Abatement in the pilot phase of the EU ETS: a quantitative analysis

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EU ETS Lingo

Pilot phase- 2005-2007

EUA- European Union Allowance unit (1t CO_2)

CITL-Community Independent Transaction Log

BaU- Business as usual, the counterfactual

Over-allocation- given more EUAs than needed

Abatement- reduce CO_2 emissions

Long – have more EUAs than needed

Short- don't have enough EUAs

Installation- CO_2 emission point

Research motivation

Determine how much over-allocation or abatement led to the mostly long positions in the pilot phase of the EU ETS

Why?

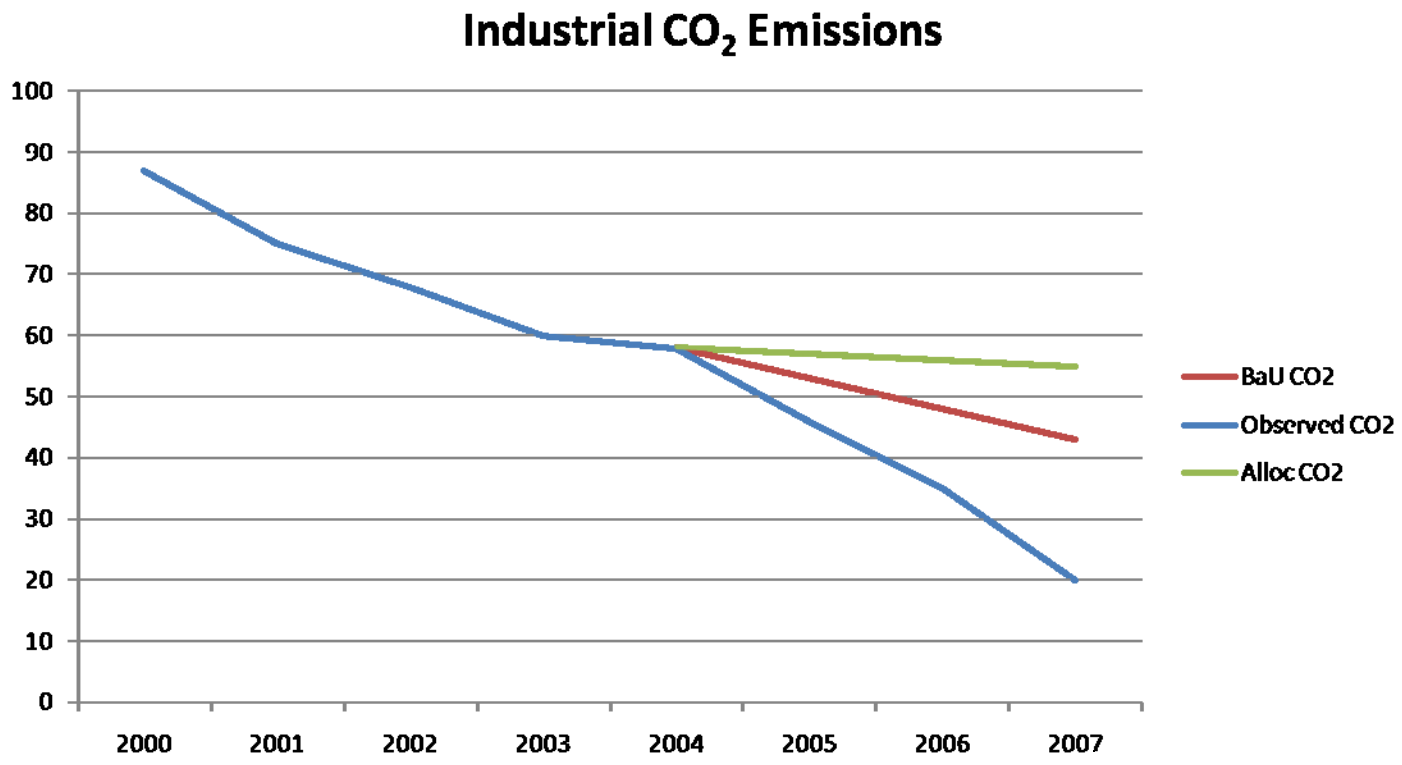
- Identify poor allocation. Remove “hot air” in future.
- Correct incentives, windfall profits, competitive distortions

Who?

- Kettner et al. (2008)- 2005-2006 ETS CITL data
- Ellerman and Buchner (2008)- 2005-2006 over-allocation ratios, and national growth/CO_2 trends/NAPs

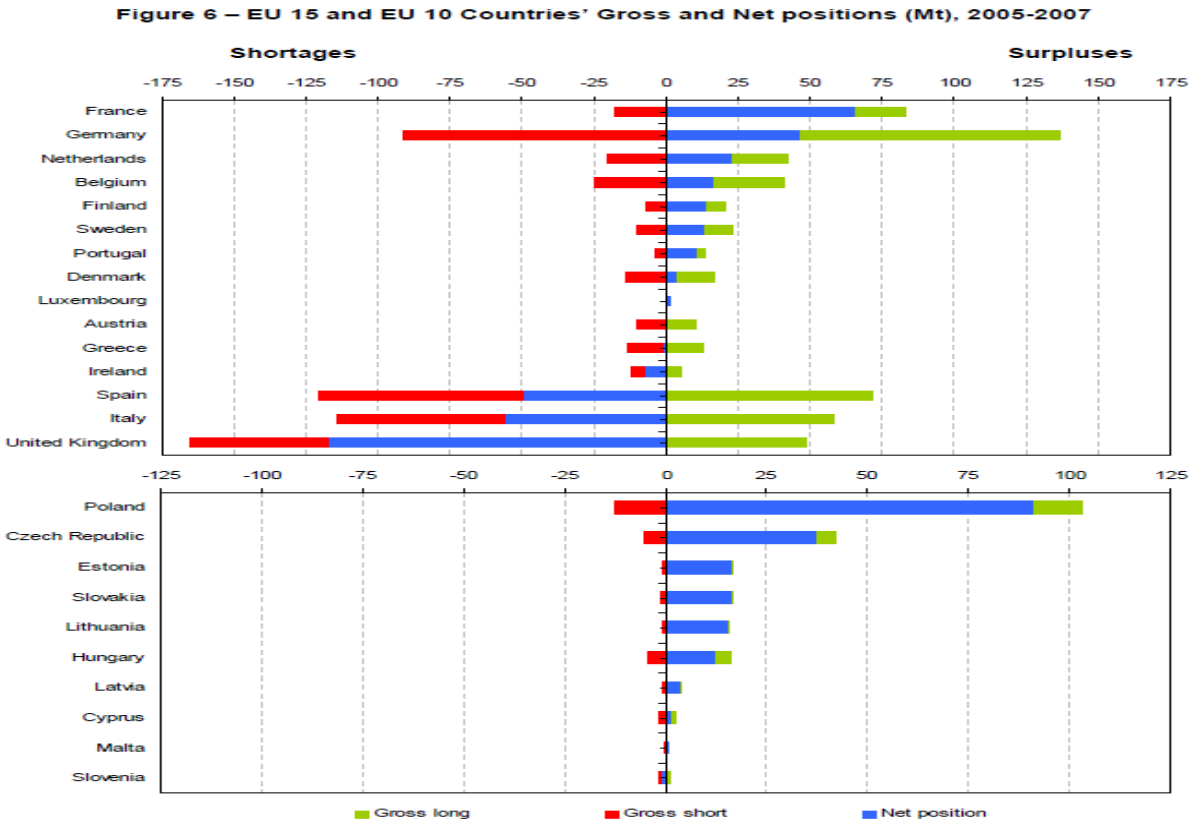
Over-allocation/Abatement

- Policy begins in 2005



What happened?

Source: Trotignon and Delbosc (2008)



Methodology

- Use 1990-2004 data to estimate a model for industrial CO_2 emissions.
- Use observed data for 2005-2007 to do an ex-poste estimation of industrial CO_2 emissions.
- Determine ETS share of industrial CO_2 emissions.
- Compare BAU to observed EU ETS emissions to observe levels of over-allocation and abatement.

Data used

Relevant factors for CO_2 emissions- relative fuel prices, CO_2 intensity of energy, weather, economic activity levels

- EEA GHG Inventory reports Industrial CO_2
- Industrial Production index- Eurostat
- Heating Degree Days- Eurostat
- Cooling Degree Days- European Climate and Assessment Database (missing values from tutiempo.net)
- CO_2 intensity of industry – ODYSSEE Database

Specification for 1990-2004 years

- Dynamic panel data estimation

$$Y_{i,t} = X'_{i,t} * B + a * Y_{i,t-1} + u_{it} + e_{it}$$

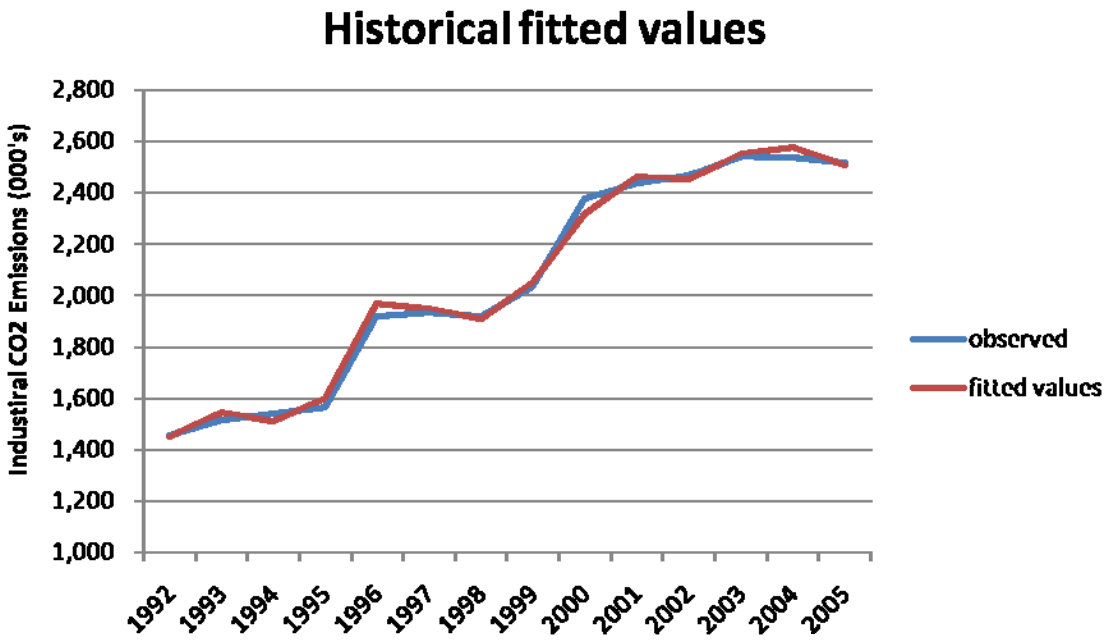
- This is estimated using Arellano and Bond (1991) estimator

$$\ln Y_{i,t} - \ln Y_{i,t-1} = a(\ln Y_{i,t-1} - \ln Y_{it-2}) + (\ln X_{i,t} - \ln X_{i,t-1}) * B + (e_{it} - e_{it-1})$$

Estimated parameters

D.ln_y	Coefficient.	Robust Std. Err.	Z	P>z	[95% Conf.	Interval]
ln_y_ LD.	0.364	0.091	3.99	0.00	0.185	0.543
ln_index_Ind_ prod D1.	0.406	0.080	5.1	0.00	0.250	0.562
ln_CO2int_ind D1.	0.529	0.099	5.33	0.00	0.335	0.724
ln_HDD D1	0.133	0.071	1.88	0.06	-0.006	0.272
ln_CDD D1	0.004	0.004	1.06	0.29	-0.003	0.011
_cons	0.008	0.004	2.23	0.03	0.001	0.015

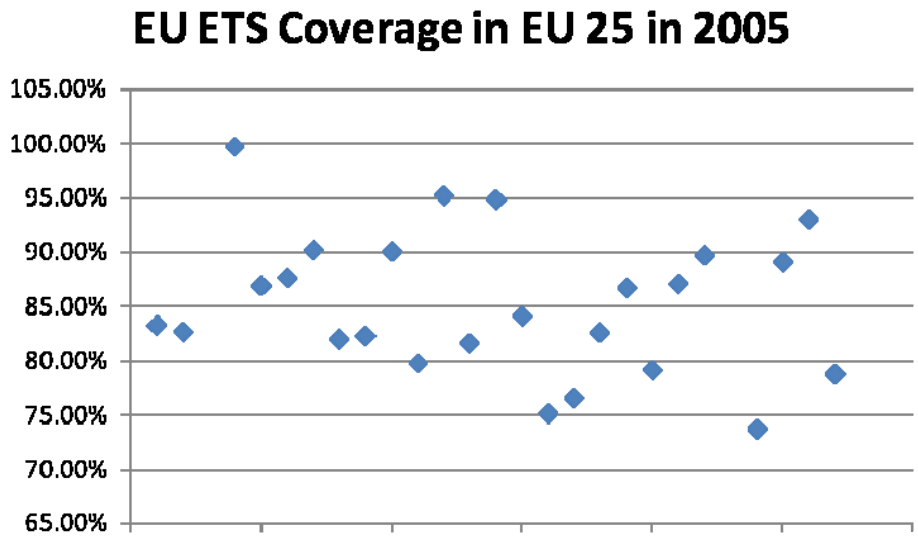
Fit of model



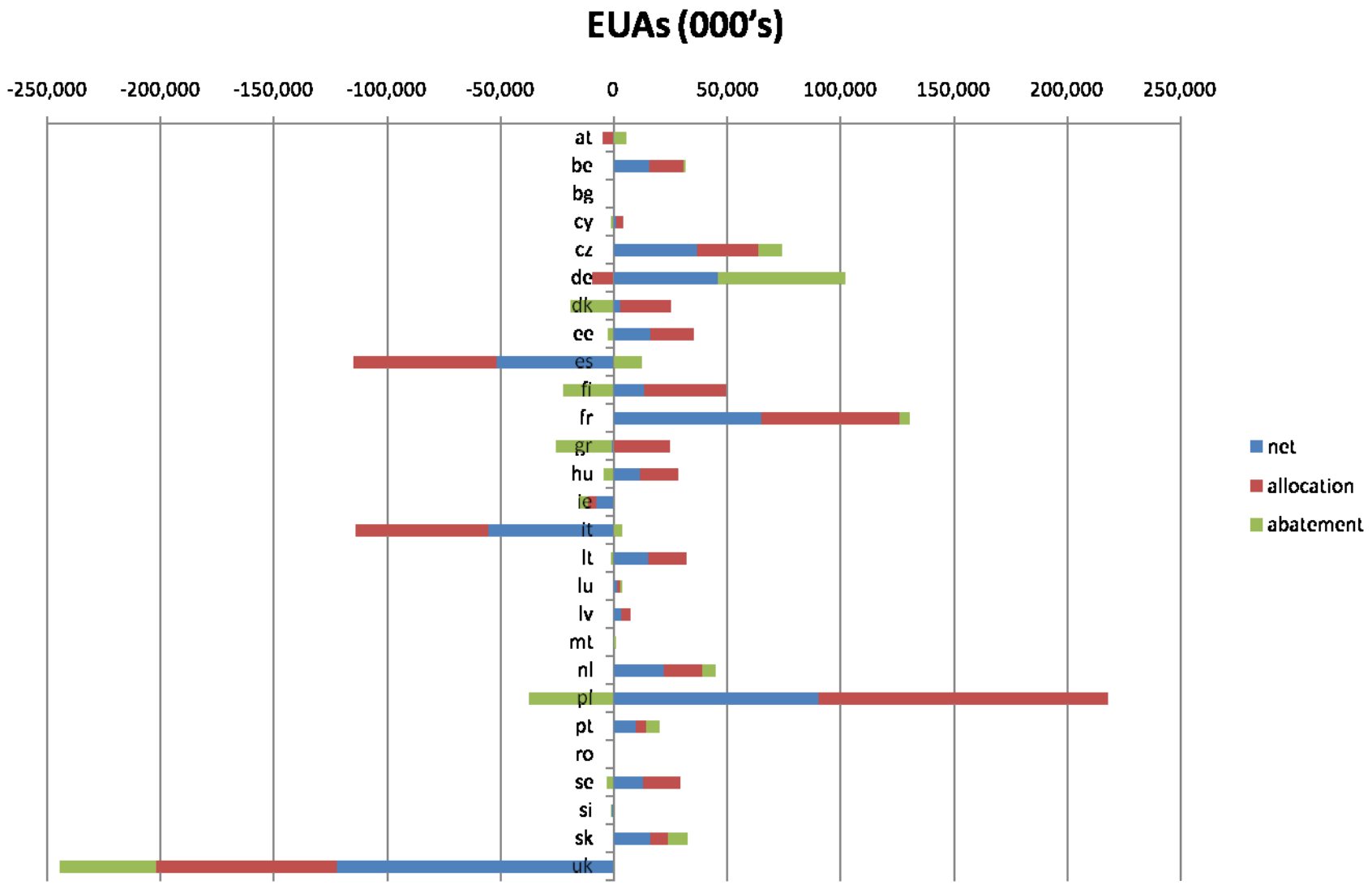
- Observed = 290.7723 + .993586*fitted
  (.458) (0.00)

2005-2007Assumptions

- exogeneity of regressors (competitiveness)
- constant share of ETS projections (Georgopoulou et al., 2006)



Results 2005-2007



Conclusions

- Both over allocation and abatement occurred but at different levels than previously suggested

year	alloc_eua	vfd_eua	eua_proj	over-alloc	E/B (2008)	abatement	E/B (2008)
2005	2,096,444	2,014,017	2,012,868	135,387	125,000	40,072	130,000-200,000
2006	2,071,740	2,035,612	2,017,547	135,840	125,000	35,365	140,000-220,000
2007	2,076,417	2,049,518	2,016,584	153,383	-	54,133	-
2005-2007	6,244,601	6,099,147	6,046,999	424,611		129,569	
				(net) 197,602		(net) -52, 148	

Future work

- Sectoral analysis instead of national, if data permits for some sectors.

For example: Delarue et. al. (2007) power sector abatement of 88 Mt (2005) and 59 Mt (2006) due to fuel switching.

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