



Does EU emissions trading bite? An event study[☆]



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HIGHLIGHTS

- Firms are more positively valued with lower carbon-intensities of production.
- Firms are more negatively valued with smaller holdings of allowances.
- The stock market does not value the firms' allowance trade activity.
- The stock market does not seem to value the pass-through of carbon costs in product prices.

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ABSTRACT

The aim of this paper is to examine whether shareholders consider the EU Emissions Trading Scheme (EU ETS) as value-relevant for the participating firms. An analysis is conducted of the share prices changes as caused by the first publication of compliance data in April, 2006, which disclosed an over-allocation of emission allowances. Through an event study, it is shown that share prices actually increased as a result of the allowance price drop when firms have a lower carbon-intensity of production and larger allowance holdings. There was no significant value impact from firms' allowance trade activity or from the pass-through of carbon-related production costs (carbon leakage). The conclusion is that the EU ETS does 'bite'. The main impact on the share prices of firms arises from their carbon-intensity of production. The EU ETS is thus valued as a restriction on pollution.

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1. Introduction

To meet its greenhouse gas emission targets, the European Union (EU) has introduced in 2005 the EU Emissions Trading Scheme (EU ETS).¹ This scheme is based on "cap-and-trade" regulation. The total amount of emissions is 'capped' and the EU emission allowances, which make up the subsets of that total amount, are tradable. In Phase I (2005–2007) and Phase II (2008–2012) of the EU ETS, the total domestic supply of allowances was determined through National Allocation Plans (NAP). However, at the end of April, 2006, the first EU Member State annual reports

were published. These reports showed that national demand for allowances in 2005 was much less than supply. The resulting carbon price drop was the main signal that market participants revised their expectations on the shortage of allowances.

But while supply was larger than demand, the carbon price did not immediately fall to zero. And while one can expect investors to put a lower valuation on cleaner rather than dirtier firms, the statistics (to be shown later) suggest that dirtier firms instead received a lower valuation. Yet, if the carbon price drop lowers firms' valuations, it does not suggest that the EU ETS is costly. Since share prices reflect the firms' *future* profitability, the EU ETS 'bite' is in the market's expectation of its *future* related costs. The aim of this paper is to find out whether investors consider the EU ETS as relevant for polluting firms, and how this is related to the firms' allowance allocations and transactions.

The central question of this paper is therefore: did EU ETS firms' shareholders interpret the April 2006 carbon price drop as significant and, if so, how did the event's impact differ among firms' allocations and transactions?

This paper is organized as follows. In Section 2, the literature will be reviewed on the EU ETS how the impact of the EU ETS differs through the related allocations and transactions. In Section 3,

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¹ Due to space constraints, we refer the reader to Böhringer (2014) for a recent, more general overview on EU ETS developments.

hypotheses are formulated on the share price responsiveness through which the carbon price drop impacted the EU ETS firms. The methodology will be discussed in Section 4. The empirical results and a discussion thereof will be presented in Section 5. Section 6 concludes the paper.

2. Literature review

With an abundant supply of allowances one may expect the regulation did not affect the firms' management or share prices. For example, Anger and Oberndorfer (2008) showed for a sample of German firms that allocations did not impact revenues and employment. Kettner et al. (2008) concluded it was unlikely that abatement had taken place.

However, ex-post research shows the EU ETS did have an impact on firms. Anderson and Di Maria (2011) showed there were both 'under-allocations' as well as 'over-allocations' and that some firms did reduce emissions. Abrell et al. (2011) found that the profit margins of over-allocated firms were positively affected, and vice versa. Furthermore, the market valuations of firms were responsive to the carbon price. For example, Oestreich and Tsiakas (2012) analyse the "carbon premium", defined as the share price return difference of dirty versus clean firms. They find that this premium is higher for dirtier firms. However, when focusing on energy companies in the EU, Koch and Bassen (2013) find the opposite, namely that dirtier firms have higher costs of capital due to carbon related risks and thus a lower equity value. Moreover, through an event study on the April 2006 carbon price drop, Bushnell et al. (2013) shows that the market values of dirtier *non-energy* industries declined more, i.e. dirtier firms were more heavily penalized, as was found for the *energy* industry in Koch and Bassen (2013).² Among energy firms, however, the impact was the opposite, i.e. being cleaner will be penalized, as with Oestreich and Tsiakas (2012).

This study contributes to the literature through the inclusion of the firms' allowance purchases and sales from the EU ETS database: the European Union Transaction Log (EUTL). Only three studies have analysed these EU ETS transactions. Both Jaraitė and Kažukauskas (2012) and Zaklan (2013) examine determinants in purchasing and selling allowances. Yet, to our knowledge the impact of these transactions on share prices has not been analysed yet.

Bushnell et al. (2013) also conduct an event study on the same allowance price fall in the EU ETS. However, our paper is different from theirs. First, where Bushnell et al. (2013) make an industry comparison by focusing on power versus non-power industries, we use a more specific categorization of industries to test the effect of the allowance price fall on share prices. Second, contrary to Bushnell et al. (2013) we bring the buying and selling of allowances, which is the very essence of emissions trading, into the analysis, by incorporating such purchases and sales into a number of hypotheses. Third, as a result our conclusions partly reproduce but also partly differ from theirs, which enhances the validity of both studies and adds new insights to this carbon market event.

The literature thus shows that the ex-post results are mixed on the impacts of over-allocation and of carbon-intensive production, and that there is a literature gap regarding the effects of allowance trade on share prices. This paper fills these gaps by incorporating allowance trade with the allocation and the product market in determining the EU ETS impact on share prices. In the next section hypotheses are formulated on the interplay of these three factors.

3. Theoretical framework and hypotheses

Several related effects on firms' market values occur simultaneously with a change in the carbon price. The three main effects, discussed below, are: (1) carbon leakage and carbon-intensity effects, (2) exposure and borrowing effects, and (3) trade effects.

3.1. Carbon leakage and carbon-intensity effects

Carbon-intensive production becomes less attractive in an emissions trading scheme. 'Carbon leakage' refers to the consequential relocation of companies, and thus emissions, to countries where restrictions on carbon emissions are weaker. Firms competing with firms from outside the system cannot or can partly pass on carbon-related costs in their product prices. This decreases their profit margins. Once the carbon price drops, the profit margins and thus share prices should increase of firms within the EU ETS. The first hypothesis H1 is therefore:

(H1). Market values of firms with carbon leakage increase. Increases are larger for dirtier firms, i.e. with a higher carbon-intensity of production, than for cleaner firms.

Hence, if firms can pass-through less than 100% of their carbon-related costs, a drop in the carbon price increases the market value of such firms.

However, if firms can pass on at least 100%, i.e. they do not suffer from carbon leakage, the carbon price drop decreases product revenues, profits and thus their market values.³ Indeed, Oberndorfer (2009) finds a positive share-price-to-carbon-price relationship for European power firms. The carbon cost margin, i.e. the carbon price times the emissions per unit of production, is higher for firms with a dirtier production. Product prices of dirtier firms will thus decrease more when the carbon price drops, lowering their profits and thus their share prices. Contrary to H1, the impact for dirty versus clean firms is thus the opposite. As a result, the second hypothesis H2 is that:

(H2). Market values of firms without carbon leakage decrease. Decreases are larger for dirtier firms than for cleaner firms.

3.2. Exposure and borrowing effects

Polluting firms in the EU ETS either receive their allowances for free or they have to buy them at auction. Auctioning or free allocation have similar economic costs (costs of buying allowances or the opportunity costs of using free allowances) but do affect accounting profits and the market values of firms differently. Firms receiving free allowances should thus have higher market values than comparable firms having to buy them at auction. Typically, the former is long on allowances, while the latter is short. The carbon price drop should thus have lowered the cost burden for firms that were short on allowances on an annual basis. The hypothesis is that investors see the accumulation of these lowered cost burdens into increases in market values. The third hypothesis is thus as follows:

(H3). Market values increase the more firms are short on allowances. Market values decrease the more firms are long on allowances.

However, in the short-term the price drop decreases the value of allowances held in stock. This negatively affects the market values of firms. One of the features of the EU ETS Directives (2003/87/EC and 2009/29/EC) allowing firms to manage short-term

² There are more event studies on the EU ETS, e.g. Mansanet-Bataller and Pardo (2007).

³ This relationship holds with grandfathered allowances. With auctioning the effect on market values is neutral. Allowance costs are then not only an opportunity cost but an out-of-pocket expense as well.

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