

ANALYSING TRANSFER FLOWS OF THE SWISS EMISSION TRADING REGISTRY: WHAT CAN WE LEARN ABOUT THE CARBON MARKET UNDER THE KYOTO PROTOCOL?

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Overview

Since 2007, companies and private individuals from anywhere in the world have been able to open an account in the Swiss Emissions Trading Registry. The accounts allowed the owner to hold and transfer different types of greenhouse gas units, namely:

- 1) Certified Emissions Reductions (CERs) generated on the basis of emission-saving projects in developing countries on the basis of the Clean Development Mechanism (Article 12 of the Kyoto Protocol),
- 2) Emission Reduction Units (ERUs) generated on the basis of Joint Implementation projects pursuant to Article 6 of the Kyoto Protocol. The main difference between ERUs and CERs is that ERUs are generated by converting AAUs of the host country and thus no additional allowances are created,
- 3) Assigned Amount Units (AAUs), which were issued by the countries obliged under the Kyoto Protocol according to their targets and which were allowed to be traded internationally in accordance with Article 12 of the Kyoto Protocol.
- 4) Swiss emission allowances (so-called CHUs), which have been issued to Swiss companies covered by the cap and trade scheme under the CO₂ Act.

The aim of this paper is to analyse the trading flows of both national and international emissions allowances and international emission credits in order to gain a picture of Switzerland's role in international emissions trading in 2007-2014. So far Borghesi and Flori (2018) and Liu et al (2018) have applied network analysis to the registry data of the EU emissions trading system. However, there is very little knowledge on the actors and trading flows under the Kyoto Protocol. It is expected that such a better understanding will allow us to understand impacts on the design of Article 6 under the Paris Agreement. Given that the Swiss Registry was a major market place for international emission credits and international emissions allowances we use data from the Swiss Emissions Trading Registry for the period 2007 to 2014 (Figure 1). The data was made available anonymously by the Federal Office for the Environment.

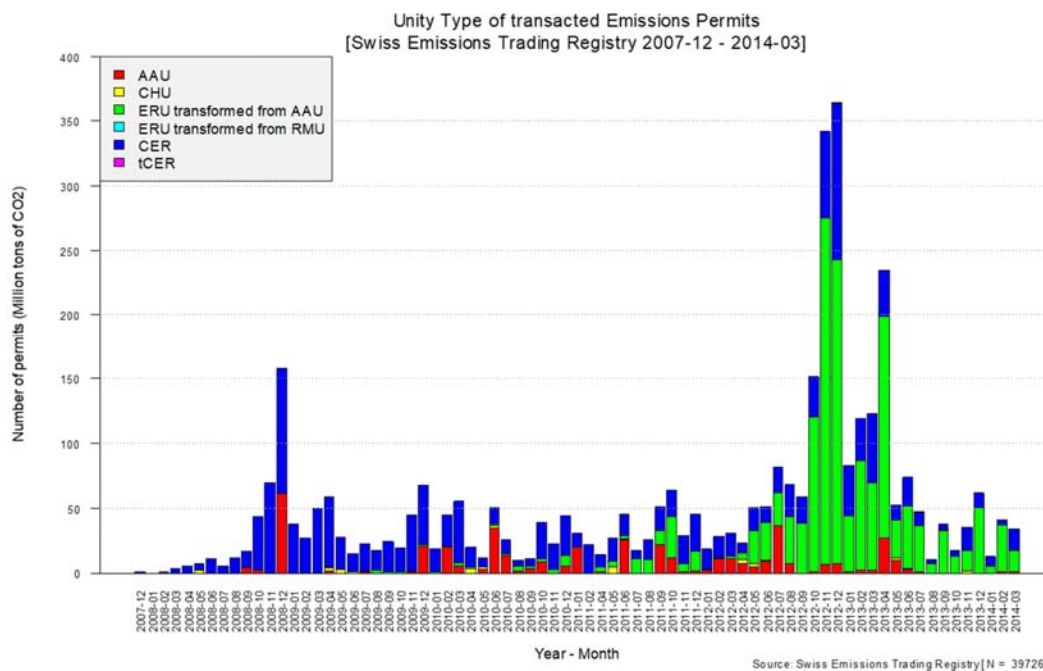


Figure 1: Swiss Registry Transfers (2007-2014)

Methods

We use network analysis to analyse the Swiss Registry Data. Network analysis techniques have been applied in several areas to study the features of a system (see e.g., Newman, 2003 and Jackson, 2010). Network analysis allows to represent a system as a network $G = (V;E)$, where V are the nodes representing the agents (e.g. accounts) and E represents the set of links between pairs of nodes (e.g. flows of different types of units). In a directed network if i and j are two nodes (accounts) and there is a link from i to j , then this is denoted as the pair. The structure of the network is summarized by a matrix M , where $M_{ij} = 0$ if there is no link from i to j , while $M_{ij} = 1$ if such links exist. We use a weighted network, that means that the matrix assigns a weight to each edge, which would be in our application the volume transferred between i and j .

Results

The analysis shows that, contrary to widespread belief, the transfer volume through the Swiss registry was substantial. Although transfer volumes in Swiss emission allowances (CHUs) are negligible, and trading in AAUs was also relatively low, the volumes of CERs and ERUs transferred via the Swiss registry are considerable. According to World Bank estimates the total trading volume of CERs in 2008 amounted to 1 billion, of which approximately 400 million transactions were recorded in the Swiss Registry. The type of actors in both submarkets vary considerably. The market of ERUs is dominated by commodity traders buying large volumes from Russia and the Ukraine (Figure 2 right), the CER market involves more players from different sectors (see Figure 2 left) and is less concentrated.

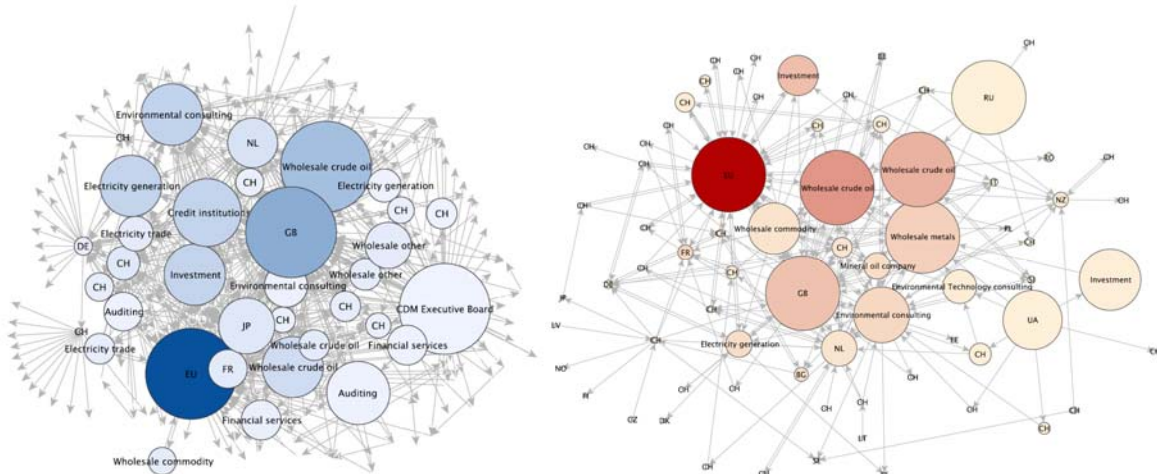


Figure 2: CER (left) and ERU (right) Network in 2012 (Balmer 2017)

Conclusions

The network analysis allows to illustrate the changes over time as well as the comparisons between the two types of emission credits. We find that CER trading started much earlier and that a much more complex network of actors has emerged. On the other hand, although ERU trading flows reached similar volumes compared to CERs, trading started later and only a few actors and countries were involved in the trading.

References

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