Assessing Shocks and Overlapping Policies in the EU ETS – Can the Reform Live up to its Promises?

Martin Hintermayer*, +49 221 27729-303, martin.hintermayer @ewi.uni-koeln.de
Lukas Schmidt*, +49 221 27729-325, lukas.schmidt@ewi.uni-koeln.de

*Department of Economics and Institute of Energy Economics, University of Cologne

Overview

The European Commission (EC) has confirmed the European Emission Trading Scheme (EU ETS) as the cornerstone for abating greenhouse gas (GHG) emissions within the European power sector, energy-intensive industries as well as commercial aviation by implementing extensive amendments. Besides tightening the emission cap by reducing the issued allowances in phase IV (2021-2030), three major components have been added to the EU ETS: First, the Market Stability Reserve (MSR) is implemented to control the volume of allowances in circulation. Second, the MSR is complemented by a cancellation mechanism (CM) from 2023 on which limits the volume of the MSR to the previous' years auction volume. Third, nation states are explicitly allowed to adjust the volume of issued allowances in phase IV in case they close down electricity generating facilities (e.g. via a national coal phase-out). Besides strengthening the short-term carbon price signal, the major goals of this reform are to make the EU ETS more resilient towards demand shocks as well as to make it more compatible with overlapping policies.

We base our work on the previously developed theoretical model of the EU ETS (compare Bocklet et. al. 2019) which considers the behavior of market participants and depicts the new regulation adequately. The paper at hand analyses the robustness of the reformed EU ETS towards demand shocks as well as its compatibility and interactions with overlapping policies on a supranational and a national level, e.g. a European Carbon Price Floor – CPF vs. e.g. coal phase-outs with and without adjusting the volume of issued allowances. A focus is set on the timing of demand shocks as well as the introduction of overlapping policies and its impact on aggregate cancellation and carbon price development.

The main contribution of this paper is to extend the existing literature on robustness, CPF and overlapping policies of the reformed EU ETS (compare e.g. Perino et al. 2019, Newbery et al. 2018, Beck/Kruse-Andersen 2018 and Carlen et al. 2018) by an model-based assessment considering individual decision-making within the regulatory framework of the EU ETS.

Methods

The model used is derived from cost-minimizing decision making of firms within perfect markets. Assuming symmetric price-taking firms, the model depicts the market clearing and equilibrium conditions as well as an exact replication of the current EU ETS regulations in a mixed integer linear program. The price development follows the Hoteling rule as long as there are allowances held on private accounts.

Abatement costs are approximated by a quadratic cost function which is parametrized with an assumption of counterfactual emissions which reflect emissions without abatement efforts induced by the EU ETS and a cost parameter defining the slope of the marginal abatement costs (MAC). Negative demand shocks e.g. as a result of an economic crisis are modeled as a temporary reduction of counterfactual emissions and an adjustment of the cost parameter increasing the slope of the MAC. The European CPF is modeled as a price premium for GHG emissions on top of the carbon price within the EU ETS, this follows the UK implementation of a CPF via an additional carbon tax. As a result, allowances which are not used due to the CPF are treated as if they are in the TNAC, i.e. they are issued to the market but remain unused. The allowance demand reduction of overlapping national policies is depicted via a permanent reduction of counterfactual emissions and an increase in the slope of the MAC.

Results

The implementation of the MSR and the CM have a rather low impact on carbon prices in the model, increasing the prices by about 15% and reducing total emissions by about 5%. The new EU ETS design dampens demand shocks via the dynamic adjustment of the available allowances via the CM, the introduction of the MSR without the CM does not reduce the impact of demand shocks. Nevertheless, the CM becomes only active if the demand shock occurs early on, later demand shocks do not impact the aggregate cancellation volume of the CM. The reason is the constant threshold for the intake of allowances into the MSR which becomes a non-binding constraint since the MSR effectively

reduces the private banking in the short term. Resulting from an overall tightened emission budget, demand shocks under the reformed EU ETS design without additional cancellation rather amplify the price impact of demand shocks in the long-run contradicting the underlying goal of the reform.

Further, we assess the impact of the introduction of a CPF on cancellation, depending on the timing of the introduction as well as the announcement. If the introduction is credibly announced beforehand, the introduction of a CPF has an impact on carbon prices before its introduction since firms anticipate future carbon prices. In line with the findings regarding demand shocks, the earlier a CFR is credibly announced or introduced, the larger its impact on cancellation volume resulting from the CM and, hence, its impact on carbon prices.

Overlapping national policies (such as regional price floors, national subsidies for renewables or coal-phase outs) only have an effect within the EU ETS if the emission budget is at least partly reduced. A reduction of the emission budget can be either an automatical adjustment via the CM or the result of additional national cancellation in case of the closure of electricity generation capacity (e.g. a coal phase-out). The CM, in analogy to demand shocks, has only a notable effect on total aggregate emissions if overlapping policies are implemented until the mid-'20s. Otherwise, the possibility of a national cancellation of allowances in case of closure of electricity generation capacity should be realised for ensuring a net impact on total emissions. Though, the costs of additional abatement could be reduced by allowing the cancellation of allowances without the closure of electricity generation capacity via overlapping national policies.

Conclusions

All in all, we find that the reform of the EU ETS is not fully feasible to fulfill its underlying goals of strengthening the short-term price signal, increasing the robustness of demand shocks as well as the compatibility with overlapping policies.

Under the perfect market assumption, we observe only a slight price increase following the reform. Nevertheless, market failures (e.g. transaction costs) or firm constraints (e.g. hedging requirements or short-sightedness) may increase the fundamental price effect of the reform.

The introduction of the MSR increases the robustness of the EU ETS towards shocks if the aggregate emission budget is adjusted by the CM. As the CM is sharp until the mid-'20s and loses its relevance afterward, the reform of the EU ETS increases robustness with respect to demand shocks only in the short-run. An adjustment of the thresholds for the intake into and the market reinjection from the MSR would increase the shock robustness also for the long-run.

A European CPF impacts the overall emission budget if introduced or announced credibly early on. The CM and the possibility of canceling allowances are a first step to increase the compatibility of the EU ETS with overlapping national policies. The possibility of national allowance cancellation should be expanded from the specific case of coal phase-outs to other overlapping national policies, such as national CPF's as well as RES subsidies. Though, the cost-efficient solution of additional abatement would be a national allowance cancellation without specifying the allowance demand reduction via overlapping policies. Such national interventions on the allowance supply of the EU ETS without adjusting the allowance demand have distributional effects among participating countries. The realization of its political implementation calls for compensation mechanisms. A thorough assessment of such mechanisms remains a research question.

References

Bocklet, J., Hintermayer, M., Schmidt, L. and Wildgrube, T. (2019): The Reformed EU ETS - Intertemporal Emission Trading with Restricted Banking, EWI Working Paper No 19/04

Perino, G., Ritz, R. A. and van Benthem, A. (2019): Understanding overlapping policies: Internal Carbon Leakage and the punctured waterbed effect. Working Paper 25643, National Bureau of economic research.

Newbery, D., Reiner, D. M. and Ritz R.A. (2018): When is a carbon price floor desirable? EPRG Working Paper 1816, University of Cambridge.

Beck, U. R.. and Kruse-Andersen, P. (2018): Endogenizing the cap in a cap-and-trade system: assessing the agreement on EU ETS phase 4. Working Paper, De Okonomiske Rads Sekretariatet.

Carlen, B., Dahlqvist, S. M. and Marklund, P. (2018): EU ETS emissions under the cancellation mechanism: Effects of national measures. Working Paper No 151, National Institute of Economic Research.