Michael Pahle and *Ottmar Edenhofer**

Discretionary Intervention Destabilizes the EU Emissions Trading System: Evidence and Recommendations for a Rule-Based Cap Adjustment

ABSTRACT

The EU is currently preparing a major overhaul of its climate policy framework to deliver on the Green Deal's new climate targets of a 55 percent cut in greenhouse gas (GHG) emissions relative to 1990 by 2030 and GHG neutrality by 2050. Extending and strengthening the role of carbon pricing, implemented through the EU Emissions Trading System (EU-ETS), will play an important role in this framework. Accordingly, the design and governance of the EU-ETS will be ever more crucial. In this article, we focus both on the 2018 EU-ETS reform as the first step on a slippery slope of increasing discretionary intervention and on the upcoming reform risks reinforcing this trend. In their seminal work, Kydland and Prescott (1977) caution against such interventions, because of their ability to destabilize the market and engender recurring interventions. This limits the capacity of policymakers to credibly commit to long-term targets, which undermines the dynamic efficiency of intertemporal emissions trading systems like the EU-ETS. To counteract this trend, we provide recommendations for rule-based adjustments to the EU-ETS.

To implement the Green Deal, the EU is currently preparing a major overhaul of its climate policy framework. The Green Deal is the bloc's masterplan for transitioning to a sustainable economy in this decade and beyond. As a first step, the EU Council agreed in December 2020 to increase its long-term climate targets, and now aims for a 55 percent reduction in greenhouse gas (GHG) emissions relative to 1990 levels by 2030, and GHG neutrality by 2050. The second step is to open up the entire climate and energy package for revision and subsequent reform. In summer 2021, the European Commission (EC) will publish its proposals for a revision of the full range of climate measures, most crucially the Emissions Trading System Directive (EU-ETS Directive) and the Effort Sharing Regulation (ESR). Although the EU's ambitions require urgent action, decisions must be well informed and economically prudent – especially since this set of reforms will set the direction of policy architecture for decades to come.

INTRODUCTION

The impact assessment[1] (IA) accompanying the EC's Climate Target Plan 2030 already alludes to policymakers' preference for a broad policy mix. The IA analyzes various future policy architecture scenarios, of which the three main ones describe differing roles for carbon pricing and other policies and measures (see Table 1). In the "CPRICE" scenario, a new economy-wide ETS would be the centerpiece of the new policy architecture, eschewing regulation in favor of a market-based approach. In contrast, the "REG" scenario is based on a high intensification of policies and measures, implying a regulatory philosophy of "command and control". The "MIX" scenario, as the name suggests, sits in between, with no specific regulatory philosophy, and is expected to meet the least political resistance to implementation. This makes it the most likely path for future reforms (Knodt et al. 2020).

A major challenge in designing policy mixes, however, is to ensure coherence such that individual instruments complement rather than counteract each other. Moreover, a dedicated compliance mechanism is needed to ensure that policy targets are met, especially when the interaction between instruments is complex and their impact uncertain. If a policy mix is not appropriately designed and governed, future discretionary policy adjustments are very likely, especially if the policy mix has no clear-cut regulatory philosophy. The profound implications of such an approach to regulation were exposed by Kydland & Prescott (1977) in their seminal paper on rules vs. discretion. They showed that discretion can destabilize the market and lead to an iterative reform process that never converges. Discretion also implies that policymakers cannot make a

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[1] https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/impact_en.pdf

Michael Pahle

is Head of the "Climate and Energy Policy" working group at the Potsdam Institute for Climate Impact Research (PIK).

Ottmar Edenhofer

is Director of PIK, Director of the Mercator Research Institute on Global Commons and Climate Change (MCC), and Professor of the Economics of Climate Change at the Technical University Berlin.

credible commitment to long-term climate targets.

Yet long-term commitment is fundamental to the dynamic efficiency of intertemporal cap-and-trade programs like the EU-ETS. If credible, this commitment brings a degree of certainty regarding future reductions in the emissions cap, thus avoiding distortions in investment decisions, the hold-up problem and the inappropriate allocation of risk (Hepburn 2006). At the same time, regulators want the flexibility to be able to cope with future circumstances, which is why they prefer discretionary intervention to commitment (Hasegawa and Salant 2014). However, this can result in economic instability; for instance, firms may persistently mispredict the intervention's long-term impact on allowance prices, which may necessitate further corrective interventions in the future (Kydland and Prescott 1977). The anticipation of future corrections might create regulatory uncertainty which, in turn, might further distort allowance prices (Salant and Henderson 1978; Salant 2016). Contrary to their intention, then, discretionary interventions in cap-and-trade programs could have the perverse effect of destabilizing the allowance market.

Against this background, we first clarify the risks and implications of such discretionary interventions for the EU-ETS. We focus on emissions trading because of its relevance for EU climate policy and because its dynamic efficiency can be substantially impaired by such interventions. We discuss two examples: the 2018 EU-ETS reform and the 2020 German coal phase-out, the latter being a national measure that overlaps with the EU-ETS. We then provide recommendations for the further evolution of the EU-ETS in line with a rule-based approach, lending credibility to the EU's long-term commitment by removing the specter of future discretionary intervention.

DISCRETIONARY INTERVENTION IN THE EU-ETS

Historically, the main trigger of intervention in the market has always been the level of allowance prices. From an economic perspective, it is precisely this flexibility of allowance prices in response to supply and demand that constitutes its efficiency. If prices are very high, this reflects a high demand or sparse supply – and vice versa. Correspondingly, if the supply of allowances (i.e., the cap) is fixed, the allowance price adjusts itself to the marginal emissions abatement cost, ensuring that climate targets are met. However, the low price of allowances in the past have triggered a debate both about the proper functioning of the EU-ETS and its broader role in the policy mix (Flachsland et al. 2020). From a political perspective, this implies a risk of the program becoming insignificant, and political support may wane (Borenstein 2016). On the other hand, there might also be a backlash if allowance prices exceed a politically acceptable level (Borenstein et al. 2019).

In fact, "measures in the event of excessive price fluctuations" were already included in the 2009 reform of the EU-ETS.[2] This happened as a response to the sharp rise in allowance prices in 2008. However, in the subsequent years, such a rise never occurred again (see Figure 1), so these measures have as yet never been executed. Yet their very adoption is evidence that regulators are ready and willing to intervene in the market. This indeed happened later on, when prices dropped to levels that were far lower than expected (Ellerman, Marcantonini, and Zaklan 2016), triggering important interventions that adjusted supply by canceling allowances. At the same time, allowance cancelation has also been deployed at the member state level (Germany) to compensate for complementary climate policies. The following sections discuss these two interventions and their impacts in relation to Kydland and Prescott's findings.

[2] See Article 29a at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0029&from=EN.

Table 1

Main Policy Architecture Scenarios of the EC Impact Assessment

	Increasing role of carbon pricing		
	REG	**MIX**	**CPRICE**
ETS	Same sectoral scope	Extension to other sectors (including buildings and transport)	
Policies & measures	High intensification	Medium/low intensification	EE* and RES**: no intensification Transport: low intensification
ESR	Same sectoral scope	Same sectoral scope	ESR does not apply to buildings & transport

*EE=energy efficiency; **RES=renewable energy sources.

Source: Knodt et al. (2020) based on EC.

Cancelation of Allowances in the 2018 EU-ETS Reform

After the first historical high in June 2008, prices in the EU-ETS declined to relatively low levels and lingered there for several years (see Figure 1). Diagnosing a systematic imbalance in supply and demand, EU regulators started to take counteractions by first introducing the "Market Stability Reserve", a cap-neutral mechanism for moving allowances into and out of the market depending on the total number of allowances in circulation. Later, as part of the reform of the EU-ETS in preparation for the next trading phase (2021–2030)[3], they adjusted the cap by means of the so-called "Linear Reduction Factor", which progressively lowers the cap according to a predetermined path. At the same time, they strengthened the *Market Stability Reserve* by introducing the cancelation of allowances from 2023 onwards, which also indirectly affects the cap. The reform was signed into law in March 2018, and prices started to rally to levels nearing 30 EUR/t within a few months. Considering prices alone, it would appear that the reform delivered on rectifying the "diagnosed" supply–demand imbalance, as expectations of a lower supply in the future indeed led to an increase in prices, as economic theory suggests.

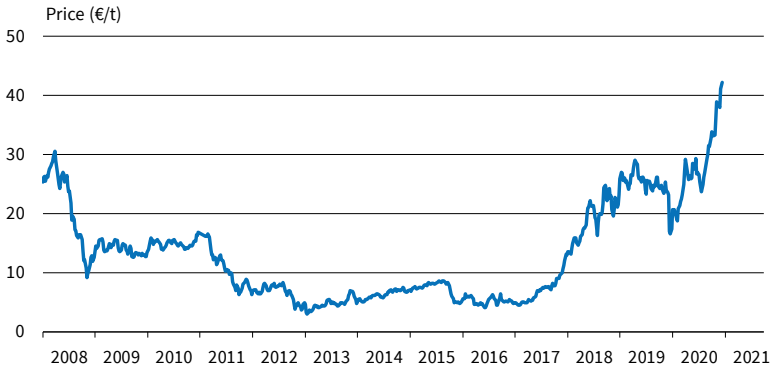
However, the central question here is not how prices responded, but how the reform affected market beliefs about the price impact of the reform and future interventions. Economic theory predicts that if market participants expect such interventions, intertemporal price formation becomes distorted (Salant 2016). Accordingly, because *Market Stability Reserve* cancelation rules are very complex (Perino 2018) and their effect on prices is very difficult for the market to predict, the reform may actually have destabilized the market. Notably, the *Market Stability Reserve's* complexity may have been deliberate, something which has been characterized as "smokescreen politics" (Wettestad and Jevnaker 2019), that is, making the distribution of costs obscure and diffuse and the probable benefits (a higher carbon price and therefore greater auctioning revenues for member states) more specific and closer in time. This will have helped to make the reform politically feasible, but at the cost of increasing price uncertainty.

Before proceeding, it is helpful to discuss whether the reform constituted a discretionary intervention or not. The answer is ambiguous. It was discretionary in the sense that the supply-demand imbalance triggered the 2015 reform (as described above), and influenced the 2018 reform. It was rule-based in the sense that the intervention was scheduled years ahead of its planned implementation, and changes to the market design were also rule-based – unlike the one-off (discretionary) cancelation of a certain number of allowances, for example. Yet, as mentioned, the complexity of the cancelation rules makes their impact on prices very hard to predict. This is underlined by the wide-ranging estimates of the number of allowances that will be canceled from 2023, from around 1 Gt to 13 Gt (Osorio et al. 2020).

[3] For more detail see: https://ec.europa.eu/clima/policies/ets/revision_en

Figure 1

EU-ETS Allowance Price



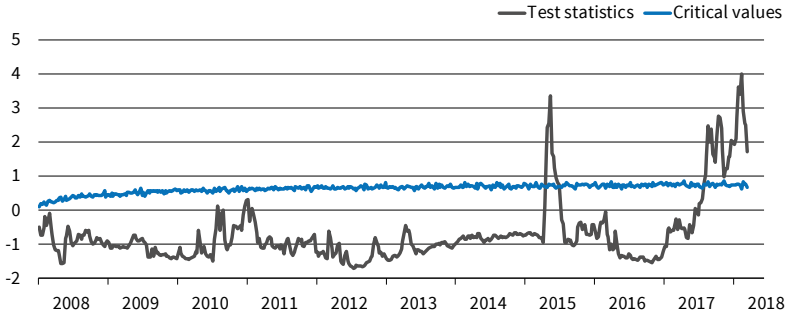
Source: Sandbag. © ifo Institute

It was against this background that we tested the hypothesis in a recent analysis (Friedrich et al. 2020) that the reform prompted market participants to persistently speculate about its price impacts, thereby destabilizing the market. For this analysis we employed the following empirical strategy. First, we used time-varying regression to analyze whether the price trend can be explained by a corresponding development in market fundamentals. Second, we conducted a statistical test to look for a period of explosive behavior, indicating an overreaction of the market (similar to what is observed during the inflationary period of a bubble), and whether it coincides with the date of the reform's adoption. Third, we modeled the episode using non-causal statistical processes to calculate the crash odds.

The results of the first two steps suggest that the reform indeed triggered a speculative overreaction about its price effects. The results of the time-varying coefficient model confirm that the upward trend cannot be explained by movements in market fundamental price drivers. However, it is picked up by the

Figure 2

Date Stamping of Explosive Episodes in Allowance Prices Using the BSADF (Backward Supremum Augmented Dickey-Fuller) Test



Note: Bootstrapped critical value series (blue) and test statistics (black). Sequences of test values above critical values indicate explosive episodes.
Source: Friedrich et al. (2020). © ifo Institute

trend component, which implies other price drivers. Correspondingly, we find evidence of explosive behavior beginning in March 2018, coinciding exactly with the time when the reform was signed into law. Finally, the upper estimates for the one-year-ahead crash odds after October 2018 (when prices peaked) are as high as 86 percent, which further supports the interpretation that the price rally was an overreaction of the market.

While these empirical results lend themselves to different explanations, the characteristics of the reform suggest that it has indeed destabilized the market. It must be noted that a process of adapting to a new equilibrium can also appear explosive (Harvey et al. 2016), although this would not result in market destabilization. However, it is questionable whether the market is now in a stable equilibrium, given uncertainties surrounding the cancelation volume, and therefore whether this explanation is applicable. Furthermore, while no rock-bottom price collapse has materialized (see Figure 1), there was a (partial) collapse from around 25 EUR/t down to around 15 EUR/t in November 2018. The price subsequently rebounded, but this might have been due to a conflation with further policy developments – the EC published its vision for a 2050 climate-neutral economy in November 2018. Moreover, in the course of 2019, it became clear that the EC would propose more stringent climate targets for 2030, implying a more stringent cap, and in December 2019, it published the EU Green Deal, which proposes a ratcheting up of long-term climate targets. This development may have counteracted further price drops.

The policy implications of these findings are as follows: While rules are preferred over discretion, it is important for the rules to be clear and transparent in terms of their impact on prices. If the market cannot predict their impact, it may destabilize price formation and induce volatility. With the EU-ETS increasingly becoming a financial market, such volatility might be compounded if noise traders are attracted (De Long et al. 1990). In fact, media reports suggest that the 2018 reform encouraged many financial players, such as investment banks and hedge funds, to enter the market. The findings also question the stability of the rule itself. Even if policy makers limit themselves to only adjusting the long-run cap, this could still induce substantial price volatility in the short term. If prices become politically unacceptable (too low or too high) as a result, policymakers may be unwilling to uphold the rule and intervene (see above). We return to this issue in the final section.

Alleviating the Waterbed Effect of the 2030 German Coal Phase-Out

The persistently low EU-ETS allowance prices throughout 2017 also had important implications for interventions at the member state level. Notably, Germany was bound to fall short of its ambitious national climate targets, not least because it failed to reduce its coal-based emissions. As a result, the so-called "Coal Commission"[4] was established to propose measures that would enable the country to meet its 2030 target for the electricity sector. The commission ultimately proposed a timeline for phasing out coal capacity, similar to the nuclear phase-out – rejecting the adoption of a national or EU-wide carbon price floor (Edenhofer and Pahle 2019).

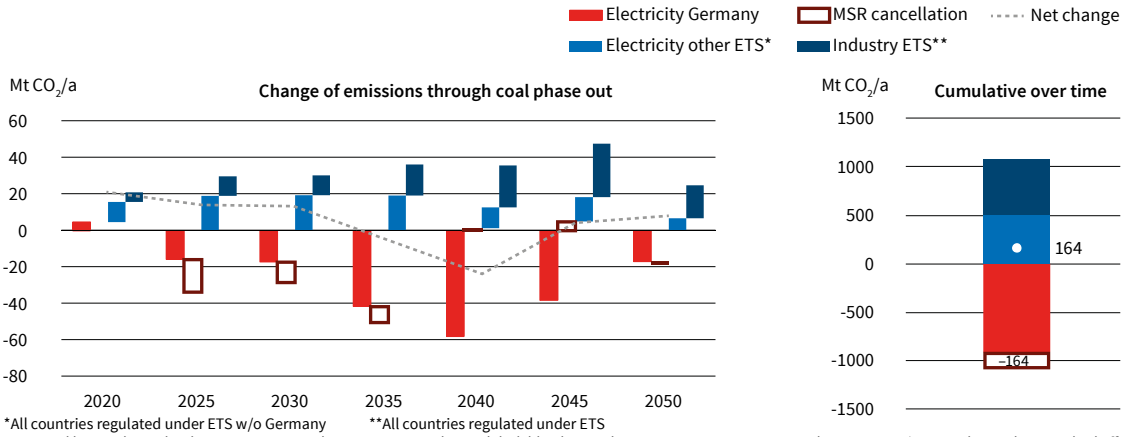
The specific policy aside, any national measure to phase out coal will necessarily overlap with the EU-ETS, leading to the so-called waterbed effect: with a given cap, policy-related emission reductions are neutralized by increased emissions elsewhere in the system. In anticipation of this effect, the 2018 EU-ETS reform included a provision (Article 12(4)) for the unilateral de-facto cancelation of allowances corresponding to the additional emissions reductions associated with Germany's coal phase-out. The cancelation was adopted as part of the Coal Phase-Out Act, which passed into German law in 2020.

As with the case of the *Market Stability Reserve,* this national cancelation mechanism can also be seen as a discretionary intervention. But an important difference is that the "rule" for determining the number of allowances to be canceled is even more complex, with the volume of allowances to be canceled equaling the additional emission reductions from the coal phase-out (compared to a counterfactual market development without coal phase-out), net of *Market Stability Reserve* cancelation. Both emissions estimates used in this calculation are highly uncertain, which in turn similarly renders the volume of allowances to be canceled very uncertain. What is more, overlapping policies may reduce the *Market Stability Reserve* cancelation, leading to a "green paradox" in the EU-ETS (Gerlagh, Heijmans, and Rosendahl forthcoming), whereby anticipating a drop in future allowance demand due to complementary policies could depress prices in the short term, reducing the total number of allowances in circulation and, in turn, the number of cancelations through the *Market Stability Reserve.* This could have the perverse effect that national policies may even increase net emissions. Indeed, the model-based analysis by Pahle et al. (2019) confirm that the German coal phase-out has the potential to trigger this effect (see Figure 3), reducing *Market Stability Reserve* cancelations by 164 Mt.

Here again, the (national) cancelation mechanism implies considerable price uncertainty. Notably, determining the national cancelation volume depends on *Market Stability Reserve* cancelations and vice versa. Accordingly, uncertainties on both sides are amplified

[4] Officially named the "Commission on Growth, Structural Change and Employment", its members were tasked, inter alia, with recommending measures to achieve the 2030 target in the energy sector through reducing coal-based power generation. See: https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/einsetzungsbeschluss_kohlekommission_en_bf.pdf.

Figure 3
Net Change in Emissions Induced by German Coal Phase-Out



*All countries regulated under ETS w/o Germany **All countries regulated under ETS
Note: Red bars indicated reduction in German electricity sector. Blue and dark blue bars indicate emissions increases in other countries/sectors due to the waterbed effect. Dark red rectangles indicate changes in MSR (Market Stability Reserve) cancelations.
Source: Pahle et al. (2019).

by this interaction. This would be exacerbated if national cancelations became more widespread in the future to compensate for other overlapping national measures, whether in Germany or other member states (Pahle 2020). This also underlines the coordination challenges that arise from interventions at different levels of government. In summary, by resorting to complex cancelation rules – nationally and through the Market Stability Reserve – the 2018 reform has set the EU-ETS on a path of more and more (discretionary) intervention.

A WAY FORWARD

The upcoming reforms of the EU-ETS in the context of the Green Deal are bound to reinforce the path taken with the 2018 reform, but reversing this trend is essential and should be prioritized. The crucial question is how best to balance flexibility (to adapt to new circumstances and information) with market stability (and thus the dynamic efficiency of the EU-ETS). Lessons from the US Clean Air Act emphasize that such adaptability is indeed a key aspect of successful climate polices (Carlson and Burtraw 2019).

The first-best approach, from an economic perspective, would be to adjust the cap at regular intervals in a way that best balances benefits and costs (Hepburn 2006). Calling this a "structured discretion" approach, Aldy (2020) recently proposed such an updating process for a potential new US carbon tax, in which the US president would submit a carbon tax adjustment recommendation to Congress every five years, based on government agency reviews of the environmental, economic, and multilateral conditions related to climate change. It would thus incorporate flexibility for adapting to new learning and changing market conditions. The general considerations could, in principle, also be applied to adjusting the EU-ETS cap. However, a major difference between adjusting taxes and caps is that prices fluctuate after the cap is adjusted. If the time span between cap adjustments is large, and uncertainty about future adjustment is high, considerable price uncertainty (volatility) may result. As described above, this can trigger government intervention if prices exceed or undercut politically acceptable levels.

The risk of such interventions can be mitigated by a clear and transparent combined price floor and ceiling (or price collar). In this way, regulators can credibly commit to the levels at which they will intervene, assuming that such intervention is unavoidable (i.e., taking a second-best approach). A price collar would thus address the stability problem and the associated political risks. A price floor at the EU level could also help solve the coordination problem by preventing policies at the member state level from inducing the waterbed effect. In other words, a price collar ensures that prices are driven by market fundamentals alone, rather than being distorted by expectations about future regulatory interventions. For this reason, it is a central pillar of any proposals for introducing and strengthening carbon pricing in Germany (Edenhofer et al. 2019) and at the EU level (Edenhofer et al. 2021). For the EU-ETS, this would require the transformation of the *Market Stability Reserve* into a price-based stability mechanism (Perino et al. 2021). If, as Edenhofer (2021) proposes, a parallel ETS covering the building and transport sectors were set up as an intermediate step toward an integrated EU-ETS, a price collar should be implemented in this new system from the outset.

The final question concerns who should determine the updates and on what basis. Kydland and Prescott's work had a profound impact in raising policymakers' awareness of the crucial role played by credible long-term commitments in monetary policy, which led to the creation of independent central banks. In the same vein, a carbon bank could be established on a similar basis to strengthen the EU's climate policy commitment. Edenhofer et al. (2021)

set forth the conditions under which a European carbon bank would be advantageous: (1) the emissions reduction pathway or carbon budget must be well defined by legitimate democratic institutions, (2) the performance criteria for implementing policy instruments must be well understood, (3) the carbon bank must act independently of any revenue objectives and remain unaffected by any lobbying by firms or national governments, and (4) to avoid pursuing multiple objectives, the carbon bank must not be mandated to consider distributional effects between member states or in the income distribution. Nevertheless, it remains debatable whether such a bank would be feasible, given the problems of delegation and agreement on the optimal rules. But whether administered by a regulator or through a central carbon bank, optimal rules will be crucial for moving the EU-ETS off the slippery slope of discretionary intervention. Given what is at stake, environmental economists should make further research on this topic a top priority.

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