



# The initial impact of EU ETS verification events on stock prices



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## HIGHLIGHTS

- We study the impact of EU ETS verified emissions disclosure on firms' market value.
- Disclosure is relevant if carbon price is high and permits scarcity is anticipated.
- We find a negative relationship between allocation shortfalls and firm value.
- Stronger relationship for carbon – intensive and no cost pass-through firms.
- High carbon price and addressing cost pass-through are crucial for EU ETS reforms.

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## ABSTRACT

This paper studies the impact of verified emissions publications in the European Emissions Trading Scheme (EU ETS) on the market value of participating companies. Using event study methodology on a unique sample of 368 listed companies, we show that verified emissions only resulted in statistically significant market responses when the carbon price was high and allowance scarcity was anticipated. The cross-section analysis of abnormal returns surrounding the publication of verified emissions shows that share prices decrease when actual emissions relative to allocated emissions increase. This negative relationship between allocation shortfalls and firm value is only significant for firms that are either carbon-intensive, compared to sector peers, or are less likely to pass through carbon-related costs in their product prices. The results suggest that although the EU ETS has been deemed unsuccessful so far due to over-allocation and low carbon price, shareholders initially perceived allowance holdings as value relevant. Our results highlight that a significant carbon market price and addressing pass-through costing are essential for successful future reforms of the EU ETS and other analogous carbon cap-and-trade systems implemented or planned worldwide.

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## 1. Introduction

The development and increase in the number of carbon emissions schemes around the world, as a response to the growing concern about climate change, has resulted in the emergence of carbon allowances as a tradable commodity. Emission trading is an important mechanism of the Kyoto Protocol and has enabled the financial markets to put a price on carbon emissions, thereby creating an incentive for companies to reduce their carbon emissions (European Commission, 2009). The practice of emissions trading is not particularly novel. Trading of sulphur dioxide (SO<sub>2</sub>)

and nitrogen oxides (NO<sub>x</sub>) began in the United States in the 1990s (Hepburn, 2007). Carbon trading, which refers to the trading of emission allowances of six major greenhouse gases<sup>1</sup> is more recent. The European Union (EU) launched an EU-wide cap-and-trade emissions trading scheme (EU ETS) for CO<sub>2</sub> emissions in 2005 which can be considered as the cornerstone of the EU climate policy. The EU ETS was the first and is to date the largest international system for trading greenhouse gas emission allowances, covering almost half of the EU's greenhouse emissions and operating in 31 countries (European Commission, 2013).<sup>2</sup> The idea behind the EU ETS is that carbon-intensive companies have to surrender allowances equivalent to the number of carbon

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<sup>1</sup> These are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>).

<sup>2</sup> The EU ETS operates in the 27 EU countries, the three EEA-EFTA states (Iceland, Liechtenstein and Norway) and Croatia (joined in 2013).

emissions caused by their installations. Companies with an allowance shortage (i.e., under-allocated) have to buy additional allowances on the market and analogously, companies with verified emissions below the allocated amount can sell allowances (Hoffmann, 2007). As a result, investors should take the allowances from the cap-and-trade system into account when assessing the firm's carbon liability (Clarkson et al., 2014).

An important condition regarding the effectiveness of an emission trading scheme is that financial markets perceive carbon allowances as value relevant. De Perthuis and Trotignon (2014) state that the economic efficiency of a cap-and-trade system depends on its ability to shape short term emissions as well as environmental investment behaviour in the long run. In the case of EU ETS, the trigger should come from the carbon price. This price however is not subjectively determined by a regulator but is a result of a market trading process. An interesting question therefore is whether financial markets acknowledged the true value of companies' carbon liabilities at times when the initial information on the allowances was released and whether this value was influenced by company as well as industry characteristics. The answer to this question potentially provides important policy implications as more and more emission trading schemes similar to the EU ETS are developed in countries like China (Jiang et al., 2014), Korea (Park and Hong, 2014) and even the US and Canada (Branger et al., 2015) while industry specific distortions like carbon leakage still have to be addressed (De Perthuis and Trotignon, 2014).

In this study, we analyse the initial impact of carbon emissions on firm value during the first two phases of the EU ETS by measuring the market reaction to 8 annual verification announcements over the period 2006–2013 on a unique sample of 368 participating listed companies, representing 25 countries. The results of the event study demonstrate that the first publications of compliance data in phases I and II both resulted in statistically significant market responses while the announcements in other years did not trigger a significant abnormal market reaction. The most important reason for this result is that the anticipated scarcity of allowances at the beginning of each phase, was never realised. This caused the carbon price to drop massively rendering the allowances virtually worthless. Furthermore, within each particular phase, allowance holdings could be transferred over the years while allowance allocation remained fixed, allowing firms to anticipate fluctuations in emissions. The cross-section analysis of the abnormal return for the two significant publications of verified emissions, shows that market value decreases when actual emissions exceed allocated allowances. Interestingly, this negative impact of the percentage allowance shortage relative to allocated allowances on the market reaction is found to be only significant for firms that are either carbon-intensive or unable to pass on carbon-related costs in their product prices. Our results show that besides the problem of insufficient scarcity and ensuing carbon price instability (Branger et al., 2015), also the pass-through of environmental regulatory costs in product prices is an important issue. For even at the time when investors anticipated a deficit of allowances at high carbon prices, they did not acknowledge the value relevance of allowances for firms that were able to pass through environmental costs.

We contribute to the literature in three distinct ways. First, by analysing the impact of verified emissions on share prices, we add to the literature determining the economic value of emission allowances created by an emission trading system. The value of carbon performance within the context of the EU ETS, has only been scarcely studied either on a subset of countries (Schmidt and Werner, 2012) or only for one particular event (Jong et al., 2014). Our study contributes to this limited literature by providing a comprehensive analysis on a unique data set comprising all

8 publication events of the two currently completed EU ETS phases in all participating countries. Second, the study provides policy implications concerning the effectiveness of environmental regulation by examining whether the value impact of the regulatory system depends on carbon intensity, compared to sector peers, and the pass-through of carbon-related production costs. This way we contribute to the ongoing debate on the economic as well as environmental consequences of a cap-and-trade system (Clò, 2010; Fisher and Fox, 2012; Schmidt and Heitzig, 2014; Clarkson et al., 2014). We further provide policy implications for future reforms of EU ETS or similar programs concerning coping with allowance market stability as well as carbon leakage. Finally, by examining the market reaction to environmental disclosure events in the context of a mandatory carbon emissions program, we provide more insight on whether investors recognize the shareholder value generated by environmental performance. This question has up until now mainly been studied in the context of voluntary disclosure programs (e.g., Lee et al., 2013).

The remainder of the paper is organized as follows. In Section 2 we present an overview of the related literature and develop our hypotheses which is followed by a description of the data and the research methodology. Empirical results are then presented before the concluding remarks.

## 2. Literature review and hypotheses development

### 2.1. European Emissions Trading Scheme (EU ETS)

The EU ETS has been implemented in different phases. Phase I ran between 2005 and 2007 and could be regarded as a start-up and trial period to allow firms and governments to gain experience in emissions trading. Phase II, which comprised the years 2008–2012, coincided with the Kyoto Protocol commitment period and required EU Member States to achieve an 8% emission reduction compared with their 1990 level. Phase III has the longest compliance period, from 2013 to 2020. However, as it is still incomplete, the current paper focuses on the first two EU ETS phases.<sup>3</sup> During these two phases, both the total emissions cap and the distribution of allowances were the responsibility of individual Member States. Each state had to design a National Allocation Plan (NAP) for every trading period based on criteria and guidelines set by the European Commission (Ellerman and Buchner, 2008). The NAPs also had to specify how the allowances were distributed among existing installations, new installations and auctions (Neuhoff, 2011). Each Member State has its own registry where changes in the composition of its firms are recorded. The European Central administrator, the Community Independent Transaction Log (CITL), oversees the registry systems and keeps track of allowances and verified emissions of each EU ETS-covered installation. However, while verified emissions are published each year on the same date for all installations, the release of allocation-related information for both phases is not concentrated on one particular date as the NAPs submissions may be rejected by the European Commission, and sent back to member states for adaptation (Chevallier, 2012).

The allocation process of emission allowances differs considerably over the phases. Grubb et al. (2005) argue that the ability for each country to allocate free allowances to its own firms, combined with a flawed basis of the allocation method and corporate lobbying, led to the over-allocation of allowances in phase I. Due to the lack of transparency and the severe over-allocation, the

<sup>3</sup> Some specificities of the third phase as well as some empirical results for the verification events in this phase so far, are discussed later on (see footnote 10).

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