

Climate policy, interconnection and carbon leakage: The effect of unilateral UK policy on electricity and GHG emissions in Ireland

John Curtis,^a Valeria Di Cosmo,^b and Paul Deane^c

The paper contributes to the existing literature on CO₂ leakage by illustrating that unilateral climate policies have the potential to cause perverse outcomes through carbon leakage. We analyze the effect of the carbon price floor (CPF) implemented by the UK in April 2013 using a simulation model, PLEXOS, of the Irish (SEM) and the BETTA electricity markets.

Even if Northern Ireland was exempt from the CPF in recognition of energy security issues, our work finds that BETTA's CPF has the potential to have significant spill-over into the SEM due to the interconnection between the SEM and the BETTA markets. In particular, we find that the CPF can be very effective in decarbonising electricity generation in the GB and Ireland but total emissions within the EU ETS will remain unchanged. However, we also found that the electricity prices in Ireland will increase as a result of the unilateral GB policy.

Our simulation projections for 2016 are that GB's CPF will result in the SEM electricity price increasing by 2.4% and emissions increasing in both NI and ROI by 4.2%

a Economic and Social Research Institute, Sir John Rogerson's Quay, Dublin 2, Ireland; and Trinity College Dublin, Dublin 2, Ireland. Corresponding author. Contact: john.curtis@esri.ie

b Economic and Social Research Institute, Sir John Rogerson's Quay, Dublin 2, Ireland; and Trinity College Dublin, Dublin 2, Ireland.

c Energy Policy and Modelling Group, Environmental Research Institute, University College Cork, Cork, Ireland.

and 7.8% respectively, given our model assumptions. The increase in SEM emissions is directly attributable to carbon leakage from the BETTA market. A carbon price floor in the BETTA market leads to a reduction of 2.3% in GB emissions, which contributes to the UK government's ambition to move to a low carbon economy. The UK's unilateral carbon policy has a clear and significant impact on adjoining energy markets. Policy ambitions within the Republic of Ireland (SEM without Northern Ireland) to decarbonise the electricity sector will become more difficult. There is also a negative welfare impact with Irish electricity consumers paying more for electricity. In the SEM market the marginal dispatching generation plant sets the marginal price, which in the case of a CPF will be a more expensive generation plant that is dispatched to supply exports to GB. On the contrary generation companies within the SEM will benefit through higher electricity prices. The UK's unilateral climate policy has negative impacts on neighbouring countries both in terms of prices and carbon leakage. An EU-wide rather than unilateral approach may be less distorting.

An unanticipated result of the analysis is that emissions from the SEM and BETTA markets combined declined by 1.2%. This result is attributable to more efficient electricity generation across the two markets, rather than directly attributable to the UK's policy choice. However, in the wider context of the EU-ETS the GB's CPF will not affect the number of ETS allowances. Any reduction in emissions in the SEM or BETTA markets has the potential to be offset by increased emissions elsewhere in Europe. The UK's unilateral policy has no global impact on emissions. If the policy objective is to reduce emissions, any measures to increase the price of carbon must be integrated with the EU-ETS scheme.

When the CPF was initially proposed the CPF was intended for the entire UK including NI. Had the CPF been actually implemented in NI, dispatching generation plant in NI would increasingly set the SEM's marginal price and simulations suggest that Irish

electricity prices would increase by 20% (The SEM price is common to both ROI and NI). A CPF within the SEM is still a policy option and as a carbon abatement policy option would be quite attractive. A ROI CPF would reduce emissions from the electricity sector by 17.3% and raise tax revenues for the Irish Treasury of some €260 million, which is not insignificant in the context of austerity budgets.

Analyzing the effects of the CPF on the electricity prices, we found that the implementation of the CPF would significantly reduce business competitiveness and household welfare, with electricity prices rising by roughly 17%. The analysis here is based on the assumption that interconnection capacity between the SEM and BETTA markets is used optimally and that the interconnection flows between GB, France and the Netherlands are kept constant and equal to their historical levels. However, empirical evidence indicates that interconnector transmissions capacity auctions are persistently undersubscribed, and transmissions rights acquired are not fully used, and also that there are significant power flows against the efficient price spread direction.

While some of those issues can be attributed to factors such as intermittent wind, strategic behaviour by dominant firms is also suspected. The implication for the analysis here is that the model projections on interconnector flows are upper bound estimates of potential trade and carbon leakage between markets. Market rules that hinder trade on the interconnectors are a barrier to carbon leakage.

The EU is currently discussing a proposal to postpone (i.e. 'back-load') or potentially cancel ETS allowances as a measure to support allowance prices and thereby reduce emissions. Because of the relatively high floor price in the GB CPF compared to the expectation of ETS allowance prices under the EU proposal (€27 versus €12) our analysis suggests that back-loading will have only minimal additional effect on the electricity sector in

the UK or ROI. But the GB's CPF will not reduce aggregate emissions either in the EU or globally, as it will not have any effect on the total allocation of emission allowances in the EU-ETS. The policy may improve the carbon intensity of the electricity generation sector in the UK but total emissions within the EU-ETS will not be reduced.