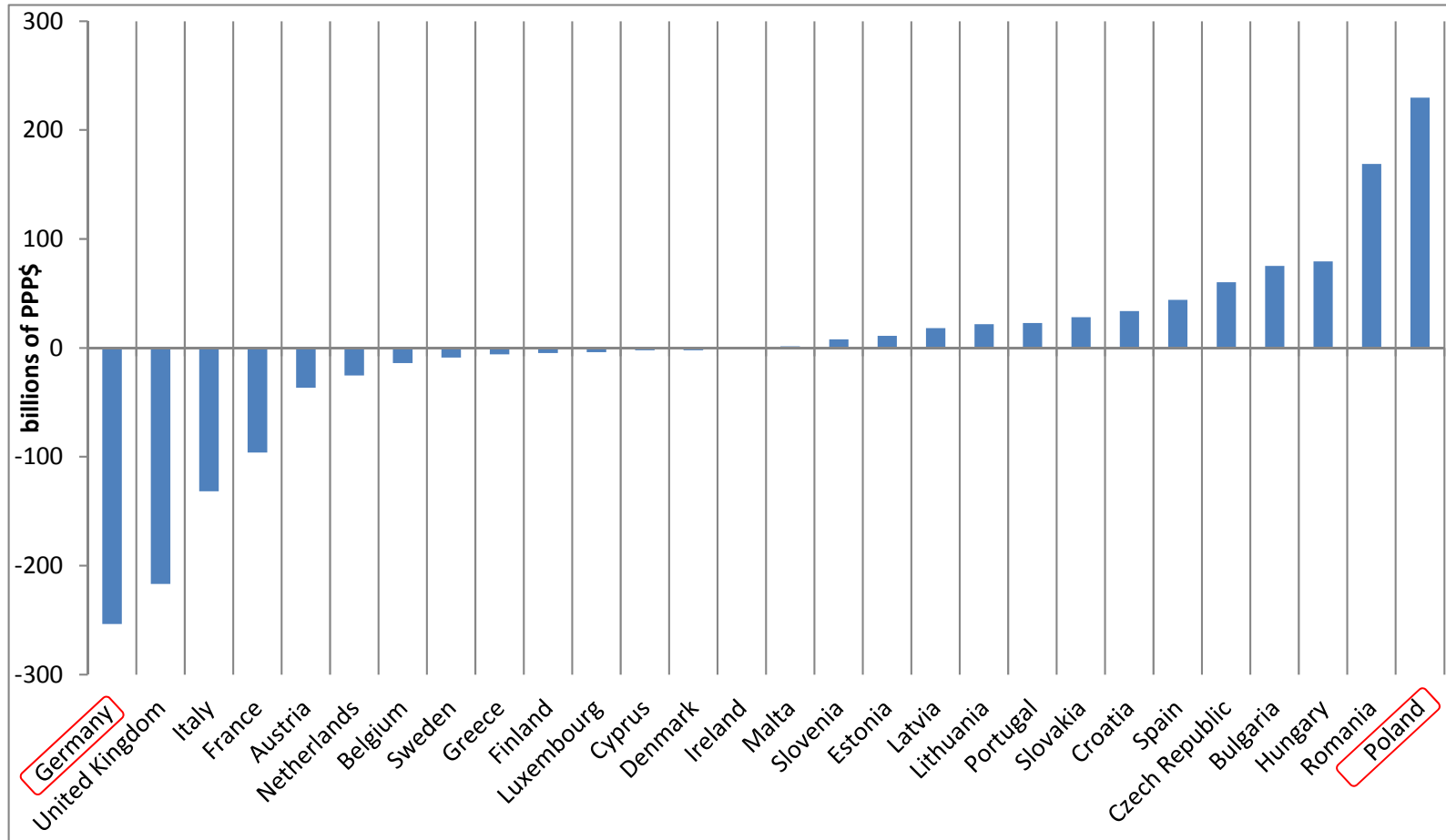
$$MUC_1 = \dots = MUC_n$$

... for which **transfers** are needed.



## Design principle 1. Efficiency, transfers and solidarity

### One possibility of optimal EU ETS transfers per country



... according to private consumption in the year 2010 in billions of \$ of purchasing power parity (PPP\$).

## Design principle 1. Efficiency, transfers and solidarity

### Optimal EU ETS transfers

- **Significant amounts of transfers necessary,**
  - likely to be **politically infeasible.**
- We propose the consideration of a **non-optimal world,**
- and to ensure that the **joint implementation** of climate policies creates **winners**, while also guaranteeing that there are **no losers.**

**Reducing state-federal conflicts in global public good provision policy: The role of fiscal transfer design.**

C. Roelfs, B. Gaitan, O. Edenhofer

Implementation rule. Minimum price and appropriate transfers

## Institutional design in a non-optimal world

We start from the Member States' perspective.

Can the top-level (EU) achieve a Pareto-improvement\* using

1. a **uniform** carbon price and
2. **simple\*\* transfer** schemes?

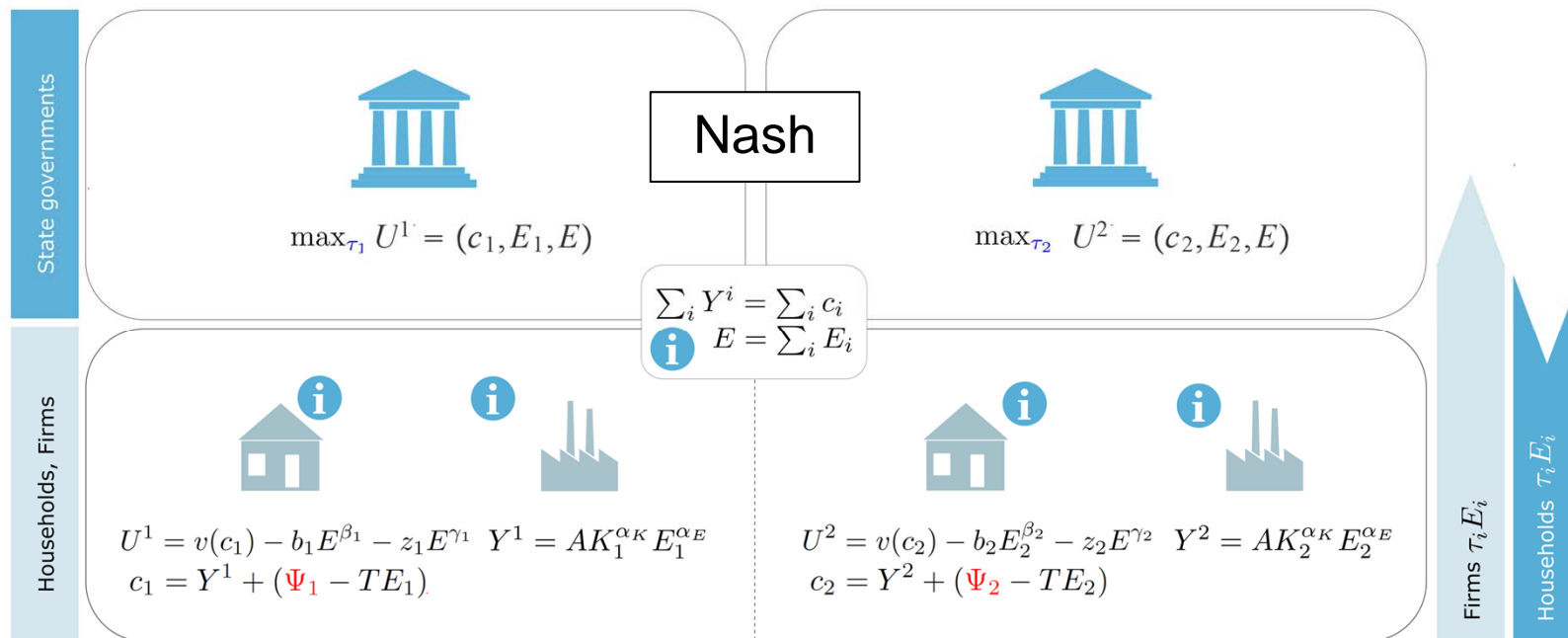
\* make at least one state better off while the other state is not worse off.

\*\* juste retour, equal per capita, historical emissions transfers

Implementation rule. Minimum price and appropriate transfers  
**Starting point provided by Member States' policies**

## Decentralized solution

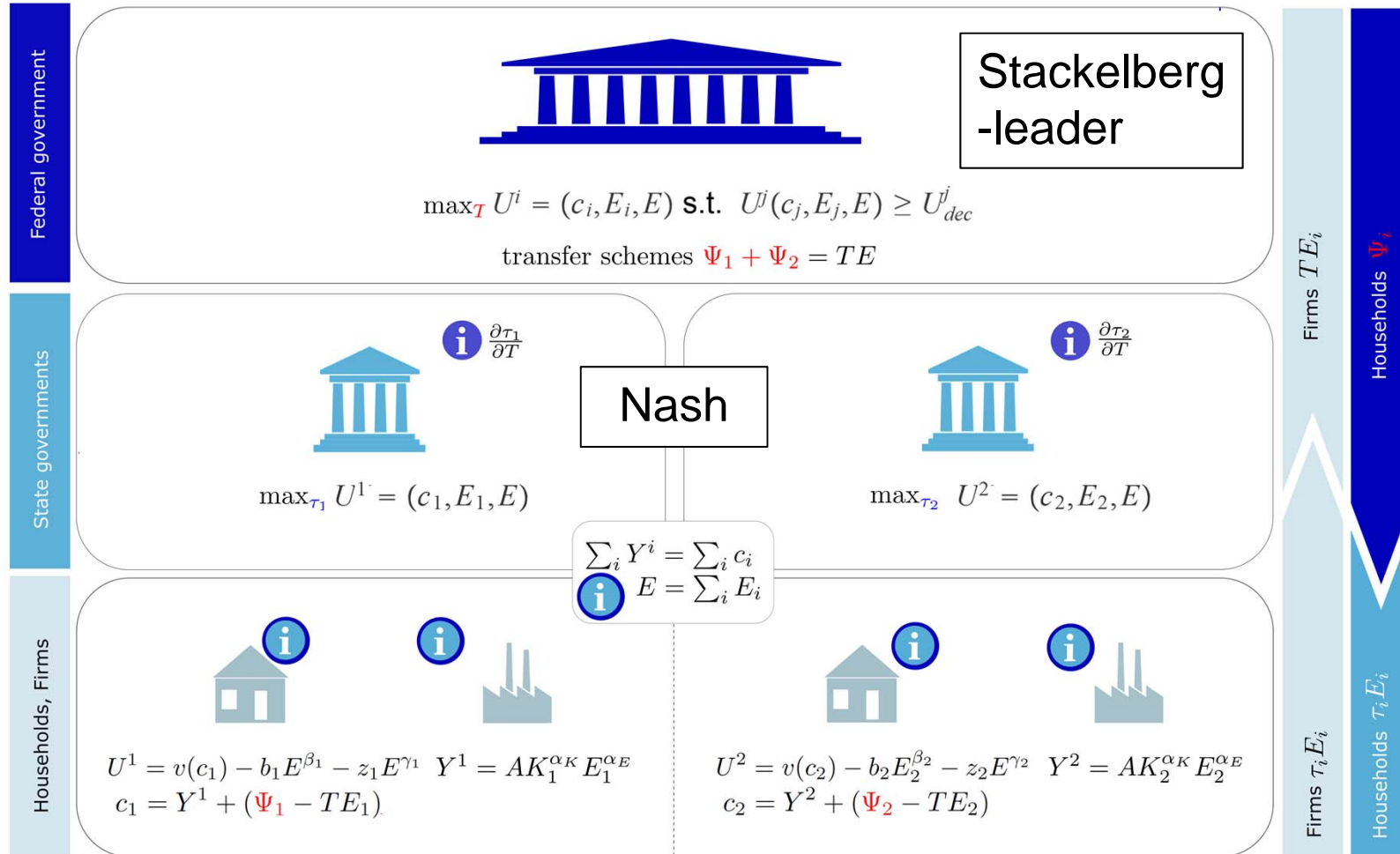
$T = 0$



Based on Rooffs, Gaitan, Edenhofer

# Implementation rule. Minimum price and appropriate transfers

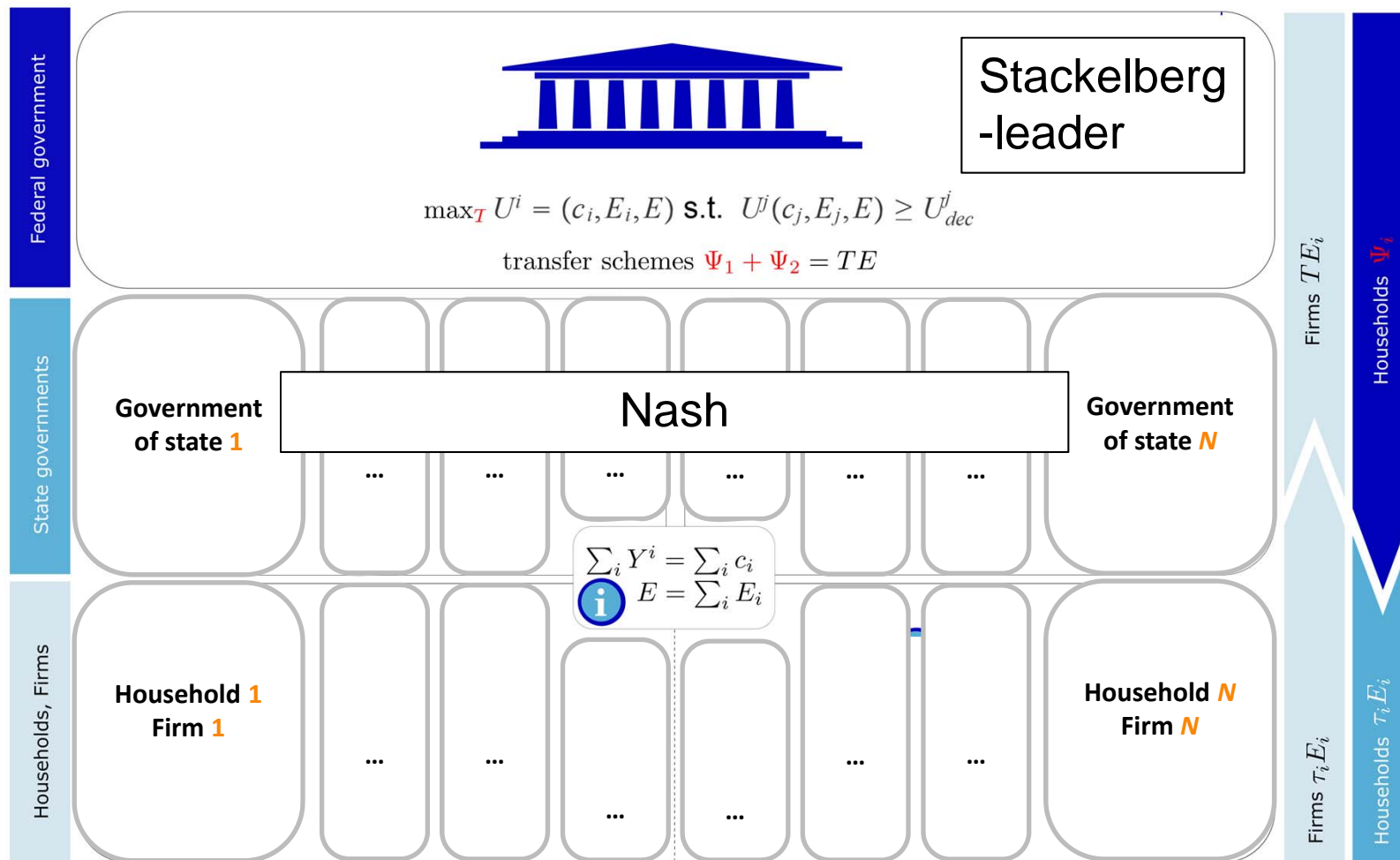
## Role of EU-level: Improve on Member States' policies



Based on Rooffs, Gaitan, Edenhofer

# Implementation rule. Minimum price and appropriate transfers

## Role of EU-level: Improve on Member States' policies



Based on Rooffs, Gaitan, Edenhofer

## Implementation rule. Minimum price and appropriate transfers

# Equal per capita transfer, income heterogeneity

- **States** (income **highest**  $i=3$ , middle  $i=2$ , **lowest**  $i=1$ )  
set national carbon prices (result in  $U^i_{dec}$ )
- **EU-level (Stackelberg): Pareto-improvements**  
( $U^i \geq U^i_{dec}$  and  $U^{j \neq i} \geq U^{j \neq i}_{dec}$ )

**When is an equal per capita transfer and a uniform EU price ( $T$ ) incentive compatible?**

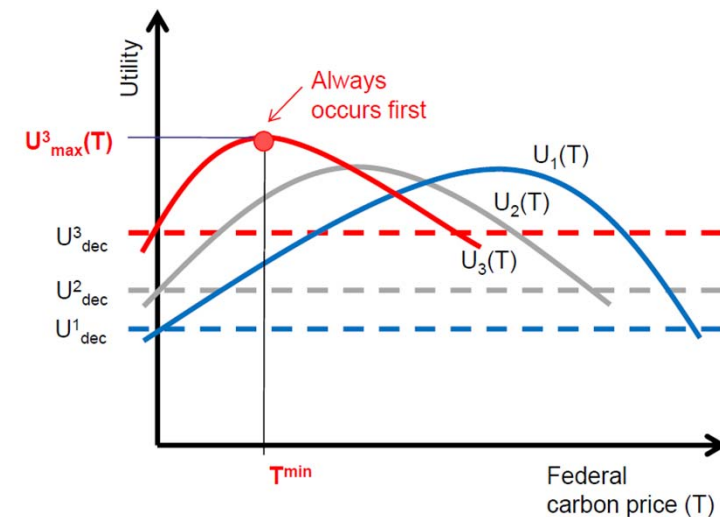
**The richest state** ( $i=3$ ) has the highest mitigation cost due to largest transfers, but

- agrees on equal per capita transfers,
- as long as  $T^{min}$  maximizes its utility.

→ **Defines minimum price.**

**The poorer states** ( $i=2,3$ ) **always benefit**, due to

- income increase by transfers,
- externality internalization.



Based on Rooffs, Gaitan, Edenhofer

## Implementation rule

# Set a minimum price and provide appropriate transfers

**A minimum carbon price** can help

- to address the challenges associated with the **heterogeneity of States**
- while accepting a **non-optimal world and multilevel policies.**

With an EU-wide minimum carbon price, **transfers must not necessarily be optimal to lead to welfare improvements for all states.**



## Conclusion

# EU and the design of multilevel climate policies

## EU ETS

- Equalizes marginal abatement costs,
- Member States' heterogeneity and national ambitions for higher mitigation-levels are not per se efficiently considered.

## Minimum price for the EU ETS – two advantages

- *Known argument: price stabilization effect*
- New argument: **can integrate more ambitious strategic Member States' policies** without undermining EU policy



## Conclusion

# Implications for an EU ETS reform

### Key elements

- **The Member States' heterogeneity**  
Consideration on **efficiency, solidarity and subsidiarity** grounds.
- **Companion policies: Appreciation and integration of multilevel climate policies**
  - Benefit from price (or hybrid) instruments on the EU level.
  - **Transfer design represents institutional tipping point.**

### → **Pareto-improvements are possible**

with a **minimum price, simple transfers** and strategic states.

- **If the EU's laboratory for climate policy multilateralism succeeds, it can facilitate positive signals to the global challenge.**