JOINING A CARBON-POLICIES COALITION: FLEXIBLE MECHANISMS, COMPETITIVENESS AND ANTI-LEAKAGE INSTRUMENTS IN EUROPE

Christoph Böhringer, University of Oldenburg, +44 17984102, boehringer@uni-oldenburg.de
Brita Bye, Statistics Norway, Research Department, +47 62 88 50 00, Brita.Bye@ssb.no
Taran Fæhn, Statistics Norway, Research Department, +47 62 88 60 00, Taran.Faehn@ssb.no
Orvika Rosnes, Statistics Norway, Research Department, +47 62 88 60 00, Orvika.Rosnes@ssb.no

Overview

The EU 2030 climate and energy framework (EC, 2014) includes targets for greenhouse gas emissions for sources embraced by the Emission Trading System (ETS) as well as for those outside of the ETS. Emissions mitigation efforts can, however, be counteracted by carbon leakage. For this reason, the EU has introduced anti-leakage policy for the most trade-exposed ETS industries. The 2030 climate and energy framework does also allow for non-EU associates and the non-member Norway has decided to link its climate policy to EU's. This paper takes a look at costs and benefits of such a strategy for a small, open economy. In this context, we also include an analysis of the particular rules designed to limit carbon leakage and whether anti-leakage instruments are beneficial for the competitiveness of the trade-exposed industries involved, and what are the repercussions for other industries. The framework in EC (2014) opens for interactions among non-ETS (NETS) sources across borders and between the ETS and NETS sectors, so-called flexible mechanisms. The designs and the coverage of such mechanisms will be important for the costs of the 2030 goals. Within the EU 2030 framework, existing instruments that are designed to dampen carbon leakage are intended to be prolonged. While border carbon adjustments as carbon tariffs and export rebates have been frequently on the agenda (Fischer and Fox, 2012), the main compensation arrangement in the EU ETS system is free allowances. The revised ETS Directive also allows for national state aid schemes that compensate the most exposed industries for increases in electricity costs as a result of the EU ETS.

We analyse the economic costs, carbon leakage and competitiveness effects of the 2030 emissions caps under different flexibility regimes for both the EU and the small, open economy Norway. Moreover, we identify the impacts of anti-leakage policies, including the intended compensation policies for the years to come. These include the mechanisms already in use in the EU ETS: free allowances and financial compensation for indirect costs of CO_2-emissions in the electricity market (higher electricity prices) for energy intensive industries. Two aspects are analysed. First, they are compared to other instruments recommended in the literature (Fischer and Fox, 2012). Second, we scrutinise whether, as common sense seems to suggest, competitiveness and carbon leakage solutions go hand in hand, which need not be true (Böhringer et al., 2015).

Methods

We use a three-region (Norway, the EU, rest-of-the-world (RoW)), multi-sector CGE model of global trade and energy established for analysing carbon emission control strategies (see e.g. Böhringer et al., 2010). The CGE model is based on the GTAP 8.0 dataset, which includes detailed national accounts on production and consumption (input-output tables) together with bilateral trade flows and CO_2 emissions for up to 112 regions, including Norway, and 57 industries (Narayanan et al., 2012). CGE models build on general equilibrium theory that combines equilibrium assumptions with behavioural modelling of rational economic agents. The model features one representative agent in each region that receives income from the three factors: labour, capital, and fossil-fuel resources. Labour and capital are mobile across industries *within* a region, but immobile *across* regions. Fossil-fuel resources (coal, oil and gas) are specific to the respective extraction industries of each region. Final consumption in each region is determined by the representative household who maximizes welfare subject to its budget constraint with fixed investment (i.e., a given demand for savings) and exogenous government provision of public goods and services. The dataset includes all major primary and secondary energy carriers: coal, crude oil, natural gas, refined oil products, and electricity. We separate the main emission-intensive and trade-exposed industries: chemical products, non-metallic minerals, iron and steel products, and non-ferrous metals. CO_2-emissions are linked in fixed proportions to the use of fossil fuels, with CO_2-coefficients differentiated by the specific carbon content of fuels. The model also includes process emissions linked to output.

Our *Baseline* scenario for 2030 is based on continuing the energy and climate policy as before the 2030 framework was launched. We look at three *Framework* scenarios, F1, F2 and F3. In all the *Framework* scenarios, the EU needs to cut its 2030 emissions from the *Baseline* with 10% to meet its commitments. F1 assumes full cross-border and cross-industry flexibility within the two sectors, but no flexibility across EU ETS and NETS. This results in different CO_2-prices in the markets for ETS and NETS. F2 simulates the extreme flexibility regime with full allowance trading among countries and across ETS and NETS sectors, which will result in a common carbon price for all EU emissions sources. F3 allows for full trading in the ETS, but no trading across countries in NETS, nor across the two sectors. This gives a common price in ETS, but country specific prices in NETS. In all scenarios, Norway is modelled as part of the EU. We then look at the impacts of the various components of the anti-leakage and competitiveness policies and how they interact.

Results

Our preliminary results indicate that using flexibility mechanisms in NETS will significantly reduce the abatement costs for the coalition as a whole and for Norway, in particular. Abatement costs do, for instance, more than halve from the non-flexible scenario F3 to F1 and are cut significantly more to the fully flexible F2. We also find that EU's anti-leakage policies seems to be relatively costly for the economy as a whole, but mostly, but not always, benefit the individual industries involved. Nevertheless, there is not necessarily a correlation between carbon leakage and competitiveness losses. For Norway acting alone, anti-leakage policies do not necessarily improve competitiveness of domestic trade-exposed industries. We find quite heterogeneous effects from industry to industry, depending on their electricity intensity and embodied emissions in imports and export shares. Least profitable for the exporting industries are border carbon adjustments, though they more effectively alleviate carbon leakage than the options used in the EU today. Anti-leakage policies tend to shift abatement from reducing the output in emission-intensive industries to reducing their energy input. However, when process emissions are accounted for, the emissions from process industries will respond less and abatement costs amplify.

Conclusions

In this paper we analyse different ways to operationalize EU's and Norway's greenhouse gas mitigation commitments for 2030. We analyse the economic costs of the caps under different flexibility regimes, and the interplay between the flexibility of carbon policies and anti-leakage policies, which include the two main instruments of the EU: free allowances and financial compensation for indirect costs of regulated CO_2-emissions in electricity generation. Our preliminary results show that flexibility is even more crucial for keeping down Norwegian than for EU's abatement costs. We also find that EU's anti-leakage policies seems to be relatively costly for the economy as a whole, but mostly, but not always, benefit the individual industries involved. In the wake of the Paris agreement, carbon leakage will be far less topical, as a much larger share of global emissions will be subject to some sorts of caps. Expectedly, motivating policy measures by their anti-leakage effect will be less legitimate, yet still tempting, as different (shadow) prices of the caps in different regions will mean loss of competitiveness for ambitious countries like the European ones.

References

Böhringer, C. and K. E. Rosendahl (2010): Green Promotes the Dirtiest: On the Interaction between Black and Green Quotas in Energy Markets. Journal of Regulatory Economics, 37 (3), 316–25.

Böhringer, C., A. Müller, J. Schneider (2015): Carbon Tariffs Revisited, Journal of the Association of Environmental and Resource Economists, 2 (4) 629-72.

EC (2014): A Policy Framework for Climate and Energy in the Period from 2020 to 2030, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2014) 15 final, European Commission, Brussels, 22.1.2014, https://ec.europa.eu/energy/en/topics/energy-strategy/2030-energy-strategy

Fischer, C., Fox, A. K. (2012), Comparing policies to combat emissions leakage: Border carbon adjustments versus rebates, *Journal of Environmental Economics and Management*.

Narayanan, G.B., A. Aguiar, R. McDougall (2012): Global Trade, Assistance, and Production: The GTAP 8 Data Base. Center for Global Trade Analysis, Purdue University

UNFCCC (2015): Adoption of the Paris Agreement. Proposal by the President. Conference of the Parties Twenty-first session Paris, 30 November to 11 December, 2015.