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Politics matters: Regulatory events as catalysts for price formation under cap-and-trade

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ABSTRACT

This paper investigates how the political process of making cap adjustments has shaped market outcomes in the world's largest cap-and-trade system – the EU ETS. Capitalizing on an event study method that incorporates an econometric technique designed to handle parameter instability and model uncertainty, we assess the news-implied price response to 29 hand-collected announcements about the EU ETS supply schedule. Our findings document a high market responsiveness to political events and reveal how market participants view the evolution of cap stringency in the light of a particular announcement. We provide evidence that a sequence of strong event-induced price drops evolve in the backloading decision process, which is consistent with the interpretation that market participant's confidence in the political support for reform, and probably the EU ETS in general, has been unsettled. We also document positive price reactions to the 2020 and 2030 policy packages, but not the 2050 roadmaps.

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Introduction

A major source of uncertainty in any cap-and-trade program with a long-term emissions reduction objective is that the regulatory framework of the government-created market can change over time. This regulatory risk stems primarily from features of the cap-setting process in the real-world political environment. In virtually all emissions trading programs, the stringency of long-term targets remains uncertain since caps are typically only specified sequentially for the multiple commitment periods of the program. For instance, in the EU ETS, targets are only legislated until 2020 and the legislated linear reduction factor of 1.74%, that determines the cumulative cap, is not consistent with politically declared long-term targets for 2050.¹ Operational experience with cap-and-trade programs thus highlights that the allowance supply schedule is not static but subject to potential policy revisions. The recent EU decision on 2030 targets is an example of an adjustment of the medium-term cap in the EU ETS as part of the periodic updating of the long-term cap. At the same time, due to the

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¹ If the linear reduction factor (LRF) of 1.74% p.a. is continued until 2050, a 73% emissions reduction (cumulative cap) will be achieved by 2050 in the EU ETS. Yet, the 2050 Roadmaps, which provide the long term perspective on EU climate policy, envisage a 90% reduction in the EU ETS for 2050 (EC, 2011). The latter would require a LRF of 2.4%. Recently, the Commission has proposed a revised LRF of 2.2% from 2021 onwards which would be consistent with a 84% reduction (EC, 2014).

inflexibility of most cap-and-trade designs to adjust the legislated caps within each commitment period to current contingencies (e.g. severe economic shocks), there seems to be an immanent risk of short-term policy interventions in the policy program. A prime example for such an ad hoc intervention is the so-called EU “backloading” decision to postpone the auctioning of 900 million allowances in the third commitment period of the EU ETS.

This paper points to underappreciated consequences of the political uncertainty inherent in the cap-setting process of long-term emissions trading programs. We show that feedbacks from political events to allowance price formation are of major relevance to our understanding of the related commitment problems in cap-and-trade programs. It is widely recognized in the literature (e.g. [Newell et al., 2014](#)) that there cannot be full market confidence in political commitments of both cap-and-trade programs (i.e. the number of allowances available) and carbon taxes (i.e. tax rate).² This situation reflects the trade-off between commitment and flexibility, which confronts policymakers with a classic time-inconsistency problem and ex-post incentives to renege on ex-ante commitments ([Kyland and Prescott, 1977](#)). However, we argue that the commitment problems resulting from political uncertainty can have different impacts on the performance of cap-and-trade programs compared to conventional regulation or tax instruments.

To understand the central role of regulatory events in a cap-and-trade market with intertemporal flexibility (i.e. the ability to bank unused allowances) but limited commitment, we turn to a seminal paper by [Salant and Henderson \(1978\)](#) for theoretical motivation. Their Hotelling-type anticipation model guides our investigation, since it predicts that news becomes a pivotal element of expectation formation if market participants are exposed to an ongoing risk of regulatory intervention that would drastically affect prices. The important prediction in the ETS context is that any announcement that affects market's estimate of the odds of a cap revision will trigger sharp price jumps, irrespective of whether the contemplated change actually happens ([Salant, 2015](#)). Thus, mere speculation about the political commitment to the indicated cumulative cap might influence market outcomes. In sharp contrast, with a tax instrument, such a price feedback from policy debates will not occur, even if market participants anticipate a change in the tax rate ([Murray et al., 2008](#)).³

Empirical research in environmental economics has overlooked the feedback from political events to allowance price formation.⁴ The standard approach in the literature is well represented by [Hintermann \(2010\)](#), who derives a reduced-form model that explains allowance prices as a function of marginal abatement costs. Such fundamentals-based models, however, explain only a minor part of the observed price variation.⁵ More importantly, they do not explain the precipitous price breaks that have occurred. Our study is the first comprehensive investigation of whether and how prices respond to regulatory announcements in the world's largest cap-and-trade system – the EU ETS. Based on the premise that regulatory risk is a key ingredient of expectation formation, we hypothesize that policy events can account for the existence and timing of price jumps. On this reasoning, we quantify the news-implied price response to 29 supply-side announcements in the EU ETS during the period 2008 to 2014.

The European cap-and-trade program is particularly well suited for the analysis.⁶ In response to severe demand shocks, a series of proposals and decisions have been announced with the objective of restoring the stringency of the EU ETS cap. This provides us with a unique sample of policy events. They are divided into two categories. The first relate to backloading policy. Backloading constitutes a cap-neutral adjustment with respect to the cumulative cap: fewer allowances (900 million) are accessible at auctions in the short-term (2014–2016), but allowances come back to auctions in the mid-term (2019–2020). The second event category relates to the periodic updating of medium- and long-term caps. In contrast to backloading, these announcements refer directly to the degree of ambition of European climate policy (determined by the 2020, 2030 and 2050 targets, respectively). They provide information about the stringency (rather than the timing) of the cumulative cap. The goal of our study is to present a careful analysis of how the political process of making cap adjustments has shaped market outcomes in the EU ETS.

We capitalize on the event study literature to design an estimation strategy that allows measuring the price reaction to regulatory announcements. Event studies have become the standard method in economics and finance of investigating event-implied price responses ([MacKinlay, 1997](#)). Conceptually, these studies disentangle the price change that would be expected if the analyzed event had not taken place (normal return) and the price change that is caused by the event of interest (abnormal return). The challenge is to identify a credible return-generating process, that is, a tenable estimate of the normal return benchmark in the EU ETS. To mitigate the ubiquitous bad model problem of event studies, we apply an innovative Bayesian approach designed to handle parameter instability and model uncertainty. The dynamic model selection (DMS) approach developed in [Koop and Korobilis \(2012\)](#) not only allows the return-generating model to change over time, but also allows coefficients in each model to evolve. Using this state-of-the-art method, enables us (i) to combine a set of 10 potential predictors that lead to 1024 possible prediction models and (ii) to identify the best-performing return-generating process at each point in time.

Our main findings are as follows: first, we present tangible evidence that regulatory events associated with cap adjustments can explain the precipitous price jumps that have occurred in the EU ETS. Second, we find that backloading policy in the EU ETS did not attain its objective to anchor higher price expectations by temporarily withdrawing allowances. Rather, we document an event-induced price cascade downwards. For example, the market reaction to the Commission's

² See [Brunner et al. \(2012\)](#) and [Helm et al. \(2003\)](#) for an overview.

³ However, it is important to note that in the case of a lower expected tax, market participants will probably also adjust their shadow price and investment behavior accordingly.

⁴ Notable exceptions are [Mansanet-Bataller and Pardo \(2009\)](#) and [Conrad et al. \(2012\)](#).

⁵ See for example [Alberola et al. \(2008\)](#); [Koch et al. \(2014\)](#); [Hintermann et al. \(2016\)](#).

⁶ See [Convery and Redmond \(2013\)](#); [Ellerman et al. \(2016\)](#); [Knopf et al. \(2014\)](#) for more general reviews of the EU ETS.

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