

Schultz, Alison

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# Profit Shifting via Carbon Emission Trading: First Indications

Alison Schultz\*

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## Abstract

This study presents preliminary evidence that the European Emission Trading Scheme (EU ETS) is exploited by multinational companies to artificially shift profits between European countries. Specifically, using the EU transaction log and Orbis ownership data, I highlight abnormally high levels of internal trade in emission allowances at year-end—despite the April surrender deadline – within firms under the same Global Ultimate Owner (GUO). This activity is especially marked in transactions involving firms without actual emission certificate needs. Towards the year-end, allowances are moved from subsidiaries in strict accounting jurisdictions to those in lenient ones, indicating regulatory arbitrage. These patterns hint to a potential misuse of the EU ETS for financial manipulation rather than emission reduction. I hope to add further analysis, in particular related to the market price of allowances, to contribute to ensuring the EU ETS remains an effective tool for environmental objectives without facilitating unintended financial exploitation.

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\*Tax Justice Network, [alison@taxjustice.net](mailto:alison@taxjustice.net)

# 1 Introduction

The European Emission Trading Scheme (EU ETS) is the largest carbon trading system in the world, regulating about 40% of European carbon dioxide (CO<sub>2</sub>) emissions through a market mechanism. However, the facility for internal trading of allowances, combined with inconsistent accounting rules among EU members, renders the system vulnerable to exploitation (Directorate-General for Climate Action (European Commission) et al. 2010; Directorate-General for Climate Action (European Commission) et al. 2019). This paper presents preliminary evidence that the EU ETS is being used by multinational companies to artificially shift profits between European countries.

By integrating data from the EU Transaction Log (EUTL), corporate ownership information from Orbis, and auction prices from the European Energy Exchange, I identify several phenomena that potentially indicate profit shifting through emission trading: First, I observe that emission allowances are traded at abnormally high levels towards the year’s end, even though the allowances matching a firm’s emissions for the current year only need to be surrendered by the end of April in the following year. While maintaining clear emissions accounting could justify this activity, the pattern is particularly pronounced for firms that have never surrendered any emission allowances throughout their existence. Secondly, such patterns are particularly prominent in internal trades, that is, transactions between firms sharing the same Global Ultimate Owner, where both subsidiaries have no necessity for the certificates to offset emissions. While market transactions between unrelated parties might be driven by financial speculation – akin to trading in stocks or bonds – trades between two subsidiaries of the same multinational, neither of whom requires the allowances for compliance purposes, suggest a strategic reallocation of allowances where one subsidiary stands to gain more from holding the allowance by year-end. Supporting this suspicion, I demonstrate that internal trades are executed in ways that align with regulatory arbitrage, aiming at artificial profit shifting: As the year ends, allowances are significantly shifted from subsidiaries in jurisdictions not treating allowances as intangible assets to those that do, and from regions disallowing allowance depreciation to those permitting it.

These observations alone do not conclusively prove the existence of aggressive tax planning through emission trading. I further plan to examine the impact of emission prices, interacting with different accounting regimes and internal trade.

This ongoing research contributes to the broader discourse on profit shifting mechanisms, expanding upon the channels reviewed by Beer, Mooij, and Liu (2020), such as transfer mispricing and strategic intellectual property managements(**<empty citation>**). It introduces a novel potential channel akin to Value Added Tax (VAT) fraud schemes,

marked by the strategic reallocation of easily transferable assets for optimal, timely utilization. The study also contemplates instances of mispricing, although such occurrences remain elusive within the current dataset.

Additionally, this work intersects with research scrutinizing the potential for misuse within emission trading schemes. Studies by Berrittella and Cimino (2012), Frunza (2016), and Borselli, Fedeli, and Giuriato (2015) have detailed the impact of VAT carousel fraud in carbon markets, with Ainsworth (2006) proposing preventative measures.

Furthermore, this research builds on the pioneering work of Kundu (2024), who highlighted the significance of the internal carbon market and the extensive trading among firms under the same corporate umbrella. While Kundu’s work primarily addresses the implications for emission reduction, my focus shifts towards exploring the potential for tax avoidance through internal carbon trading mechanisms.

The paper is organized as follows: The next section revisits past exploitations of the EU ETS and outlines my hypotheses regarding its potential for profit shifting. Section 3 delineates the data and methodology employed. My principal findings are discussed in Section 4, with concluding remarks presented in Section 5.

## **2 Fraud and Profit Shifting in the European Emission Trading Scheme**

The European Union Emission Trading System (EU ETS), inaugurated in 2005, pioneers the global effort against climate change by regulating approximately 40% of European CO<sub>2</sub> emissions through a cap-and-trade mechanism. As the largest carbon market globally, the EU ETS facilitates the trading of emission allowances across over 11,000 power stations, industrial plants, and airlines within the EU, UK, Norway, Iceland, and Liechtenstein. Despite its crucial role in emission reduction, the system’s openness to internal trading and variances in accounting standards across member states have exposed it to exploitation, including VAT fraud, cybersecurity breaches, and phishing scams.

### **2.1 Historical Fraud Cases in the EU ETS**

#### **VAT Fraud: Carousel Schemes**

Emission allowances were used as a core product of the Missing Trader Intra-Community (MTIC) fraud, where illicit VAT repayments were evoked by a circular trade of allowances. The introduction of the reverse charge mechanism significantly curtailed such fraudulent activities.

## **Cybersecurity Issues and Theft**

The system’s early years saw notable cybersecurity challenges, with instances of hacking and theft of allowances from national registries. These incidents underscored the need for robust security measures, culminating in the creation of a unified EU-wide registry and enhanced security protocols.

## **Phishing Scams**

Phishing scams targeting the EU ETS market participants prompted increased cybersecurity awareness and education initiatives by the European Commission and national authorities to protect account integrity.

## **2.2 The Potential for Profit Shifting in the EU ETS**

Building on Kundu (2024)’s insights into the prevalence of internal carbon markets, this section delves into the mechanisms through which multinational corporations might leverage emission allowances for profit shifting, beyond mere financial speculation. The fluidity of allowance trading, unrestricted by physical transfers and governed solely by electronic registry transactions, presents a unique opportunity for tax optimization strategies.

### **Transfer Price Manipulation**

The EU ETS’s structure allows for profit shifting through transfer price manipulation of emission allowances between subsidiaries of the same Global Ultimate Owner (GUO). To the best of my knowledge<sup>1</sup>, no clear EU-wide transfer pricing guidance exists for internal emission trades. Even though the market price of allowances is easy to determine, this might tempt firms to massively deviate from the market price in internal pricing and allow the artificial shift of profits to low-tax jurisdictions.

### **Timing of Internal Trades**

The strategic timing of internal trades, particularly at year-end, and the differential recognition of allowances as intangible assets or their depreciation eligibility across member states, underscore the potential for profit shifting. Even firms that stick to market prices in their internal trades could time their trades such that they can shift profits. For instance, they could internally transfer allowances to a high tax jurisdiction when the price

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1. I am delving into the details of the relevant transfer pricing rules as part of the ongoing research

is high and transfer them back to a low-tax jurisdiction when the price is low.<sup>2</sup>

In the following, I will provide first descriptive support, especially for the timing of internal trades.

## 3 Data and Methodology

### 3.1 Data

This study employs a comprehensive dataset to investigate the dynamics of profit shifting within the European Union Emission Trading Scheme (EU ETS). The analysis integrates data from three primary sources: the European Union Transaction Log (EUTL), auction prices from the European Energy Exchange, and Global Ultimate Owners (GUOs) information from Orbis Flatfiles. Each data source contributes unique insights into the trading behaviors, pricing mechanisms, and corporate structures within the EU ETS.

#### European Union Transaction Log (EUTL)

The EUTL provides a detailed record of all transactions within the EU ETS, serving as a critical resource for understanding the flow of emission allowances. The dataset includes:

- The nature and types of transactions, distinguishing between trades, allocations, and surrenders.
- The volume of allowances traded, offering insights into market activity and trading patterns.
- The exact dates of transactions, enabling temporal analysis of trading behavior.
- Information on the firms involved in each transaction, facilitating the identification of trading networks and potential internal trading among subsidiaries.
- Data on surrendered units, which are crucial for assessing compliance and the actual use of allowances.
- Emission data, which will be utilized in subsequent analyses to correlate trading activities with emission levels.

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2. This could potentially be prevented by other regulations, which I will need to investigate further for this work. However, the quick and circular trade of emission allowances between related firms was surely feasible for VAT carousel fraudsters.

The dataset has been processed in a user friendly way by Jan Abrell, who provides the relevant files at <https://www.euets.info/>. Transaction data is accessible between 2005 and April 2019, which mark the range of my sample.

### **EU ETS Auction Prices**

Auction prices from the European Energy Exchange provide daily data on the market value of emission allowances starting from 2012. This price information is instrumental in evaluating market trends, understanding the impact of regulatory changes, and assessing the financial strategies employed by firms participating in the EU ETS.

### **Global Ultimate Owners (GUOs) from Orbis Flatfiles**

Orbis Flatfiles, updated as of June 2023, supply exhaustive data on corporate ownership structures, specifically identifying GUOs with more than a 50% ownership stake. This information is vital for unraveling the complex relationships between firms trading emission allowances, pinpointing instances of internal trading, and exploring the strategic placement of subsidiaries for tax optimization purposes.

### **Tax Treatment of Emission Certificates Across Jurisdictions**

I have compiled information on the varied treatments of emission allowances across different jurisdictions, specifically focusing on whether they are classified as commodities or intangible assets and their eligibility for depreciation. This overview is primarily based on the insights from Directorate-General for Climate Action (European Commission) et al. (2010). Efforts to find more recent sources detailing these regulatory differences are currently underway.

## **3.2 Methodology**

The current version of the paper simply provides descriptive statistics. A future version will look into greater depth into the relationship between price movements and trading patterns, combined with information about firm connections and the different regulatory context they face in each country.

## 4 Results

### 4.1 Emission Trading Patterns

Aggregating the emission trading for each trading day for the time between 2005 and April 2019 allows us to see patterns in emission trading volumes. These patterns are visualized in Figure 1. It is important to note that each regulated entity within the emissions trading scheme must surrender allowances matching its previous years' emissions on April 30. The elevated trading volume before that date visible in Figure 1 fit this reality. However, as also visible from Figure 1, the trading volume is considerably higher before the end of the financial year. Firms seem to optimize their certificate holdings in line with their end-of-the year financial statement, rather than with the allowances they need to surrender due to their actual emissions.

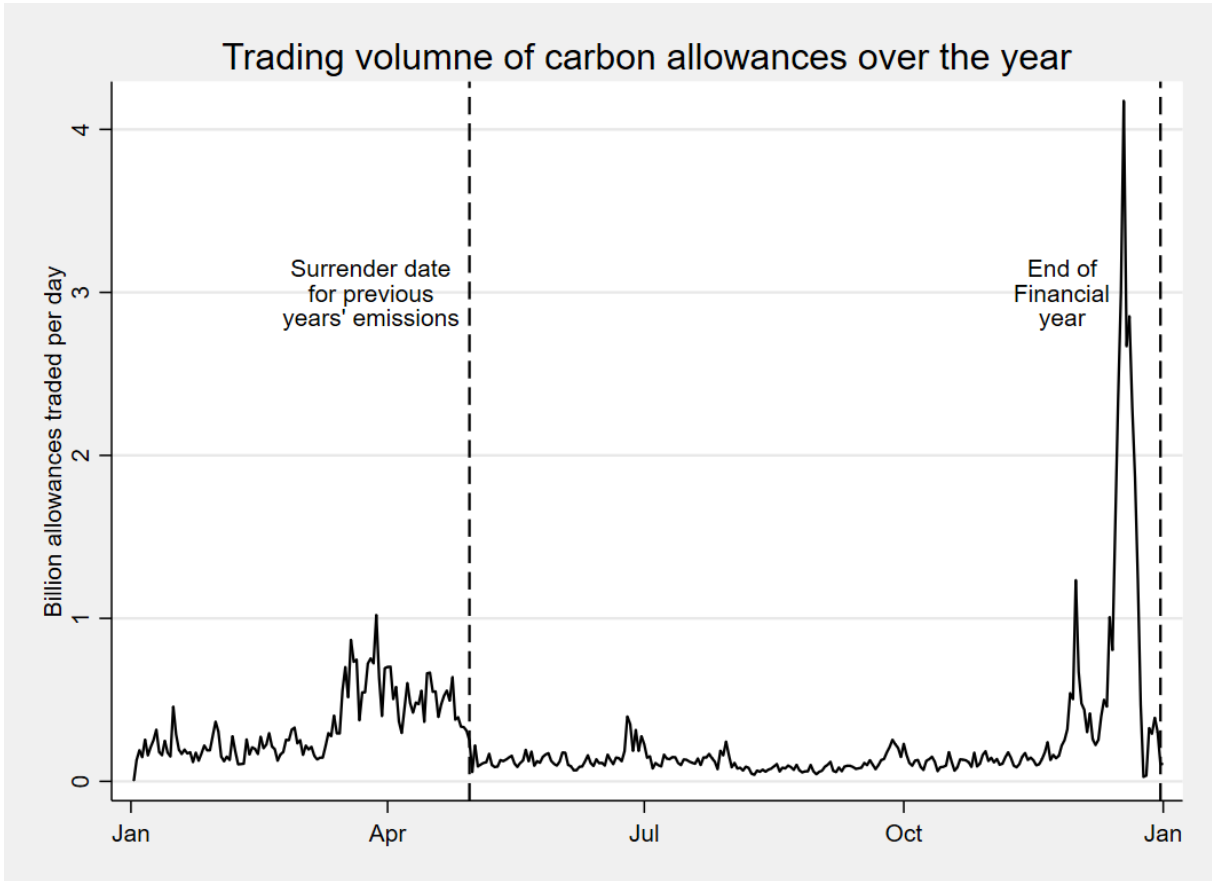


Figure 1: Emission trading volume over the year

In principle, Figure 1 does not reveal any illegitimate or particularly surprising insights: The practice of matching allowances with actual emissions by the end of the year, aimed



at ensuring clear carbon accounting, is a logical approach that could indeed promote transparent and accurate management of carbon emissions.

Figure 2 demonstrates that the heightened trading activity at year-end is clearly not a result of aligning the year’s certificates with the year’s emissions. The left panel of Figure 2 displays the trading volume for transactions where the certificate is received by a firm that has surrendered at least one allowance during its lifecycle, indicating firms that are actively participating in the emission trading scheme due to their significant emissions. The right panel of the figure presents trades to firms that have not surrendered any allowance, likely because they do not fall under the scheme’s regulated entities due to their lower emissions.

Figure 2 reveals two significant insights: First, the volume of trading with partners not requiring certificates for emissions compliance is substantially higher than trade between entities regulated under the EU ETS. Specifically, the average daily trading volume of actors outside the EU ETS (right panel) is about five times greater than that between regulated participants (left panel). Second, while trading activity prior to the surrender date at the end of April is evidently crucial for those needing certificates to comply with their emissions obligations (left panel), this deadline appears to have little significance for traders not subject to EU ETS regulations. Instead, for these external traders, end-of-year transactions are markedly more significant.

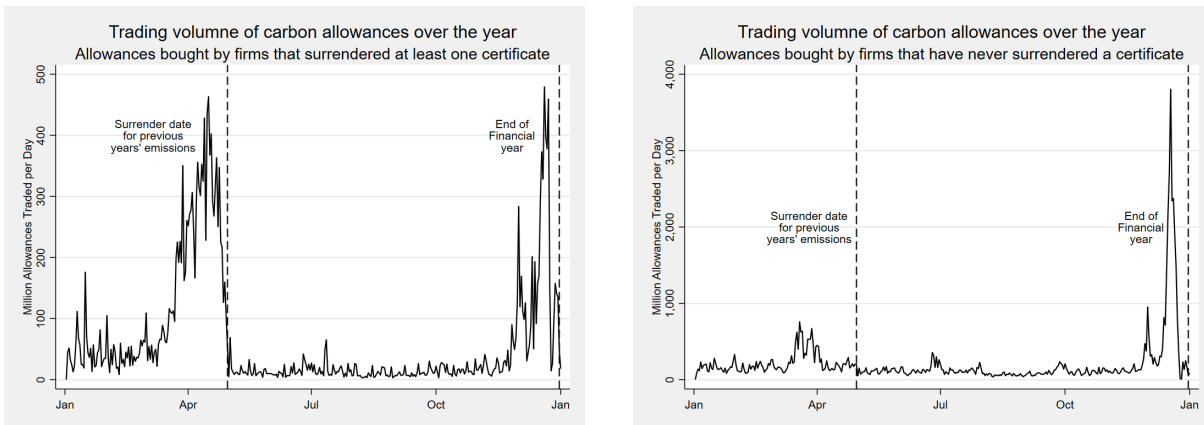


Figure 2: Emission trading of firms with and without needs for certificates

## 4.2 Internal Emission Trading Patterns

Having covered overall emissions trading in the previous subsection, I now turn to internal emission trading. Should emission trading serve as a mechanism for profit shifting between subsidiaries across different countries, such activities would likely manifest within

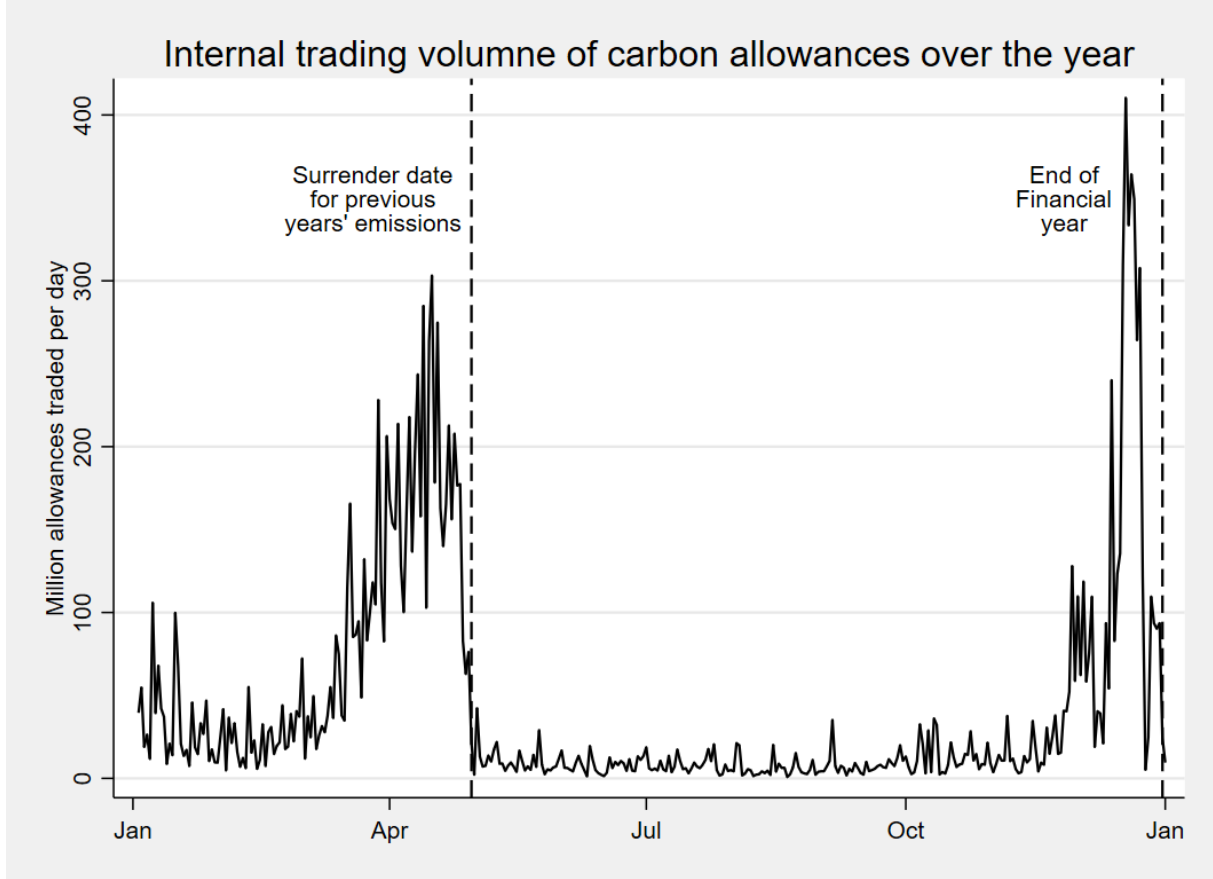


Figure 3: Internal emission trading volume over the year

a multinational corporation's internal trades. Consequently, the analysis that follows is restricted solely to transactions occurring between firms sharing the same GUO.

Figure 3 illustrates the dynamics of internal carbon trading. Interestingly, a significantly larger proportion of the trade is conducted with the objective of aligning with actual emissions from previous years in April.

However, Figure 4 reveals that this only stems from the fewer trades that happen between firms that are actually regulated under EU ETS (left panel), while the non-regulated still seem to conduct trades mainly for financial motives (right panel). The primary insight from Figure 4 is that two subsidiaries of the same multinational corporation frequently engage in end-of-year trades, despite the recipient not requiring the certificates for emission compliance. While in the broader market, such sales might be justified for financial speculation—akin to trading stocks or other financial assets—in internal markets, these transactions defy purely financial logic unless one subsidiary derives greater financial benefit from the asset than another.

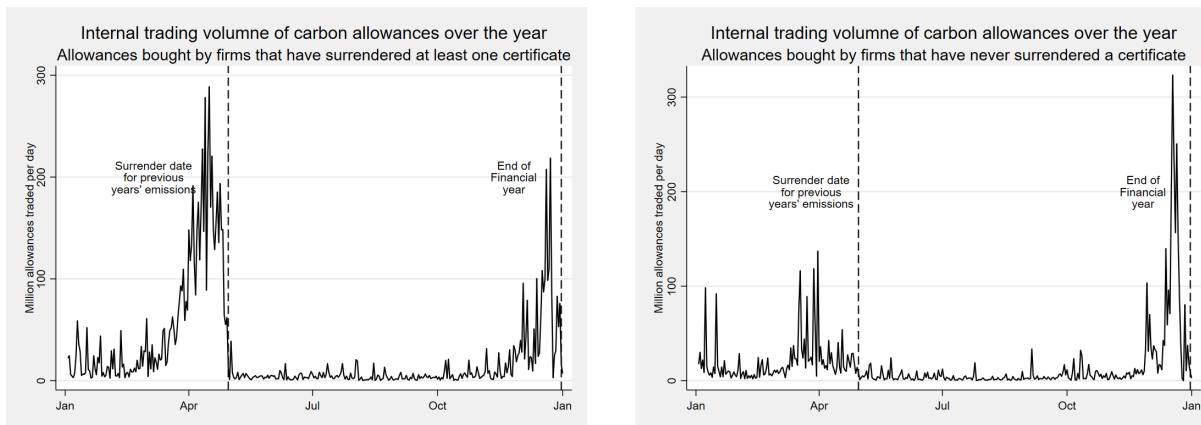


Figure 4: Internal emission trading by firms with and without needs for certificates

### 4.3 Regulatory Arbitrage

Figure 5 and Figure 6 highlight the potential sources of advantageous allowance usage by one subsidiary over another. Figure 5 examines internal emission trading between subsidiaries facing different accounting rules. The red line indicates trading volume moving from subsidiaries in jurisdictions where emission allowances are treated as commodities to those where allowances are considered intangible assets, which may be advantageous for tax optimization at year-end. The blue line represents trades in the opposite direction, from subsidiaries treating allowances as intangible assets to those viewing them as commodities. Clearly, Figure 5 shows that the increase in trading volume towards the end of the year mainly consists of trades from subsidiaries that classify the allowance as a commodity to those that can account for it as an intangible asset.

Figure 6 presents further data supporting the theory that allowances are strategically traded within a multinational to the subsidiary that can utilize them most effectively in their year-end financial statements. This figure illustrates the volume of internal trades from jurisdictions that do not permit carbon allowance depreciation to those that do, marked in red, versus trades in the opposite direction (from jurisdictions allowing depreciation to those that don't) shown in blue. The notable spike in trading activity towards the year's end predominantly originates from trades moving from a non-depreciation to a depreciation regime, underscoring the potential tax advantages such maneuvers could offer to the multinational corporation as a whole.

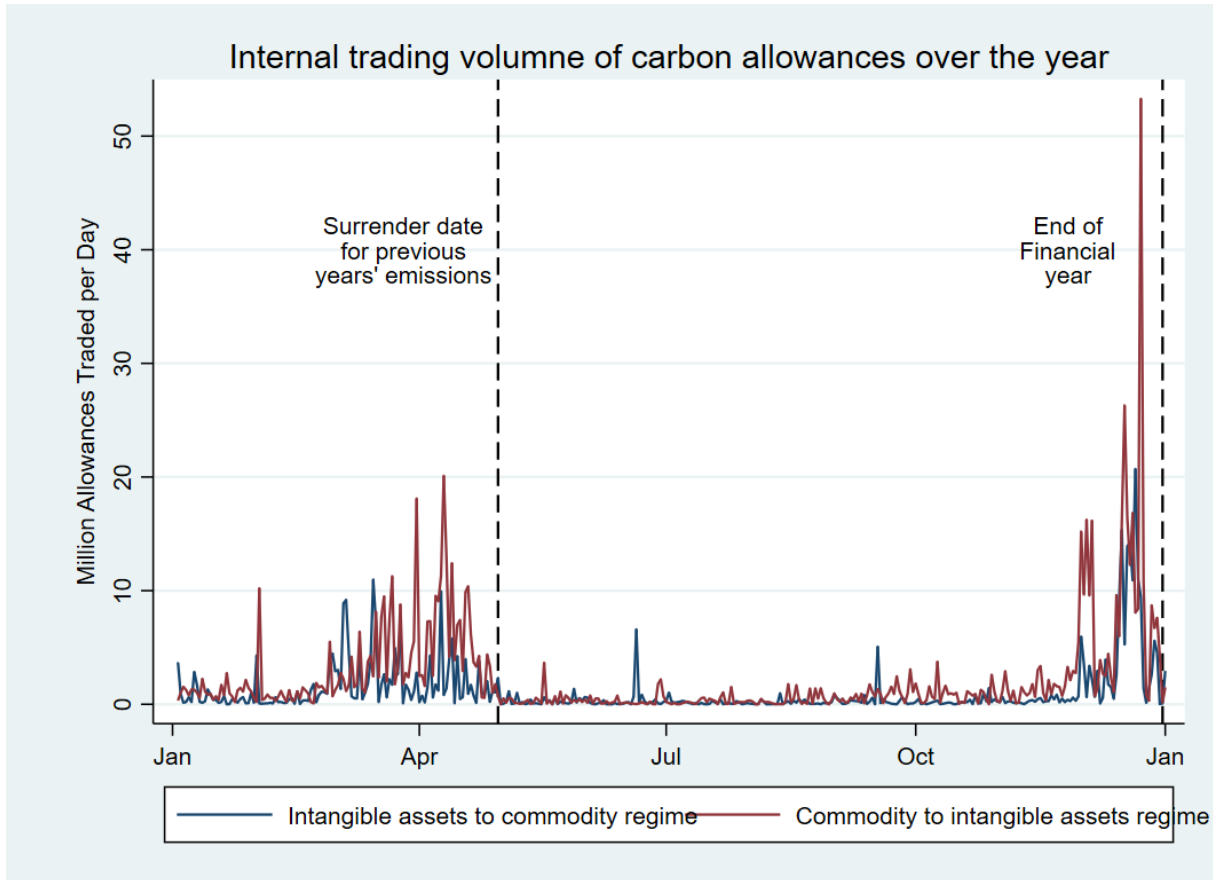


Figure 5: Internal emission trading between regimes that treat allowances as intangible assets or commodities

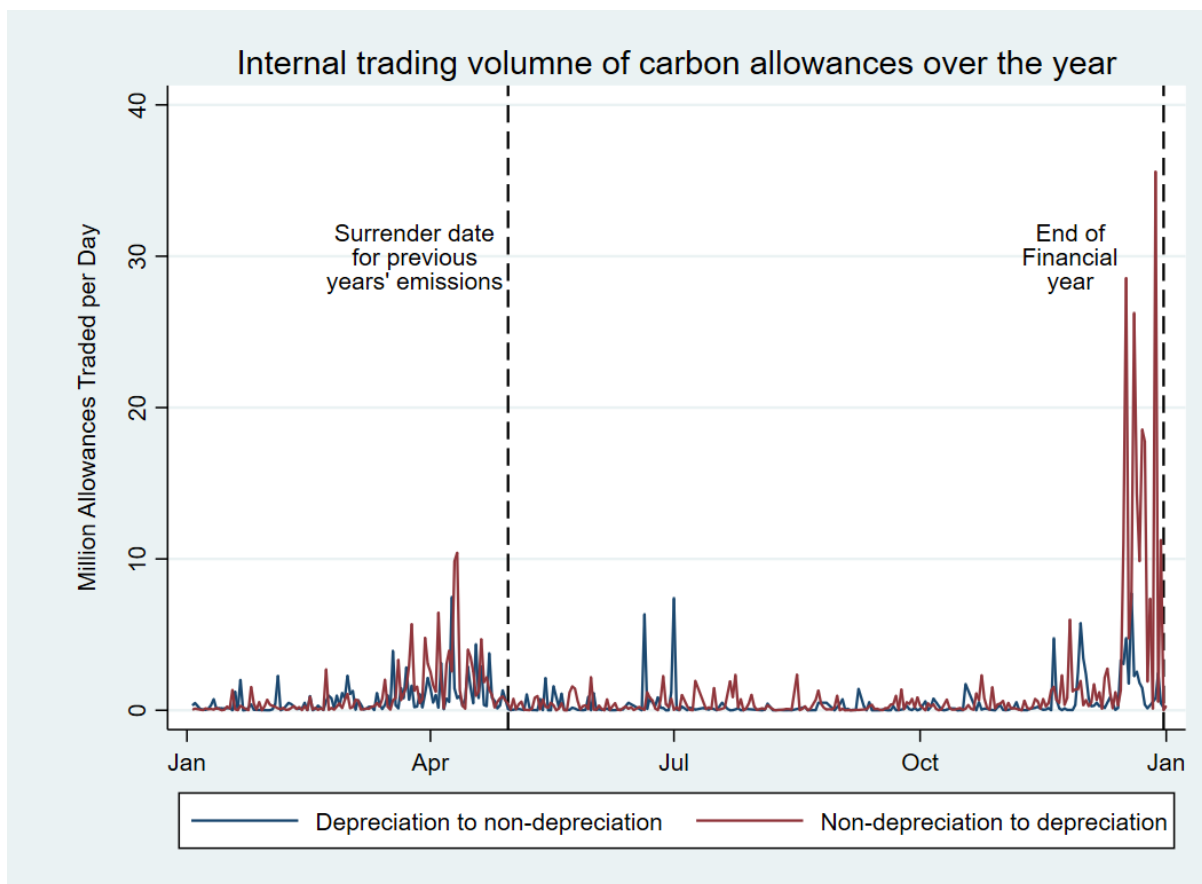


Figure 6: Internal emission trading between regimes that do and do not allow for the depreciation of allowances

## 5 Conclusion

The descriptive analysis in this paper highlights a notably high volume of emission allowances trading towards the year-end—contrary to the expected increase as the surrender deadline approaches—among firms that have not utilized a certificate for emissions at any point in their history. Such trading, especially between subsidiaries of the same parent company, strongly suggests that these internal transactions are motivated by tax or accounting considerations. This suspicion gains further credibility from the observation that these end-of-year internal trades predominantly flow towards subsidiaries in jurisdictions with more lenient regulations.

This study is work in progress. I submit it to this conference anyways, as I think the topic is urgent and of high policy relevance. My existing descriptive results indicate that the EU ETS is exploited for tax planning, potentially aggressive tax planning. I hope to be able to further substantiate or discard these results with additional tests, in particular linked to the difference in trading patterns for high and low emission prices.

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