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The EUTL Transfer Dataset
Description and Insights

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ABSTRACT

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Abstract: This working paper gives an overview of the three main datasets of the EU Transaction Log (EUTL): the datasets of Operator Holdings Accounts (OHAs), Person Holding Accounts (PHAs), and the EUTL Transfer dataset. It describes in detail how these datasets can be linked, expanded, and analyzed. Particular attention is given to the different possibilities of relating EU ETS accounts to the parent companies and to classifying transactions by establishing different categories. Different options for adding allowance prices to the EUTL Transfer dataset are presented based on analysis of potential forward and futures contracts. The technical descriptions are intended to serve as a background against which to use the EUTL Transfer dataset for future research. A set of guidelines is proposed for researchers intending to employ the datasets in their own analyses.

Keywords: EUTL Transfer dataset, parent companies, forward and futures contracts, EUA prices

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TABLE OF CONTENTS

1 INTRODUCTION

The EU Emissions Trading Scheme (EU ETS) was the world's first major greenhouse gas emissions scheme for factories, power stations, and other installations. It is one of the main mechanisms with which the EU aims to reach its greenhouse gas reduction targets under the Kyoto Protocol and the EU Climate and Energy Package. It was set up in 2005 and is currently in its third trading period, which is to run from 2013 to 2020 (EU 2003, 2009). Information regarding the installations covered by the scheme, the respective account holders, and in particular data on emissions and emissions allowances are stored in the EU Transaction Log (EUTL). This working paper gives an overview of the three main datasets of the EUTL. It concisely describes the way in which these datasets can be linked, augmented and analyzed. This technical description is intended to serve as a background to analysis carried out using the EUTL transfer dataset elsewhere (Cludius 2016; Pinkse et al. forthcoming) and contains some guidelines for researchers intending to employ those datasets in their own analyses.

2 DATASETS AVAILABLE ON THE EUTL

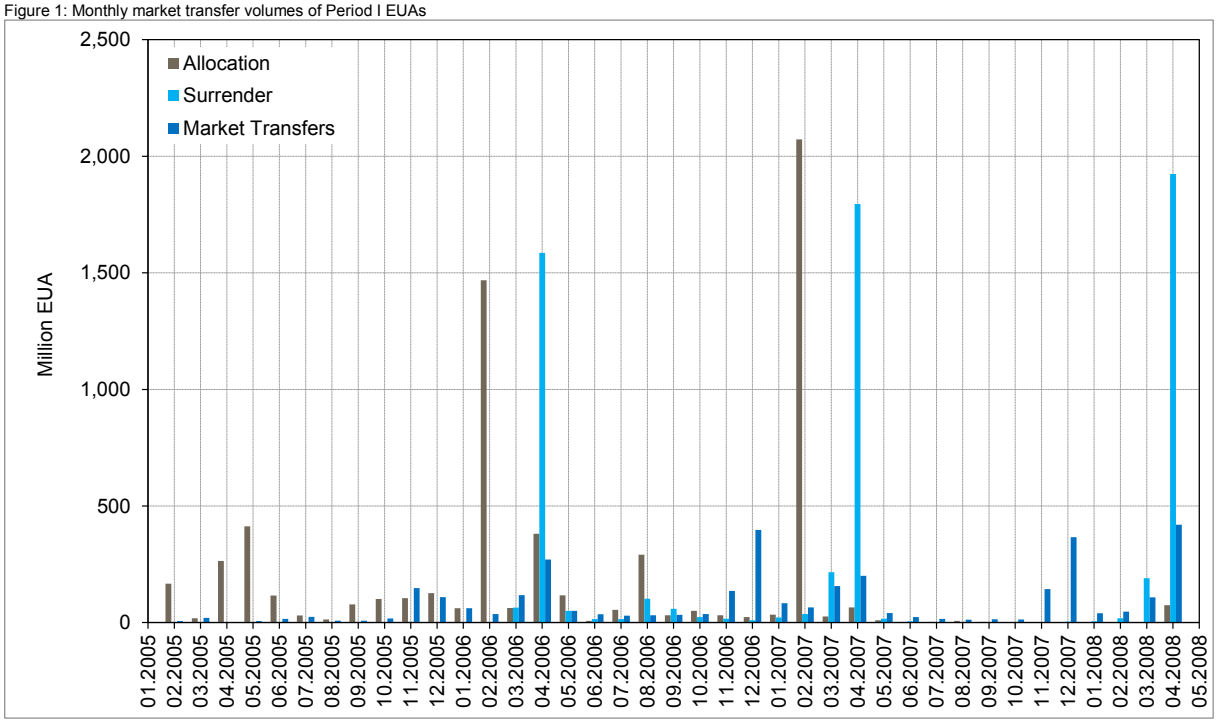
The European Union Transaction Log (EUTL) – formerly known as the Community Independent Transaction Log (CITL) – serves as a registry for the EU Emissions Trading Scheme (EU ETS). Data is published on the basis of the EU ETS Registry Regulation (European Commission 2004, 2013). There are three main datasets available on the EUTL that can be used to assess permit transfer patterns:

- Operator Holding Accounts (OHAs): This dataset consists of data on all installations covered by the EU ETS at the time of download, including the operator, ETS sector, and compliance information such as allocated allowances, verified emissions, surrendered allowances, and compliance status. Each installation liable under the EU ETS must have an account.
- Person Holding Accounts (PHA): This dataset contains information on accounts opened voluntarily in order to be able to trade on the market for EU Allowances (EUAs). These accounts are opened by banks and brokers, but also by companies liable under the EU ETS wishing to establish a trading account for the purpose of trading on the EUA market, an option which is open to anyone.
- EUTL Transfer dataset: This dataset contains the following information on all physical EUA transactions (including international certificates such as CERs / ERUs)[1]: the transfer date and time, information on the two parties taking part in the transfer, and the type of transfer (issuance, allocation, surrender, market transfer, cancellation, retirement, or the import of international certificates). Trading volumes are not included, but the information can be deduced from the serial numbers of the emissions permits.

While the first two datasets contain static information on characteristics of account holders and installations covered by the scheme, the third dataset contains dynamic data on the flow of permits, which are currently published with a delay of three years (five years before 2013; European Commission 2013). This study used a full dataset of transfer activity involving Period I permits (January 2005 - April 2008) to illustrate results.

[1] Certified Emission Reductions (CERs) and Emission Reduction Units (ERUs) are types of emissions units (or carbon credits) issued under the rules of the Kyoto Protocol. From 2013 onwards, CERs and ERUs are no longer directly submitted by operators but exchanged for EUAs. Information on these exchanges is only available at an aggregate level.

Figure 1: Monthly market transfer volumes of Period I EUAs



Source: EUTL; own estimation and illustration

Figure 1 shows the monthly transfer volumes for the categories ‹Allocation›, ‹Surrender›, and ‹Market Transfers›. While allocation during the first trading year happened gradually because some registries were late to open, allocation spiked in February 2006 and 2007, respectively. Total amounts were higher in 2007 due to the accession of Bulgaria and Romania to the EU, and therefore to the EU ETS. Allowances are surrendered in April each year. The total amount of surrendered allowances is shown to be smaller than the amount allocated, which points to a net excess of permits during the first trading period. There is a cluster of market transfers (i.e., transfers that do not involve a government account, see 4.1) in November and December (usually the delivery months for forward and futures contracts, see 5.1) and around allocation and surrender dates.

Even before transfer datasets became available on the EUTL, researchers were able to investigate some aspects of EUA trading. Trotignon and Delbosc (2008) made use of the fact that allowances are stamped by their registry of origin. Thus, information on surrendered allowances could be used to determine whether they were surrendered in a different country than the one in which they had been issued. The two researchers were also among the first to assign individual installations included in the EUTL data to companies using national registries, National Allocation Plans (NAPs), and national reports. More importantly, they were able to divide installations of the EU ETS sector ‹Combustion› into producers of electricity, providers of energy for industry, and installations owned by other entities as a backup, such as generating units for hospitals or universities.

3 LINKING DATASETS

In order to enhance information on transfers in the EU ETS, the three datasets can be linked to each other and to external data sources. The following links can be established:

- Link between the OHA and PHA datasets and aggregation of the installations and accounts contained in the datasets to parent companies
- Link between the transfer dataset and the OHA and PHA datasets and thus to parent companies
- Link to external databases

3.1 Linking OHA and PHA datasets and parent companies

The information logged by the EUTL refers to installations and account holders. There are, however, companies with several hundred installations that are liable under the EU ETS. In fact, Veolia Environment, which owned the highest number of accounts that were active during the first trading period of the EU ETS, is the parent company holding 206 OHAs and 10 PHAs. It is followed by E.ON SE with 183 OHAs and 15 PHAs. Since it is important to understand how installations and accounts are managed, a system is proposed that differentiates between four different levels of management. Table 1 below is an overview of the different aggregation levels; it also lists some of the underlying assumptions and a method of determining the level of aggregation.

Table 1: Aggregation level overview

	Assumption	Method
Level 0	Each installation/account is managed individually	Can be identified from the transfer data (account type, registry, and trading ID)
Level 1	The account holder's name indicates the installation's operating/managing entity	Can be identified from the account holder name; additional corrections if this field is empty
Level 2	The installation/account is managed by a subsidiary of the parent company	Can be identified from the name of the parent company, in combination with the country of origin (for OHAs) or the type of account (for PHAs)
Level 3	The installation/account is managed directly by the parent company	Can be identified from the name of the parent company

Level 0 assumes that each installation or account manages its carbon liability and / or carbon trading individually. In order to identify Level 0, the Unique Identifier (UID) – a combination of the type of account (OHA or PHA), the registry it was opened in, and its trading ID – is used.

Level 1 assumes that the account holder name is the best indication for which entity operates or manages the account in question. In fact, Veolia Environment has 125 accounts with the same account holder name.[2]

Level 2 assumes that installations are managed at the subsidiary level of a company, either at the country level (for OHAs) or as financial entities (for PHAs). Assigning PHAs to the country they are situated in can be misleading, as many PHAs are opened in countries where exchanges are located (France for Bluenext and the UK for the European Climate Exchange [ECX]).[3] Furthermore, PHAs may have been opened in registries that started operating early or where it was easier to set up an account (e.g., in Denmark).

[2] The account holder name is usually readily available in OHA and PHA files. However, for some accounts in Sweden the account holder was not available and had to be identified based on the Swedish NAP (cf. Jaraite and Kazukauskas 2012). For accounts in other countries where this field was empty, the OHA dataset field 'parent company' (which is usually empty) or the name of the installation were used.

[3] For some exchanges, it was a prerequisite to open an account in the relevant registry.

Level 3 assumes that all installations and accounts are managed at the EU parent company level. Level 3 companies are determined using a dedicated dataset published by the European University Institute, EUI (Jaraite et al. 2013) that links OHAs and PHAs via their EUTL IDs to IDs in the company database ORBIS and their 'Global Ultimate Owner' (GUO). The general rule is that the GUO corresponds to the GUO in 2006 (if unavailable the GUO in 2005, or otherwise in 2007, is used). If the parent company changed during the first trading period and the new parent is still the owner to date (relevant, for example, in the case of the acquisition of Spanish power stations from Endesa by Enel in 2007), the new parent company is given. The EUI dataset identifies 78% of OHAs and 60% of PHAs in the dataset underlying the illustrations in this paper. Parent companies were added to the remaining accounts manually, based on information contained in the OHA and PHA datasets (e.g., e-mail addresses, names of installations and account holders, etc.). After applying this method, 916 installations (about 8% of all installations active in the first trading period) remained for whom no parent company could be identified. They are assumed to consist of just this one installation, with the account holder name being the same as the company name. This includes universities, hospitals, brickworks, and Nordic heating plants, where it is quite likely that a company only consists of one installation, although some installations may of course also belong to another company.

Figure 2 illustrates the different levels of aggregation using the example of E.ON SE.

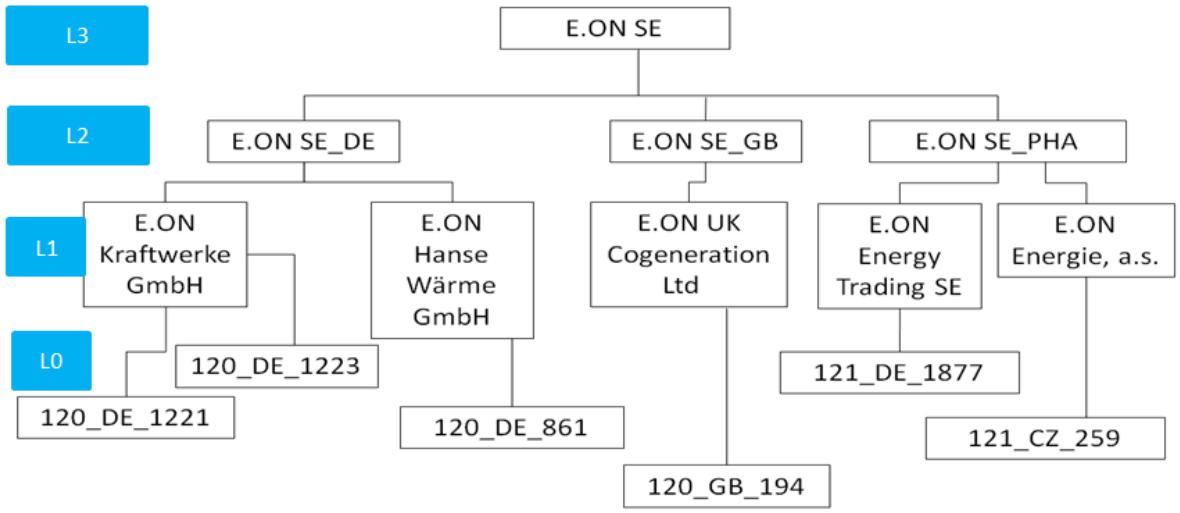
Level 0 (L0) is represented by six accounts. Unique Identifiers (UIDs) starting with '120' represent installations (OHAs) that are liable under the EU ETS, in this case power and heat installations. UIDs starting with '121' represent PHAs that were voluntarily opened by E.ON to trade on the EUA market.

For Level 1 (L1) accounts are aggregated to the account holder level, defined by the account holder name as given in the OHA and PHA datasets. All accounts with the same name in the account holder field are now treated as one entity.

Level 2 (L2) further aggregates those account holder names from Level 1 into country subsidiaries of E.ON, in this case in Germany (DE) and Great Britain (GB). The financial trading arm is treated as a separate entity (E.ON SE_PHA).

Finally, at the highest level (Level 3 – L3) the whole company, in other words E.ON SE with all accounts opened under the EU ETS, is considered as one entity. In its latest annual report, E.ON SE (2013) stated: "As the link between E.ON and the world's wholesale energy markets, our Global Commodities unit buys and sells electricity, natural gas, liquefied natural gas, oil, coal, freight, and carbon allowances" (p.19). This indicates that carbon liability and trading may indeed be managed at the parent company level and delegated to the trading desk of a company.

Figure 2: Example of aggregation levels for E.ON SE



Note: This is an illustrative example. In fact, E.ON SE held 183 installations (OHAs) that were covered during the first trading period of the EU ETS and 15 PHAs that conducted transfers.

Other researchers have noted the need to match accounts to parent companies in order to be able to carry out a meaningful analysis. For their analysis of transaction costs, Jaraite et al. (2009) assigned individual installations to firms in order to be able to assess whether a firm traded with other firms, with third parties, or internally. Their aim was to investigate the role of transaction costs in the decision to engage in trading. Their proxy for low transaction costs was whether a firm holds more than one installation (lower fixed costs) or has conducted more than two transfers (lower information costs). These dummy variables were found to have a significant effect on a company's decision to trade – and on the decision as to whether or not to involve a ‹third party› rather than participating in the market directly. While PHAs were still assumed to be a third sector, it is in fact true that many PHAs belong to companies that are liable under the EU ETS (cf. Figure 2). To account for this fact, Zaklan (2013) also matched PHAs to the firms he used in his analysis on why emitters traded during the first two years of the EU ETS. He found that the initial allocation position, that is whether a company was ‹long› or ‹short›, plays a decisive role in whether or not it decided to trade, but that other company characteristics, such as its ownership structure, are also important. The variables pertaining to company characteristics are derived from the company dataset ORBIS.

3.2 Linking EUTL Transfer, OHA, and PHA datasets

The transfer dataset itself does not contain a lot of information on the accounts that participate in a particular transfer. However, it can be linked with the OHA and PHA datasets and, through them, to information about parent companies. This link between the three datasets can be achieved by using the Unique Identifier (UID). As described above (3.1), this is a combination of type of account (OHA or PHA), the registry the account was opened in, and the account ID given in the transfer dataset. This account ID is distinctive from the identifier used in the OHA dataset for compliance information. Furthermore, it is not readily available in the PHA and OHA datasets, but has to be extracted from the identifier in the registry (see Table 2 for examples of the extraction process).[4]

[4] This procedure worked for all countries except Belgium, where account IDs were corrected on the basis of volumes allocated and surrendered, which are in many, but not all cases identical in the transfer and OHA datasets.

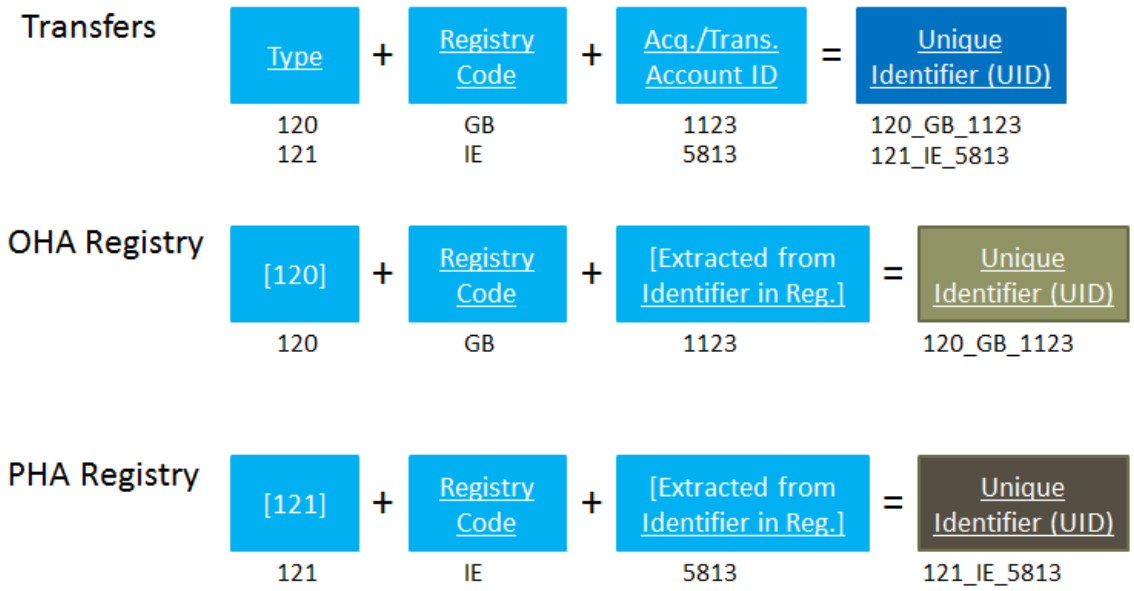
Table 2: Examples of extracting account IDs from identifiers in a registry

Identifier in registry (OHA dataset)	Account ID (Transfer dataset)
ES120.728.0	728
CPTE HOLOPHANE SA-310	310
1671 - Anlagenkonto	1671
CIEPŁOWNIA-623	623

Source: EUTL

The link to the OHA dataset could not be established for all installations contained in the transfer dataset, as this account ID could not be extracted for all installations in the OHA dataset. For some accounts, the link could be established on the basis of identical allocation and surrender volumes in both the OHA and transfer datasets. However, for 49 OHAs appearing in the transfer dataset no information on compliance is available, because a link to the OHA dataset could not be established (equivalent to 0.4% of accounts active in the first trading period). See Figure 3 for an illustration of the process of linking the three datasets.

Figure 3: Process of linking the transfer dataset to OHA and PHA datasets



Source: Own illustration

3.3 Linking to external databases

Researchers have added additional information from external company databases to the EUTL transfer data. In their study on the influence of carbon prices and the EU ETS on share prices of firms, Jong et al. (2013) used information from the company database ORBIS to classify participating entities into sectors and observe share price developments. In order to study technological change induced by the ETS, Calel and Dechezleprêtre (2012) linked the EUTL dataset to a patent dataset to determine the effect of emissions trading on innovation. Zaklan (2013) added variables from ORBIS in order to assess driving factors for buying and selling activity on the market for EUAs; he found that the ownership structure (and turnover in one of his regressions) has a significant effect. Jaraite and Kazukauskas (2012) excluded the variables obtained from the company database AMADEUS from their analysis, since they are not available for all observations and noted that «these variables are insignificant in most models and do not alter the main findings of this paper» (p.10).

One of the challenges of adding additional variables from external databases lies in the fact that these repositories do not usually contain all of the companies included in the EUTL dataset. This applies in particular to small companies. Therefore one ‹loses› a number of observations that can be quite substantial and may furthermore be concentrated in a particular group of companies.

4 DEFINING TRANSFER CATEGORIES

4.1 Administrative and market transfers

Although the information contained in the EUTL dataset includes information on the type of transfer, this definition are not always reliable. In fact, OHAs acquire 202 Mt from government accounts that are not labelled as ‹allowance allocation›.[5] The same is true for 100 Mt transferred from OHAs to government accounts not labelled as ‹allowance surrender›. It was therefore decided to classify all transfers involving government accounts (i.e, account types -1 and 100) as administrative transfers (A), and all other transfers as market transfers (M) (cf. Martino and Trotignon 2013).

Table 3 shows the number of active entities on each of the aggregation levels engaging in market and administrative transfers of Period I permits. 11,616 L0 accounts acquired Period I permits. In other words, they were either allocated permits by their governments (OHAs), allowances were transferred to them within their organizations (OHAs and PHAs), they bought allowances in exchange for money (OHAs and PHAs), or they were government accounts that received permits submitted by installations liable under the scheme. 11,452 L0 entities transferred allowances. They thus surrendered allowances to their governments (OHAs), transferred them within their organizations (OHAs and PHAs), or sold them on the market (OHAs and PHAs); or they were government accounts that allocated permits to installations covered by the scheme. For all aggregation levels, the number of accounts engaging in administrative transfers is roughly double the number of accounts engaging in market transfers. This indicates that there is a large number of OHAs that transferred allowances purely for compliance reasons. The fact that some PHAs engaged in administrative transfers may for the most part be explained by how such transactions were defined. A large part of that volume involved KfW, a German state-owned bank, which bought allowances on behalf of the German government (see below).

Table 3: Active entities for each transfer category of Period I permits

	Period I - Acquired			Period I - Transferred		
	Market	**Admin**	**Total**	**Market**	**Admin**	**Total**
L0 - all	5,604	10,651	11,616	6,464	10,735	11,452
L0 - OHA	4,828	10,524	10,727	5,783	10,548	10,676
L0 - PHA	776	22	782	681	125	713
L0 - Gov (100)		62	62		62	62
L1	3,494	6,355	7,043	3,979	6,436	6,957
L2	2,861	5,221	5,744	3,154	5,294	5,657
L3	2,379	4,533	4,874	2,593	4,575	4,793

Source: EUTL; own estimation

Note: The number of government accounts corresponds to all accounts of the account type ‘100’ since it is unclear how many ‘-1’ accounts there are, as there is no transfer ID.

Given that the total amount of L0-OHA accounts is larger than the number carrying out administrative transfers, it may be assumed that some transfers are missing from the EUTL dataset, which was confirmed when it became clear that some accounts finished the first trading period with a negative net balance of allowances, that is they transferred more allowances than they received. In particular, 22 PHAs shifted 22 Mt more than they had bought. Since they did not receive any free allocation, this left them with a negative permit balance. In particular, one account held by Barclays Bank transferred 8 Mt more than it had acquired. Personal communication with the

[5] These transactions may cover allocation to ‘new entrants’, ex-post changes to allowances, or first period auctions. However, since the total amount of EUAs auctioned or sold in the first trading period was equal to 8.5 Mt (EEA 2013), it can be assumed that most of these transfers represent allowances that were allocated for free.

European Commission revealed that the main issue with those transactions missing from the dataset is that their ‹status› changed from ‹not completed› to ‹completed›, which was not recorded in the EUTL.

4.2 Inter- and intra-company transfers

Transfers are further differentiated by whether they took place between the same or different entities. Transactions between the same entities on each level are called intra-company transfers, while deals between different entities are called inter-company transfers. Intra-company transfers are expected to be carried out without any money being exchanged between the parties. Inter-company transfers are assumed to involve money. Table 4 below gives detailed information on volumes transferred in each transfer category on each of the aggregation levels.

L0 does not include any intra-company transfers because each account is treated as an individual entity. Inter-company market transfer volumes decrease as the level of aggregation increases, while the volume of intra-company transfers rises. At the highest aggregation level (L3), intra-company and inter-company transfer volumes are nearly identical. Furthermore, the important role of PHAs, which account for two thirds of inter-company market transfers on L0, should also be noted.

Table 4: Transfer volumes in the different transfer categories

	Period I - Acquired				Period I - Transferred		
	Market		Admin	Total	Market	Admin	Total
Volume (Mt)	inter-company	intra-company			inter-company		
L0 - all	3,352		31,303	34,655	3,352	31,303	34,655
L0 - OHA	1,095		6,203	7,298	1,174	6,019	7,193
L0 - PHA	2,257		22	2,279	2,178	32	2,210
L0 - Gov (100)			25,078	25,078		25,252	25,252
L1	2,956	396	6,224	9,576	2,956	6,051	9,403
L2	2,730	622	6,224	9,576	2,730	6,051	9,403
L3	1,750	1,603	6,224	9,576	1,750	6,051	9,403

Source: EUTL; own estimation

Notes: The large volumes of administrative transfers also include the categories of allowance issuance and retirement. Those categories link EUAs to Assigned Amount Units (AAUs), which specify the EU's international climate commitment under the Kyoto Protocol.

The reason why PHAs are involved in administrative transfers at a level of 22 Mt has to do with them having been defined as transactions involving government accounts. In fact, 20 Mt of the volume transferred from PHAs to the state is related to the fact that the German state-owned bank KfW bought permits on behalf of the German government in order to replenish the German new entrants reserve at the end of the first trading period.[6] These permits were acquired mainly from other banks (e.g., Barclays and Unicredit, and from auctions of Period I permits) and then transferred to the German government. As compensation, the KfW bank was awarded Period II permits by the German government to sell on the futures market.

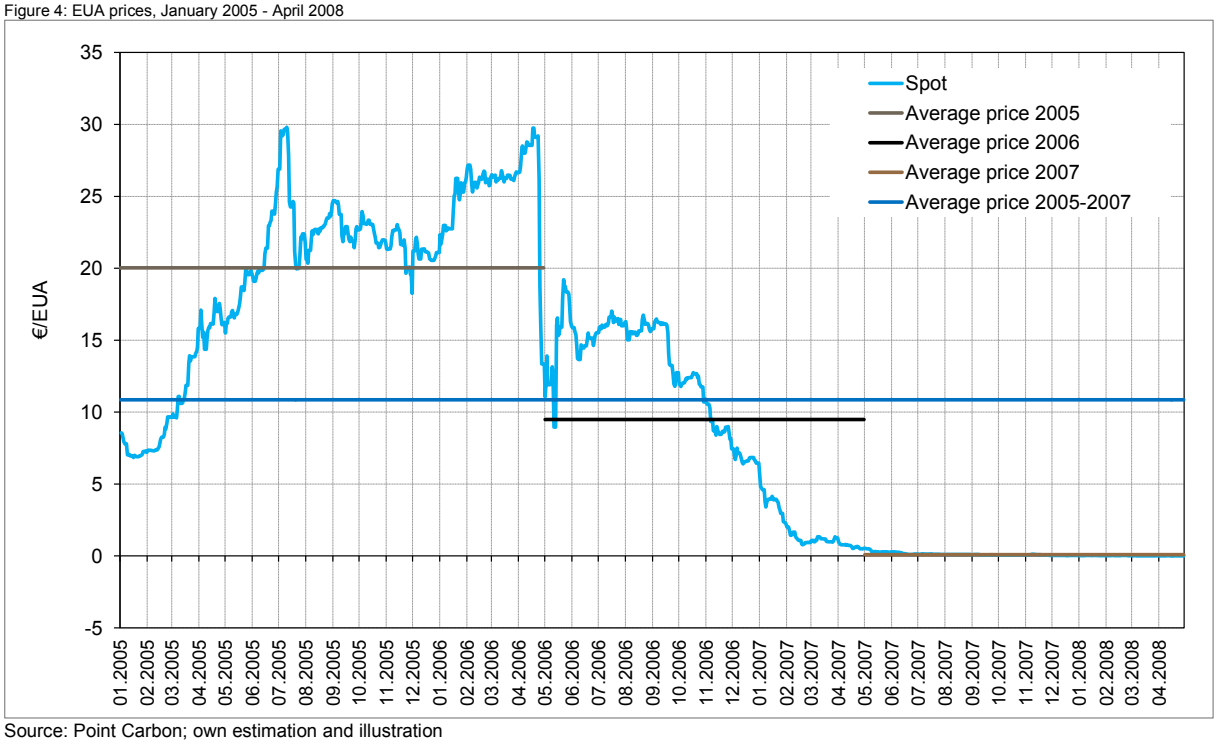
The volume of carbon allowances (physically) transacted during the first period of the EU ETS was about five times higher than the minimum volume that would have had to be transacted for all companies to be compliant in each year. Therefore, a fairly liquid market seems to have emerged, allowing companies to engage in trading activities over and above what would have been necessary for pure ‹compliance trading›.

[6] The new entrants reserve provided free allocation, or additional capacity, to new companies entering the EU ETS.

5 ADDING ALLOWANCE PRICES

The EUTL data do not include information about the prices underlying the transactions, nor do they indicate whether a price was paid for a transaction at all. However, in some applications (cf. Cludius 2016; Pinkse et al. forthcoming), it is necessary to evaluate the transferred amounts at the most likely carbon price. EUA prices fluctuated significantly during the first trading period (Figure 4). They climbed to about €/EUA 30 during the first year of the first trading period but dropped considerably in April 2006, after the first data on verified emissions had been released. From that point onwards, they went into a steady decline until they became virtually worthless in mid-2007, when it became apparent that there would be an oversupply on the market and that it would not be possible to bank excess permits into the second trading period of the EU ETS.

Figure 4: EUA prices, January 2005 - April 2008



Source: Point Carbon; own estimation and illustration

Note: Average prices are given for 'emissions trading years' running until the end of April each year, when allowances have to be surrendered.

The easiest way of combining transaction amounts with price data is to evaluate all inter-company market transactions at the spot price on the day on which they were carried out (intra-company transactions are always assigned a price of 0). Spot prices can be obtained from exchanges, or from information services such as Point Carbon. Transactions of EUAs that did not involve an exchange, such as over-the-counter (OTC) or bilateral trades are also contained in the EUTL transfer dataset. Those trades may have been carried out at prices that were different from spot prices observed on exchanges. However, no information is available as to what these prices might have been. Since it can be expected that prices as reported on exchanges or information websites were used as guidance, this analysis referred to prices as reported by Point Carbon.

Another issue relates to the necessity of linking the physical transfer of permits recorded in the EUTL to the point in time when the corresponding trade was carried out. The inter-company market transactions observed may be spot trades or the (net) delivery of an amount agreed on in a forward or futures contract.

Futures are standardized contracts traded through an exchange that specifies a certain amount of carbon permits to be delivered from the seller to the buyer at a specific point in time. On the EUA market, a large share of futures

mature in mid-December each year. Forwards also include an agreement between the buyer and the seller of a certain number of permits to be delivered at a certain point in time. However, as opposed to futures forwards are non-standardized contracts. In the EUA market, they often mature on the first day of business in December. Both forward and futures contracts can be traded multiple times after they were first created. The delivery at the maturity date of the contract then ‹nets out› the volumes to be delivered if seller and buyer bought and sold volumes of the same contract. In order to facilitate the trade of permits, both on the spot and in the forward or futures market, financial service companies or brokers can offer (costly) services to firms covered by the EU ETS.

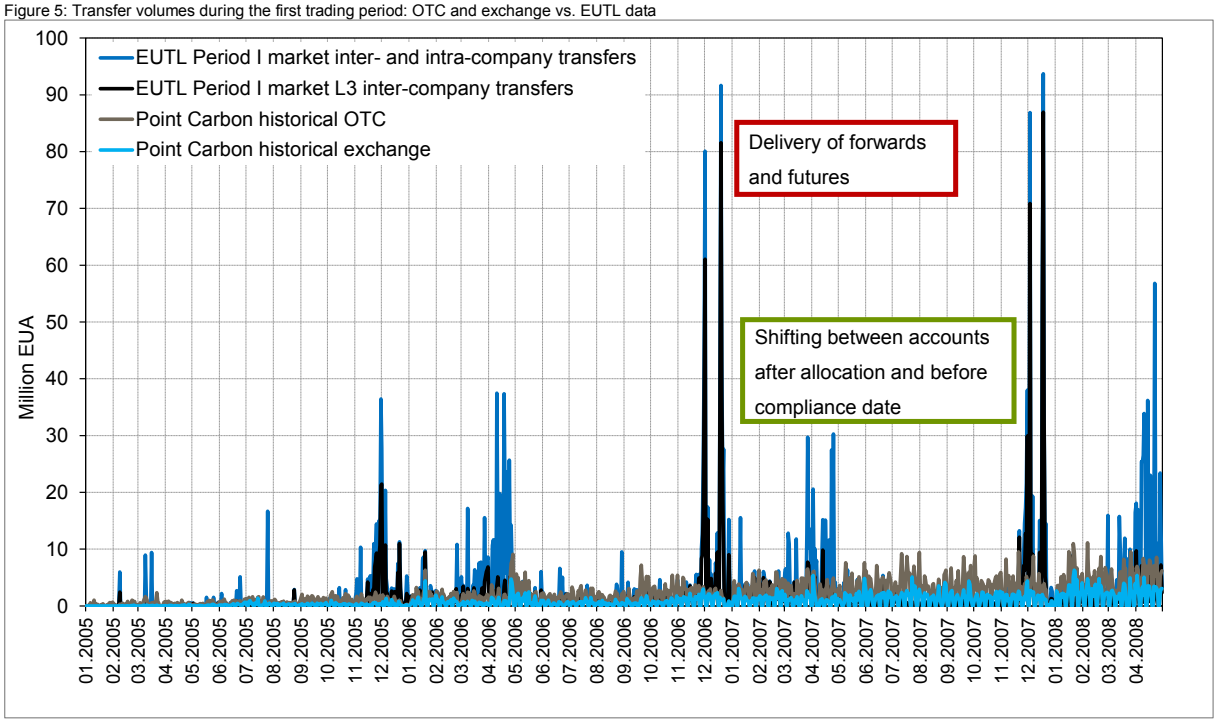
Due to the prevalence of forward and futures trading under the EU ETS, using only spot prices most likely causes (at least some) forward or futures deliveries to be evaluated incorrectly, since the deal could have been struck up a long time before the transaction was recorded in the EUTL data.

5.1 Disentangling spot, forwards, and futures contracts

There are different ways for OHAs and PHAs to exchange permits and money. They can go through exchanges, trade over-the-counter (OTC) or engage in bilateral transactions. Brokers can be used to facilitate any of these transactions. The important role of financial intermediaries acting as market makers has been noted in the literature (Pana, forthcoming). During the first trading period, OTC transactions were the most common. The outstanding role of the London Energy Brokers Association (LEBA) has been noted in this regard (Capoor and Ambrosi 2007; Ellerman et al. 2010). In general, the volumes traded on forward and futures markets were much higher than on the on-the-spot market – even during the first period of the EU ETS (Capoor and Ambrosi 2007; Mansanet-Bataller and Pardo 2008) – with the 2006 futures being the most important (Ellerman et al. 2010). Trading in forward and futures contract can be done for different reasons, such as hedging for future delivery of electricity (utilities), hedging against risk associated with carbon trading (all liable companies), speculation (banks, traders, investment funds, but also utilities, industry) or providing (costly) services on this market (brokers, exchanges). Figure 5 compares exchange and OTC volumes to market transfers from the EUTL. It further shows which of these market transfers took place between different L3 entities (inter-company market transfers [L3]). It becomes clear that while exchange and OTC trading activity is spread out across the year, with an upward trend between 2005 and 2007, the transactions observed in the EUTL data appear to cluster around two points during the year:

- In February to April of each year, many intra-company transfers take place. This is related to the shifting of allowances between accounts after allocation and before the compliance date. In fact, it could be observed that liable companies that had opened a PHA often shifted the allowances from all installations to this account and then shifted the required allowances back to the installations before the surrender date.
- Two spikes in December point to the delivery of forward (usually on the first day of business in December) and futures contracts (in mid-December).

Figure 5: Transfer volumes during the first trading period: OTC and exchange vs. EUTL data



Sources: EUTL; Point Carbon; own illustration

Total volumes transacted on exchanges and OTC are higher than aggregate L3 inter-company volumes from the EUTL (Table 5) due to the fact that forward and futures contracts can be sold and bought several times before they are delivered, thus making their trading volume higher than the delivery volume, which is further reduced as those contracts are usually ‹netted out›.[7] Furthermore, even during the first trading period, forwards and futures for delivery during the second trading period were already traded. The remaining inter-company market transfers observed in the EUTL between the forward or futures delivery dates may either represent spot trades or deliveries of forwards or futures with a maturity date during the year. Unfortunately, it is not possible to directly infer this from the EUTL transfer data.

Table 5: Aggregate transfer volumes: Differences between OTC, exchange and EUTL data

Point Carbon historical volumes (Mt)		**EUTL Period I market inter-company transfers**		**EUTL Period I + II market inter-company transfers**	
Exchange	OTC	L0	L3	L0	L3
961	2,265	3,352	1,750	3,359	1,755

Sources: EUTL, Point Carbon; own estimation

Note: Includes all transfer volumes up until April 2008.

A vast amount of futures were traded through the European Climate Exchange, ECX (Chevallier 2012). Martino and Trotignon (2013) note that everyone wanting to trade futures on the ECX needs a clearer registered at the London Clearing House (LCH Clearnet). It turns out that only 20 accounts conducted transfers with LCH Clearnet involving Period I permits and that all transfers involving LCH Clearnet were concentrated on a few days in mid-December each year (Table 6). Forward contracts, on the other hand, are typically delivered on the first day of business in December. Thus, 35% of all inter-company transfers (L3) were carried out on only 16 days during the first trading period.

[7] One company may sell and buy the same futures or forward contract to and from the same counterparty. The volumes delivered only correspond to the net volumes sold and bought, thus avoiding transaction fees on exchanges.

Table 6: Volumes on forward and futures delivery days

Date	L3 inter-company volumes (Mt)	Share of overall L3 inter-company volumes	Volumes via LCH Clearnet (Mt)	Share of volumes transferred on this day
30/11/2005	21.2	1%	-	-
01/12/2005	21.5	1%	-	-
19/12/2005	5.9	0.3%	3.8	64%
20/12/2005	1.8	0.1%	0.8	44%
21/12/2005	11.0	1%	4.5	41%
30/11/2006	35.9	2%	-	-
01/12/2006	61.0	3%	-	-
18/12/2006	37.3	2%	16.5	44%
19/12/2006	81.6	5%	74.3	91%
20/12/2006	37.5	2%	-	-
21/12/2006	18.4	1%	4.7	25%
30/11/2007	29.9	2%	-	-
03/12/2007	70.9	4%	-	-
17/12/2007	52.2	3%	30.3	58%
18/12/2007	86.9	5%	69.4	80%
19/12/2007	32.9	2%	-	-
Sum	**605.88**	**35%**	**204.3**	

Source: EUTL; own estimation

Note: Mt denotes million tonnes

These facts may help to identify the deliveries of forward and futures contracts. However, one has to keep in mind that analysis based on the EUTL data will not be able to account for trading activities on the forward and futures markets that did not lead to a physical delivery, as the volumes traded in this way never show up in the EUTL dataset. In order to find out for which companies this type of trading activity may be particularly important, because they had considerable involvement in forward and futures markets, Table 7 details the entities with the highest (absolute) inter-company (L3) transaction volumes on the days when forwards and futures were cleared (the same 16 days as in Table 6). These companies are jointly responsible for 86% of the L3 inter-company transaction volumes on those days.

The largest total volume is traded through the account of LCH Clearnet (17% of the total volume on those days), followed by financial actors, many of which had registered accounts at LCH Clearnet and were therefore able to clear futures (marked with an asterisk in Table 7 below). Table 7 also shows the share of the respective companies' total trading volume during the first trading period that was conducted on one of those 16 days. LCH Clearnet transacted 91% of its total transaction volume on those days, followed by Calyon Financial and UBS with 89% and 82%, respectively. Considerable activity could also be observed for large utilities during those periods, along with as energy companies and a couple of industrial companies. However, even a considerable number of smaller companies did a large share of their total transfers on these days during the first trading period (overall mean of 40% for all companies in the dataset).

Table 7: Companies with the highest transaction volumes on forward and futures delivery days

Company	Volume on forward / futures days (Mt)	Representing a share of		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			The company's total trading volume in Period I	Total trading volume on forward / futures days
Clearing house, exchange				Utilities			
LCH Clearnet	204	91%	17%	ELECTRICITE DE FRANCE	40	67%	3%
NASDAQ OMX (Nordpool)	9	11%	1%	RWE AG	28	42%	2%
CDC	6	5%	1%	E.ON SE	25	35%	2%
Financial actors				SSE PLC	22	60%	2%
UBS AG*	119	82%	10%	ENEL SPA	18	27%	2%
Calyon Financial	71	89%	6%	ENBW AG	18	57%	1%
BARCLAYS PLC*	68	43%	6%	GDF	16	19%	1%
AGEAS SA/NV*	34	38%	3%	ESSENT N.V.	16	59%	1%
BNP PARIBAS*	33	72%	3%	ALLIANDER N.V.	15	41%	1%
MORGAN STANLEY*	25	58%	2%	IBERDROLA SA	14	67%	1%
GOLDMAN SACHS GROUP*	25	78%	2%	CENTRICA PLC	13	35%	1%
SOCIETE GENERALE	18	48%	1%	DRAX GROUP PLC	12	56%	1%
ROYAL BANK OF SCOTLAND	13	49%	1%	CEZ A.S.	12	67%	1%
COMMERZBANK AG	13	37%	1%	VATTENFALL AB	12	35%	1%
SAL. OPPENHEIM JR. & CIE. *	9	53%	1%	Deeside Power Limited	8	25%	1%
NUCLEAR LIABILITIES FUND	9	74%	1%	VEOLIA ENVIRONNEMENT	7	33%	1%
PCE Investors	8	67%	1%	Sempra Energy Europe Ltd.	7	44%	1%
MERRILL LYNCH & CO.*	8	34%	1%	Energy			
DEUTSCHE BANK AG*	6	33%	1%	ROYAL DUTCH SHELL	24	41%	2%
Industry				BP PLC	18	41%	1%
SAINT GOBAIN SA	19	39%	2%	BHP BILLITON LIMITED	9	76%	1%
RHODIA SA	10	43%	1%	TOTAL S.A.	8	56%	1%

Source: EUTL; own estimation

Note: All of the companies shown are involved in at least 1% of the total volume transacted on those days;* denotes accounts that have direct transactions with LCH Clearnet (‹clearing accounts›)

The limitations of an analysis that links transfer volumes with price data are twofold:

- Results may only show a small share of the overall trading activity, in particular on forward and futures markets. This holds in particular for financial companies and large utilities and energy companies. An indication of the magnitude can be gained when considering that E.ON reported carbon trading involving 721 Mt in 2012 alone (E.ON SE 2013). In the EUTL dataset, a total of 71 Mt of inter-company transactions on L3 was observed for the whole three years of the first trading period. This discrepancy shows that already in the first period there may have been much higher volumes traded on the forward and futures market than can be observed in the EUTL data.[8]
- It will not be possible to define the price actually associated with each transaction correctly, due to the fact that prices may have been different from the ones observed on exchanges when agreed on bilaterally and the impossibility to link all of the transactions observed in the EUTL to the point in time when the corresponding trade was carried out. In order to tackle this challenge, four different price series are proposed that can be added to the EUTL dataset, as detailed in the next section.

5.2 A three-tiered approach

Keeping in mind the issues discussed in the previous section and the fact that the price for EUAs fluctuated significantly during the first period of the EU ETS (Figure 4), the following three-tiered approach is proposed for linking allowance prices with EUTL data: [9]

- Tier 1: Takes into account all market inter-company transfers at spot market prices. This is the simplest and most straight-forward calculation and gives an indication of the value of permits at the time of delivery. This

[8] This also poses the question whether the volumes for OTC and exchanges during the first trading period as reported by Point Carbon (Table 5) reveal the full extent of forward trading. However, E.ON and most other companies did not report total carbon allowance trading volumes in their annual reports during the first trading period.

[9] Nominal prices are used in this analysis. However, the difference to using real prices is expected to be small.

method will evaluate all spot trades carried out at exchange prices correctly, but might assign the wrong price to forward and futures trades, which may have been traded a long time before their delivery date.

- Tier 2a: Analyzes all market inter-company transfers at the average CO_2 price in the relevant year. This method assumes that permits delivered in a year are most likely to have been sold or bought in the same year (Zaklan 2013). If this assumption holds, this method should give a good approximation of the average gains made. However, some information on the timing of transactions is lost. Due to the compliance cycle, average prices and traded quantities are defined on the basis of an ‹EU ETS year›, running until 30 April each year (as shown in Figure 4).
- Tier 2b: This method uses a mix of spot and average prices. For the 16 days shown in Table 6, the average EUA price from the start of the trading period up to December of the relevant year was used, that is from January 2005 to December 2005 (19.13 €/t), December 2006 (17.74 €/t), and December 2007 (12.05 €/t). This takes into account the fact that the deal on this forward or futures contract delivered may have been made at any point in time during the whole first trading period (see also Figure 5.7 in Ellerman et al. 2010). This method will approximate the average value of forward and futures contracts, but it will not evaluate spot trades on these days correctly. Furthermore, if some transactions during the year are also forward or futures deliveries, those are incorrectly evaluated at spot prices.
- Tier 3: Evaluates all market inter-company transfers at the average price of the whole first trading period, which is equal to an analysis of net trading volumes (covering spot market trades and the delivery of forwards and futures). This method foregoes the problem of identifying forward and futures deliveries, but fails to acknowledge that it makes a difference at which point in time a transfer is carried out.[10]

[10] In this context, Martino and Trotignon (2013) found that a small number of ‹short› installations even borrowed large volumes of EUAs from later years in the first and second year of trading, which they may have sold at higher prices before buying them back for less at later stages of the EU ETS. This confirms the findings of Trotignon and Delbosc (2008), who observed this behavior mainly for German installations.

6 CONCLUSION

The EU Emissions Trading Scheme (EU ETS) is one of the main mechanisms to support the EU in reaching its greenhouse gas reduction goals made under the Kyoto Protocol and the EU's Climate and Energy Package. It has been running since 2005 and is currently in its third trading period (2013-2020) (EU 2003, 2009).

This working paper gives an overview of the three main datasets available on the EU Transaction Log (EUTL): the dataset of Operator Holdings Accounts (OHAs), Person Holding Accounts (PHAs) and the EUTL transfer dataset. It concisely describes the way in which these datasets can be linked, augmented and analysed. Particular attention is given to the different possibilities of aggregating the account-level datasets to the parent company level and classifying transfers observed into different categories. Furthermore, a detailed analysis of potential forward and future trading volumes is carried out. In light of these findings, different options for adding prices to the transfer dataset are explored.

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FIGURES

TABLES

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