

Empirical Evidence on the Valuation Implications of the European Union Carbon Emissions Trading Scheme

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A. Motivation & Setting

- **Climate change** is a global issue that concerns
 - Governments
 - Policy makers
 - Management
 - Investors
- **Accounting debate**
 - Existence of legal liability
 - Proper disclosure of carbon exposure
 - Fair value assessment of carbon allowance and liability

Research Questions

- does the release of carbon emissions data provide valuation relevant information to market participants?
 - do investors **differentiate** firms based on **cost pass through ability** (industry type, relative carbon efficiency), and **jurisdictional setting** when assessing firms' carbon liability?
- ultimately, **our study** speaks to **disclosure issues**

IRRC Institute, 2009 (Trucost, page 28):

“Corporate reporting of plant-level emissions to authorities in Europe has been of limited use to investors.

Mandatory reporting of company-wide greenhouse gas emissions, whether to the EPA or in annual reports and accounts, would better enable investors to assess the carbon performance of equity holdings.

Data at a country and regional level would allow investors to analyse exposures under different cap-and-trade regimes”

EU ETS mechanisms

- carbon allowances were allocated freely to installations based on established benchmarks and industry standards in phase I (2005-07) and Phase II (2008-12) (**historical performance**)
- firms must submit allowances to neutralize their carbon emissions by the end of April
- shortages must be purchased from the market
- intention has been that future carbon allowance be auctioned rather than allocated freely in Phase III (2013 onward)

⇒ extant literature has documented the existence of latent carbon liabilities but within jurisdictions without a ‘cap and trade’ (tax) regime and using total emissions as their proxy for the valuation impact

However, industry research (e.g., IRRC Institute and Trucost, 2009; Deutsche Bank, 2009) argues that the valuation impact of carbon emissions depends not only on a firm’s total emissions but additionally on

- (1) the firm’s **ability to pass carbon costs** on to their customers;
- (2) the **price of carbon**, both **current and anticipated**;
- (3) the market’s perceptions regarding the firm’s **future carbon emissions profile** relative to its current profile;
- (4) **key legislative outcomes** including the overall scheme cap, **permit allocation**, and compensation

Clarkson, Li, Pinnuck, Richardson, 2013 (working paper)

- listed EU firms with carbon emissions and permit allocation data available over the period 2006 – 2009
- ⇒ participating installations; emissions data recorded by the European Commission in the *Community Independent Transaction Log (CITL)*
- installation data aggregated up to the listed entity level using the BVD Amadeus Database

Research Focus –

- the valuation relevance of carbon emissions under the EU ETS
- *free permit allocations*
- cost pass on ability*
- jurisdictional differences*

H_1 : the market values the portion of total emissions covered by **free allowances** differently than the **shortfall** not covered by free allowances

\Rightarrow *Table 4*

$$V = \gamma_0 + \gamma_1 BV + \gamma_2 AE + \gamma_3 \mathit{EmitTot} \quad (1)$$

$$V = \alpha_0 + \alpha_1 BV + \alpha_2 AE + \alpha_3 \mathit{AllocShort} + \alpha_4 \mathit{PerAlloc} + \varepsilon \quad (2)$$

V	=	market value of common equity, measured at the end of April following year end (EU disclosure date);
BV	=	book value of common equity;
AE	=	abnormal earnings to common defined as earnings to common equity less an assumed cost of capital based on the CAPM times beginning-of-period book value of common equity;
$EmitTot$	=	measure of the firm's total carbon emissions reported to the EU (reported at the installation level and then aggregating upward);
$PerAlloc$	=	free permit allocations to firm;
$AllocShort$	=	$EmitTot - PerAlloc$

Results – Covered versus Uncovered Emissions

Variable	Pooled	Pooled
Intercept	1.194	1.212
	(< 0.001)	(< 0.001)
<i>BV</i>	1.116	0.522
	(< 0.001)	(< 0.001)
<i>AE</i>	7.048	7.038
	(< 0.001)	(< 0.001)
<i>EmitTot</i>	-0.044	---
	(<0.001)	
<i>AllocShort</i>	---	-0.084
		(0.038)
<i>PerAlloc</i>	---	0.019
		(0.475)
<i>Adj R²</i>	0.809	0.809

← assessed liability = €44 per ton

← assessed liability = €84 per ton of uncovered emissions

← assessed liability statistically zero for permit allocations

Step #2 – cost pass through ability

H_2 : a firms' carbon cost pass on ability will mitigate the negative valuation impact of carbon emissions

a = industry-level perspective

→ **Herfindahl-Hirschman (HH) index**

b = firm-level perspective

→ **sector relative carbon efficiency**

@ industry level

H_{2a} : firms' *market power impacts its ability to* mitigate the negative valuation impact of carbon emissions

\Rightarrow *Table 5*

$$\begin{aligned} V = & \alpha_0 + \alpha_1 BV + \alpha_2 AE + \alpha_3 HH \\ & + \alpha_4 \textit{AllocShort} + \alpha_5 \textit{PerAlloc} \\ & + \alpha_6 \textit{AllocShort} * \textit{HH} + \alpha_7 \textit{PerAlloc} * \textit{HH} + \varepsilon \end{aligned}$$

@ firm level

H_{2b} : firms' *sector relative carbon efficiency underscores its ability to* mitigate the negative valuation impact of carbon emissions

2 sector rivals

low emitter 1 tonne / €1,000 sales

high emitter 10 tonnes / €1,000 sales

elasticity of demand → cost pass through ability of 1 tonne / €1,000 sales

⇒ low emitter can pass through all related costs

high emitter directly bears costs relating to 9 tonnes / €1,000 sales

→ *high emitter suffers reduced profitability / economic viability*

⇒ Table 6 Panel A: rank

IRRC Institute, 2009 (Trucost):

“High emitters which find it difficult to pass these liabilities on in higher prices could see profits fall, unless they profoundly change the goods they produce or how they produce them”

“Companies that are more carbon efficient than sector peers stand to gain competitive advantage. Carbon pricing could create opportunities for low-emission companies in carbon-intensive sectors. High emitters which find it difficult to fully pass these liabilities on could see profits fall ”.

firms with superior carbon intensity performance have lower latent carbon liabilities

$$V = \alpha_0 + \alpha_1 BV + \alpha_2 AE + \alpha_3 Rank + \alpha_4 AllocShort + \alpha_5 PerAlloc + \alpha_6 AllocShort * Rank + \alpha_7 PerAlloc * Rank + \varepsilon$$

<i>Rank</i>	=	rank installation-level emissions within industry & year, then equal-weighted average of emissions-ranked performance for firm's installations;
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Results – Cost Pass On Ability

<u>HH</u>				<u>Rank</u>
<i>AllocShort</i>	-0.098 (0.014)	} baseline liability	-0.119 (0.017)	<i>AllocShort</i>
<i>PerAlloc</i>	0.013 (0.647)		0.016 (0.697)	<i>PerAlloc</i>
<i>AllocShort*HH</i>	0.063 (0.052)		0.101 (0.037)	<i>AllocShort*Rank</i>
<i>PerAlloc*HH</i>	0.007 (0.443)	mitigation	0.002 (0.773)	<i>PerAlloc *Rank</i>

⇒ significant liability for firms with limited ‘cost pass on ability’
 greatly mitigated (or zero) for those with the greatest ability to pass on
 the costs $-0.098 + 0.063HH$ and $-0.119 + 0.101Rank$

Step #3 = Caveat – non-EU emissions not reported under the EU ETS but should still be “assessed” by the capital markets

H_3 : the valuation impact of the EU ETS carbon emissions differs from that for carbon emissions from non-EU ETS zone

Data – 189 firm-year observations with global emissions data through the CDP

Results – EU versus Non-EU Emissions

Variable	Model 3	Model 4
Intercept	1.738	1.657
	(0.190)	(0.182)
<i>BV</i>	1.411	1.460
	(< 0.001)	(< 0.001)
<i>AE</i>	5.526	5.808
	(< 0.001)	(< 0.001)
<i>CDP Global Emissions</i>	-0.053	---
	(0.023)	
<i>AllocShort</i>	---	-0.094
		(0.008)
<i>PerAlloc</i>	---	0.025
		(0.169)
<i>Non-EU Emissions</i>	---	-0.048
		(0.041)

EU

non-EU

1%

F. Conclusion and Implications

- ✓ carbon emission data are valuation relevant
 - ✓ the market values firms' future carbon liability differently based on firms'
 - relative carbon efficiency *(Rank)*
 - competition environment *(HH)*
 - rigor of the regulatory regime *(EU vs non-EU)*
- } pass on
ability
- ✓ notwithstanding their documented importance, the carbon emissions data are not “easily accessed”



- ❑ MD&A disclosures on carbon risk should focus on firms' relative carbon efficiency and firms' ability to pass on the increased carbon costs to consumers
- ❑ recognition of carbon liability based on the current emission levels may not be informative (or even misleading)
- ❑ existing research in this area may suffer from model misspecification