Why do Firms Trade Carbon Emission Permits? Evidence from the European Emission Trading Scheme

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Climate Policy Research Unit – CITL Data Workshop

Paper Summary: Motivation and Research Questions

Motivation:

- The right to emit CO_2 is an input in the production processes of many sectors
- EU ETS as an instrument to internalize the climate externality
- Intertemporal optimization feasible through borrowing und banking
- Firms make participation and amount decisions every year

Research Questions:

- What drives firms' trading behavior in the EU ETS?
- To what extent do the results correspond to theoretical predictions and empirical evidence from the existing literature?

Paper Summary: Background and Contribution

Background:

- Limited usefulness of existing theoretical literature on emission permit trading in deriving predictions regarding actual firm trading behavior

- Trade literature addressing heterogeneous firms

- Evidence from existing empirical literature identifies candidate drivers

Contribution:

- Compilation of comprehensive dataset

- Application of a flexible two-part model to determinants of trading behavior of CO2-emitters

- Contribution to empirical literature on international trade in a specific market

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Paper Summary: Results and Conclusions

- Main drivers of trade in EUAs:

	Firm-specific factors	Market-specific factors
Participation	Firm size (acquisitions only) Sector Ownership structure	Allocation size EUA position
Amount		Allocation size EUA position (acquisitions only)

- EU ETS flexible mechanisms allow firms significant discretion

- Notable departures from general trade literature

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CITL Transaction Data: Basic Structure

```xml
<transaction>
    <acquiringAccountIdentifier>90</acquiringAccountIdentifier>
    <acquiringAccountTypeCode>120</acquiringAccountTypeCode>
    <acquiringAccountTypeCodeLookup>Operator Holding Account</acquiringAccountTypeCodeLookup>
    <transferringAccountTypeCodeLookup>120-Operator Holding Account</transferringAccountTypeCodeLookup>
    <acquiringRegistryCode>BE</acquiringRegistryCode>
    <acquiringRegistryCodeLookup>Belgium</acquiringRegistryCodeLookup>
    <acquiringHolder>E ON Generation Belgium</acquiringHolder>
    <transferringHolder>Electrabel</transferringHolder>
    <transferringAccountIdentifier>105</transferringAccountIdentifier>
    <transferringAccountTypeCode>120</transferringAccountTypeCode>
    <transferringRegistryCode>BE</transferringRegistryCode>
    <transactionDate>2006-4-18.15.36. 18. 569000000</transactionDate>
    <transactionID>BE989</transactionID>
    <transactionTypeCode>10</transactionTypeCode>
    <suppTransactionTypeCode>0</suppTransactionTypeCode>
    <suppTransactionTypeCodeLookup>no supp </suppTransactionTypeCodeLookup>
    <transactionTypeCodeLookup>Internal - Internal transfer of unit/supplementary program transaction</transactionTypeCodeLookup>
    <transactionblock>
        <suppUnitTypeCode>2</suppUnitTypeCode>
        <unitTypeCode>0</unitTypeCode>
        <startBlock>46568059</startBlock>
        <endBlock>47096002</endBlock>
        <applicablePeriodCode>0</applicablePeriodCode>
        <originalPeriodCode>0</originalPeriodCode>
    </transactionblock>
    <transactionblock>
        <suppUnitTypeCode>2</suppUnitTypeCode>
        <unitTypeCode>0</unitTypeCode>
        <startBlock>105593300</startBlock>
        <endBlock>106006921</endBlock>
        <applicablePeriodCode>0</applicablePeriodCode>
        <originalPeriodCode>0</originalPeriodCode>
    </transactionblock>
</transaction>
```

- Transaction data on account level, reported with 5-calender year delay
- Transaction blocks reported
- No transaction price or platform included

CITL Transaction Data: Holder Information Unclear

```
- <transaction>
    <acquiringAccountIdentifier>2</acquiringAccountIdentifier>
    <acquiringAccountTypeCode>100</acquiringAccountTypeCode>
    <acquiringAccountTypeCodeLookup>Holding Account</acquiringAccountTypeCodeLookup>
    <transferringAccountTypeCodeLookup>120-Operator Holding Account</transferringAccountTypeCodeLookup>
    <acquiringRegistryCode>SE</acquiringRegistryCode>
    <acquiringRegistryCodeLookup>Sweden</acquiringRegistryCodeLookup>
    <acquiringHolder>Mattias Eriksson</acquiringHolder>
    <transferringHolder>Paul Bergholtz</transferringHolder>
    <transferringAccountIdentifier>446</transferringAccountIdentifier>
    <transferringAccountTypeCode>120</transferringAccountTypeCode>
    <transferringRegistryCode>SE</transferringRegistryCode>
    <transactionDate>2006-4-20.13.30. 35. 999000000</transactionDate>
    <transactionID>SE2761</transactionID>
    <transactionTypeCode>10</transactionTypeCode>
    <suppTransactionTypeCode>2</suppTransactionTypeCode>
    <suppTransactionTypeCodeLookup>Allowance surrender</suppTransactionTypeCodeLookup>
```

- Some registries report name of person responsible as account holder
- No indication of firm affiliation

CITL Transaction Data: No Account ID at all

```xml
- <transaction>
    <acquiringAccountTypeCode>-1</acquiringAccountTypeCode>
    <acquiringRegistryCode>AT</acquiringRegistryCode>
    <acquiringRegistryCodeLookup>Austria</acquiringRegistryCodeLookup>
    <transferringAccountTypeCode>-1</transferringAccountTypeCode>
    <transferringRegistryCode>AT</transferringRegistryCode>
    <transactionDate>2006-4-18.13.9. 25. 813000000</transactionDate>
    <transactionID>AT2106</transactionID>
    <transactionTypeCode>10</transactionTypeCode>
    <suppTransactionTypeCode>0</suppTransactionTypeCode>
    <suppTransactionTypeCodeLookup>no supp </suppTransactionTypeCodeLookup>
    <transactionTypeCodeLookup>Internal - Internal transfer of unit/supplementa
  - <transactionblock>
      <suppUnitTypeCode>2</suppUnitTypeCode>
      <unitTypeCode>0</unitTypeCode>
      <startBlock>120852519</startBlock>
      <endBlock>120867518</endBlock>
      <applicablePeriodCode>0</applicablePeriodCode>
      <originalPeriodCode>0</originalPeriodCode>
    </transactionblock>
```

- Some registries report no account identifiers at all
  - Austrian and Greek domestic transactions

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Installations-to-Firms: Operator Accounts

identifyer	holder	country_key
Grenaa Effekt-	Johnsen Finn	DK
Energi Fyn Prod	Nielsen Per Kristian	DK
Regulerkraft Fr	Nielsen Per Kristian	DK
Bording Kraftva	Johansen Peter	DK
Biogen Idec	Biogen Idec (Denmark) Manufacturing ApS	DK
Fjernv.Ø Toreby	Fjernvarmeforsyningen i Ø Toreby, Toreby	DK
Græsted FV	Græsted Fjernvarme A.m.b.a.	DK
Operator Account:GB4	McHattie Ken	GB
Operator Account:GB5	Centrica Storage Ltd	GB
Kittiwake:GB6	Venture North Sea Oil Limited	GB
Operator Account:GB7	Apache North Sea Limited	GB

- Merge transactions with account information to match accounts to firms

- Merger impossible for poorly identified registries

  - String comparisons difficult because of special characters

- Overall approx. 93% of all operator accounts identified numerically

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Installations-to-Firms: Trotignon and Delbosc (2008)

AccountHolder	IdentifierInReg	Name	Company	email
CARELLO KETY	Operator Account:IT1606	CENTRALE TERMOELETTRICA DI LA SPEZIA	Enel	valter.moro@enel.it
VALENTI PAOLO	Operator Account:IT1712	FORONI SPA	Foroni	paolo.valenti@foronispa.com
TESTI FRANCO	Operator Account:IT1714	ACCIAIERIA RUBIERA SPA	Acciaieria di Rubiera	rottame@acciaieriadirubiera.it
Valsecchi Marco	Operator Account:IT2120	SPA EGIDIO GALBANI STABILIMENTO DI MELZO	Galbani Group	lspadon@galbani.com
Valsecchi Marco	Operator Account:IT2121	STABILIMENTO DI CASALE CREMASCO	Galbani Group	lspadon@galbani.com
DE LA MORA JAVIER	Operator Account:IT1722	Cartiera di Avigliano	Georgia Pacific	javier.mora@gapac.com
CORVI FILIPPO	Operator Account:IT1732	STABILIMENTO GNL DI PANIGAGLIA	Eni Group	ANDREA.GIAMMATTEO@ENIFIN.ENI.IT
ZUPPINI MASSIMO	Operator Account:IT1730	GLAXOSMITHKLINE SPA	GlaxoSmithKline	Massimo.A.Zuppini@gsk.com

- Match approx. 50% of all installation accounts, more than 90% of ETS-wide emissions to firms based on operator accounts
  - 1,049 firms

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Recap: Installation to Firm Matching

**Transactions
(CITL)**

36,917 (2006)

Registry	Acct.-Nr.
CZ	347
DE	857
GB	136

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Firms: Descriptive Overview

Variable	Obs.	Median	Mean	Std. Dev.	Min	Max
Allocation (EUAs)	667	199,272	2,269,057	9,221,445	4	150,000,000
Verified emissions (metric tons)	667	160,738	2,301,767	9,773,813	5	157,000,000
Turnover (Thousand Euro)	667	393,113	5,615,122	19,500,000	1,462	248,000,000
Number of employees	667	927	13,662	38,800	4	368,500
Return on Assets (in percent)	667	4.1	5.3	6.4	-17.5	51.0

- Sample skewed towards large and more profitable firms receiving large EUA allocations

- Median firm was much smaller and less profitable

- Mean firm was short on EUAs, median firm long on EUAs

- 28% of the firms in the sample are government-owned, 8% are family-owned

- 62% of the firms are classified as belonging to the combustion category by the CITL

Conclusions: Technical and Economic Suggestions

Technical:

- Common ID variable for transactions, compliance and accounts

- Names in common script

- More consistent representation of information by registry
  - Avoid people's names as holder information
  - Numerical accounts IDs

- Completeness of information (e.g. Austria, Greece)

Economics:

- Shorten period of delay to less than five (six years)

- Change base of reporting to compliance years

- Transaction price

- Transaction character (OTC, exchange etc.)

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Thank you very much for your attention.
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