Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA



Winners and Losers of EU Emissions Trading during its first trading period (2005 - 2007)

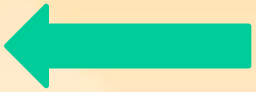
4th IAEE Asian Conference

19-21 September 2014, Beijing

Johanna Cludius, CEEM, UNSW

Ways to become a 'winner'

- Sell overallocation
  - Engage in EUA-CER swaps

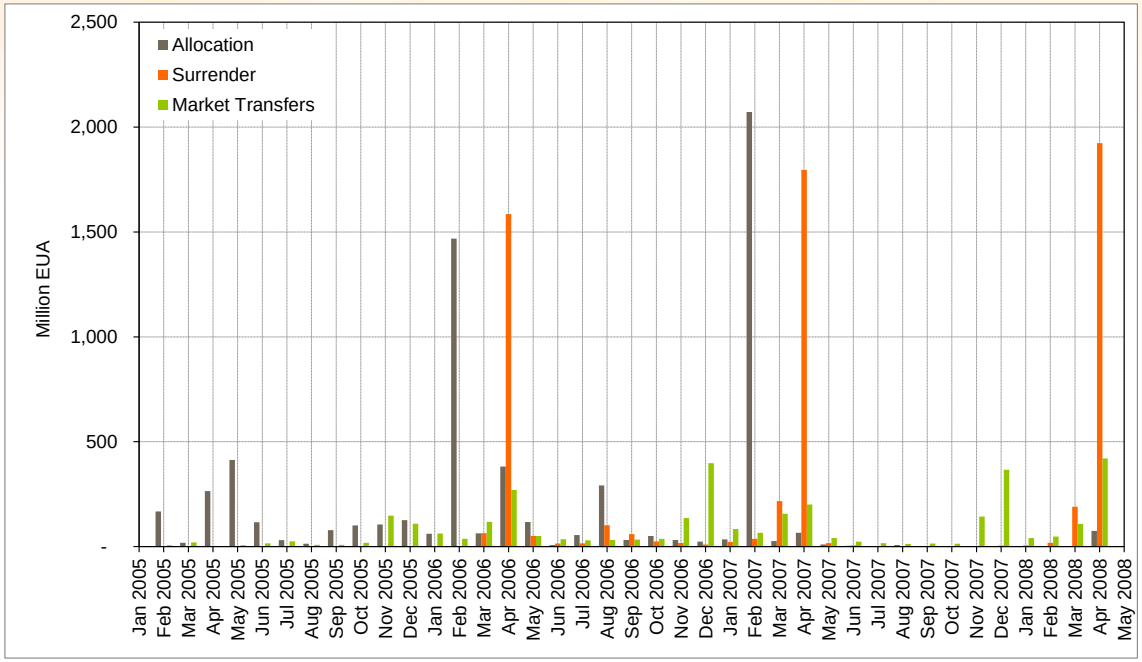


- Speculate on carbon market
  - Offer (costly) brokerage and other services to liable firms

- Pass-through carbon cost to consumers over and above actual costs incurred

Data

- Datasets available on the EU Transaction Log (EUTL) / CITL
  http://ec.europa.eu/environment/ets/
  - Operator Holding Accounts
  - Person Holding Accounts
  - Transfer Dataset



Source: EUTL

Enhancing the dataset

- Linking datasets
- Aggregation from installation to parent company level (Jaraite et al. 2013) *http://fsr.eui.eu/CPRU/EUTLTransactionData.aspx*
- Defining transfer categories
  - Admin vs. market transfers (cf. Martino and Trotignon 2013)
  - Intra- vs. inter-company transfers

	Period I - Acquired				Period I - Transferred		
	Market		Admin	Total	Market	Admin	Total
Volume (Mt)	inter-company	intra-company			inter-company		
	1,750	1,603	6,224	9,576	1,750	6,051	9,403

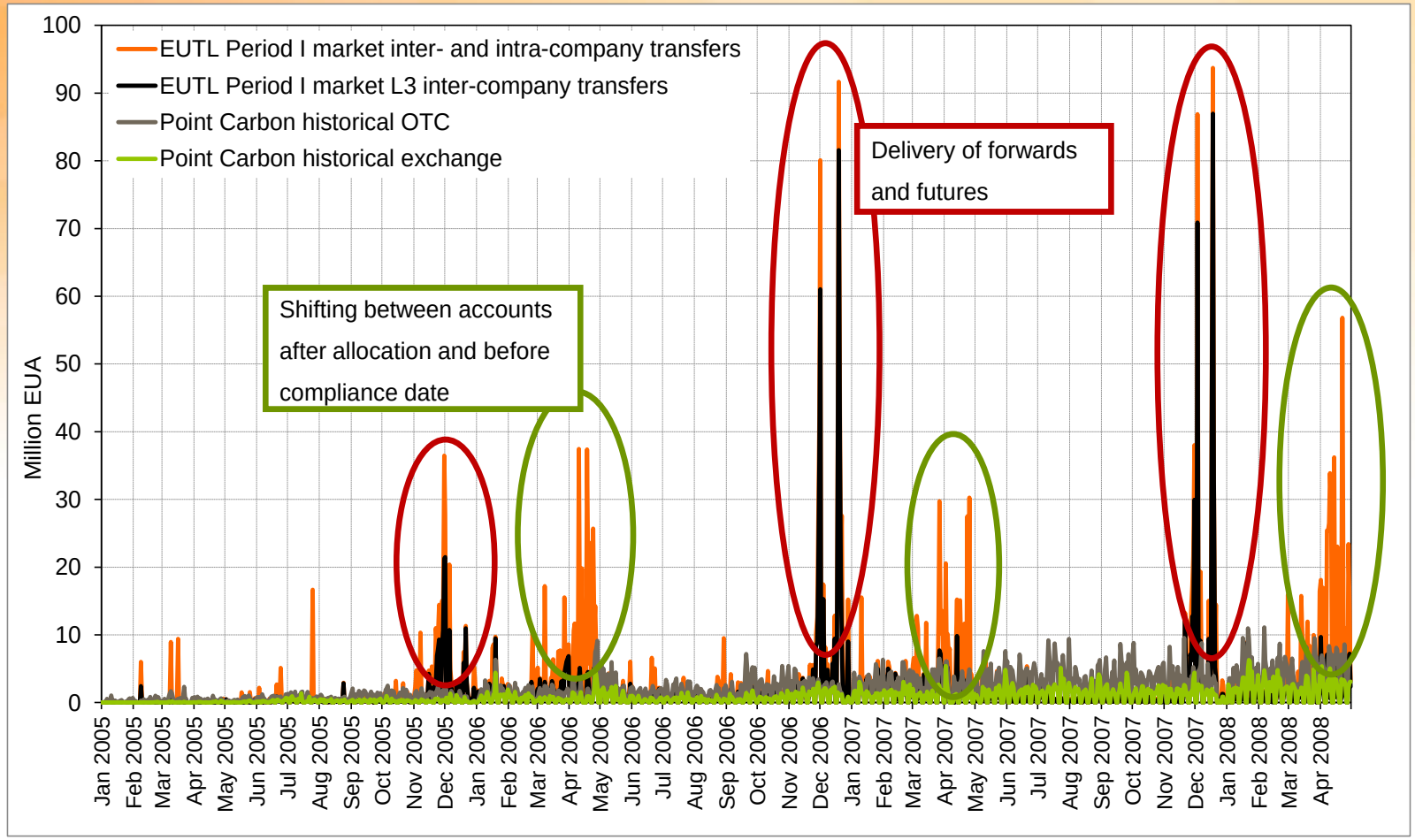
Source: EUTL

Adding prices

- EUTL dataset contains no information on
  - Time of trade (only physical delivery)
  - Price employed

Source: Point Carbon

Spot, forwards and futures



Source: EUTL, Point Carbon

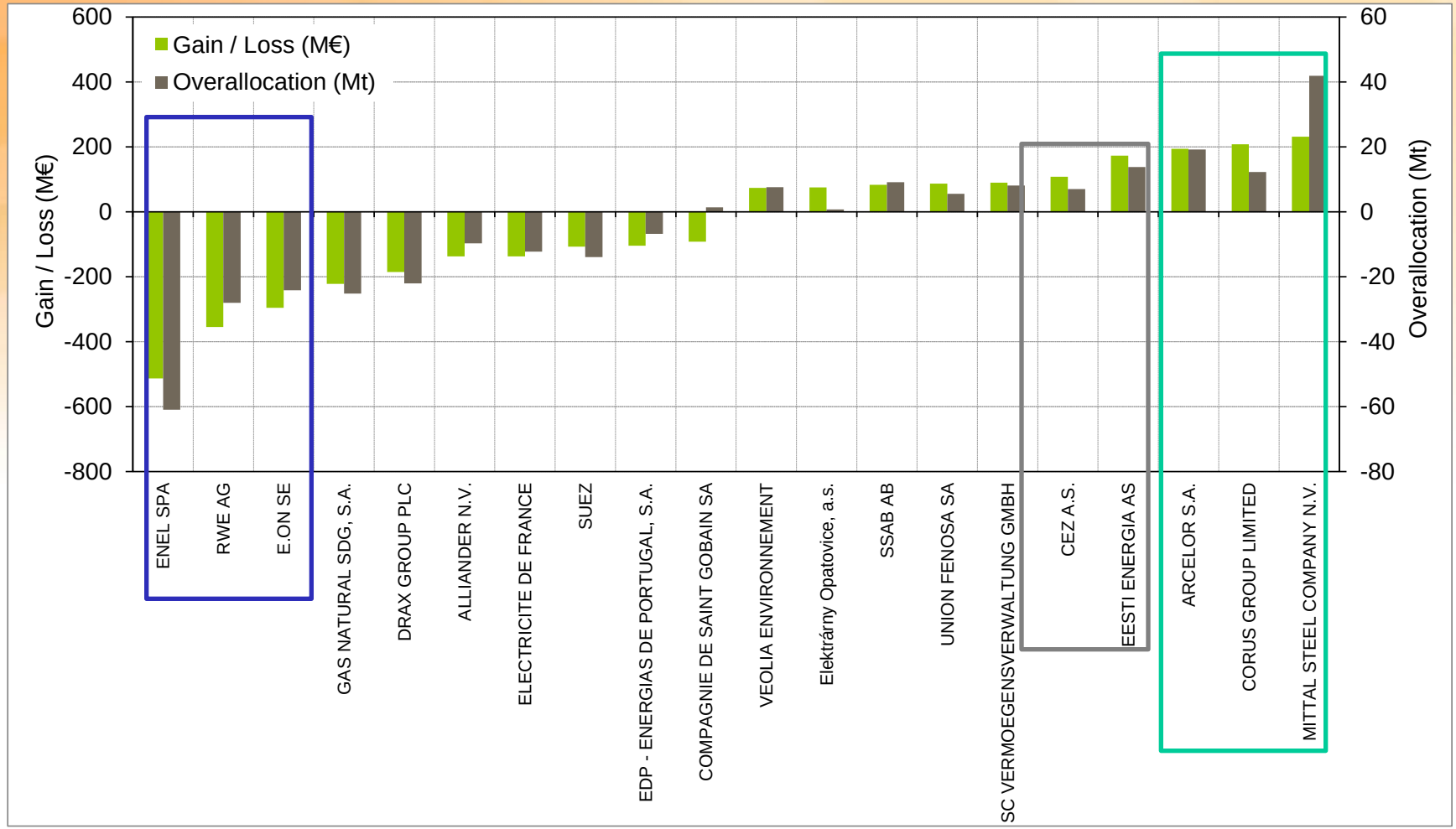
Most active entities on clearing days

Company	Volume on forward / futures days (Mt)	Representing a share of	
		The company's total trading volume in Period I	Total trading volume on forward / futures days
Clearing house, exchange			
LCH Clearnet	204	91%	17%
NASDAQ OMX (Nordpool)	9	11%	1%
CDC	6	5%	1%
Financial actors			
UBS AG*	119	82%	10%
Calyon Financial	71	89%	6%
BARCLAYS PLC*	68	43%	6%
AGEAS SA/NV*	34	38%	3%
BNP PARIBAS*	33	72%	3%
MORGAN STANLEY*	25	58%	2%
GOLDMAN SACHS GROUP*	25	78%	2%
SOCIETE GENERALE	18	48%	1%
ROYAL BANK OF SCOTLAND	13	49%	1%
COMMERZBANK AG	13	37%	1%
SAL. OPPENHEIM JR. & CIE. *	9	53%	1%
NUCLEAR LIABILITIES FUND	9	74%	1%
PCE Investors	8	67%	1%
MERRILL LYNCH & CO.*	8	34%	1%
DEUTSCHE BANK AG*	6	33%	1%
Industry			
SAINT GOBAIN SA	19	39%	2%
RHODIA SA	10	43%	1%

Company	Volume on forward / futures days (Mt)	Representing a share of	
		The company's total trading volume in Period I	Total trading volume on forward / futures days
Utilitlies			
ELECTRICITE DE FRANCE	40	67%	3%
RWE AG	28	42%	2%
E.ON SE	25	35%	2%
SSE PLC	22	60%	2%
ENEL SPA	18	27%	2%
ENBW AG	18	57%	1%
GDF	16	19%	1%
ESSENT N.V.	16	59%	1%
ALLIANDER N.V.	15	41%	1%
IBERDROLA SA	14	67%	1%
CENTRICA PLC	13	35%	1%
DRAX GROUP PLC	12	56%	1%
CEZ A.S.	12	67%	1%
VATTENFALL AB	12	35%	1%
Deeside Power Limited	8	25%	1%
VEOLIA ENVIRONNEMENT	7	33%	1%
Sempra Energy Europe Ltd.	7	44%	1%
Energy			
ROYAL DUTCH SHELL	24	41%	2%
BP PLC	18	41%	1%
BHP BILLITON LIMITED	9	76%	1%
TOTAL S.A.	8	56%	1%

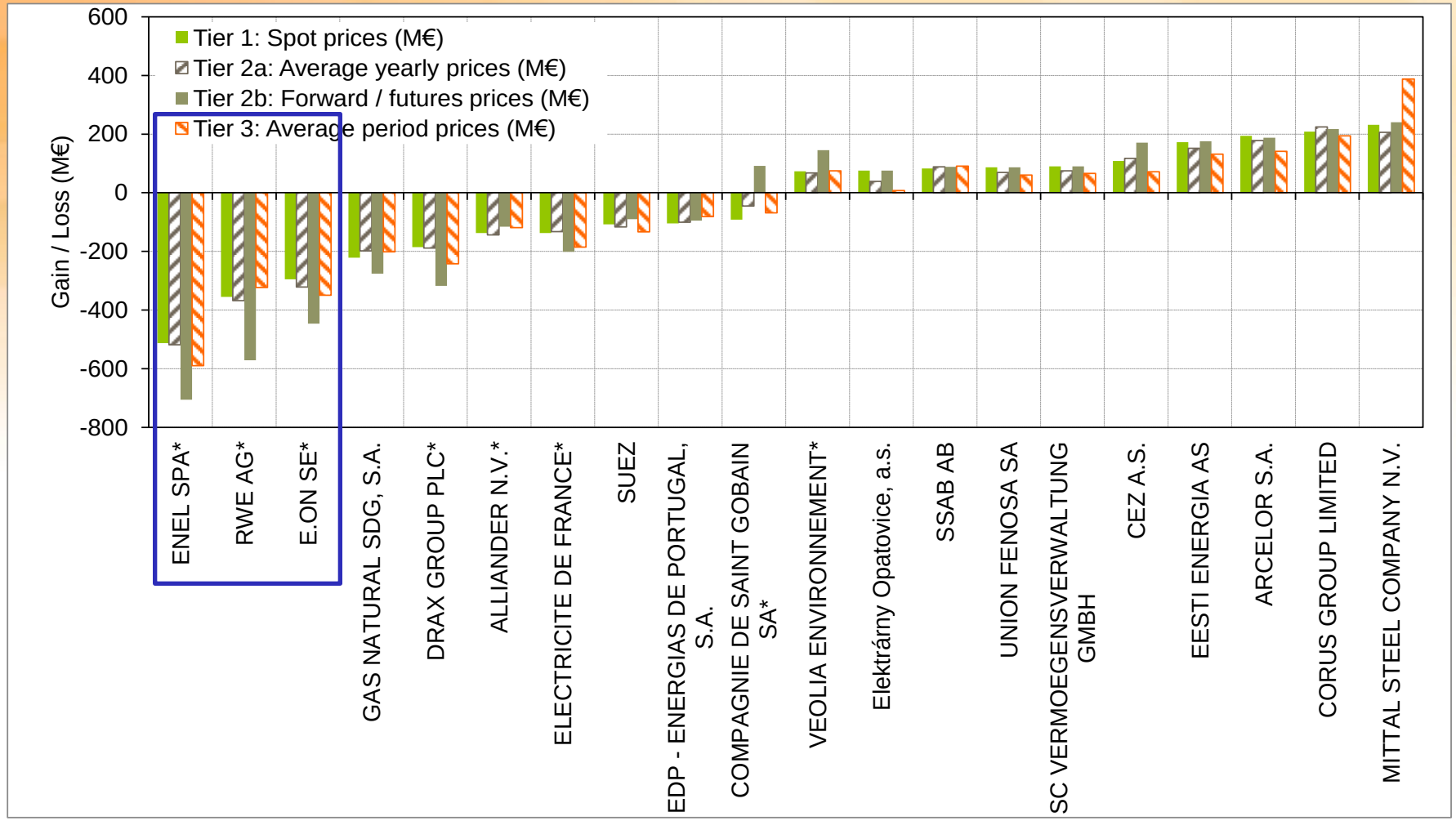
Source: EUTL

Biggest winners and losers



Source: EUTL

Sensitvity to price assumptions



Source: EUTL

Regression analysis

- Two-step model (cf. Zaklan 2013)

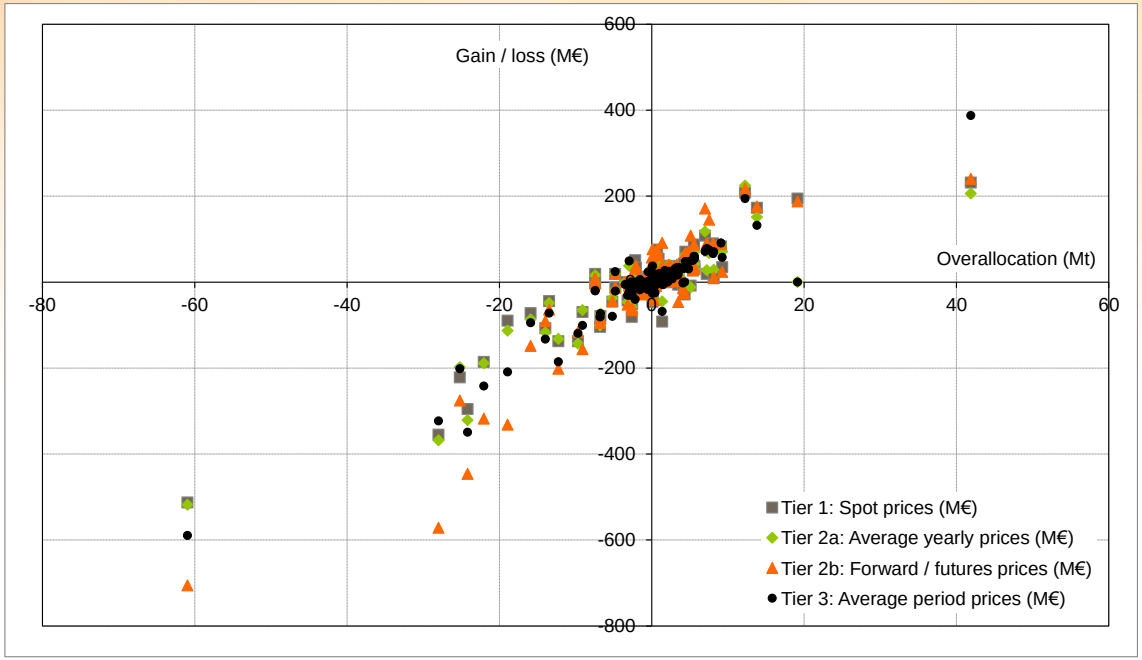
$$y_1^* = x_1'\beta_1 + u_1$$

$$y_2^* = x_2'\beta_2 + u_2$$

$$y_1 = \begin{cases} 1 \; if \; y_1^* > 0 \\ 0 \; if \; y_1^* \leq 0 \end{cases}$$

$$y_2 = \begin{cases} y_2^* \; if \; y_1^* > 0 \\ 0 \; if \; y_1^* \leq 0 \end{cases}$$

$$\mathrm{Cov}(u_1, u_2) = \rho$$



- Number of accounts used as exclusion restriction

Summary statistics

	Obs.	Mean	Min	P5	P10	P25	Median	P75	P90	P95	Max
Trade	4,559	0.65									
Number of accounts	4,559	2	1	1	1	1	1	2	4	7	216
Has PHA	4,559	0.04									
Short	4,559	0.26									
Position (Mt)	4,559	0.03	-60.96	-0.03	-0.01	-0.0002	0.01	0.03	0.15	0.33	41.90
Small	4,559	0.58									
Medium	4,559	0.24									
Large	4,559	0.13									
Very large	4,559	0.05									
Electricity	4,559	0.10									
Gains											
Tier 1: Spot prices (M€)	2,955	0.25	-512.89	-0.20	-0.05	-0.0005	0.02	0.33	1.61	3.86	231.44
Tier 2a: Avg. yearly prices (M€)	2,955	0.19	-518.28	-0.29	-0.08	-0.001	0.03	0.31	1.48	3.66	224.35
Tier 2b: Forw. / fut. prices (M€)	2,955	0.14	-705.71	-0.23	-0.06	-0.0005	0.02	0.36	1.81	4.53	240.43
Tier 3: Avg. period prices (M€)	2,955	0.16	-589.41	-0.51	-0.15	-0.03	0.05	0.34	1.60	4.23	387.63
First	2,955	0.40									
Second	2,955	0.36									
Third	2,955	0.24									
Number of trades	2,955	13	1	1	1	1	2	5	13	27	2,986
Via intermediary	2,955	0.60									

Sources: EUTL, Point Carbon

Regression results

	Tier 1: Spot prices	Tier 2a: Average yearly prices	Tier 2b: Forward / futures prices	Tier 3: Average period prices
Short	0.30	0.41***	0.51**	0.53***
	(0.21)	(0.10)	(0.25)	(0.13)
Position	-0.08	0.19	0.33	7.62***
	(0.38)	(0.26)	(0.36)	(1.01)
PosXFirst	8.05***	8.46***	7.32***	0.45
	(1.41)	(0.75)	(1.38)	(1.20)
PosXSecond	2.55***	3.15***	2.52***	-0.72
	(0.62)	(0.48)	(0.63)	(1.22)
First	0.23***	0.11*	0.01	-0.06
	(0.09)	(0.06)	(0.08)	(0.06)
Second	0.05	0.06**	-0.02	-0.004
	(0.03)	(0.02)	(0.03)	(0.03)
Medium	0.21	0.21**	0.47**	0.19
	(0.17)	(0.09)	(0.22)	(0.12)
Large	0.94**	0.88***	0.74*	0.57**
	(0.39)	(0.22)	(0.43)	(0.23)
Electricity	0.37**	0.34***	-0.01	0.13*
	(0.15)	(0.12)	(0.26)	(0.07)
Number trades	-0.02***	-0.02***	0.03***	-0.003
	(0.005)	(0.003)	(0.01)	(0.005)
Has PHA	-0.95***	-0.68**	-0.53	-0.29
	(0.37)	(0.32)	(0.60)	(0.32)
Via intermediary	0.06	0.05	-0.01	0.06**
	(0.05)	(0.04)	(0.05)	(0.03)
Constant	-0.69	-0.80***	-1.16**	-0.94***
	(0.43)	(0.19)	(0.51)	(0.25)
Country dummies	X	X	X	X

Regression results: Selection equation

	Tier 1: Spot prices	Tier 2a: Average yearly prices	Tier 2b: Forward / futures prices	Tier 3: Average period prices
	Selection equation			
Number accounts	0.14***	0.14***	0.14***	0.18***
	(0.03)	(0.03)	(0.03)	(0.05)
Short	0.87***	0.82***	0.83***	0.82***
	(0.10)	(0.09)	(0.10)	(0.09)
Medium	0.31***	0.30***	0.30***	0.29***
	(0.05)	(0.05)	(0.05)	(0.05)
Large	0.95***	1.04***	1.01***	0.94***
	(0.19)	(0.14)	(0.11)	(0.13)
Electricity	0.11	0.13	0.14*	0.09
	(0.09)	(0.08)	(0.08)	(0.08)
Constant	-0.09*	-0.12	-0.12	-0.19**
	(0.08)	(0.08)	(0.08)	(0.09)
Country dummies	X	X	X	X
ρ	0.42	0.62**	0.59*	0.67***
	(0.38)	(0.18)	(0.23)	(0.14)
Observations Uncensored (Total)	2751 (4343)			
*** Significant at the 99% confidence level, ** at the 95% level, * at the 90% level				

Sources: EUTL, Point Carbon

Note: Newey-West standard errors in parentheses

Estimates of windfall profits due to cost pass-through

- Electricity sector
  - € 5.3 - € 7.7 billion annually for generators in Belgium, France, Germany and the Netherlands at carbon prices of 20 €/tCO_2; free allocation of 90 % (Sijm et al. 2006)
  - € 1.2 – 2.2 billion annually for each of the large four utilities in Germany at carbon prices of 25 €/tCO_2; free allocation of at least 90 % (Matthes 2008)
  - € 19 billion annually for generators during 1st period (Keppler and Cruciani 2010)
- Industry sector
  - € 6.7 billion expected during third period (Martin et al. 2012)
  - € 14 billion in 2005 - 2008 for refineries and iron and steel sector (Bruyn et al. 2010)
  - Less consensus (cf. Demailly and Quirion 2008; Ponssard and Walker 2008)

Policy implications

- Significant wealth transfers during the first period of the EU ETS
  - Overallocation as important determinant for gains calculated from EUTL data
  - Larger companies more likely to trade (and make a gain) than small companies
- Biggest 'losers' on ETS market (electricity generators) likely to have received windfall profits due to cost pass-through over and above any costs incurred on the market for EUAs
- Who were the 'real losers'?
  - Majority of costs likely borne by households

- Low-income households most likely to be affected
  - Spend a large fraction of their income on energy
  - Firm profits most likely passed-through to higher income households
  - High level of free allocation means less revenue for the government with which unwanted effects could be alleviated

- Therefore, free allocation determines winners and losers within the scheme, but also between scheme participants and households

Outlook

- 2nd trading period
  - Majority of allowances still allocated for free
  - More mature market
- 3rd trading period
  - 50 % free allocation
  - Electricity sector has to buy most allowances, but large amount of free allocation to industry continues

Thank you very much for your attention

Questions?

j.cludius@unsw.edu.au

Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

Many of our publications are available at:

www.ceem.unsw.edu.au