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Causes of the EU ETS price drop: Recession, CDM, renewable policies or a bit of everything?—New evidence

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HIGHLIGHTS

- We examine whether abatement-related fundamentals justify the EU ETS price drop.
- 90% of the variations of EUA price changes remain unexplained.
- Variations in economic activity are robustly explaining EUA price dynamics.
- Price impact of renewable deployment and international credit use remains moderate.
- Reform options are evaluated in the light of the new findings.

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ABSTRACT

The price of EU allowances (EUAs) in the EU Emissions Trading Scheme (EU ETS) fell from almost 30€/tCO_2 in mid-2008 to less than 5€/tCO_2 in mid-2013. The sharp and persistent price decline has sparked intense debates both in academia and among policy-makers about the decisive allowance price drivers. In this paper we examine whether and to what extent the EUA price drop can be justified by three commonly identified explanatory factors: the economic recession, renewable policies and the use of international credits. Capitalizing on marginal abatement cost theory and a broadly extended data set, we find that only variations in economic activity and the growth of wind and solar electricity production are robustly explaining EUA price dynamics. Contrary to simulation-based analyses, our results point to moderate interaction effects between the overlapping EU ETS and renewable policies. The bottom line, however, is that 90% of the variations of EUA price changes remains unexplained by the abatement-related fundamentals. Together, our findings do not support the widely-held view that negative demand shocks are the main cause of the weak carbon price signal. In view of the new evidence, we evaluate the EU ETS reform options which are currently discussed.

1. Introduction

The EU Emissions Trading Scheme (EU ETS), considered the flagship climate policy of the European Union, has experienced a sharp decline in permit prices between 2008 and 2013. The price for EU Allowances (EUAs) went from 28€ per ton of carbon dioxide (tCO_2) in mid-2008 to 5€/tCO_2 at the time of writing this paper. Such depressed permit prices are not likely to provide sufficient incentives for low-carbon technological investments (Nordhaus, 2011) and may increase the risk of carbon lock-in (Clò et al., 2013). This situation has sparked intense debates both in academia and among policy-makers about the reasons of the price drop, its impact on the effectiveness of the trading scheme and options for reform (Clò et al., 2013; European Commission, 2012; Grosjean et al., 2014). To inform the debate, this paper intends to investigate empirically the drivers of the current EUA price movements with a special focus on overlapping climate policies and the role of renewables in particular.

An extensive stream of the literature is devoted to exploring the carbon pricing mechanism. Theory predicts that the permit price should reflect market fundamentals related to the marginal costs of emissions abatement; see e.g. Montgomery (1972) and Rubin (1996)[2]. Fuel switching in the dominant power sector is considered to be the single most important abatement method in

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[2] For a recent survey of permit pricing theory, see Bertrand (2013).

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the EU ETS (Delarue et al., 2008; Hintermann, 2010)[3] and, consequently, in an efficient market, prices for input fuels are expected to determine EUA prices. In addition, exogenous factors such as economic activity or weather conditions are identified as relevant price fundamentals, since they determine business-as-usual emissions, i.e. the need for abatement (Hintermann, 2010). Empirical evidence relating to these theoretical expectations is scattered over the different regulatory periods which have been put in place in the EU ETS. The pilot Phase I covered the period 2005 to 2007. Phase II coincided with the Kyoto Protocol commitment period of 2008 to 2012. Phase III runs from 2013 to 2020. A series of studies empirically analyzes the relevance of the theoretically motivated price drivers in Phase I of the EU ETS (Aatola et al., 2013; Alberola et al., 2008a, 2008b; Chevallier, 2009; Hintermann, 2010; Mansanet-Bataller et al., 2007). The common finding is that the identified marginal abatement cost drivers had only a limited influence on EUA price formation. Evidence for Phase II is relatively scarce and restricted to early Phase II (until December 2010) when the EUA price was still around 15€/tCO_2. The first studies (Bredin and Muckley, 2011; Creti et al., 2012; Koch, 2014) suggest that a new pricing regime with an increased dependency between EUA, fuel and stock prices emerges in the Phase I-to-Phase II period, which may be attributed to advances in the EU ETS market design and maturity. Lutz et al. (2013) recently provide corroborating evidence for the nonlinearity in the relation between EUA, energy and financial prices for the entire Phase II.

However, the economic environment as well as the policy environment of the EU ETS has substantially changed since 2011. In fact, we know very little about the causes of the EU ETS price drop over the last three years which ultimately led to the persistently low EUA price level in 2013. The widely-held view among market participants, academics and policy-makers (Grosjean et al., 2014; de Perthuis and Trotignon, 2013) is that three main causes can be put forward to explain the weak EUA price signal: (i) the deep and lasting economic crisis in the European Union (Aldy and Stavins, 2012; European Commission, 2013; Neuhoff et al., 2012), (ii) the overlapping climate policies, e.g. feed-in tariffs for renewables (Fankhauser et al., 2010; Van den Bergh et al., 2013; Weigt et al., 2013), and (iii) the large influx of Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) in the EU ETS during Phase II (Neuhoff et al., 2012; Newell et al., 2012). However, an accurate assessment of the relative importance of the different explanatory factors is an outstanding empirical issue. This examination is all the more important as Koop and Tole (2013) have shown for the Phase I-to-Phase II period that there is substantial turbulence and change in the EU ETS pricing mechanism.

The economic crisis reduces the production of firms covered by the EU ETS, which decreases their demand for EUAs. Simultaneously, grim prospects of economic recovery reinforce the expectations of a lasting low EUA demand, which affects the long-term price trend in the trading scheme. Gloaguen and Alberola (2013) indeed find that the economic downturn plays a significant, but not dominant, role in the decrease of CO_2 emissions in EU ETS (see also Declercq et al., 2011). This finding suggests that other structural factors are also relevant for the price formation.

Overlapping policies and more specifically the deployment of renewable energy sources (RES), have been cited as an additional possible explanation of the low EUA price. To reach the EU's 20-20-20 headline targets,[4] EU Member States have launched generous support mechanisms to stimulate RES deployment, which effectively contributed to a marked expansion of wind and solar capacity in the electricity sector (Edenhofer et al., 2013). The coexistence of EU ETS and RES deployment targets, however, creates a classic case of interaction effects (Goulder, 2013; Levinson, 2010). Theoretical work of Fankhauser et al. (2010) and Fischer and Preonas (2010) suggests that the overlapping policies work at cross-purposes, since RES injections displace CO_2 emissions within the EU ETS and thereby reduce the EUA demand and price.[5] Corroborating the theory, several simulation-based studies predict that RES deployment exercises a strong downward pressure on EUA prices. For instance, simulations in Van den Bergh et al. (2013) suggest that RES deployment reduces the EUA price by 46€ in 2008 and more than 100€ in 2010. In the simulation of De Jonghe et al. (2009) the allowance price could even drop to zero depending on the stringency of targets (see also Unger and Ahlgren, 2005; Weigt et al., 2013). However, Ellerman et al. (2014) highlight that it remains to be investigated whether the *ex post* effect of RES on the EUA price is large or small.

Finally, the unexpectedly high use of CERs/ERUs during Phase II of the EU ETS might also contribute to a decreasing EUA demand and price. During the period 2008–2012, companies had already surrendered for compliance more than 60% of the total permissible 2008–2020 quota (Point Carbon, 2013). In particular, 2011 and 2012 experienced a high use of Kyoto credits. This might be attributed to the collapse in credit prices (due to the non-ratification of the Kyoto protocol by major emitters) as well as the European Commission's change in the regulations regarding the imports of credits from certain projects. More specifically, in Phase III credits originating from hydrofluorocarbon (HFC) and adipic acid nitrous oxide (N_2O) projects are no longer permitted. In addition, new CERs are only allowed if they originate from least-developed countries (Kossoy and Guigon, 2012). As a consequence, companies surrendered for compliance large amounts of cheap credits in the later years of Phase II. For instance, Berghmans and Alberola (2013) estimate that the power sector offsets around 65% of its shortfall of EUAs using Kyoto credits. In Phase III, however, the policy changes should rather reduce the number of available CERs which may have a positive impact on the price of CERs if demand remains constant.

Our paper contributes to the literature by quantifying the actual impact of the different explanatory factors on the allowance price in EU ETS based on a broadly extended data set. A quantification of the relative importance of the various price drivers is essential to understanding if and how the EU ETS should be reformed. We expand existing research by conducting a first ex post analysis for the entire Phase II of the EU ETS and the first year of Phase III (January 2008–October 2013). In particular, we apply extensive data on the deployment of intermittent RES, including monthly electricity production data for wind, solar and hydropower that covers more than 80% of the (variable) renewable electricity production in the European Union. The ex post data for RES allows us – for the first time – to investigate whether the coexisting of EU ETS and RES targets work at cross-purposes. Previous research has focused on simulation-based modeling approaches and, to the best of our knowledge, no empirical analysis has been carried out.

Our main findings are as follows: we detect a robust and statistically significant – yet at the same time rather modest in terms of magnitude – impact of intermittent renewables underlining the importance of examining overlaps with other policies. Variations in economic activity are indeed the most important

[3] This is due to (i) the ability of power generators to abate emissions without either cutting output or building new plants and (ii) the fact that the power and heat sector is dominant within the EU ETS (Kettner et al., 2008).

[4] It is noteworthy that the legal status of the three goals varies: the GHG emissions reduction and RES share targets are binding while the energy efficiency target is indicative.

[5] In theory, interactions could be mutual: the EU ETS could narrow the cost gap between RES technologies and conventional technologies and therefore stimulate RES deployment. This effect is, however, rather unlikely given the persistent low EUA price level. For instance, Gavard (2012) shows that a carbon price of 46€ is necessary to provide a price advantage to wind energy over electricity production from gas.