The impact of EU ETS verification events on stock prices

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Outline

- Introduction
- Contribution
- Hypotheses
- Data
- Methodology
- Results
- Conclusion

Introduction

- EU ETS is the biggest emission trading system.
- Designed in 3 phases:
  - 2005-2007 : start-up and test period
  - 2008-2012 : 8 % reduction compared to 1990 level
  - 2013-2020 : 21% reduction compared to 2005 level
- EU ETS places a 'cap' on the amount of carbon dioxide that participating installations can emit every year, by allocating emission allowances for free (“grandfathering”)
- More efficient companies can sell their remaining allowances, less efficient companies must buy allowances from others ➔ value relevance of firms’ carbon performance

Contribution

- Limited literature about the value of carbon performance within the EU ETS:
  - Bushnell et al. (2011) and Schmidt & Werner (2012) find evidence that investors regard emission allowances as a valuable asset
- This study contributes to this research by examining how the publication of verified emissions affected stock prices of 368 companies, covering the entire European Union
- 6 publication events over the period 2006-2011
- Analysis of the announcement effect using both allocated and expected verified emissions

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Hypotheses

H1: The publication of verified carbon emissions contains valuable information to investors

- Emission allowances have similar characteristics as the firm's other assets
- Risks from regulation
- Reputational risk

H2: The market reaction is negatively associated with unanticipated verified carbon emissions

- Inverse relationship between carbon emissions and firm value (e.g. Konar and Cohen, 2001; Griffin et al., 2012)
- Unanticipated emissions as the stock market only reacts to unexpected news

Hypotheses

H3: The effect on stock prices of verification events is stronger for carbon-intensive firms

- High carbon-intensive companies face greater financial risk caused by increased regulatory intervention, abatement expenses and reputational impact

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Data

- Emission data (CITL, provided by Carbon Market Data)
- Financial data (Datastream)
- CITL reports emission data at the installation level

➔ Manually matching of installations to firms

1. Selection of European listed companies (Amadeus) with installations covered by the EU ETS
2. Matching of installations (installation's name, account holder, e-mail addresses of the installation's contact person) to firms by:
   - company name
   - subsidiaries' names (Amadeus)

- Identification of 3533 installations (27,2% of population)

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Methodology

- Informational content of the EU ETS verification events
  - Event study (MacKinlay, 1997)
  - Market model (e.g. Lee et al., 2013)
  - No hypothesis is made about the sign of the market reaction
    ➔ Test if <u>absolute</u> abnormal returns are different from the average absolute abnormal return in the estimation period
  - Grank test (Kolari & Pynnönen, 2011)

- Determinants of market reactions to EU ETS events
  - <u>Signed</u> abnormal returns
  - OLS
  - Naive model versus expectations model

Results

- Informational content of the EU ETS verification events

	CAAR[-1.1]	CAAR[0.1]	CAAR[0.2]	CAAR[0.3]
2006	1.13 (2.95)	0.90 (2.37)	0.99 (2.81)	1.63 (3.69)
	*3.77****	*3.52****	*3.79****	*3.79****
2007	-0.17 (1.63)	-0.04 (1.43)	-0.00 (1.79)	-0.10 (2.17)
	-0.34	*-0.14*	*-0.06*	*-0.06*
2008	0.28 (2.84)	0.35 (2.42)	0.11 (2.69)	0.34 (3.29)
	0.55	*1.13*	*0.40*	*0.88*
2009	1.28 (4.73)	1.16 (3.93)	2.11 (5.55)	2.33 (6.36)
	1.56	*1.83**	*2.15***	*2.25***
2010	0.12 (2.45)	0.04 (1.96)	0.23 (2.56)	0.18 (2.85)
	0.06	*-0.04*	*0.21*	*0.44*
2011	-0.02 (1.98)	0.14 (1.75)	0.17 (2.18)	0.03 (2.35)
	-1.18	*-0.30*	*-0.46*	*-0.16*

*,**,*** denote significance at the 10%, 5%, 1%

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Results

- Evidence for hypothesis 1 although financial markets only react to the first publication of each Phase and subsequent reports are considered less relevant

    - Allocation levels do not change within one Phase, subsequent reports are therefore less relevant as the first verification report served as a benchmark

    - Negligible impact of carbon trading on firm performance, due to low carbon price. The carbon price was only at the beginning of each Phase at a reasonable level

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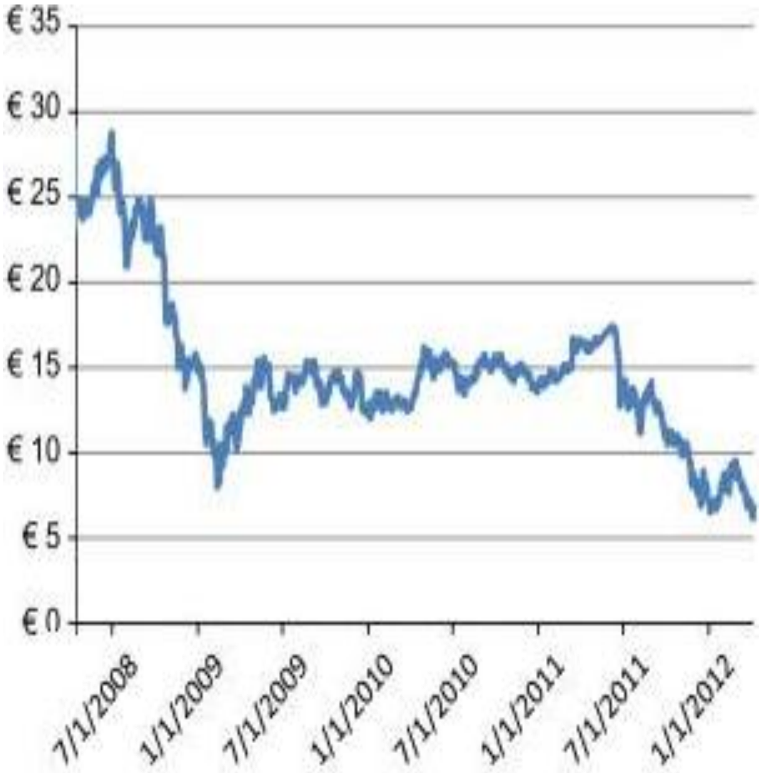
Evolution carbon price

PHASE 1

PHASE 2



Results

- Determinants of market reactions to EU ETS events

2006	*Panel A: Event window (0, +1)*		*Panel B: Event window (0, +2)*	
	(1)	(2)	(1)	(2)
Intercept	-0.036***	-0.033**	-0.058***	-0.054***
	(0.006)	(0.011)	(0.000)	(0.001)
UA	-0.008	-	-0.013*	-
	(0.234)		(0.089)	
NP	-	-0.004	-	-0.003
		(0.298)		(0.331)
Size	0.001	0.001	0.002*	0.002
	(0.274)	(0.435)	(0.077)	(0.102)
MTB	0.001	0.001	0.001	0.001
	(0.513)	(0.604)	(0.443)	(0.442)
Industry-FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.109	0.071	0.083	0.049
P-value	0.000	0.001	0.001	0.012
Obs.	241	241	241	241

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Results

2009

Panel B: Event window (0, +2)

	(1)	(2)	(3)	(4)
Intercept	0.067** (0.012)		0.060** (0.025)	0.064** (0.017)
UA	-0.035** (0.013)			
NP		-0.024*** (0.008)		
UE			0.014 (0.265)	
UP				0.002 (0.824)
Size	-0.001 (0.472)	-0.001 (0.602)	-0.001 (0.411	-0.002 (0.378)
MTB	-0.004** (0.023)	-0.004** (0.024)	-0.005* (0.095)	-0.005* (0.079)
Industry-FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.146	0.154	0.165	0.160
P-value	0.000	0.000	0.000	0.000
Obs.	267	251	267	251

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Results

- Evidence for hypothesis 2 : market reaction is negatively related to unexpected emissions, estimated by the naive model
- Variables related to unexpected emissions, calculated by the expectations model have limited explaining power

➔Naive model outperforms the expectations model.

- Limited evidence for hypothesis 3

Conclusion

- Informational content of the EU ETS verification events
  - Event study using absolute abnormal returns
  - Only the first publication in each Phase results in significant market responses
  - Investors value particularly the information revealed at the first verification event. As allocation levels do not change within one Phase, the first report served as a benchmark
- Determinants of market reactions to EU ETS events
  - Significant positive correlation between the market reaction and the level of excess allowances
  - Naive model outperforms the expectations model
  - Limited evidence found that carbon performance matters more for high-carbon intensive companies

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Conclusion

- Some caveats
  - Cross-sectional results partially based on expectation model
    ➔ further research needed to improve this model
  - Short-term reactions could differ from long-term valuation
    ➔ further research needed to investigate the impact of carbon performance on long-term financial performance indicators

Thanks for your attention !

Appendix A

$$Expected\ emissions_t = Emissions_{t-1} * 1 + \left(\frac{Revenues_t - Revenues_{t-1}}{Revenues_{t-1}}\right) * 1 + \left(\frac{Allocated_t - Allocated_{t-1}}{Allocated_{t-1}}\right)$$

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