Welfare implications of EU effort sharing decision and possible impact of a hard Brexit

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Introduction

Last developments in EU climate policy

- In December 2015 at COP21, the EU is committed to a binding target of an at least 40% domestic reduction in GHG emissions by 2030 compared to 1990.

- In June 2016, the UK voted to leave the European Union.

- In July 2016, the EC presented its proposal for a regulation to reduce GHG emissions in sectors not covered by the emissions trading system (ETS) with regards to post-2020 binding targets called *Effort Sharing Decision* (ESD).

Questions:

1. What are resulting cost by Member States of this EU Effort Sharing Decision?

2. What are the impact of the Brexit on the UK and European climate policies?
Assumptions:

1. **A safety emissions budget** \( Bud \) is distributed among the Member States. Let \( \theta_j \in (0, 1) \) be the share of Member State \( j \), with \( \sum_{j=1}^{m} \theta_j = 1 \).

2. **A competitive market for emissions permits**, which clears at each period. Let \( \omega^t_j \) be the vector of permits for Member State \( j \) at period \( t \).

Model: Then we consider the game where each Member State \( j \) controls the permit allocations schedule \( (\omega^t_j : t = 0, \ldots, T - 1) \) with \( \Omega^t = \sum_{j=1}^{m} \omega^t_j \) and tries to achieve

\[
\min_{\omega_j} \left\{ \sum_{t=0}^{T-1} \beta^t_j (\Phi^t_j(e^t_j(\Omega^t)) + p^t(\Omega^t)(e^t_j(\Omega^t) - \omega^t_j)) \right\},
\]

subject to actions chosen by the other Member States and under the budget sharing constraint

\[
\sum_{t=0}^{T-1} \omega^t_j \leq \theta_j \text{Bud.} \quad (1)
\]

Here \( \Phi^t_j(e^t_j) \) represents the cost of abatement with respect to emissions by Member State \( j \), at time \( t \) and \( \beta^t_j \) a discount factor.
Numerical implementation and further assumptions

- $Bud = 99 \text{ Gt CO}_2$; Reference scenario = 173 Gt CO$_2$
- $\Phi_j^t(e_j^t)$ are estimated from 200 runs of the CGE GEMINI-E3

We assume full flexibility between ETS and non-ETS (one-off flexibility option)

We assume trading between non-ETS sectors (inter-Member State flexibility)

We assume inter-temporal flexibility between decades
- EC already defined ESD per Member State for years 2020 and 2030
- We have to define ESD for the whole period (2011-2050)
- CO₂ emissions targets: 2020 = -20%, 2030 = -40%, 2050 = -80%

![Graph showing Effort Sharing Decision rule](image)
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Computing the share of budget allowed to MS $j$: $\theta_j$

- We already defined $\theta_j^{ESD}$ the burden sharing for non ETS emissions
- We compute the $\theta_j$ with the following equation:

$$\theta_j = \frac{\gamma_j \theta_j^{ESD, Bud} + (1 - \gamma_j) \sum_t e_j^t \text{TAX}}{\psi \text{Bud}},$$

where

- $e_j^t \text{TAX}$, the emissions in an uniform tax scenario
- $\gamma_j$ is the share of emissions in non-ETS sectors
- $\psi$ a normalization factor (equal to 1.04)
Welfare cost in relation to GDP per capita

Welfare cost: discounted welfare cost in % of discounted household consumption

EU effort sharing decision and hard Brexit
UK and climate change policy

- UK was the second-largest European GHG emitter, with 518 Mt CO$_2$-eq emitted, representing 13.1% of EU28 emissions
- UK was the first G20 country to adopt legislation on GHG emissions
- According to the UK government about 1,000 power stations and industrial plants in the UK participate in the EU ETS
- UK Climate Change Act established a mandate of an 80% cut in GHG emissions by 2050
- As pointed out by Lord Nicholas Stern: “The UKs commitment on climate change is longstanding and based on a understanding that it is global issue and should not be altered by its future departure from the European Union”
We consider two options:

- Hard Brexit: no access to EU emissions trading
- Third access status: UK participates to the EU emissions trading but without ESD (i.e. UK budget = UK domestic commitment)

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<thead>
<tr>
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Change in welfare cost (billion US $) = –

| EU discounted welfare cost† | 1.17 |

† in % of discounted household consumption
EU climate change policy and Brexit options

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*Note: EU effort sharing decision and hard Brexit*
Conclusion

- Using a meta-game approach it is possible to analyse the ESD
- With the ESD, high-income European countries pay for low-income European countries
- A hard Brexit would induce a welfare cost of UK climate policy ($\approx 43$ billion US $)
- A soft Brexit (i.e. a “third access status”) would moderate UK cost ($\approx 34$ billion US $)
- Within the Brexit scenarios MSs that are net sellers of permits (new Ms) suffer from less revenue and, in contrast, net buyers experience some benefits
- Brexit will divert EC from climate policy in short and mid term
  - EC will look after the Brexit during several years
  - Brexit reinforces the leadership of Germany that accounts now for $1/4$ of CO$_2$ European emissions
  - But also other countries that are less sensitive to climate policy (Eastern countries)